



**WENTWORTH**  
INSTITUTE OF TECHNOLOGY

Catalog  
2018-2019



# CATALOG CONTENTS

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# ABOUT WENTWORTH

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## THE UNIVERSITY

For more than a century, Wentworth Institute of Technology has offered a first-rate education in preparation for career success. While educating its students to work with industry-standard technology, Wentworth has always operated under the most basic canon of traditional principles: you learn something best by doing it. Wentworth is a nationally recognized, private, coeducational university offering master's, bachelor's, and associate degrees, in addition to certificate programs, to more than 3,900 full-time students each year. More than 50,000 students—who have assumed leadership roles in a multitude of professions in industry, education, and government—have graduated since Wentworth opened its doors in 1911.

At Wentworth, we are dedicated to the “Five Factors of Career Success,” which include focused academics, cooperative education, innovation and entrepreneurship, collaboration and partnerships, and ideal location. Our students are adept at collaborating with others, and they graduate from Wentworth with the ability to lead with confidence and contribute to society in meaningful ways.

Wentworth consists of four colleges: the College of Architecture, Design and Construction Management; the College of Arts and Sciences; the College of Engineering and Technology; and the College of Professional and Continuing Education.

Wentworth offers bachelor's degrees in twenty-one (21) majors: Applied Mathematics, Architecture, Biological Engineering, Biomedical Engineering, Building Construction Management, Business Management, Civil Engineering, Computer Engineering, Computer Information Systems, Computer Networking, Computer Science, Construction Management, Electrical Engineering, Electromechanical Engineering, Facility Planning & Management, Industrial Design, Interdisciplinary Engineering, Interior Design, Mechanical Engineering, and Project Management. Nineteen (19) minors are also offered. Wentworth offers seven master's degree programs including: Master of Science in Applied Computer Science, Master of Architecture, Master of Engineering in Civil Engineering, Master of Science in Construction Management, Master of Science in Facility Management, Master of Science in Project Management, and Master of Science in Technology Management.

The University fields 17 NCAA Division III varsity athletic teams. The average class size is 20, and students currently hail from 38 different states and 60 countries.

As a fundamental part of a Wentworth education, students are required to complete two cooperative (co-op) education semesters in work placements with an option for a third. Co-op experiences can take place anywhere in the world and are always related to the career major of the student, preparing them for postgraduate work or further study.

Wentworth co-op students and graduates are sought after for their demonstrated abilities to quickly become productive members in the workplace, for their technical problem-solving skills, and for their educational preparation to adapt to changing technologies. More than 58 percent of Wentworth students are offered post-graduate, full-time employment by their co-op employers.

A part-time class schedule is also available through the College of Professional and Continuing Education (CPCE). CPCE offers evening, weekend, and online courses and programs for working adults who wish to complete their undergraduate degrees, supplement their skills, or earn a graduate degree. Wentworth's practical orientation has made these programs particularly attractive to current employees who want to develop the updated skills necessary to advance professionally.

Wentworth's 31-acre campus on Huntington Avenue in the Fenway section of Boston is located near the Museum of Fine Arts, the Isabella Stewart Gardner Museum, and Symphony Hall. Wentworth is a member of

the Colleges of the Fenway consortium, which also includes Emmanuel College, Massachusetts College of Art and Design, MCPHS University, and Simmons College.

The Institute was founded in 1904 through a bequest from Arioch Wentworth, a Boston merchant, and held its first classes in 1911.

## **Mission, Vision, and Values**

### *Mission*

Wentworth's core purpose and mission is to empower, inspire, and innovate through experiential learning.

### *Vision*

Wentworth envisions a future in which it is nationally recognized as the university of choice for externally collaborative, project-based, interdisciplinary learning.

### *Wentworth's Fundamental Values*

At Wentworth, our core values reflect that we are student-centered, that we are passionate for real-life, hands-on teaching and learning, and that innovation and creativity are at the center of what we do. We express these three core values as "Students first," "The world is our classroom," and "Thinking without a box."

## **Colleges of the Fenway**

The City of Boston, an international center of learning with its many colleges and universities, museums, conservatories and art institutions, provides exciting opportunities for institutional cooperation, enhancing curricular choices for students. Wentworth takes a leading position in developing meaningful academic programming with area institutions.

Wentworth Institute of Technology is one of five colleges forming the Colleges of the Fenway. This collaboration with the Massachusetts College of Art and Design, MCPHS University, Emmanuel College, and Simmons College expands academic opportunities and choices through cross-registration, and enhances the student and faculty environments of the individual institutions while retaining the unique and special qualities of each of the five colleges.

## **THE WENTWORTH MODEL**

In order to fulfill its mission and to prepare students for the world in which they will live, Wentworth has established the following general education learning outcomes as the institution's definition of an educated person.

After completing their general education curriculum, students will be able to demonstrate competence in:

- Written, oral, and visual communication
- Problem solving
- Information literacy skills
- Applications of ethics to decision-making
- Logical thinking and scientific and quantitative reasoning
- Critical analysis of scientific, historical, and social phenomena and aesthetic dimensions of humankind

In order to fulfill its Mission, Wentworth has established the following Undergraduate Student Learning Outcomes. These Learning Outcomes are reinforced in classrooms, laboratories, studios, cooperative education experiences, and co-curricular opportunities. All alumni of Wentworth undergraduate programs will demonstrate proficiency in:

1. Written, oral, and visual communication
2. Problem solving
3. The use of current technological tools
4. Making connections between disciplines and contexts
5. A range of effective teamwork skills
6. Critical thinking
7. Personal and social responsibility

In order to fulfill its Mission, Wentworth has established the following Graduate Student Learning Outcomes. Upon graduation, Wentworth Institute of Technology Graduate students will demonstrate:

1. Core Knowledge: advanced knowledge in a specialized area consistent with the focus of their graduate program, including critical thinking and problem solving.
2. Scholarly Communication: advanced proficiency in written and oral communication, appropriate to purpose and audience.
3. Professionalism: advanced intellectual and organizational skills of professional practice, including ethical conduct.
4. Research Methods and Analysis: quantitative and qualitative skills in the use of data gathering methods and analytical techniques used in typical research that is consistent with the focus of their graduate program.

## UNDERGRADUATE AND GRADUATE PROGRAM CURRICULA

Wentworth's curricula have been structured to:

- Allow students to enter a baccalaureate degree program directly from high school
- Allow transfer from another institution of higher learning with the possibility of receiving advanced-standing credit

At the end of their sophomore year, baccalaureate students have the opportunity to participate in Wentworth's optional pre-cooperative work semester prior to entering their junior year. The cooperative education model, in which students complete two co-op work semesters along with their academic degree requirements, is both a university tradition and a graduation requirement.

To ensure that the student learning objectives are being achieved, the University's undergraduate curricula incorporates a core of general studies. Baccalaureate students are required to take, at minimum, one course in basic mathematics, one laboratory science course, a minimum of 28 credits in Humanities and Social Sciences (with at least one in Humanities and one in Social Sciences), an English Sequence, an introduction to major/profession seminar, and a capstone requirement. Several course offerings, including the capstone requirement, independent study, directed study, and design and project courses, provide opportunities to senior and fifth-year students to demonstrate competency in innovative problem-solving situations, and proficiency in analytical writing and presentation skills. Team and/or interdisciplinary projects, with clearly defined individual responsibilities, are encouraged.

Within this framework the baccalaureate curricular structure for four- and five-year programs mandates that courses will not exceed five per semester and will be at least 12 credits, but no more than 20 credits, per semester. Graduate curricular structure (M.Arch) is a full-time program offered in one, two, or three-year length of study dependent upon type of baccalaureate degree earned. Academic credit will be based on the 15-week format, with one hour of lecture or recitation equal to one credit and two hours of laboratory or studio work equal to one credit.

## College of Professional and Continuing Education

The part-time curriculum model for the College of Professional and Continuing Education (CPCE) is structured to provide:

- Access directly into either an associate, bachelor's, or master's program based on the student's previous academic preparation and educational and goals
- Access to preparatory courses prior to beginning an academic degree program
- Learning opportunities that are convenient and appropriate for adult learners who are currently working and seeking career advancement through education and/or training
- Support for student learning through our academic advising, Center for Academic Excellence, and student support services

To ensure that learning outcomes are achieved, the University has developed a curricular structure that incorporates a core of general studies. In accordance with these general study guidelines, students are required to take, at minimum for an associate degree, two mathematics courses, one laboratory science course, one computer literacy course, two communication courses, one humanities or social science elective, and 10 prescribed courses related to their discipline.

To receive a baccalaureate degree, in addition to completing the associate degree requirements, students must complete, at the baccalaureate level, one mathematics course, one course in professional communication, three courses in the area of humanities and social sciences, one general elective course, one course in professional practice, nine prescribed courses related to their discipline, and a capstone course. This capstone requirement for graduating seniors provides an opportunity to demonstrate competency in problem-solving situations, proficiency in analytical writing, and presentation skills. Team and/or interdisciplinary projects, with clearly defined individual responsibilities, are encouraged.

Within this framework of general studies, the curricular structure has been designed to permit students to take two courses per semester, in either the seven-week term format or the traditional 15-week semester. Both formats enable students to complete their graduation requirements as their schedule permits. Academic credit will be based on the credit award for each course.

Wentworth Institute of Technology offers baccalaureate degrees in the following disciplines:

### College of Arts and Sciences

- Applied Mathematics (BSAM)
- Business Management (BSM)
- Computer Information Systems (BSIS)

### College of Architecture, Design, and Construction Management

- Architecture (BSA)
- Construction Management (BSCM)
- Industrial Design (BIND)
- Interior Design (BINT)

### College of Engineering and Technology

- Biological Engineering (BSBE)
- Biomedical Engineering (BBME)
- Civil Engineering (BSCE)
- Computer Engineering (BSCO)
- Computer Networking (BSCN)
- Computer Science (BCOS)
- Electrical Engineering (BSEE)
- Electromechanical Engineering (BELM)
- Engineering (BSEN)
- Mechanical Engineering (BSME)

*Minors are offered in:*

- Aerospace Engineering
- Applied Math
- Architectural Studies
- Bioinformatics
- Biology
- Business Management
- Chemistry
- Civil Engineering
- Computer Networking
- Computer Science
- Construction Management
- Electrical Engineering
- Environmental Engineering
- Financial Mathematics
- Manufacturing
- Media, Culture, and Communication Studies
- Performing Arts (through COF)
- Physics
- Surveying

## **College of Professional and Continuing Education**

*Associate in Applied Science (A.A.S.)*

- Building Construction Management (ABCM)
- Engineering Technology (AENT)

*Bachelor of Science (B.S.)*

- Building Construction Management (BBCM)
- Facility Management (BSFM)
- Project Management (BPM)

*Professional Certificates - Undergraduate*

- Facilities Management (CPFM)
- Managing Construction Projects (CMCP)
- Professional Land Surveying (PLS)
- Project Management (CPPM)

Wentworth Institute of Technology offers graduate programs in the following disciplines:

*Master of Architecture (M.Arch.)*

- Architecture (MARC)

*Master of Engineering, Civil Engineering (M.Eng. CE)*

- Civil Engineering (MECE)

*Master of Science (M.S.)*

- Applied Computer Science (MSACS)
- Construction Management (MSCM)
- Facility Management (MSFM)
- Project Management (MSPM)
- Technology Management (MSTM)

## ACCREDITATION

Wentworth Institute of Technology is accredited by the Commission on Institutions of Higher Education of the New England Association of Schools and Colleges, Inc.

Accreditation of an institution of higher education by the Commission indicates that it meets or exceeds criteria for the assessment of institutional quality, which is periodically applied through a peer review process. An accredited college or university is one that has available the necessary resources to achieve its stated purposes through appropriate educational programs, is substantially doing so, and provides reasonable evidence that it will continue to do so in the foreseeable future. Institutional integrity is also addressed through accreditation. Accreditation by the Commission is not partial but applies to the institution as a whole. As such, it is not a guarantee of every course or program offered, or the competence of individual graduates. Rather, it provides reasonable assurance regarding the quality of opportunities available to students who attend the institution. Inquiries regarding the accreditation status by the Commission should be directed to the administrative staff of the institution. Individuals may also contact:

Commission on Institutions of Higher Education  
New England Association of Schools and Colleges  
3 Burlington Woods Drive, Suite 100, Burlington, MA 01803-4514  
(781) 425 7785  
E-Mail: [cihe@neasc.org](mailto:cihe@neasc.org)

Wentworth is also a member of the Association of American Colleges & Universities (AAC&U), the American Society for Engineering Education, the American Council on Education, the Association of Collegiate Schools of Architecture, the Boston Chapter of the International Facility Management Association (IFMA) and the National Commission for Cooperative Education.

### College of Arts and Sciences

Wentworth Institute of Technology has received specialized accreditation for its business programs through the International Assembly for Collegiate Business Education (IACBE), located at 11374 Strang Line Road in Lenexa, Kansas, USA.

The following degrees are accredited by IACBE:

- Bachelor of Science in Business Management
- Bachelor of Science in Computer Information Systems

### College of Architecture, Design and Construction Management

In the United States, most state registration boards require a degree from an accredited professional degree program as a prerequisite for licensure. The National Architectural Accrediting Board (NAAB), which is the sole agency authorized to accredit U.S. professional degree programs in architecture, recognizes three types of degrees: the Bachelor of Architecture, the Master of Architecture, and the Doctor of Architecture. A program may be granted a six-year, three-year, or two-year term of accreditation, depending on the extent of its conformance with established educational standards.

Doctor of Architecture and Master of Architecture degree programs may consist of a pre-professional undergraduate degree and a professional graduate degree that, when earned sequentially, constitute an accredited professional education. However, the pre-professional degree is not, by itself, recognized as an accredited degree.

Wentworth Institute of Technology's Department of Architecture offers the following NAAB-accredited degree programs: a one-year Master of Architecture (pre-professional degree + 36 graduate credits, for internal candidates); a two-year Master of Architecture (pre-professional degree from a NAAB accredited

school + 70 graduate credits, for external candidates); and a three-year Master of Architecture (for candidates with an undergraduate degree in a field other than Architecture, or an architecture degree from a school without a NAAB-accredited degree).

The Bachelor of Science degree program in Construction Management (BSCM) is accredited by the American Council for Construction Education (ACCE).

The Bachelor of Science degree program in Interior Design (BINT) is accredited by the Council for Interior Design Accreditation (CIDA).

The Bachelor of Science degree program in Industrial Design (BIND) is accredited by the National Association of Schools of Art and Design (NASAD).

Wentworth Institute of Technology has received specialized accreditation for its business programs through the International Assembly for Collegiate Business Education (IACBE), located at 11374 Strang Line Road in Lenexa, Kansas, USA.

The following degrees are accredited by IACBE:

- Bachelor of Science in Facility Planning and Management

## **College of Engineering and Technology**

Wentworth programs in Civil Engineering Technology, and Mechanical Engineering Technology are accredited by the Engineering Technology Accreditation Commission of ABET, [www.abet.org](http://www.abet.org).

Programs in Computer Science and Computer Networking are accredited by the Computing Accreditation Commission of ABET, [www.abet.org](http://www.abet.org).

Wentworth programs in Biomedical Engineering, Civil Engineering, Computer Engineering, Electrical Engineering, Electromechanical Engineering, Engineering – Interdisciplinary, and Mechanical Engineering are accredited by the Engineering Accreditation Commission of ABET, [www.abet.org](http://www.abet.org).

For more information on the accreditation of individual degree programs, please contact the academic department offering the program, or contact the Engineering Accreditation Commission, Engineering Technology Accreditation Commission, or the Computing Accreditation Commission of ABET at:

415 North Charles Street  
Baltimore, MD 21201  
410-347-7700

## **College of Professional and Continuing Education**

Wentworth Institute of Technology has received specialized accreditation for its business programs through the International Assembly for Collegiate Business Education (IACBE), located at 11374 Strang Line Road in Lenexa, Kan. The business programs in the following degrees are accredited by IACBE:

- Bachelor of Science in Project Management

The Master of Science degree program in Construction Management (BSCM) is accredited by the American Council for Construction Education (ACCE).

## ADMISSIONS – UNDERGRADUATE PROGRAMS

Maureen Dischino, Executive Director of Admissions  
Wentworth Hall, Room 108  
(617) 989-4000

Wentworth accepts applications on a rolling admissions basis, which means that applications are reviewed as soon as all required documents are received. The priority deadline for full-time admissions for the fall semester is February 15. After that date, applications are reviewed on a space-available basis. Transfer students will be considered for spring semester admissions depending on space availability. The priority deadline for spring admissions is December 1.

Wentworth accepts full-time students in the program majors, either as first-year or transfer applicants, however, students seeking to study part time may apply to the College of Professional and Continuing Education's (CPCE) evening and weekend programs.

Wentworth accepts international students as first-year or transfer applicants. Specific requirements regarding international student admissions can be found below.

The deposit deadline for tuition (\$250.00) and on-campus housing (\$500.00) is May 1 to guarantee enrollment. Deposits may be accepted after May 1 if space is available. Admissions and on-campus housing deposits are not refundable after May 1.

Each student planning to attend Wentworth must submit completed immunization records and enroll in the Wentworth Health Plan or waive enrollment in the plan if eligible by the bill due date. Failure to provide complete immunization and physical examination records may lead to the cancellation of classes and/or housing.

Please refer to the section regarding transfer credit for information and policies about receiving academic credit for courses taken at another institution, for advanced placement and other exam courses, and for military, professional or other experience.

Wentworth Institute of Technology reserves the right to be the exclusive judge of the acceptability of any applicant for admission to its programs of study.

### Admissions Requirements

All undergraduate applicants must have completed four years of English, algebra I, algebra II, plane geometry, and one laboratory science (e.g., chemistry, physics, or biology) course. For students applying to the Applied Mathematics program, the Computer Science program, or any engineering program, pre-calculus is also required.

### Application Process and Required Documents for Full-time Undergraduate Admissions

High school seniors may apply any time after August 1 of their senior year. The application priority deadline for completed applications is February 15. After this date, some programs may be closed to further applications.

Applicants for full-time academic programs must submit the following:

- A completed application, which can be submitted online through the Wentworth homepage ([wit.edu](http://wit.edu)), through the Common Application ([www.commonapp.org](http://www.commonapp.org)) or through the Universal College Application ([www.universalcollegeapp.com](http://www.universalcollegeapp.com))
- A \$50.00 application processing fee, due at the time the application is received
- An official high school transcript or G.E.D. scores
- Official SAT or ACT scores
- At least one letter of recommendation from an academic advisor or teacher.
- A personal statement (essay) of 250-500 words



First time incoming students may be required to submit an English Writing Sample during new student orientation based on SAT or ACT scores. To ensure proper placement, students placed into ENGL0700, ENGL0800, ENGL0900, and ENGL1100 will be reassessed during the first week and able to reregister before the end of drop/add if necessary.

For first time incoming students who have completed college level courses, Advance Placement or International Baccalaureate course work to be evaluated for Wentworth credit, please see the Transfer Credit section below.

## **Application Process and Required Documents for Full-time Undergraduate Transfer Admissions**

Students who enroll in any college level courses after the completion of high school, or its equivalency, must apply as a transfer student. The priority deadline for full-time transfers for fall admissions is February 15. After that date, applications are reviewed on a space-available basis. Transfer students will be considered for spring semester admissions depending on space availability. The priority deadline for spring admissions is December 1.

In addition to the requirements listed above for full-time undergraduate admissions, transfer applicants must also submit the following:

- A transfer report from the most recent college attended. This form must be completed by a school official who is knowledgeable of your academic and disciplinary standing ([www.wit.edu/transferreport](http://www.wit.edu/transferreport)).
- An official transcript from all institutions of higher learning attended.
- SAT/ACT Scores (for students who are within one year of high school graduation)
- Proof of English Proficiency (if necessary, please refer to our English Proficiency Requirements).

### *Additional requirements for transfer students (if applicable):*

- Transfer students may be required to submit an English writing sample at transfer student orientation, unless transfer credit is granted for courses equivalent to English I or English II.
- Students seeking to transfer into the Electromechanical Engineering or Mechanical Engineering programs must have completed similar coursework at an accredited college or university (NEASC and/or EAC-ABET accreditation or equivalent) and have a minimum of 2.5 out of a 4.0 GPA for all mathematics and physics courses.
- Students seeking to transfer into the Architecture, Interior Design or Industrial Design programs must present a portfolio of work to receive credit for courses with visual content.

## **Transfer Credit**

Incoming First Year or Transfer students wishing to transfer credits to Wentworth must submit an official transcript to the Office of Undergraduate Admissions before the University can evaluate and award credit. Students who have attended regionally accredited institutions can expect to receive credit for successfully completed courses (bearing a grade of “C” or higher) that are comparable in depth and content to those offered at Wentworth. In some cases, courses will transfer as elective credit and those credits will count towards the overall hours required for graduation, but not satisfy program requirements.

No academic credit is awarded for Internships/COOP’s, Practica, Directed Research, Preparatory, or remedial course work or for courses with grades of “P” or “S”. Grades for coursework completed at another institution are not recorded on the students’ official transcript, transfer credit is assigned “TR”.

Residency requirement for all transfer students enrolled in a full-time baccalaureate degree granting program must complete a minimum of 50% of their required credit hours at Wentworth Institute of Technology.

The following chart details the credit awarded for Advance Placement and International Baccalaureate course work.

<b>AP EXAM TITLE</b>	<b>SCORE</b>	<b>CREDITS</b>	<b>WIT EQUIVALENT COURSE</b>
Art History Exam	3, 4, 5	4	HUMN3797 - AP Art History
Biology Exam	4, 5	4	BIOL1100 - AP Cell and Molecular Biology
Calculus AB	3, 4, 5	4	MATH1750 - AP Engineering Calculus I
*Calculus AB (Architecture and Construction Management majors only)	3, 4, 5	8	MATH1000 - AP College Mathematics & MATH 1500 - AP Precalculus
Calculus AB (Computer Information System majors only)	3, 4, 5	4	MATH1000 - AP College Mathematics
Calculus AB (Interior and Industrial Design Majors only)	3, 4, 5	4	MATH1020 - AP Plane and Solid Geometry
Calculus AB (Business Management majors only)	3, 4, 5	4	MATH1040 - AP Applied Math for Business
Calculus AB (Computer Networking majors only)	3, 4, 5	4	MATH1500 - AP Precalculus
Calculus BC	3, 4, 5	8	MATH1750 - AP Engineering Calculus I & MATH1850 AP Engineering Calculus II
**Calculus BC (Architecture and Construction Management majors only)	3, 4, 5	8	MATH1000 - AP College Mathematics & MATH 1500 AP Precalculus
Calculus BC (Computer Information System majors only)	3, 4, 5	4	MATH1000 - AP College Mathematics
Calculus BC (Interior and Industrial Design Majors only)	3, 4, 5	4	MATH1020 - AP Plane and Solid Geometry
Calculus BC (Business Management majors only)	3, 4, 5	4	MATH1040 - AP Applied Math for Business
Calculus AB (Computer Information System majors only)	3, 4, 5	4	MATH1000 - AP College Mathematics
Chemistry Exam	4, 5	4	CHEM1100 - AP Engineering Chemistry I
Chinese Language and Culture Exam	3, 4, 5	4	GNEL3797 - AP Chinese Language and Culture
Comp Government and Politics	3, 4, 5	4	POLS3797 - AP Comp Gov't & Politics
Computer Science A	3, 4, 5	4	COMP1000 - AP Computer Science I
English Language and Comp	3, 4, 5	4	ENGL1100 - AP English I
English Literature and Comp	3, 4, 5	8	ENGL1100 - AP English I & LITR3797 - AP English Literature
Environmental Science	3, 4, 5	4	SCEL3797 - AP Science Elective
European History	3, 4, 5	4	HIST3797 - AP European History
French Language and Culture	3, 4, 5	4	GNEL3797 - AP French Language and Culture

AP EXAM TITLE	SCORE	CREDITS	WIT EQUIVALENT COURSE
German Language and Culture	3, 4, 5	4	GNEL3797 – AP German Language and Culture
Human Geography Exam	3, 4, 5	4	SOCL3797 - AP Human Geography
Italian Language and Culture Exam	3, 4, 5	4	GNEL3797 - AP Italian Language and Culture
Japanese Language and Culture	3, 4, 5	4	GNEL3797 - AP Japanese Language and Culture
Latin	3, 4, 5	4	GNEL3797 - AP Latin Language
Macroeconomics	3, 4, 5	4	ECON4152 - AP Macroeconomics
Microeconomics	3, 4, 5	4	ECON4154 - AP Microeconomics
Music Theory	3, 4, 5	4	HUMN3797 - AP Music Theory
Physics 1, Algebra Based	3, 4, 5	4	PHYS1000 - AP College Physics I
Physics C, Electricity & Magnetism	3, 4, 5	4	PHYS1750 - AP Engineering Physics II
Physics C, Mechanics	3, 4, 5	4	PHYS1250 - AP Engineering Physics I
Psychology	3, 4, 5	4	PSYC4100 - AP Introduction to Psychology
Spanish Language and Culture	3, 4, 5	4	GNEL3797 - AP Spanish Language and Culture
Spanish Literature and Culture	3, 4, 5	4	GNEL3797 - AP Spanish Literature and Culture
Statistics	3, 4, 5	4	MATH1030 - AP Statistics and Applications
Studio Art, 2-D Design	3, 4, 5	4	GNEL3797 - AP Studio Art: 2-D Design
Studio Art, 3-D Design	3, 4, 5	4	GNEL3797 - AP Studio Art: 3-D Design
Studio Art: Drawing	3, 4, 5	4	GNEL3797 - AP Studio Art: Drawing
United States History	3, 4, 5	4	HIST3797 - AP US History
US Government and Politics	3, 4, 5	4	POLS4102 - AP American Government
World History	3, 4, 5	4	HIST3797 - AP World History

\*Students who change majors to a program requiring Math 1750 Engineering Calculus I an AP credit adjustment will be made on their academic transcript: 4 credits for Math 1750 Engineering Calculus I and the 4 credits GNEL1xxx, General Elective will replace the lower level mathematics course (e.g. Math 1000 and Math 1500); an even exchange of credit.

\*\*Students who change majors to a program requiring Math 1750 Engineering Calculus I the reallocation of AP credit will be made on their academic transcript: Math 1750 Engineering Calculus I , 4 credits, MATH 1850 Engineering Calculus II, 4 credits, which replaces the lower level mathematics courses (e.g. Math 1000 and Math 1500); an even exchange of credit.

## International Baccalaureate Exams (IB)

The following is a list of acceptable examinations and Wentworth courses for which credit may be obtained. Scores of 5, 6, and 7 are acceptable for credit.

Mathematics Standard Level: MATH1750 - Engineering Calculus I

Physics: PHYS1000 - College Physics I

IB Humanity/Social Science courses will be considered equivalent if the incoming student places into ENGL1100.

- \* Regarding ECON4102 Directed HSS requirements: If a student transfers both Microeconomics (ECON4154) and Macroeconomics (ECON4102) the Directed ECON4102 is completed plus four additional ECON credits. If a student transfers only ECON4152 or ECON4154 and requires ECON4102, then that student must still complete ECON4102.

## Financial Aid

Students applying for financial aid are encouraged to complete the Free Application for Federal Student Aid (FAFSA) by the financial aid priority filing date of March 1. For more information about financial aid, please refer to the financial aid section of this catalog.

## Application Process and Required Documents for Full-time Undergraduate International Admissions

The term “international student” refers to any student who is not a United States citizen, U.S. permanent resident, or Deferred Action for Childhood Arrivals (DACA) beneficiary. Most international students obtain F-1 student non-immigrant status.

## Application Process and Required Documents for Full-time International Undergraduate Admissions

- A completed application, which can be submitted online through the Wentworth homepage ([wit.edu](http://wit.edu)), through the Common Application website ([www.commonapp.org](http://www.commonapp.org)) or through the Universal College Application website ([www.universalcollegeapp.com](http://www.universalcollegeapp.com)).
- Official transcript attesting to the applicant’s secondary and post-secondary education (if applicable). These records must be mailed directly by the attended institution(s) to the Wentworth Office of Admissions. The records must have an original signature, in ink, from the appropriate certifying official (such as a registrar or keeper of records) and bear the institution’s seal. If originals cannot be sent, exact copies certified as such by the appropriate official may be submitted. If the documentation is not in English, it must be accompanied by an official English translation.
- Evidence of proficiency in English if the applicant’s first language is not English. Acceptable evidence of proficiency includes:
  - A Test of English as a Foreign Language (TOEFL) score of 79 or higher on the internet-based exam or 550 or higher on the paper-based exam
  - An International English Testing System (IELTS) overall score of 6.5 or higher, with no sub score below 5.5
  - A “C” (2.0) or higher grade in English I and English II on an official transcript from a U.S. college or university
  - Successful completion of the highest level of a Wentworth-recognized intensive English program and a recommendation from that program’s director. A list of recognized programs is available from the Admissions Office.
- Proof of financial support to cover the cost of tuition, books, supplies, medical insurance, and living expenses for the first year of study at Wentworth. For the 2018-2019 academic year, the estimated cost of 12 months for commuter students is \$59,280 and \$58,002 for resident students. Proof of support must be

provided in one of these formats:

- Completed Wentworth Declaration and Certification of Finances form, signed by the student's sponsor, with an attached certified bank letter from the sponsor's bank
- Original signed letter of support from a recognized sponsoring embassy, agency, or organization
- At least one letter of recommendation from an academic advisor or teacher.
- A personal statement (essay) of 250-500 words.
- A copy of the identity page from the applicant's passport.
- College Official's Report (transfer students) from the most recent college attended. This form must be completed by a school official who is knowledgeable of your academic and disciplinary standing ([www.wit.edu/transferreport](http://www.wit.edu/transferreport)).

When these items are received, an evaluation is made of the applicant's eligibility for admission. If all requirements are met and the applicant is determined admissible, a letter of acceptance will be mailed to the student.

### **Additional Requirements for International Transfer Student**

- Wentworth Institute of Technology requires that applicants with coursework or degrees from a non-U.S. university have their transcript evaluated for potential transfer credit. Students must obtain a professional transcript evaluation from one of the following companies:
  - Center for Educational Documentation (CED)
  - World Education Services, Inc. (WES)
- All transfer students (U.S. and non-U.S. universities) must also provide a catalog or syllabus form each post-secondary school attended containing course descriptions for all classes completed. If the documents are in a language other than English, they must be accompanied by the official English translations. All records should indicate the number of lecture and/or laboratory hours per week and the grade received for each course.

Once accepted, a tuition deposit of \$250.00 (and a housing deposit of \$500.00 if the student chooses to live on campus) is required to guarantee enrollment. The deposit deadline is May 1. Deposits will be accepted after May 1 on a space-available basis. Payments may be made by Flywire at [www.flywire.com/pay/wit](http://www.flywire.com/pay/wit), or by credit card, check, or Cashnet. These deposits are refundable for the fall semester, provided that a written request for a refund is sent to the Admissions Office postmarked by May 1 and the original I-20 Form (if issued) is returned to the Admissions Office. For the spring semester admission, the tuition and housing deposits are non-refundable.

Once the deposit(s) is made, a Certificate of Eligibility (Form I-20) is issued for visa purposes. All remaining charges and monies due to Wentworth must be paid by one of the following methods:

- A bank draft in United States dollars drawn on a correspondent bank with offices in the United States. Checks must be in U.S. dollars and payable in the United States.
- Credit card
- Flywire at [www.flywire.com/pay/wit](http://www.flywire.com/pay/wit)

It should be noted that payment for each semester's tuition, room, and board charges must be paid by the due date, as failure to pay may lead to the cancellation of classes and/or housing.

All first-time international students are required to submit an English writing sample during International Student Orientation for placement into the appropriate English level course, unless SAT or ACT scores were submitted and meet the required score for placement into English 1100. To ensure proper placement, students placed into ENGL0700, ENGL0800, ENGL0900, and ENGL1100 will be reassessed during the first week and able to reregister before the end of drop/add if necessary. International transfer students will be required to submit an English writing sample unless transfer credit on prior course work has been awarded for college level English I or English II.

Each international student planning to attend Wentworth must submit completed immunization records and enroll in the Wentworth Health Plan or waive enrollment in the plan if eligible by the bill due date. Failure to provide complete immunization and physical examination records may lead to the cancellation of classes and/or housing.

## ADMISSIONS – GRADUATE PROGRAMS

Wentworth offers Graduate Master's programs in a range of disciplines. Our programs are offered either on-campus or online. Explore the programs below, find what you need, and apply.

Wentworth Institute of Technology offers graduate programs in the following disciplines

### *Master of Architecture (M.Arch.)*

- Architecture (MARC)

### *Master of Engineering, Civil Engineering (M.Eng. CE)*

- Civil Engineering (MECE)

### *Master of Science (M.S.)*

- Applied Computer Science (MSACS)
- Construction Management (MSCM)
- Facility Management (MSFM)
- Project Management (MSPM)
- Technology Management (MSTM)

### *Master of Architecture*

Wentworth Institute of Technology offers a Master of Architecture (M.Arch) degree, a first professional degree accredited by the National Architectural Accrediting Board (NAAB).

Graduate study in architecture is an exhilarating and challenging enterprise, an opportunity for students to develop a focused position within a broad and rapidly evolving field. The graduate curriculum promotes research and design investigations on the linkage between theoretical frameworks, design intentions, and the tangible, material nature of architecture.

Candidates with a Bachelor of Science in Architecture from Wentworth can complete the program in a single year, while external candidates with a four-year, NAAB-based degree from another institution typically complete the program in two years.

Application requirements are listed below. International students should refer to the international student admission section of the catalog for specific additional requirements regarding admission. All transcripts of course work completed outside the United States must be evaluated by CED, Center for Educational Documentation; WES, World Education Services, Inc. The application priority deadline for completed applications is February 15. Students apply online at [wit.edu/apply](http://wit.edu/apply)

The Master of Architecture program is offered as a one-, two-, or three-year course of study.

### *One-Year Program: (Wentworth B.S. Arch + 36 credits)*

Candidates who are currently enrolled in Wentworth's Bachelor of Science in Architecture degree program are considered internal candidates.

Internal candidates who have achieved a cumulative departmental GPA of at least 3.2 at the end of their junior year qualify for automatic acceptance into the program; all other students are encouraged to apply. Students receive confirmation of their automatic acceptance in the fall of their fourth year from the Department of Architecture. Students who have earned automatic acceptance must complete the online application along with the following materials, with the exception of a design portfolio and application fee.

## *One-Year Program Application-Internal Candidates*

- **Statement of Objectives:** Answer each of the three following questions listed below.
  - If you were given complete freedom to investigate an architectural question, what would it be and how would you start? (300 words)
  - Describe an object or environment that you have made, repaired, built, or created. (300 words)
  - Name a place (real or imagined) where architecture matters and describe it. (300 words)
- **Resume or Curriculum Vitae (CV)**
- **Reference Sheet:** Include the names and contact information for two people who may be contacted as references. Recommendation letters are not required and should not be submitted. Reference sheets should be submitted as a separate electronic file with the application and include reference name, title, address, email and phone number.
- **Transcript(s):** All applicants must submit a transcript from Wentworth. Unofficial transcripts are acceptable and may be downloaded from LeopardWeb. Unofficial transcripts should be submitted electronically with the application.
- **Application Fee:** A non-refundable \$50 fee is required.
- **Design Portfolio:** Portfolios should contain work that demonstrates your proficiency in architecture and reflects the full range of your creative, research, and technical skills. The portfolio should be submitted as an electronic PDF file no larger than 20MB. See the Portfolio Recommendations section below.

## *Two-Year Program (prior NAAB accredited B.S. Arch from another institution + 72 credits)-External Candidates:*

Candidates who have successfully completed a pre-professional degree in Architecture from an NAAB accredited program or who have graduated from Wentworth's Bachelor of Science in Architecture must complete the external candidate application process. Wentworth graduates may still be considered for admission to the one-year program based on the department's assessment of their status.

## *Three-Year Program: (prior non-professional degree from another institution + 108 credits)-External Candidates:*

Candidates who have successfully completed a four-year undergraduate degree in a discipline other than architecture are eligible to apply. The M.Arch program is structured as a three-year sequence of study for external candidates without previous degrees in architecture.

## *Two- and Three-Year Program Application Requirements*

To apply to the two- or three-year program, candidates must complete the online application at [wit.edu/apply](http://wit.edu/apply) and submit the following materials:

- **Statement of Objectives:** Answer each of the three following questions listed below.
  - If you were given complete freedom to investigate an architectural question, what would it be and how would you start? (300 words)
  - Describe an object or environment that you have made, repaired, built or created. (300 words)
  - Name a place (real or imagined) where architecture matters and describe it. (300 words)
- The statement must be submitted as an electronic file with the application.
- **Resume or Curriculum Vitae (CV)**
- **Recommendation Letters:** With your application, you should submit the names and titles for two people who are providing you with letters of recommendation.
- **Official Transcript(s):** All external applicants must submit an official transcript from all institutions attended after high school graduation. All transcripts of course work completed outside the United States must be evaluated by CED, Center for Educational Documentation; WES, World Education Services, Inc.
- **GRE:** Applicants must complete the Graduate Record Examination (GRE) and submit official scores.
- **Application Fee:** A non-refundable \$50 fee is required.

- **Design Portfolio:** Portfolios should contain work that demonstrates your proficiency in architecture and reflects the full range of your creative, research, and technical skills. The portfolio should be submitted as an electronic PDF file no larger than 20MB. See the Portfolio Recommendations section below.
- **Proof of English Proficiency** (for non-native English speakers): Please review Wentworth's English proficiency requirements at [wit.edu/admissions/international-student/english-proficiency](http://wit.edu/admissions/international-student/english-proficiency). International applicants will also be required to submit proof of financial support.

All materials are to be submitted electronically; letters of recommendation may be submitted either electronically or by mail to:

### **Admissions Office**

Wentworth Institute of Technology  
 Attn: Graduate Architecture  
 550 Huntington Ave  
 Boston, MA 02115

## *Portfolio Recommendations*

The following recommendations are designed to help you produce a strong architectural portfolio.

- **Format:** Applicants should submit an electronic copy of their portfolio. Portfolios may be uploaded to the application or emailed to [admissions@wit.edu](mailto:admissions@wit.edu) with the subject line "MARC Application Portfolio". The body of the email should include the applicant's full name and address. Electronic portfolios should be PDF files and must not exceed 20MB.
- **Content:** Emphasis should be placed on your four to five best and most creative projects. Creative and professional work may be included if it helps illustrate your abilities to perform successfully as a graduate student. Preference should be given to your original design work. Show a range of your work: sketches, images, photography, sculpture, writing samples, or any work that conveys your artistic sensibilities.
- **Organization:** Portfolios should be well organized with a brief introductory text for each project. Each project should be clearly labeled.
- **Simplicity:** The goal of the portfolio is to legibly display the quality of your design and creative work. Focus your efforts on making the clearest presentation with simple elegant layouts of imagery and brief, informative texts. Use straightforward typefaces (avoid all-caps body texts and force-justification to ease legibility).
- **Quality:** Make an effort to document your work carefully so that photographs, digital prints, and scans of your work are of high quality when printed. The committee expects a professional presentation.

## *Admissions Decisions*

Completed applications for the M.Arch program are reviewed by the Department of Architecture. Notification of the outcome of the admissions process occurs by April 1 for admission to the following fall semester. Accepted students must indicate their decision to enroll in writing by no later than May 1, accompanied by a \$250.00 tuition deposit and a \$500.00 housing deposit. The tuition and housing deposits are non-refundable after May 1. Admissions decisions are mailed to the address provided on the application form.

Wentworth Institute of Technology reserves the right to be the exclusive judge of the acceptability of any applicant for admission to its programs of study. Admission decisions for the M.Arch program are final. All acceptances are contingent upon successful completion of the specified undergraduate degree program and maintenance of the minimum GPA standard.



## College of Professional and Continuing Education

### Master of Science and Master of Engineering Part-Time Programs

Summary:

- Complete online application
- Current resume
- Statement of purpose
- Official transcript(s) from any college(s) attended
- Two professional recommendations
- \$50 application fee
- Earned bachelor's degree or higher from an accredited institution

Applications are accepted for the fall and spring semesters and are reviewed on a rolling basis.

#### *Admissions Requirements*

Official transcripts from all institutions attended after high school graduation are required.

The recommended undergraduate GPA is 3.0. The admissions committee may request the GRE or GMAT exams if the GPA is below a 3.0.

#### *Admissions Decisions*

Notification on the outcome of the admissions process occurs on a rolling basis for admission to the following semester. Wentworth Institute of Technology reserves the right to be the exclusive judge of the acceptability of any applicant for admission to its programs of study. All acceptances are contingent upon successful completion of the specified undergraduate degree program and maintenance of the minimum GPA standard. The decision of the graduate committees related to all aspects of admissions is final.

### Master of Science in Applied Computer Science

Science (MSACS) degree through the College of Professional and Continuing Education (CPCE). The degree is designed to educate professionals in the application of technical computing and management skills required to plan, design, implement, deploy, and operate computer-based solutions within an organization. To be eligible for admission consideration, applicants must possess a bachelor's degree from an accredited college or university in computer science, computer networking, computer information systems, computer engineering (with significant computer science content), information technology, or software engineering. Candidates should be able to demonstrate competence in three areas: programming, fundamentals of computer science (including computer organization, operating systems, databases, and data communication), as well as statistics.

The Master of Science in Applied Computer Science is available in a fully online delivery format.

### Master of Science in Construction Management

Wentworth Institute of Technology offers a part-time Master of Science in Construction Management (MSCM) through the College of Professional and Continuing Education (CPCE). Students must possess a bachelor's degree from an accredited college or university. An undergraduate degree from an American Council of Construction Education (ACCE) accredited program in construction management is a plus. Candidates must also demonstrate competencies in three areas; construction estimating, construction scheduling, and management.

Competencies can be demonstrated either through prior class work, testing, architectural/engineering/construction (AEC) employment, and/or documented work experience in the field. Qualifications and

competencies are assessed on a case-by-case basis. Competencies can also be acquired through CPCE's Managing Construction Projects professional certificate.

The Master of Science in Construction Management is available in a hybrid delivery format, as well as fully online.

## **Master of Science in Facility Management**

Wentworth offers a part-time Master of Science in Facility Management (MSFM) through the College of Professional and Continuing Education (CPCE). Students must possess an undergraduate degree in one of the following areas of study: facility management, architecture, engineering, construction management, business, or interior design. Students should also be able to demonstrate one year of verifiable full-time work experience in the facility management field, or be able to exhibit competency in the following areas: accounting or finance, real estate, project management, operations, and general management. Competencies can be demonstrated either through prior class work, testing, architectural/engineering/construction (AEC) employment, and/or documented work experience in the facilities management field. Qualifications and competencies are assessed on a case-by-case basis. Facility management competencies can also be acquired through CPCE's Facilities Management professional certificate.

The Master of Science in Facility Management is available in a hybrid delivery format, as well as fully online.

## **Master of Science in Project Management**

Wentworth Institute of Technology offers a part-time Master of Science in Project Management (MSPM) through the College of Professional and Continuing Education (CPCE). Successful candidates for admissions must have a bachelor's degree from an accredited college or university. It is also recommended, but not required, that applicants have at least two years of work experience, which can include, but is not limited to, full-time employment, co-op experiences, and internships.

Due to the advanced nature of the subject matter, it is also recommended that applicants to the program are able to demonstrate some competency in project management. Project management competency can be demonstrated in many ways including class work, testing, or on-the-job learning.

The Master of Science in Project Management is available in a fully online delivery format.

## **Master of Science in Technology Management**

Wentworth Institute of Technology offers a part-time Master of Science in Technology Management (MSTM) through the College of Professional and Continuing Education (CPCE). Students must possess a BA or BS degree from an accredited college or university and at least one year of professional experience in a technical role and/or technical organization. Familiarity with accounting and finance is a plus but is not required for admission.

The Master of Science in Technology Management is available in a fully online delivery format.

## **Master of Engineering in Civil Engineering**

Wentworth Institute of Technology offers a part-time Master of Engineering in Civil Engineering (MEng CE) degree through the College of Professional and Continuing Education (CPCE). The degree is designed to educate technical professionals in post-graduate civil engineering principles. Students must possess a bachelor's degree from an accredited college or university. A Bachelor of Science degree from a civil engineering curriculum accredited by ABET is a plus. Results of the GRE or GMAT exams may be submitted but are not required. The MEng CE admission requirements are based on a 3.0 grade point average and an academic record demonstrating adequate preparation and potential for successful graduate study, or at the discretion of the department chair. Undergraduate degrees from other disciplines will be considered on a case-by-case basis. MEng CE admission qualifications and civil engineering competencies are assessed based on

grade point average, relevant work experience, and the completion of additional coursework to bridge the gap between engineering and the applicant's undergraduate degree.

The Master of Engineering in Civil Engineering is available in a hybrid delivery format.

## ADMISSIONS - COLLEGE OF PROFESSIONAL & CONTINUING EDUCATION

### **Martha Sheehan, Director of Admissions and Marketing**

Dobbs Hall Room 107A

(617) 989-4661

Wentworth Institute of Technology, through the College of Professional and Continuing Education, continues to expand its online program offerings each year. For over 100 years Wentworth has built strong citizens and industry leaders through a curriculum that blends strong, theory-based learning with a practical, problem-solving approach. That same approach is present in our online programming.

Let's face it: lifelong learning has to keep up with your lifestyle. We understand that as a busy working adult, coming to campus may no longer be the most convenient option for you. That's why we offer most programs in multiple formats, giving you the option to switch if your circumstances change.

The online courses at Wentworth are as engaging and challenging as our face-to-face classes, both taught by dedicated faculty and practitioners. With our online courses you can work towards advancing your career, doing so from the comfort of your own home. Find the online program that is right for you.

## Program Offerings

### College of Professional and Continuing Education

#### *Associate in Applied Science (A.A.S.)*

- Building Construction Management (ABCM)
- Engineering Technology (AENT)

#### *Bachelor of Science (B.S.)*

- Building Construction Management (BBCM)
- Facility Management (BSFM)
- Project Management (BPM)

#### *Professional Certificates - Undergraduate*

- Professional Land Surveying (PLS)
- Facilities Management (CPFM)
- Managing Construction Projects (CMCP)
- Project Management (CPPM)

#### *Master of Engineering, Civil Engineering (M.Eng. CE)*

- Civil Engineering (MECE)

#### *Master of Science (M.S.)*

- Applied Computer Science (MSACS)
- Construction Management (MSCM)
- Facility Management (MSFM)
- Project Management (MSPM)
- Technology Management (MSTM)

## Associate and Bachelor's Degree Admissions Requirements

### Summary:

- Complete online application
- Official high school or GED transcript
- Official transcript(s) from any college(s) attended
- Current resumé
- \$50 application fee

Applicants for admission must submit an official transcript of record from a recognized high school, except in cases where the applicant possesses an associate degree. The high school equivalency diploma of a state education department or of a high school may be substituted for high school graduation. Students can submit official G.E.D. scores to the College of Professional and Continuing Education office.

Applicants who have attended college must submit an official transcript of their final record from each college they have previously attended.

## Non-Matriculating Undergraduate Students

Applicants can also be admitted on a non-matriculating basis to take individual courses. Acceptance to take a course is based on an evaluation of the student's previous academic experience. Non-matriculating students may not take more than 16 credits without special permission of the Dean of Professional and Continuing Education.

## Non-Matriculating Graduate Students

To be eligible for consideration, non-matriculated graduate student applicants must:

Possess a bachelor's degree from an accredited college or university. Admission requirements are based on a 3.0 grade-point average and an academic record demonstrating adequate preparation and potential for successful graduate study, or at the discretion of the department chair. Non-matriculating graduate students may take a maximum of two (2) graduate level courses or six (6) graduate level credits.

### Summary:

- Complete the application online
- A current resumé
- Official transcript(s) from any college(s) you have attended

## Professional Certificate Requirements

### Summary:

- Complete online application
- Official transcript(s) from any college(s) attended
- Earned bachelor's degree or higher from an accredited institution
- Current resumé
- \$50 application fee

Applications are accepted for the fall and spring semesters.

## Workforce Training Program Requirements

### Summary:

- Complete online pre-registration form

Pre-registration forms are accepted for the fall, spring, and summer semesters.

## *Specific Program Requirements*

Applicants must also fulfill specific requirements, depending on the program to which they are applying. Please refer to the CPCE academic programs section to see if your program has specific requirements.

## **International Student Application Requirements**

Prospective students seeking part-time study who can study in the United States without the institution's support for a student visa are encouraged to apply. International student applicants must provide to the CPCE admissions office:

- A copy of the applicant's current I-94 card (front & back)
- A copy of the applicant's current passport
- A copy of the applicant's current visa

All other admissions requirements for CPCE undergraduate students also apply to international students.

## *Optional Math Placement Exam*

Upon acceptance, CPCE program applicants may complete an online math placement test no later than one full week prior to the start of the semester and before registering for MATH1005, College Mathematics A. Applicants who receive transfer credit for MATH1005 or who have been advised to enroll in Basic Algebra (MATH0900) are not required to complete the test. Each section of the exam will only be given to a student once a semester.

The exam consists of three sections:

- Section I College Mathematics A
- Section II College Mathematics B
- Section III College Mathematics C

All students must take Section I of the exam unless they have been awarded transfer credit for MATH1005 or have been advised to enroll in Basic Algebra (MATH0900). Students are not required to take the other sections unless they are seeking placement into a higher level of mathematics. A student who passes both sections of the exam will be awarded advanced standing credit for College Mathematics A and advised that he/she may advance in the sequence of mathematics courses. Students requiring remediation will be advised of their options regarding preparatory course work. If a student in College Mathematics A, B, or C feels that he/she could test out of a mathematics course, he/she should contact the College of Professional and Continuing Education to arrange to take a comprehensive mathematics placement exam.

Applications are accepted for the fall, spring, and summer semesters.

## *Academic Activity and participation requirements*

Given the asynchronous format of online and hybrid courses, students have the opportunity to take part in the class at multiple times during each weekly module. It is recommended that students login to their online/hybrid course, at minimum, 4-5 times per week to participate in discussion boards, read materials, take assessments, and submit assignments. Active participation in online courses is required and is often graded by the instructor.

To be considered active, students will be expected to login to their online or hybrid course(s) in the Blackboard Learning Management System (LMS) and participate in at least two (2) "Academic Activities" each week:

- At least one Academic Activity by midnight ET Wednesday each week.
- At least one additional Academic Activity by midnight ET Sunday each week.

“Academic activities” includes any combination of the following:

- Posting to discussion boards within the online course.
- Turning in an assignment within the online course.
- Taking a quiz, test, or other assessment within the online course.

A student who is unable to take part in a given week’s activities must contact the instructor prior to any assignment deadlines. Makeup work is accepted at the discretion of the instructor. Students should plan accordingly and make sure to read the schedule of deadlines listed in the course syllabus.

# ACADEMIC POLICIES & PROCEDURES

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## ACADEMIC APPEALS

### Grades

A student who disagrees with a grade or sanction assigned by a faculty member (e.g. project, homework, quiz, test, grading concerning academic dishonesty, or misconduct) may submit a grievance in writing to the faculty member within five business days of the notification of the grade. The faculty member will meet or speak with the student at their earliest mutual convenience, no later than one week after receiving the grievance. Based upon the information provided by the student and review of other relevant information, the faculty member will decide if the grade remains or is changed and notifies the student.

For spring semester final grades, and when the student and faculty member are not both present on campus, the written grievance is submitted to the faculty member and the department chair (or the Director of Academic Operations- College of Professional and Continuing Education [CPCE] for courses taken there) through email within five business days from the posting of the grade on Leopardweb. The faculty member and the student will meet or connect within five business days at their mutual convenience. Based upon the information provided by the student and review of other relevant information, the faculty member will decide if the grade remains or is changed. The faculty member will email their decision to the student and the department chair within two business days from the conversation.

### Non-Academic Student Issues of Concern

A student who has a concern about non-academic issues should contact the Dean of Students or the Director of Human Resources.

### Classroom and Other Academic Review Procedures

If a faculty member is non-responsive, or the student wished to appeal the faculty member's decision, a student should contact the chair of the department offering the course in writing, within five business days from the date of the grievance. If the student is a College of Professional and Continuing Education (CPCE) student and/or the course is a CPCE course, the student must contact, in writing, the Director of Academic Operations (CPCE). The academic department chair or the director of academic operations within CPCE should meet/contact the student within two weeks from the receipt of the grievance to settle the concern. If the issue is not resolved at this level, the student can appeal by following the Grade and Attendance Review process.

### Grade Review Process

When a student disagrees with the decision of the faculty member concerning a grade/sanction assigned by a faculty member (e.g. project, homework, quiz, test, grading concerning academic dishonesty or misconduct, etc.), the following procedure applies.

- 1. First Step: Review by the department chair (Director of Academic Operations -CPCE for CPCE cases).** The student may seek a review by the department chair (Director of Academic Operations -CPCE). The student submits the communication about the issue with the faculty member, any supporting evidence, and the decision of the faculty member to the department chair of the offering course (Director of Academic Operations -CPCE). The department chair (Director of Academic Operations -CPCE) will meet or speak with the student, the faculty member and any other persons he/she deems necessary. The department chair (Director of Academic Operations -CPCE) will provide the student with a decision within five business days (excluding breaks and holidays) after completing the review.

**2. Second Step: Review by Academic Review Committee (FINAL)** If the student is not satisfied with the decision of the department chair (Director of Academic Operations-CPCE), the student may seek review, in writing, within five business days of receipt of the department chair's decision (excluding breaks and holidays) to the Academic Review Committee ("ARC"). The student must submit all of the prior communications, supporting materials and decision of the faculty member and department chair to the Executive Assistant to the Provost.

## **Academic Review Committee Process**

The Academic Review Committee members are the deans of the college, or other designees selected by the provost. A panel of three members will review each case. A representative of the provost's office serves as the administrator for the ARC and does not vote.

The ARC administrator will schedule a meeting of the ARC as soon as possible after receipt of the student's written request for review. The ARC may meet with the student, but it is not required. The ARC reviews all prior material, communications and decisions regarding the matter from the faculty member and the chair and may ask faculty, chairs, or others to attend to answer questions and/or gather additional information. The student will be notified of the decision of the ARC in writing within five days of the meeting (excluding breaks and holidays). The ARC's decision is final.

## **ACADEMIC HONESTY POLICY**

Students, faculty, and staff are responsible for maintaining a proper learning environment at Wentworth. All students are required to abide by the Student Code of Conduct, the Wentworth Creed, and all published Wentworth policies and procedures to satisfy the general requirements for graduation. Wentworth takes violations of academic honesty and cases of academic misconduct very seriously. Sanctions include, but are not limited to: a reduced grade for the assignment, a grade of "0" for the assignment, "F" for the course, removal from a course, Institute suspension, or Institute expulsion.

## **Procedures for Handling Academic Honesty Violations**

The Wentworth faculty and administration have developed a set of procedures to investigate and determine whether undergraduate and graduate students have engaged in violations of academic honesty. Information about this process can be found on the Academic Affairs website: [wit.edu/academic-honesty](http://wit.edu/academic-honesty).

Students who suspect another classmate of academic dishonesty can either talk directly to the faculty member or contact EthicsPoint anonymously (855-353-9143) or EthicsPoint Online: [wit.ethicspoint.com](http://wit.ethicspoint.com)).

## **ADVANCED PLACEMENT, INTERNATIONAL BACCALAUREATE, AND COLLEGE LEVEL EXAMINATION PROGRAM**

Wentworth Institute of Technology offers course equivalencies and credits from many Advanced Placement and International Baccalaureate subject areas. Please consult the tables to determine the subject areas available to WIT students and minimum score requirements.

### **Advanced Placement (AP)**

If the course equivalencies listed below are not required in the student's program, the student will receive credit for the required lower/prerequisite level course. \*Advanced Placement (AP) test scores of 3, 4, and 5 are accepted for credit unless otherwise noted.



<b>AP EXAM TITLE</b>	<b>SCORE</b>	<b>CREDITS</b>	<b>WIT EQUIVALENT COURSE</b>
Art History Exam	3, 4, 5	4	HUMN 3797 - AP Art History
Biology Exam	4, 5	4	BIOL1100 - AP Cell and Molecular Biology
Calculus AB	3, 4, 5	4	MATH1750 - AP Engineering Calculus I
*Calculus AB (Architecture and Construction Management majors only)	3, 4, 5	8	MATH1000 - AP College Mathematics & MATH 1500 - AP Precalculus
Calculus AB (Computer Information System majors only)	3, 4, 5	4	MATH1000 - AP College Mathematics
Calculus AB (Interior and Industrial Design Majors only)	3, 4, 5	4	MATH1020 - AP Plane and Solid Geometry
Calculus AB (Business Management majors only)	3, 4, 5	4	MATH1040 - AP Applied Math for Business
Calculus AB (Computer Networking majors only)	3, 4, 5	4	MATH1500 - AP Precalculus
Calculus BC	3, 4, 5	8	MATH1750 - AP Engineering Calculus I & MATH1850 AP Engineering Calculus II
**Calculus BC (Architecture and Construction Management majors only)	3, 4, 5	8	MATH1000 - AP College Mathematics & MATH 1500 AP Precalculus
Calculus BC (Computer Information System majors only)	3, 4, 5	4	MATH1000 - AP College Mathematics
Calculus BC (Interior and Industrial Design Majors only)	3, 4, 5	4	MATH1020 - AP Plane and Solid Geometry
Calculus BC (Business Management majors only)	3, 4, 5	4	MATH1040 - AP Applied Math for Business
Calculus BC (Computer Networking majors only)	3, 4, 5	4	MATH1500 - AP Precalculus
Chemistry Exam	4, 5	4	CHEM1100 - AP Engineering Chemistry I
Chinese Language and Culture Exam	3, 4, 5	4	GNEL3797 - AP Chinese Language and Culture
Comp Government and Politics	3, 4, 5	4	POLS3797 - AP Comp Gov't & Politics
Computer Science A	3, 4, 5	4	COMP1000 - AP Computer Science I
English Language and Comp	3, 4, 5	4	ENGL1100 - AP English I
English Literature and Comp	3, 4, 5	8	ENGL1100 - AP English I & LITR3797 - AP English Literature
Environmental Science	3, 4, 5	4	SCEL3797 - AP Science Elective
European History	3, 4, 5	4	HIST3797 - AP European History
French Language and Culture	3, 4, 5	4	GNEL3797 - AP French Language and Culture

AP EXAM TITLE	SCORE	CREDITS	WIT EQUIVALENT COURSE
German Language and Culture	3, 4, 5	4	GNEL3797 - German Language and Culture
Human Geography Exam	3, 4, 5	4	SOCL3797 - AP Human Geography
Italian Language and Culture Exam	3, 4, 5	4	GNEL3797 - AP Italian Language and Culture
Japanese Language and Culture	3, 4, 5	4	GNEL3797 - AP Japanese Language and Culture
Latin	3, 4, 5	4	GNEL3797 - AP Latin Language
Macroeconomics	3, 4, 5	4	ECON4152 - AP Macroeconomics
Microeconomics	3, 4, 5	4	ECON4154 - AP Microeconomics
Music Theory	3, 4, 5	4	HUMN3797 - AP Music Theory
Physics 1, Algebra Based	3, 4, 5	4	PHYS1000 - AP College Physics I
Physics C, Electricity & Magnetism	3, 4, 5	4	PHYS1750 - AP Engineering Physics II
Physics C, Mechanics	3, 4, 5	4	PHYS1250 - AP Engineering Physics I
Psychology	3, 4, 5	4	PSYC4100 - AP Introduction to Psychology
Spanish Language and Culture	3, 4, 5	4	GNEL3797 - AP Spanish Language and Culture
Spanish Literature and Culture	3, 4, 5	4	GNEL3797 - AP Spanish Literature and Culture
Statistics	3, 4, 5	4	MATH1030 - AP Statistics and Applications
Studio Art, 2-D Design	3, 4, 5	4	GNEL3797 - AP Studio Art: 2-D Design
Studio Art, 3-D Design	3, 4, 5	4	GNEL3797 - AP Studio Art: 3-D Design
Studio Art: Drawing	3, 4, 5	4	GNEL3797 - AP Studio Art: Drawing
United States History	3, 4, 5	4	HIST3797 - AP US History
US Government and Politics	3, 4, 5	4	POLS4102 - AP American Government
World History	3, 4, 5	4	HIST3797 - AP World History

\*Students who change majors to a program requiring Math 1750 Engineering Calculus I an AP credit adjustment will be made on their academic transcript: 4 credits for Math 1750 Engineering Calculus I and the 4 credits GNELIxxx, General Elective will replace the lower level mathematics course (e.g. Math 1000 and Math 1500); an even exchange of credit.

\*\*Students who change majors to a program requiring Math 1750 Engineering Calculus I the reallocation of AP credit will be made on their academic transcript: Math 1750 Engineering Calculus I, 4 credits, MATH 1850 Engineering Calculus II, 4 credits, which replaces the lower level mathematics courses (e.g. Math 1000 and Math 1500); an even exchange of credit.

## College Level Examination Program (CLEP)

The CLEP program applies only to students who have been out of high school for at least three years. Students must have taken the CLEP examination before matriculating at Wentworth Institute of Technology. No student will receive credit for a CLEP examination if they have received credit at Wentworth Institute of Technology or transferred credit to the University for an equivalent course.

Students may receive academic credit by completing the College Level Examination Program (CLEP). Examinations are offered in a wide variety of subjects and are tied closely to specific courses. To receive credit for CLEP exams, students need to achieve a “C” grade or better as a “Mean Scaled Score.”

Interested students must contact CLEP, Box 6600, Princeton, NJ 08541-6600 (609) 951-1026 for dates and locations of CLEP exams.

The following is a list of acceptable examinations. The student must achieve a “C” grade or better as a “Mean Scaled Score.”

CLEP EXAM TITLE	CREDITS	WIT EQUIVALENT COURSE
American Government	4	POLS4102 - Intro to American Government
American Literature	4	LITR3797 - American Literature
Analysis & Interpretation of Literature	4	LITR3797 - Interpretation of Literature
Calculus	4	MATH1750 - Engineering Calculus I **
College Composition	4	ENGL1100 - English I
English Literature	4	LITR3797 - English Literature
Financial Accounting	4	MGMT2700 - Financial Management
French Language, Levels 1 and 2	4	GNEL3797 - French Level 1 and 2
German Language Levels 1 and 2	4	GNEL3797 - German Level 1 and 2
History of the United States I, Early Colonization to 1877	4	HIST4123 - US History to 1877
History of the United States II, 1865 to the Present	4	HIST4175 - Modern American History
Human Growth and Development	4	PSYC3797 - Human Development
Humanities	4	HUMN3797 - Humanities Elective
Introduction to Educational Psychology	4	PSYC3797 - Educational Psychology
Introductory Business Law	4	MGMT3650 - Business Law
Introductory Psychology	4	PSYC4100 - Introduction to Psychology
Introductory Sociology	4	SOCL4102 - Sociology
Natural Sciences	4	SCEL3797 - Natural Science Elective
Precalculus	4	MATH1500 - Precalculus **
Principles of Microeconomics	4	ECON4154 - Microeconomics
Principles of Macroeconomics	4	ECON4152 - Macroeconomics
Principles of Marketing	4	MGMT2850 - Principles of Marketing

CLEP EXAM TITLE	CREDITS	WIT EQUIVALENT COURSE
Social Sciences and History	4	GNEL3797 - Social Science and History
Spanish Language, Levels 1 and 2	4	GNEL3797 - Spanish Level 1 and 2
Western Civilization I, Ancient Near East to 1648	4	HIST3797 - Western Civilization I
Western Civilization II, 1648 To Present	4	HIST3797 - Western Civilization II

\*\* CPCE

## International Baccalaureate Exams (IB)

The following is a list of acceptable examinations and Wentworth courses for which credit may be obtained. Scores of 5, 6, and 7 are acceptable for credit.

Mathematics Standard Level: MATH1750 - Engineering Calculus I

Physics: PHYS1000 - College Physics I

IB Humanity/Social Science courses will be considered equivalent if the incoming student places into ENGL1100.

\* Regarding ECON4102 Directed HSS requirements: If a student transfers both Microeconomics (ECON4154) and Macroeconomics (ECON4102) the Directed ECON4102 is completed plus four additional ECON credits. If a student transfers only ECON4152 or ECON4154 and requires ECON4102, then that student must still complete ECON4102.

## ALTERNATIVES TO CLASSROOM STUDY

Proposals for Alternative Study require the department chair's approval and must be submitted prior to the last day of the add/drop period.

### Independent Study

Independent Study courses provide an opportunity for individual pursuit of knowledge in an area not covered in a regularly scheduled classroom course at Wentworth Institute of Technology. Independent Study courses include directed readings, advanced problems or specialized research.

### Co-op Requirement

As a requirement for graduation, undergraduate program students must complete two cooperative education semesters. Transfer students must complete at least one semester in residence at Wentworth before being eligible for the cooperative education program. Students must have a cumulative grade point average of 2.0 or higher as a requirement of co-op. Students who do not meet the minimum GPA by the end of the semester immediately preceding their co-op will not be eligible for co-op and dropped from their co-op registration.

Students must register for a co-op course for their work experience during the pre-registration period and will maintain full-time status during their co-op semester. Students should register for COOP3500 for their first required COOP and COOP4500 for their second required co-op.

The two specific co-op courses that are required are:

- COOP3500: Cooperative Education I (typically taken during a student's junior year)
- COOP4500: Cooperative Education II (typically taken during a student's senior year)

Optional/Additional co-op courses are:

- COOP3000: Optional Cooperative Education (offered only in the student's summer semester prior to the Junior year)
- COOP5000: Additional Cooperative Education. (Prerequisites for COOP5000 are successful completion of COOP3500 and COOP4500 and requires permission of the students' Co-Op + Career Advisor.)

Upon completion of the co-op and assignments, students earn a satisfactory/unsatisfactory (S/U) grade, which is recorded on the student's official transcript.

Occasionally students enter the baccalaureate programs with substantial work experience in their major field. With the approval of the dean of the college, with consultation from the director of the Center for Cooperative Education and Career Development, this work experience may be substituted for one of the cooperative education requirements. Students must formally petition to receive this course substitution to the Co-ops + Careers Office.

## Military Service

To qualify for advanced standing credit, students must provide official documentation of military service and follow the process listed below. Veteran students, spouses and dependents will work with the Assistant Registrar and complete the following steps:

- Obtain your DD-214/Separation papers (if applicable): [www.archives.gov/veterans/military-service-records/](http://www.archives.gov/veterans/military-service-records/)
- Apply for benefits: <https://www.vets.gov/education/gi-bill/>
- Obtain Certificate of Eligibility (COE)
- Send COE and DD-214 via fax (617-989-4201, ATTN: SCO) with your Full name, Wentworth ID number and Major

## Evaluated Non-College Sponsored Learning (CPCE only)

Students may have acquired college-level learning from non-college professional development programs, training experiences offered by an employer, professional associations, community-based organizations or military experience. This non-college learning might have been evaluated for college credit by the American Council on Education (ACE) CREDIT program. You can find more details about this program at [www.acenet.edu](http://www.acenet.edu). If such an evaluation exists, CPCE can accept the recommended credits into a student's degree plan if it fits within the degree requirements.

## Prior Learning Assessment (PLA) (CPCE only)

Students in the College of Professional and Continuing Education can earn a maximum of 45 credits in a bachelors' degree program and 27 in associates for learning experiences that took place outside of the classroom, through work experience, training programs, or volunteer opportunities. Students must be admitted into the University for a specific program and must enroll and successfully complete the PLA course in the CPCE within their first two semesters. Credits through PLA are considered as part of your incoming credits and therefore cannot be taken or applied at the completion of your program.

CPCE's PLA course helps students identify learning outcomes and develop a portfolio that documents learning content so that they may demonstrate how previously acquired knowledge aligns with the learning necessary to earn college-level credit.

During the 3-credit course, faculty work closely with students to ensure that their portfolio content is accurately documented and reflects the requirements of the college level credit for which they are applying. Students will not be awarded credit for PLA portfolio without successful completion of the course. This course is graded as a Pass/Fail.

## **CPCE Classes**

Students enrolled in a full-time program and seeking enrollment in a course in the College of Professional and Continuing Education, are required to have the approval of both CPCE's Director of Academic Operations and the academic department where they are receiving their degree.

## **ATTENDANCE**

Regular attendance in all classes is expected of all students. The attendance policy for each course is described in the course syllabus by the professor.

## **Absence due to Religious Observance**

Wentworth Institute of Technology welcomes and values people and their perspectives and respects the interests of all members of our community and acknowledges that absences are necessary due to religious observances.

In accordance with Section IIB of Chapter 151C of the Massachusetts General Laws, "Any student in an educational or vocational training institution, other than a religious or denominational educational or vocational training institution, who is unable, because of his religious beliefs, to attend classes or to participate in any examination, study, or work requirement on a particular day shall be excused from any such examination or study or work requirement, and shall be provided with an opportunity to make up such examination, study, or work requirement which he may have missed because of such absence on any particular day; provided, however, that such makeup examination or work shall not create an unreasonable burden upon such school. No fees of any kind shall be charged by the institution for making available to the said student such opportunity. No adverse or prejudicial effects shall result to any student because of his availing himself of the provisions of this section."

Wentworth recognizes the breadth of religious observance among students, faculty, and staff and the potential for conflict with scheduled components of the academic experience. Students are expected to review the syllabi and notify faculty as far in advance as possible of observances. In such an event, the instructor will provide reasonable accommodations that do not unduly disadvantage the student.

## **Instructor Arrival**

Students must wait at least twenty minutes from the scheduled beginning class time for the instructor to arrive. After that, unless the instructor has previously notified the class to wait for a longer period, the class may leave.

## **CHALLENGE EXAMS**

Enrolled students who can demonstrate evidence of expertise are eligible to apply for a challenge examination, which has been approved by the appropriate college or school. Challenge examinations may not be repeated and may not be taken for a grade replacement for previously completed courses with grades of "C-" or below. Students must request permission during the first week of classes to take challenge exams in courses in which they are enrolled. Such examinations must be administered during the first two weeks of the semester. Grading for Challenge Exams is pass/fail. Exams are graded before the end of the third week of the semester. Successful completion of a challenge examination results in the listing on the student's permanent record of the course equivalent, with the notation "credit by examination," and the amount of credit granted. Challenge exams are not repeatable.

A student may test out of no more than 25 percent of the courses needed for graduation. Interested and eligible students should be aware of the following:

## Challenge Exams in Mathematics

Incoming students without transfer credit who feel they have sufficient knowledge in College Mathematics or Pre-calculus are given the opportunity to take a Mathematics Challenge Exam. Upon successful completion, the requirement for either MATH1000 College Mathematics or MATH1500 Precalculus will be met and the appropriate course will be added to the students' academic transcript. Interested students should contact the Department Chair of Applied Mathematics.

## Transfer Challenge Exams

Transfer students who have completed a three-credit transferable mathematics course from the list below are eligible to take the Mathematics Transfer Challenge Exam. Upon successful completion of the Mathematics Transfer Challenge Exam one (1) credit is applied to the three (3) credits of a specified transferable mathematics course and will complete either a pre-requisite or a Wentworth mathematics requirement.

To qualify, transfer students must meet the following criteria: have a transferable three (3) credit mathematics course from the list of available mathematics topics found on the list below, not be enrolled in a Wentworth equivalent course, and not have completed an advanced level mathematics course of the same focus.

Note: Students who do not successfully complete the mathematics transfer challenge exam will not receive the additional one credit and will have to take the required course at Wentworth.

Students have the option to accept the transferable 3 credit mathematics course to satisfy a mathematics requirement for their major, with the understanding they will be required to make up the 1 credit difference to meet the minimum credits required in their degree program.

Available external transfer challenge exams in mathematics:

MATH1000	College Mathematics
MATH1030	Statistics & Applications
MATH1500	Pre-calculus
MATH1750	Engineering Calculus I
MATH1850	Engineering Calculus II
MATH2025	Multivariable Calculus
MATH2100	Probability & Statistics for Engineers
MATH2300	Discrete Mathematics
MATH2500	Differential Equations
MATH2860	Linear Algebra & Matrix Theory

There are no fees associated with the Mathematics Transfer Challenge Exam.

## CHANGE OR DECLARE PROGRAMS

### Change of Major - Undergraduate Program

Students seeking to change their major should inform their primary advisor and consult with the academic department chair of the new major they are considering. The academic department chair, or other department representative, will interview the student and review the academic record. If the request is approved, a Change of Major form is completed, which lists all course exclusions with the exception of Humanities and Social Science courses; the grade point average in the new major will consist of only those courses accepted in the new major. The signatures of academic department chair and the student are required for the change to become official. Change of majors for a current semester must be received and processed by the registrar prior to the end of the add/drop period, otherwise all change of majors will become effective at the start of the next semester the student is enrolled. It is important to note that not all change of major requests are granted by

the department chair if evidence of academic success is not documented on the student's academic record. A change of major does not remove the historical academic sanctions that were applied under previous major.

Students considering a change of major should be aware of the potential impact of time to graduate and financial standing. Students are advised to meet with a financial services counselor to discuss any potential impact to financial aid and tuition payments because of the change of major.

## **Change of Major – College of Professional and Continuing Education (CPCE)**

Current CPCE students who wish to change majors must have a grade point average of at least a 2.0 cumulative GPA and should contact their advisor to begin the review process. The advisor will interview the student, review the academic record, and identify any courses that will be transferred into the new major. The grade point average in the new major will consist of only those courses taken in the new major. The completed Change of Major form must have the signatures of the primary advisor and the student prior to being submitted to the registrar. Change of majors for a current semester must be received and processed by the registrar prior to the end of the add/drop period, otherwise all change of majors will be effective at the start of the next semester the student is enrolled.

Students wishing to change from full time day programs to the College of Professional and Continuing Education must contact the CPCE admissions office. Students wishing to change from a CPCE program to a full-time day program must submit an application to Undergraduate Day Admissions.

## **Add a Second Degree**

Matriculating undergraduates pursuing two baccalaureate degrees must complete at least an additional thirty-six (36) credit hours in residence and all requirements of the second major. Because the program requirements for each major must be met, it is possible that more than thirty-six (36) semester credit hours will be needed to fulfill these requirements. For day baccalaureate majors, an additional co-op semester is required in the new major. In such cases, a second degree is recorded on the student's transcript and dated accordingly; Wentworth does not allow concurrent dual degrees.

Returning students pursuing an additional degree from Wentworth Institute of Technology must have completed all requirements for the first degree and be formally approved to return in pursuit of a second degree. Non-matriculating students will be held to the catalog year in which the second degree is initiated and will complete at least thirty-six (36) additional credits in residence. Coursework completed in the first baccalaureate degree cannot be applied to the minimum of thirty-six (36) credits in residence requirement; this restriction includes converting a minor/s into a second degree. Upon completion of all required coursework, the additional degree will be recorded on the students' transcript and dated accordingly.

The same policies apply to CPCE students, with the exceptions that a minimum of thirty-two (32) semester credit hours must be taken, and no cooperative work semester is required.

Students seeking a second major are advised to consult with Student Financial Services and Financial Aid.

## **Add or Drop a Minor(s)**

Bachelor degree candidates who choose to minor are required to do so no later than the end of the junior year by filing a Minor Declaration form with the registrar. The Minor Declaration form must be signed by the department chair of the student major and the department chair of the new minor; students wishing to drop a minor must follow the same procedure. All changes must be submitted prior to submitting a Degree Application to insure an accurate review of a student's academic record and the timely awarding of a baccalaureate degree.



## Change Catalog Year

Students are assumed to be following requirements for the various degrees/majors/minors as printed in the academic catalog for their first enrollment term at Wentworth.

Students who wish to follow degree requirements in a subsequent catalog must have the approval of their department chair and file a Change of Major form with the registrar.

## WIT Academic Credit Awarded for Academic Engagement

Credits Awarded	Minutes of "Academic Engagement" (adjusted for NEASC 50-minute hour*)	Clock Hour	50-minute "hour"
1	2,250 (37.5 hours)	45	37.5
2	4,500 (75 hours)	90	75
3	6,750 (112.5 hours)	135	112.5
4	9,000 (150 hours)	180	150
5	11,250 (187.5 hours)	225	187.5
6	13,500 (225 hours)	270	225

GEN-11-06 United States Department of Education Office of Postsecondary Education the Assistant Secretary.

Guidance to Institutions and Accrediting Agencies Regarding a Credit Hour as Defined in the Final Regulations Published on October 29, 2010.

An amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally established equivalency that reasonably approximates not less than:

- One hour\* of classroom or direct faculty instruction and a minimum of two hours of out-of-class student work each week for approximately fifteen weeks for one semester or trimester hour of credit, or 10 to 12 weeks for one quarter hour of credit, or the equivalent amount of work over a different amount of time; or
- At least an equivalent amount of work as required in paragraph one of this definition for other academic activities as established by the institution, including laboratory work, internships, practice, studio work, and other academic work leading to the award of credit hours.

\*NEASC assumes a 50-minute "hour."

## CHANGE OF NAME, ADDRESS AND EMERGENCY CONTACT INFORMATION

### Enrollment Confirmation

Prior to the start of each semester, fall, spring and summer students are required to update their demographic and emergency contact information before access to LeopardWeb is permitted. Students participating in a co-op semester or study abroad program are required to complete this process.

### Change of Address

Students are responsible for reporting and maintaining all valid address information with Wentworth using LeopardWeb. Students are responsible for any information or administrative actions mailed to them at their address(es) on file.

## Change of Name

Currently enrolled students who wish to change their names must complete a Change of Name form and provide documentation of the name change, such as a marriage license, court order, or Social Security card bearing the new name.

## Preferred Name Policy

Wentworth Institute of Technology recognizes that some students use names other than their legal names to identify themselves. As an inclusive and diverse community, Wentworth hopes to provide students an empowering, safe, and non-discriminatory university experience.

The Preferred Name Policy allows students to use a preferred first name different from their legal name for purposes and records in the course of inter-campus business, communication, and education. The legal name will continue to be used where required by law or institute requirements.

## CHANGES TO ENROLLMENT STATUS

### Withdrawal, Leave of Absence, Medical Leave of Absence

Students who wish to change their enrollment status at the university are required to adhere to the following procedures.

#### *Voluntary Withdrawal – Undergraduate and Graduate*

##### *Withdrawal within the Semester*

Students who wish to withdraw from Wentworth are required to submit a Voluntary Withdrawal Form to the Student Service Center [ssc@wit.edu](mailto:ssc@wit.edu) with appropriate signatures. A grade of “W” will be assigned to all courses attempted in the effective semester if the form is submitted by the last day for “W” grades published in the Academic Calendar. If a Voluntary Withdrawal Form is submitted after the “W” period deadline, final grades of “F” will be recorded, and the date of withdrawal noted on the transcript will reflect the end date of that semester.

##### *Withdrawal at the End of the Semester*

Students who wish to complete the current semester and are not intending to return for the next semester are required to submit a Voluntary Withdrawal Form to the Student Service Center [ssc@wit.edu](mailto:ssc@wit.edu). The effective dates of withdrawal will be the last date of attendance, which according to federal reporting guidelines is the last day of the final exam period. Voluntary withdrawals will not be accepted if submitted after the last day of the semester/final exam period.

##### *Medical Leave of Absence*

Students who are experiencing a physical or mental health condition that impairs their ability to continue their current academic semester may petition for a medical leave of absence. A medical leave of absence provides students time away from campus for treatment.

Students may apply for a medical leave of absence from the University for one semester. Students are limited to one medical leave of absence during matriculation at the Institute. Students who are interested in a medical leave of absence should contact the Office of Student Affairs. Students must complete the Request for a Medical Leave of Absence Petition, acquiring the appropriate signatures, and provide appropriate documentation from a care provider, which must be approved by the Center for Wellness and Disability Services. Petitions may not

be submitted after December 1 for the fall semester, April 1 for the spring semester, and July 1 for the summer. The student is expected to be in treatment while they are on a medical leave of absence. The physician or psychologist responsible for treatment must also provide a recommendation supporting the reinstatement of the student. When students are approved for a medical leave, they receive grades of “W” for the current semester and are withdrawn from all preregistered classes for any subsequent semester/s. Students are strongly advised to contact the Financial Aid office to discuss the financial implications and contact their primary advisor to determine the impact on their academic program. Students are also encouraged to consider possible health insurance implications.

To begin the process to return to classes from a medical leave of absence, students should contact the Office of Student Affairs.

### *Non-Medical Leave at the End of the Semester*

A student who desires to interrupt the usual progress of an academic program in an upcoming semester may petition for a Leave of Absence. The student must make an appointment with their primary advisor or department chair at least one month prior to the start of the effective semester. International students must make an appointment with the director of International Student Services to discuss leave of absence procedures in accordance with federal regulations.

Students must meet with their academic department chairs prior to the end of the semester, to review their degree plan for the returning semester. A student returning from an approved non-medical leave must submit notification of intent to return to the Office of the Registrar at registrar@wit.edu no later than one month prior to the start of the semester in which they intend to return. Students are required to register for courses upon returning from a leave of absence. Students who are not registered for classes prior to the start of classes of the returning semester will be officially withdrawn from Wentworth.

A Leave of Absence is for one semester; students who do not return to the Institute at the end of the approved semester will be withdrawn from the University and therefore must apply for readmission to their program of study.

### *Administrative Withdrawal*

Students who are not registered for a subsequent semester within 30 days of the last day of final exams per the academic calendar will be administratively withdrawn from Wentworth by the registrar and will be unable to register for classes until a reinstatement has been processed. Students who are administratively withdrawn and who intend to return and do not skip a semester must submit a Request for Academic Reinstatement form to the Student Service Center ssc@wit.edu; students who skip a semester(s) may be considered for reinstatement; all requests require the approval of their school/college dean. Students must initiate their reinstatement 30 days prior to the start of the term for which they intend to enroll.

Students who do not successfully complete their degree requirements as a result of their final grades and who are not registered for a subsequent semester will be officially withdrawn from Wentworth. The effective date of the withdrawal will be reported as the final day of classes for the last semester in attendance.

### *Military Deployment Leave of Absence*

A Military Deployment Leave of Absence is available to a student in the U.S. Reserves or National Guard who is called to active duty or when an international student is called to active duty in their home country. The student must contact the Student Service Center and complete a Leave of Absence Petition, further the student must provide proof of deployment prior to the leave being approved.

## Reinstatement Undergraduate and Graduate

All students seeking reinstatement from a Leave of Absence or Withdrawal must initiate this process 30 days prior to the start of the semester they wish to enroll. The condition of the separation will determine the process a student follows.

### *Withdrawal*

For a student who officially withdraws from the University and wishes to reinstate, the department chair/director of their academic program will review the student's academic record prior to any action being taken. This includes course selection, registration, and housing assignments. Students who wish to reinstate after five years or more must matriculate under the catalog year of their reinstatement. Credit for courses taken more than five years prior to the student's reinstatement to Wentworth is not allowed. This policy applies to courses taken at Wentworth as well as those taken at other schools. All requests for reinstatement must have the approval of the department chair.

### *Leave of Absence after one semester*

Students who wish to return at the end of their one-semester Leave of Absence must initiate their return by submitting a Request for Academic Reinstatement form to the Student Service Center at [ssc@wit.edu](mailto:ssc@wit.edu) at least 30 days prior to the start of the semester they intend to enroll.

### *Administrative Withdrawal*

Students who are administratively withdrawn due to federal enrollment reporting guidelines must submit a Request for Academic Reinstatement form to the Student Service Center only if there have been no semester gaps in enrollment. Students returning beyond one semester must follow the academic reinstatement process for withdrawn students.

### *Medical Leave*

A student returning from an approved Medical Leave of Absence must provide a recommendation from the physician or psychologist responsible for treatment supporting readmission to WIT. Students must contact the Center for Wellness and Disability Services to initiate the process to return to the university.

### *Military Deployment*

At the completion of their service, students must submit a Request for Academic Reinstatement as notification of intent to return to the Office of the Registrar at [registrar@wit.edu](mailto:registrar@wit.edu).

## Changes to Enrollment Status – College of Professional and Continuing Education

All students seeking reinstatement from a Leave of Absence or Withdrawal must initiate this process 30 days prior to the start of the semester they wish to enroll. The condition of the separation will determine the process a student follows.

### *Voluntary Withdrawal*

#### *Withdrawal within the Semester*

College for Professional and Continuing Education (CPCE) students who wish to withdraw from a CPCE program at Wentworth during the semester must complete the Voluntary Withdrawal Form. The student must meet with their primary advisor or Director of Academic Operations to complete the withdrawal process. A

grade of “W” will be assigned to all courses attempted in the effective semester if the form is submitted by the last day for “W” grades published in the academic calendar. If a Voluntary Withdrawal Form is submitted after the “W” period deadline, final grades of “F” will be recorded and the date of withdrawal noted on the transcript will reflect the end date of that semester.

Students enrolled in a single course and who choose to withdraw from that course are required to complete a Voluntary Withdrawal Form.

### *Withdrawal at the End of the Semester*

Students who wish to complete the current semester and are not intending to return for the next semester are required to submit a Voluntary Withdrawal Form to the Student Service Center at [ssc@wit.edu](mailto:ssc@wit.edu). The effective dates of withdrawal will be the last date of attendance, which according to federal reporting guidelines is the last day of the final exam period. Voluntary withdrawals will not be accepted if submitted after the last day of the semester/final exam period.

### *Reinstatement*

#### *After Two or More Consecutive Semester Absences*

Any College of Professional and Continuing Education student who takes two or more consecutive semesters off must be approved to return to the university through an approved Request for Academic Reinstatement form.

## **CLASS REQUIREMENTS: ENGLISH PLACEMENT**

All incoming students will be placed into the appropriate English course based on the required writing sample completed during on-campus sessions unless given an exemption based on the criteria outlined in the Writing Sample Exemption section below. Students who have scored below the minimum score on either the writing, the verbal, or both sections of the SAT or ACT, as well as students whose SAT or ACT scores are not submitted, must complete a required writing sample to determine the best English sequence placement.

### **Writing Sample Exemptions**

Exemptions to the required writing sample are made for students whose submitted SAT scores in both Evidenced-Based Reading and Writing of 530 or higher, or ACT English/Writing score of 20 or higher, or AP English Language and Composition Exam score of 3 or higher.

To ensure proper placement, students placed into ENGL0700, ENGL0800, ENGL0900, and ENGL1100 will be reassessed during the first week and able to reregister before the end of drop/add if necessary.

Students are required to complete one of the following English Sequences determined by the English Placement Process as part of the minimum 28 humanities and social science (HSS) degree requirement.

- ENGL1100 and ENGL2200
- ENGL0900, ENGL1100, and ENGL2200
- ENGL0800, ENGL1100, and ENGL2200
- ENGL0700, ENGL0800, and ENGL1100

Once undergraduate students have begun attending Wentworth, their English sequence, if not yet completed and as determined by placement, must be completed at Wentworth. In circumstances that warrant it, exceptions to this policy may be made at the discretion of the Chair of the Dept. of Humanities and Social Science; in such cases, students must appeal to the Chair of HSS directly, who may also defer to the expertise of the English faculty.

CPCE students complete one of two English sequences:

- ENGL1050 and ENGL2050
- ENGL0250, ENGL1050 and ENGL2050

## Humanities and Social Sciences (HSS) Elective Requirements

### *Undergraduate Programs*

Students must complete a minimum of 28 credits, including an English Sequence, at least one course in humanities (HIST, HUMN, LITR or PHIL), at least one course in social science (COMM, ECON, POLS, PSYC, or SOCL) and the remaining courses from either the humanities or social sciences category. Students whose English Sequence requires 3 English courses may use the third English course to satisfy a humanities elective requirement. Students in programs with Directed HSS Electives may use the directed course to satisfy the humanities or social science as determined by that HSS course.

### *Directed HSS Electives*

HSS Directed Electives are specific humanities or social science course/s (e.g. ECON4102), or an HSS discipline (e.g. Ethics), which a program department has determined would be beneficial or necessary in the program's curriculum. Program specific Directed Electives are noted on the student's degree audit.

### *General Electives*

Programs that identify a general elective as part of the degree requirements will appear on a student's degree audit for a specific semester. Students are advised to discuss their options with their primary advisor prior to registering for courses. Please consult your primary advisor if you have any questions about this policy.

### *Program Electives*

Various majors require technical electives. Students should refer to the Academic Catalog for their catalog year for a listing of approved technical electives or consult with their primary advisor prior to registering for courses.

## DEAN'S LIST

Full-time undergraduate degree program students (attempting at least 12 credits) and CPCE undergraduate degree program students (attempting at least 6 credits) who achieve a semester grade point average of 3.50 or higher, with all grades at least 'C' (2.0) for the semester, are recognized for their scholastic achievement by placement on the Dean's List, if they have not received any 'IC' grades. A Dean's List notation is posted to the student's official transcript following each grading period in April, August, and December.

## GRADING

Student grade point average (GPA) is determined using the semester credit hours earned in each course multiplied by the weight of the grade received. The sum of these products divided by the total semester hours taken by the student during a semester is the grade point average (GPA). Courses in which advanced standing credit is given for work taken in other institutions of higher education, or in which grades of "IC", "W", "S", "P" or "U" are received, are omitted in determining the grade point average (GPA).

Exclusion of courses from the GPA may occur with one, or any combination, of the following actions:

- The student repeats a grade of "C-", "D+", "D", or "F"
- The student changes program and only the exclusive course requirements of the former major are removed from the GPA calculation of the new curriculum's GPA, as determined by the appropriate academic department chair. Humanities and social science courses do not qualify for grade forgiveness.

## Midterm and Final Grades

Midterm grades are posted at the mid-point of each semester on Leopardweb. Midterm grades do not appear on the student's official transcript. It is the student's responsibility to meet with their primary advisor and the instructor of any course in which midterm grades reflect poor academic progress to improve the quality of their work and seek help from all available campus resources. Students should consult the academic calendar for midterm grade due dates and posting dates for each semester.

Final grades are posted after each semester in April, August, and December. Students should consult the academic calendar for final grade due dates and posting dates for each semester. Students with questions or concerns regarding their final grade should contact the instructor for the course.

## Grade Scale: Undergraduate and Graduate

*Undergraduate:*

GRADE	WEIGHT	NUMERICAL DEFINITION	DEFINITION
A	4	93-100	Student learning and accomplishment far exceeds published objectives for the course/ test/ assignment and student work is distinguished consistently by its high level of competency and/or innovation.
A-	3.67	90-92	
B+	3.33	87-89	Student learning and accomplishment goes beyond what is expected in the published objectives for the course/ test/ assignment and student work is frequently characterized by its special depth of understanding, development, and/or innovative experimentation.
B	3	83-86	
B-	2.67	80-82	
C+	2.33	77-79	Student learning and accomplishment meets all published objectives for the course/test/assignment and student work demonstrates the expected level of understanding and application of concepts introduced.
C	2	73-76	
C-	1.67	70-72	
D+	1.33	67-69	Student learning and accomplishment based on the published objectives for the course/test/assignment were met with minimum passing achievement.
D	1	60-66	
F	0	0-59	Student learning and accomplishment based on the published objectives for the course/test/assignment were not sufficiently addressed or met
P	0		Pass (for credit)
S	0		Satisfactory (no credit)
U	0		Unsatisfactory (no credit)
W	0		Withdrew
IC	0		Incomplete (temporary)
NR	0		Grade Not Reported by Instructor

\*Wentworth does not offer students the option to audit a course; if a student is granted an exception to this policy the course cannot be converted at any time to a credit bearing course and will not satisfy a degree requirement.

## Graduate:

GRADE	WEIGHT	NUMERICAL DEFINITION	DEFINITION
A	4.0	96-100	Distinction
A-	3.67	92-95	High Pass
B+	3.33	88-91	Pass
B	3.00	84-87	Pass
B-	2.67	80-83	Provisional
F	0.00	0-79	No Pass
P	0.00		Pass (for credit)
S	0.00		Satisfactory (no credit)
U	0.00		Unsatisfactory (no credit)
W	0.00		Withdrew
IC	0.00		Incomplete (temporary)
NR	0.00		Grade Not Reported by Instructor

### Incomplete Grades Policy

A temporary grade of 'IC' may be issued only to a student who has completed most the work in a course, but has a medical emergency, personal emergency, or other circumstance which is beyond the student's control that would prevent the completion of work by the time grades are due. It is not used to allow students who mismanage their time to turn in work late. Students seeking an 'IC' grade must make arrangements with the course instructor prior to the final examination period.

Unresolved 'IC' grades received in the fall semester will automatically be changed to 'F' at the midterm grade deadline the following spring. Unresolved 'IC' grades received in the spring and/or summer semester will automatically be changed to 'F' at the midterm grade deadline the following fall. Seven-week courses will have until end of the full term. Session two will have until midterm of the following full term. Unresolved 'IC' grades will delay the awarding of an undergraduate or graduate degree until such time a final grade has been awarded or the requirement has been met. No degrees will be conferred with outstanding 'IC' grades.

If a student receives an 'IC' grade in a prerequisite course for a subsequent, pre-registered course, the 'IC' must be completed, and a passing grade received before the end of the drop/add period in the semester the student takes the subsequent course. Permission to remain in the sequence course must be granted prior to the deadline for completion of the 'IC' grade from the prior semester. If permission to remain in the pre-requisite course is not granted, the course(s) will be dropped from the student's schedule.

### Pass/Fail Grades

Grades of 'P' or 'F' are awarded to courses with this grade scheme and carry academic credit. 'P' or 'F' grades do not calculate into the GPA.

### Satisfactory/Unsatisfactory Grades

Grades of 'S' or 'U' are awarded to non-credit bearing courses and do not calculate into the student's semester or cumulative GPA.



## Repeated Courses

### *Undergraduate*

A course may be repeated for credit if a grade of 'C-' or less is received on the first attempt. If a student receives as second grade of 'C-' or less in the repeated course, the course may be repeated only once more. The grade for the repeated course is calculated in the GPA in place of the initial grade(s) regardless of the replacement grades earned. The previous grade(s) remains on the record, but neither the previous grade(s) nor the credits are calculated. Students are not permitted to transfer a course to WIT for grade replacement. For grades of 'C-' or below, grade replacement courses must be completed at WIT.

### *Graduate*

For courses in which a grade of 'F' is received, students may repeat that course only once. After the course, has been retaken, the first grade is excluded from the GPA and replaced by the second grade. Courses passed with a grade of 'B-' or higher may not be retaken for improving the overall program GPA. Students are not permitted to transfer a course to Wentworth for grade replacement; grade replacement courses must be completed at WIT.

## Retention of Graded Student Work

All work submitted for grading is the property of Wentworth Institute of Technology and may be retained at the discretion of the University.

## Special Grading Policies

Several degree programs have special grading policies that impact continued progress in the program or graduation from the program. Architecture, Industrial Design, and Interior Design have a grading policy regarding studio courses, while Electrical Engineering, Electromechanical Engineering, and Mechanical Engineering all require a minimum GPA for their technical courses in addition to the University minimum GPA required for graduation. All special policies are detailed with the degree program information in this catalog.

## Final Examinations

Final examinations are given in all courses during the scheduled examination period as published in the academic calendar. The final examination schedule is published on LConnect and students are responsible for consulting it. No student should make travel arrangements that conflict with the examination schedule. Students who, prior to the final exam posting, schedule departure during final exams risk failure in their final course assessment.

Students must complete the final examination on the scheduled day. However, no student will be required to take more than two final examinations on the same day. A make-up exam can be scheduled with course instructors to accommodate students in courses with final exam conflicts. The department chairs involved will determine, if necessary, which final examination will be required to be rescheduled via a make-up exam. Students who experience a medical or personal emergency may follow the procedures outlined in the Incomplete Grades section.

## REGISTRATION

**Preregistration** is held for returning degree seeking undergraduate and graduate students in October for the spring semester, February for the summer session and in March for the fall semester. Prior to registration and depending on the student's program, a Registration Access Code (RAC Code) is required and obtained from the student's primary advisor. Students are required to resolve all holds placed on their student account before they can register for classes.

Students seeking registration into a Day or CPCE course require the approval of both CPCE and the department which offers the Day course.

**Freshmen day students and all students on academic warning or probation** are required to meet with their primary advisor prior to registration to obtain a Registration Access Code (RAC). For course registration that requires permission to register, students should contact the academic department offering the course prior to the schedule date to register.

**Registration for newly accepted students** occurs during the summer prior to the student's matriculation in the fall semester. Students register for their courses during New Student Orientation. Incoming transfer students are registered by their academic department chairs and the registrar prior to their arrival. New transfer student schedules are developed based upon awarded transfer credit to best fulfill their curricular requirements.

**Registration for continuing students** occurs for each of the three academic semesters. Prior to each registration period, course listings, specific registration dates and times, registration instructions as well as up to date information regarding course openings and prerequisites are available online through the LeopardWeb student portal. Responsibility for course selection and fulfillment of graduation requirements ultimately rests with the student.

## Colleges of the Fenway Cross Registration

Wentworth is a member of the Colleges of the Fenway (COF), an association of five Fenway-area institutions whose other members are Emmanuel College, Massachusetts College of Art and Design, MCPHS University, and Simmons College.

Students interested in cross-registering for a course through the COF must complete a COF cross-registration form in the Student Service Center. Full-time matriculated students may cross-register for up to two COF courses in each semester. Course offerings and other information are published online.

Students who cross-register must follow the academic policies and procedures of the host institution for that course. This includes the host institution's academic honesty policy and adherence to their academic calendar. Discipline issues will be addressed by the student's home institution.

Grades received in cross-registered COF courses will be computed in the cumulative grade point average in accordance with the Wentworth grading system. Pass ("P") grades are not accepted at Wentworth. Students may not be allowed to register for courses that are graded on a Pass/Fail basis.

To ensure that the COF will satisfy a degree requirement, prior to taking the COF course the student must Request for a Course Substitution for the course. A Transfer Credit Pre-Approval Form must be submitted to the department which offers the Wentworth requirement. The curricular department chair determines if the course content and credit hours are equivalent to the Wentworth course and then approves or denies the request. In cases where the course is required by a department other than the department that offers the course, the student may also need approval from the department that requires that course.

## Class Standing

Class standing for undergraduate students is determined by the number of earned credit hours. It does not include credit hours for courses in progress or the number of semesters a student has attended the University.

### *Undergraduate:*

<b>Class Year</b>	<b>Earned Credit Hours</b>
Freshman	0-31
Sophomore	32-63
Junior	64-95
Senior	96-139
Fifth Year	140+

## *Undergraduate College of Professional and Continuing Education:*

<b>Class Year</b>	<b>Earned Credit Hours</b>
First Year	0-29
Second Year	30-49
Third Year	50-73
Fourth Year	74-93
Fifth Year	94-113
Sixth Year	114+

### **Registration Cancellation for Non-Payment**

Students who do not have their accounts paid in full by the tuition due date, complete required financial aid paperwork, or have not made payment arrangements with Student Financial Services/Billing, class registration and/or housing assignment may be canceled for non-payment.

If a student's class registration and/or housing assignment is canceled for non-payment, the student may re-register for classes prior to add/drop, depending on class availability and provided appropriate payment arrangements are made.

If a student's housing assignment is canceled, there is no guarantee that the student will receive on-campus housing.

Approved methods to settle the bill:

- Payment in full OR
- Approved financial aid and all requirements complete OR
- Approved payment plan

### **Course Load**

Full-time undergraduate students must carry a course load of at least 12 credit hours. Failure to carry the minimum number of credit hours may jeopardize housing, financial aid status, athletic eligibility, and health insurance.

- COOP3000, COOP3500, COOP4500, and COOP5000 are considered full-time.
- All graduate students enrolled in nine (9) or more credits are considered full-time.
- Graduate students enrolled in one (1) to eight (8) credits are considered part-time students.
- International students must be full-time (at least 12 credit hours) to maintain valid F-1 Student Visa status.

A full-time student may not schedule an overload of courses without the approval of an academic department chair on a Credit Overload Form. An overload is any number of semester credit hours more than 20. No more than 24 credits or a total of six courses will be allowed. A student will be assessed a per-credit tuition charge for each credit exceeding 20 credits in addition to the full-time tuition charge for that semester; payment for credit overloads is due at the time of registration. Refer to the tuition and fees portion of the catalog for more information.

### **Course Changes and Withdrawals**

Students can make schedule changes during the first week of the fall, spring, and summer semesters. Students should consult the Academic Calendar for part of term course change dates.

Students who withdraw from a course after the end of the drop/add period and before the published deadline for the last day to withdraw will receive a "W" recorded in the grade column of their academic transcript. To withdraw from a course after the drop/add period, students must complete the Course Withdrawal form, which includes the signatures of their instructor and primary advisor, and submit it to the Student Service Center no later than the deadline published in the Academic Calendar. Under extenuating circumstances,

the department chair's signature may be substituted for the primary advisor's signature. Students will not be permitted to withdraw from courses after the published deadline; non-attendance does not constitute withdrawal from a course.

Students enrolled for less than 12 credit hours may impact a student's financial aid package, housing, and may extend a student's graduation date. International students who wish to withdraw from a course are required to obtain the written permission of the Director of International Student Services in the Student Service Center; International students must be full-time to maintain valid F-1 Student Visa status.

Time conflicts of courses are not normally permitted. Students whose courses conflict should meet with their academic department chair to develop an appropriate alternative schedule and a curriculum plan. Under exceptional circumstances, students may register for courses with otherwise unresolvable time conflicts by obtaining the Time Conflict Override form. Overrides are processed by the Academic Coordinator.

## Transfer Credit after Matriculation

To receive credit for courses taken at another accredited institution, degree-seeking undergraduate students must obtain approval in advance. Failure to obtain this approval could result in denial of the course credit.

The Transfer Credit Pre Approval Form is available on the registrar's website. Requests for approval of a course from another institution should be accompanied by the course description from that institution's catalog. Approval must be obtained prior to registering for the course at the other institution. It is the students' responsibility to have official transcripts sent directly by the institution to the Registrar's Office upon completion of the course.

Students may not use a transfer course to replace a failed Wentworth course. Courses failed at Wentworth must be repeated at Wentworth.

Note: a minimum grade of "C" is required for credit transfer. Grades for courses taken at an institution other than Wentworth are not used in computing the student's GPA. No academic credit is awarded for Internship/co-op, Practica, Directed Research, Preparatory, or remedial course work or for courses with grades of "P" or "S". Grades for coursework completed at another institution are not recorded on the student's official transcript, transfer credit is assigned a grade of "TR".

**Incoming Freshman or New Transfer students** wishing to transfer credits to Wentworth must submit an official transcript to the Office of Undergraduate Admissions before the University can evaluate and award credit. Students who have attended regionally accredited institutions can expect to receive credit for successfully completed courses (bearing a grade of "C" or higher) that are comparable in depth and content to those offered at Wentworth. In some cases, courses will transfer as elective credit and those credits will count towards the overall hours required for graduation, but not satisfy program requirements.

## RESIDENCY REQUIREMENT

Students enrolled in a baccalaureate degree-granting Day program must complete a minimum of 50 percent of their total credit hours at Wentworth Institute of Technology. All junior, senior, and, where applicable, fifth-year major-specific courses must be completed at Wentworth.

CPCE residence requirement for AS degrees is 50 percent and, for BS degrees, students can transfer up to eighty (80) credits. CPCE graduate students can transfer six (6) credits. CPCE undergraduate and graduate students must complete their final semester at Wentworth. CPCE graduate students may, with approval of the department chair, apply up to six (6) credits of graduate work completed elsewhere toward the Master of Sciences Applied Computer Science (MSACS), Master of Science Construction Management (MSCM), Master of Science Facility Management (MSFM), Master of Science Technology Management (MSTM), or Master of Engineering in Civil Engineering (MECE).

## TRANSCRIPTS

The Wentworth Institute of Technology transcript is an official document reflecting a student's cumulative academic record. An official transcript is reproduced on colored paper stock bearing the seal of WIT and is issued directly to the person or institution specified by the student. All transcripts are issued in accordance with the Family Educational Rights and Privacy Act of 1974 and may not be released to a third party without the prior written consent of the student.

Transcripts noted at the point of graduation issued from WIT reflect the student major, minor/s, certificates and honorary distinction. Transcript requests are submitted through the National Clearing House e-transcript website ([www.iwantmytranscript.com](http://www.iwantmytranscript.com)). E-transcripts are issued within 24 hours of the request. Transcripts with dates of attendance prior to 1985 will take a minimum of three working days to process. Official transcripts cannot be sent via fax transmission from Wentworth.

All outstanding debts must be satisfied prior to release of the transcript. Requests for transcripts should include dates of attendance, graduation, name at the time of attendance, declared major, and WID number, if available; there is no fee for transcripts.

## UNDERGRADUATE AND GRADUATE DEGREES

The following undergraduate and graduate degrees are awarded by Wentworth Institute of Technology

- Associates in Science (College of Professional and Continuing Education only)
- Bachelor of Science
- Master of Architecture
- Master of Science (College of Professional and Continuing Education only)
- Master of Engineering (College of Professional and Continuing Education only)
- Professional Undergraduate Certificates (College of Professional and Continuing Education only)

## Degree Application

Students who believe they are ready to receive their degree from Wentworth Institute of Technology and have a grade point average of 2.0 or higher are required to complete a formal degree application. (See Academic Calendar for specific dates.) Degree applications will not be accepted from students with a grade point average below 2.0. Applications for graduation are submitted via LeopardWeb and are required to ensure the Registrar has received all student credentials. Degrees conferred reflect the graduation that follows the student's successful completion of all degree requirements; degrees are conferred in April, August, and December.

## Participation in Commencement

Commencement ceremonies occur in April and August. Students in good academic standing may participate in Commencement and are subject to the following conditions:

Students will have satisfied all graduation requirements by Commencement, which includes in-progress courses and at least a 2.0 cumulative grade point average in the semester before graduation.

**Walk-on Policy** - Students who have not satisfied all requirements may participate in the Commencement ceremony by submitting a Petition to Walk at Commencement form to the graduation coordinator at [registrar@wit.edu](mailto:registrar@wit.edu) if they have met one of the following criteria and are preregistered for the remaining requirements in the upcoming semester:

- Must have no more than eight remaining credits,
- One semester of required cooperative education,
- Four credits maximum and one required co-op semester,
- Exceptions that fall beyond those listed require approval of the provost. If approval is granted, the information will be sent to the graduation coordinator and entered the student's permanent record.

Students approved under the walk-on policy will not appear in the commencement program and must resubmit a new graduation application when all outstanding degree requirements have been met. Failure to do so may delay the awarding of a degree.

Students who have successfully completed all requirements for the degree before a specific graduation date are eligible to receive the degree as of that date. A diploma will not be awarded before all work is completed or before the date of graduation. Upon degree conferral, the academic record is sealed; grade changes and addition of a minor or certificate are not permitted after official award date of an undergraduate or graduate degree.

Students who do not successfully complete their degree requirements because of their final grades and who are not registered for a subsequent semester will be officially withdrawn from Wentworth. The effective date of the withdrawal will be reported as the final day of classes for the last semester in attendance.

## Graduation Requirements

Curriculum leading to baccalaureate degree are so planned that a student carrying a minimum of 17 credit hours each semester will ordinarily be able to complete the requirements for graduation in four years (48 months, or 10 semesters, which include two semesters of co-op). Degrees will be awarded to candidates who have fulfilled the following:

- A minimum of 28 credits distributed per general education requirements, the requirements of the declared major, and two semesters of required co-op.
- Satisfactory completion of all requirements for a bachelor's degree must be under a catalog in effect within two years of the date of graduation. The catalog used, however, may be no earlier than the catalog in effect at the time of matriculation or in the case of a change of major, no earlier than the catalog in effect when the major was formally declared.
- A minimum of 50 percent of the total semester credit hours of any baccalaureate degree-granting day program must be completed at Wentworth Institute of Technology. Day program students must complete all junior, senior, and, where applicable, fifth-year major-specific courses at Wentworth.
- A minimum cumulative GPA of 2.0 or higher and any other academic requirements of the students major as outlined by the department.
- A minimum cumulative GPA of 2.0 or higher is required for an associate degree (CPCE only).
- Students will not be allowed to receive their diplomas or transcripts until all financial debts to the university have been paid.
- Conferral of a degree occurs when the registrar finalizes the student's academic record and confirms that all requirements have been satisfied, which includes grades of "I" (Incomplete).
- Participation in the Commencement ceremony does not constitute conferral of the degree. Similarly, inclusion of a student's name in such publications as the Commencement program does not confirm eligibility for the degree.

## Graduation with Latin Honors

Latin honors accompanying undergraduate degrees are awarded in three grades based on the final cumulative grade point average.

- Summa cum laude, with highest honors, is awarded to students with a 3.90 cumulative GPA or higher.
- Magna cum laude, with high honors, is awarded to students with a 3.75 to 3.89 cumulative GPA.
- Cum laude, with honors, is awarded to students with a 3.50 to 3.74 cumulative GPA.

The Commencement program is printed prior to grades being submitted for the student's final semester, therefore the Registrar's Office must print honors designation based upon the student's last completed semester at the time of publication. The student diploma and finalized transcript will reflect the official honors designation based upon the student's final grade point average. Graduate distinction is based upon the top 10 percent of the graduating class.

## Replacement Diplomas

Students or alumni in need of a replacement diploma must submit a Request for Duplicate Diploma and submit it to the Student Service Center at [ssc@wit.edu](mailto:ssc@wit.edu). The form must be notarized, and there is a \$50 replacement fee due at the time the completed form is submitted.

## Time to Degree

Any student who requires more than two years after their anticipated graduation date to complete a program of study must be academically reviewed by their department chair or the director of academic advising within the College of Professional and Continuing Education. Students who wish to reinstate after five years or more must matriculate under the catalog year of their reinstatement. Credit for courses taken more than five years prior to the student's reinstatement to Wentworth is not allowed. This policy applies to courses taken at Wentworth as well as those taken at other schools. All requests for reinstatement must have the approval of the department chair.

## Programs No Longer Offered

Any student who is enrolled in a program which is no longer offered by the university must complete all graduation requirements for that program within one year after the original expected date of graduation. Any student who fails to satisfy all requirements within the one-year period must have their academic records evaluated by an academic department chair/the dean of CPCE to determine which course of study and program must be followed. Beyond the one-year statute of limitation the university will not grant a degree for any program which has been discontinued.

## UNDERGRADUATE AND GRADUATE GOOD ACADEMIC STANDING

Wentworth is committed to the academic success of all students. It monitors progress toward success via the Academic Good Standing requirements. To remain in Good Academic Standing students must meet a required cumulative grade point average. Failure to meet Good Academic Standing requirements will result in sanctions and interventions, including dismissal from the University.

**Good Academic Standing is not the same as Satisfactory Academic Progress for financial aid. Refer to the Financial Aid section for more information on financial aid eligibility.**

## Undergraduate Good Academic Standing

To remain in Good Academic Standing all undergraduate students must maintain the minimum GPA according to the scale below:

Year	Cumulative Credits	Minimum GPA
Freshman	0-31	1.75
Sophomore	32-63	2.00
Junior	64-95	2.00
Senior	96-139	2.00
5th Year	140+	2.00

A cumulative GPA is the GPA calculated using grades from all semesters. A semester GPA is the GPA calculated using grades from the current semester.

\* \*Transfer students will be considered to have completed one semester of full-time study for every 12 credits of posted transfer credit. For example, a student who transfers in 24 credits and completes at least 12 credits must have a GPA of 2.0 at the end of their first semester to achieve Academic Good Standing. Part time students must meet the GPA requirement of full time students based upon the number of credit hours they have completed. For example, a part time student who has completed between 24-31 credits would be expected to have a GPA of 1.75, a part-time student who has completed 48 credits would be expected to have a GPA of 2.0

## Graduate Good Academic Standing

Minimum requirements for all students enrolled in graduate degree programs must maintain a minimum cumulative GPA of 3.00.

### Notification to Students

Students who fail to meet the minimum requirements for Good Academic Standing at the end of each semester are notified via their WIT e-mail address within two weeks after final grades are posted to their academic record. Academic Dismissal notifications are sent prior to the start of the academic sanction semester.

### Academic Warning

Academic Warning is semester-based and serves as an advance notice to students that there is a need to increase their focus on their academic performance; otherwise, they may fall into probationary status. Students are encouraged to meet with their primary advisor to discuss methods to improve their GPA. Notices are issued to students via their Wentworth e-mail after each semester whose semester GPA does not meet the minimum GPA for their class level. Academic Warnings appear on a student's official transcript.

### Academic Probation

Academic Probation status is based upon cumulative GPA. Probation formally warns students of the need to increase their focus on their academic curriculum and to take personal responsibility for addressing their deficiencies. Students who fail to meet the minimum cumulative GPA requirements for their class level are placed on probation for one semester. A student who fails to meet the minimum GPA for their class level in a second semester (consecutive or not) is placed on Continued Academic Probation. Probationary status is placed on the student's official transcript.

Students on probation are encouraged to take advantage of the resources of the University including their primary advisor, the Center for Academic Excellence, and the Center for Wellness and Disability Services, to develop strategies for success in their academic life. Students on probation are encouraged to meet all the requirements outlined on the Probation Checklist.

Students who take classes at Wentworth or courses from the Colleges of the Fenway consortium for improving their GPA, but during a non-scheduled semester, will have their probationary status reviewed following the posting of their final course grades.

### Academic Dismissal

A student who is currently on Continued Probation and whose GPA falls below the minimum GPA for Good Academic Standing for this class year, is subject to Academic Dismissal. Academic Dismissal is placed on the student's official transcript. Students who have been academically dismissed may appeal this decision in writing to the Academic Appeals Committee in care of the assistant to the provost, per the guidelines outlined in the letter of dismissal. The decision of the Academic Appeals Committee is final.



## VERIFICATION OF STUDENT IDENTITY DISTANCE EDUCATION

The Higher Education Opportunity Act (HEOA) requires institutions that offer distance education courses or programs to have processes in place to ensure that the student registering for the course is the same student who submits work, participates and/or receives course credit. At Wentworth Institute of Technology, all students registering for a course utilize their WIT ID, which corresponds with the specific username of each student. Each student is given a temporary password to login for one-time use, and upon successful login, is immediately required to change the password. Students can change the password thereafter at any time, but are required to change the password every 180 days. The logins utilize Microsoft Active Directory to authenticate the user. The password must be a minimum of eight characters using an alpha numeric combination.

While no one method can ensure students taking an online course are completing the coursework themselves, WIT learning and teaching practices help to promote academic honesty. Every WIT student must adhere to the Student Code of Conduct, (as published in the Student Handbook), the Wentworth Creed, and all published Wentworth policies and procedures about his/her character. In addition, online faculty work closely with instructional designers to develop and implement a variety of assessment tools/methods in their courses. Where appropriate, these include research and writing assignments, discussion board participation, independent and group projects, and quizzes.

# UNIVERSITY POLICIES

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## FERPA: ANNUAL NOTIFICATION OF STUDENT'S RIGHTS

It is Wentworth Institute of Technology's policy to limit the dissemination of student information. The Family Educational Rights and Privacy Act (FERPA) affords students certain rights with respect to their education records.

### Definitions

**Directory information** – As designated by Wentworth from the statutory list: name, local address, major field of study, dates of attendance, anticipated graduation date, degrees conferred, University-issued email address, enrollment status, honors, past and present participation in officially recognized sports and activities, and physical factors of members of athletic teams.

**Education records** – Any record (in handwriting, print, tapes, film, electronic, or other medium) maintained by Wentworth or an agent of Wentworth that is directly related to a student, except:

1. A personal record in the sole possession of the maker of the record and is not accessible or revealed to any other person except as temporary substitute for the maker of the record.
2. An employment record of a person not due to his/her student status, provided the record is used only in relation to the individual's employment.
3. Records that are created and maintained by Public Safety for law enforcement purposes.
4. Records made or maintained by a physician, psychiatrist, psychologist or other recognized professional or paraprofessional acting in his or her professional or paraprofessional capacity and that are used only in connection with the treatment of a student and that are disclosed only to individuals providing that treatment.
5. Alumni records that contain information about a student after he or she is no longer in attendance at Wentworth and that do not relate to the person as a student.

**Legitimate educational interest** – Indicates the need of a school official to review an education record in order to fulfill his or her professional responsibility.

**Parent** – A person who is the parent of the student, a guardian, or an individual acting as a parent in the absence of a parent or guardian. Parents who have claimed a student as a "dependent" on their federal or state tax return may be entitled to access to student records without the permission of the student. Court records and/or agreements between the parents of a student will be reviewed to verify parental status and access in some cases.

**Personally Identifiable Information** – Names, parents or other family members' names, address and address of student or family, personal identifiers information that alone or in combination, is linked to a specific student that would allow a reasonable person in the Wentworth community to identify the student with reasonable certainty, information requested by a person whom Wentworth believes knows the identity of the student.

**School official** – A person employed by Wentworth in an administrative, supervisory, academic or research, law enforcement unit, health and counseling, support staff position, a person or company with whom Wentworth has contracted (such as an attorney, auditor, or collection agent), a person serving on the Board of Trustees, and a student serving on an official committee, such as a disciplinary or grievance committee, or assisting another school official in performing his or her tasks.

**Student** – Any person who attends or has attended Wentworth. Persons admitted but never matriculated are not considered students.

## A Student's Rights under FERPA

**(1) The right to inspect and review the student's education records within 45 days of the day Wentworth receives a request for access.**

Students should submit to the registrar written requests that identify the record(s) they wish to inspect. The registrar will make arrangements for access and notify the student of the time and place where the records may be inspected. If the records are not maintained by the registrar, the registrar shall advise the student to address the request to the appropriate Wentworth official.

A student may read any recommendation in his/her files unless the right to do so has been waived in writing.

The following is a list of the types of education records that Wentworth maintains; the location(s) of such records; and their custodians (or the custodian's designee):

### *Education Records*

Type: Academic Records  
Location: Office of the Registrar  
Custodian: Registrar

Type: Admissions Files for students currently enrolled or have a history of enrollment  
Location: Office of the Registrar  
Custodian: Registrar

Type: Admissions Files for students in pre-enrollment status  
Location: College of Professional and Continuing Education (CPCE) Admission  
Custodian: Director of Marketing and Admissions

Type: Enrollment Records  
Location: Office of the Registrar  
Custodian: Registrar

Type: Career Services Records  
Location: Center for Cooperative Education and Career Development  
Custodian: Director of Center for Cooperative Education and Career Development

Type: Counseling and Academic Placement Testing Records  
Location: Center for Wellness and Disability Services  
Custodian: Director of Counseling

Type: Academic Records (grades, transcripts)  
Location: Office of the Registrar  
Custodian: Registrar

Type: Academic Disciplinary Records  
Location: Office of the Provost; Office of the College Dean; and/or Department Chair  
Custodian: Provost; Academic Discipline Board; College Dean and/or Department Chair

Type: Non-Academic Disciplinary Records  
Location: Student Affairs  
Custodian: Dean of Students

Type: Financial Aid Records  
Location: Student Service Center

Custodian: Director of Financial Aid

Type: Cross-registration records with Colleges of the Fenway

Location: Office of the Registrar

Custodian: Registrar

Type: Terms Abroad (WIT)

Location: Chair of Department and Office of the Provost

Custodian: Chair of Department and Academic Affairs

Type: Service learning records

Location: Center for Community and Learning Partnerships

Custodian: Director of the Center for Community and Learning Partnerships

**(2) The right to request the amendment of the student's education records that the student believes is inaccurate, misleading or otherwise in violation of his or her privacy rights.**

Students may request an amendment to a record that they believe is inaccurate or misleading. They should write the Wentworth official responsible for the record, clearly identify the part of the record they want changed and specify why it is inaccurate or misleading.

If Wentworth decides not to amend the record as requested by the student, Wentworth will notify the student of the decision and advise the student of his or her right to a hearing for appeal. The hearing will take place with the FERPA Appeals Committee. This committee's membership will include the associate vice president of Student Affairs, the associate vice president of Enrollment Management, the registrar, the associate vice president of Finance, and Vice President of Executive Affairs.

If as a result of the hearing, the FERPA Appeals Committee finds that that the information in the education record is not inaccurate, misleading, or otherwise in violation of the student's privacy rights, the student shall have the right to place in the education records a statement commenting on the contested information in the record or the reason(s) the student disagrees with the decision of Wentworth.

A student may not challenge a grade given through this procedure, only the accurate recording of the grade.

**(3) The right to consent to disclosures of personally identifiable information contained in the student's education records, except to the extent that FERPA authorizes disclosure without consent.**

Personally-identifiable information from the education records of a student will be disclosed by Wentworth upon the prior written consent or request of the student. The written consent or request must (a) specify the records that may be disclosed; (b) state the purpose of the disclosure and (c) identify the party or class of parties to whom the disclosure may be made. However, Wentworth may disclose information without the prior written consent of the student in the following circumstances:

1. To school officials with a legitimate educational interest in the records.
2. To officials of another school, at the request of those officials, in which a student seeks or intends to enroll.
3. To certain officials of the U.S. Department of Education, the U.S. Comptroller General, and state and local educational authorities, in connection with certain state or federally supported education programs.
4. In connection with a student's request for or receipt of financial aid, as necessary to determine the eligibility, amount or conditions of the financial aid, or to enforce the terms and conditions of the aid.
5. To organizations conducting certain studies for or on behalf of Wentworth.
6. To accrediting organizations to carry out their functions.
7. To either of two parents when at least one parent has claimed the student as a dependent for income tax purposes. A certified copy of the parents' most recent Federal Income Tax Form may be required to verify dependency.
8. To comply with a valid court order or subpoena or to comply with federal law (e.g., the USA Patriot Act).
9. To appropriate parties in a health or safety emergency.

10. To a victim of an alleged perpetrator of a crime of violence or a non-forcible sex offense, the final results of a disciplinary proceeding conducted by Wentworth with respect to that alleged crime or offense. Wentworth may disclose the final results of the disciplinary proceeding, regardless of whether it concluded a violation was committed.
11. Directory information designated by Wentworth.
12. To parents of students under the age of 21 when laws or Wentworth policies regarding alcohol or drugs are violated.
13. To parents of students when disciplinary action may be taken.
14. To parents of students when a student is at risk of harming themselves or others or in the event of a medical emergency.
15. To a court or administrative agency in the event of legal action between Wentworth and a student.

**(4) The right to file a complaint with the U.S. Department of Education concerning alleged failures by Wentworth to comply with the requirements of FERPA.**

The name and address of the federal agency that administers FERPA is:

Family Policy Compliance Office  
U.S. Department of Education  
400 Maryland Avenue, SW  
Washington, DC 20202-4605

**(5) Directory Information (Limitation on Disclosure)**

Students may restrict the release of directory information, except to school officials with legitimate educational interests and to others as permitted by law. If a student wishes to prevent disclosure, the student must complete a Request to Prevent Disclosure of Directory Information form in the Student Service Center or online. A student's Request to Prevent Disclosure of Directory Information is valid for the life of the record or until a request to reverse non-disclosure is made in writing to the Registrar's Office.

## **DISPOSITION OF RECORDS**

Applications and related material for persons not accepted are retained for seven years and then destroyed. After a student separates from Wentworth, applications and related materials are retained in the Registrar's Office for seven years.

After seven years following graduation, student records are archived and typically the following materials are retained:

- Transcripts
- Record of grade changes

## **Rights as an Alumnus/a**

All rights possessed as a student remain after leaving Wentworth. These rights apply only to those records that pertain as a student and that are accumulated during enrollment at Wentworth.

## **DELIVERY OF SERVICES**

Wentworth Institute of Technology assumes no liability, and hereby expressly negates the same, for failure to provide or delay in providing educational or related services or facilities or for any other failure or delay in performance arising out of or due to causes beyond the reasonable control of the University, which causes include, without limitation, power failure, fire, strike by University employees or others, damage by the elements, and acts of public authorities. The University will, however, exert reasonable efforts, when in its judgment it is appropriate to do so, to provide comparable or substantially equivalent services, facilities or performance, but its inability or failure to do so shall not subject it to liability.

## IDENTIFICATION CARDS

All students and employees must carry their Wentworth identification card at all times. Students must present them upon the request of a faculty member, member of the administration, or other person of authority. Any student refusing to surrender an identification card when properly requested to do so will be subject to disciplinary action. Students must have current, valid identification cards in order to borrow books from the library, use the gym facilities, enter the studios and residence halls, etc. ID cards are to be used only by the persons to whom they were issued; they are non-transferable. Students who need to replace a lost or damaged ID card can do so in the Copy Mail Center. A replacement cost will be assessed.

When students purchase a board plan, money is placed onto the identification card for use in the Wentworth cafeteria and convenience store, Massachusetts College of Art and Design cafeteria, and the Massachusetts College of Pharmacy and Health Sciences (MCPHS) coffee shop. Students may also open a Fenway Cash account to be used for purchases in the Wentworth bookstore, convenience store, some vending machines, as well as all five of the Colleges of the Fenway cafeterias and at many off-campus businesses. Refer to the Student Handbook for additional information.

## IMAGES/ PHOTOGRAPHS/ VIDEO RECORDINGS

Wentworth Institute of Technology is authorized to use photographs, videos, and audio recordings of any student on campus or at a campus event. These can be used in printed and electronic publications, on the internet, and in other promotional materials produced, used by, and representing Wentworth. The circulation of the materials could be worldwide and the Institute does not offer any compensation to students.

## MUSEUM PASSES

### Museum of Fine Arts

Wentworth has joined the Museum of Fine Arts' Student Grant Program, which provides Wentworth's full-time students, staff, and faculty with free admission to the Museum upon presentation of their WIT ID card. Specific details about this program can be obtained through the Office of Student Leadership Programs. Students may pick up the museum's "Monthly Preview" in the Dean of Students' Office or Office of Student Leadership Programs. Wentworth faculty and staff can borrow passes for the MFA from the Douglas D. Schumann Library & Learning Commons. More information is available on the library website at [library.wit.edu](http://library.wit.edu).

### Isabella Stewart Gardner Museum

Through the Colleges of the Fenway, students, faculty, and staff receive complimentary admission to the museum in addition to other benefits. Contact the director of program planning for information on benefits. Wentworth ID cards are necessary for free admission.

## NONDISCRIMINATION POLICY

Wentworth Institute of Technology reaffirms its policy of providing equal opportunity in education and employment for qualified persons in accordance with federal, state, and local regulations. Wentworth Institute of Technology does not discriminate on the basis of race, color, national or ethnic origin, sex, sexual orientation, religion, disability, age, genetic information, gender identity, veteran status or any other category protected by law in the administration of its hiring and employment policies. No person shall be denied any of the above-stated considerations solely on the basis of being disabled, but otherwise qualified. Wentworth is also committed to equal opportunity in the employment of veterans.

This policy extends to all rights, privileges, programs and activities including admission, employment, educational, and athletic programs and relates in part to requirements of federal law including Title VII of the

Civil Rights Act of 1964, Title IX of the Educational Amendments of 1972, Section 504 of the Rehabilitation Act Assistance Act of 1974, and regulations thereunder. If any person has a complaint, it should be taken to the Vice President for Human Resources/Affirmative Action Officer or the Dean of Students, who have established procedures for review. All complaints will be investigated in a prompt and confidential manner. Infractions are subject to disciplinary action, up to and including dismissal.

## **NOTICE OF CHANGE**

Wentworth Institute of Technology reserves the right in its sole judgment to make changes of any nature in its programs, calendar, academic schedule or fees whenever it is deemed necessary or desirable, including changes in course content, the scheduling of classes with or without extending the academic term, cancelling of scheduled classes and other academic activities and requiring or affording alternatives for scheduled classes. The University catalogs and CPCE bulletins contain current information regarding the calendar, admissions, degree requirements, fees, regulations and course offerings. The policy of Wentworth Institute of Technology is to give advance notice of change, whenever possible, to permit adjustment. However, Wentworth Institute of Technology reserves the right to make changes from this published information when it is deemed advisable.

## **SEXUAL HARASSMENT**

Wentworth Institute of Technology strongly affirms its commitment to maintaining a working and learning environment free of sexual harassment. Sexual harassment is a form of discrimination as defined by federal law. The University will not tolerate conduct on the part of any employee, associate, or student which has the effect of:

- substantially interfering with an individual's work/academic performance
- creating an intimidating, hostile or offensive working/learning environment
- interfering with the educational process
- denying any student equal educational opportunity

The University will react promptly to complaints expressed to the vice president for Human Resources/Affirmative Action Officer, the dean of students (or designee), or Public Safety, who have established procedures for confidential investigation and review.

## **STORM CANCELLATION**

Whenever inclement weather is a factor, all students, faculty, and staff are encouraged to check the Institute's website ([wit.edu](http://wit.edu)) or their email for information pertaining to the status of the campus.

Additionally, every effort will be made to make an announcement on radio stations WRKO (680 AM) and WBZ (1030AM), and TV stations WBZ (Channel 4), WCVB (Channel 5) and WHDH (Channel 7), as well as Institute social media channels.

When feasible, the decision to remain open, delay the opening, cancel classes, or close the Institute will be made as early as possible. Please do not call Public Safety for this information, as it may detract from their addressing more serious matters.

## **STUDENT RIGHT TO KNOW AND GRADUATION RATE**

In accordance with the Student Right to Know Regulations (published in the December 1, 1995 Federal Register, pages 61775 through 61788), Wentworth Institute of Technology discloses its graduation rate. Graduation rates at the University have been rising. The six-year graduation rate for the Fall 2011 cohort is 66 percent.

## STUDENTS REPRESENTING WENTWORTH DURING SCHEDULED CLASS TIMES

There are various times when students such as student-athletes, student government officers, and members of the student chapters of professional organizations leave the campus to represent the University and its values. Occasionally, an intercollegiate athletic event, field trip, or professional meeting will conflict with a scheduled lab, class, or examination. In these cases, the student is expected to notify the instructor, in writing, in advance. Faculty should allow the student to make up the missed work without penalty. All students, regardless of the activities they participate in as part of their Wentworth education, are expected to conscientiously complete all assignments in the courses of study.

## STUDENTS WITH DISABILITIES

Wentworth Institute of Technology strives to provide students with disabilities equal and integrated access to all academic, social, and recreational programs and activities. Wentworth adheres to the Federal laws set forth in the Rehabilitation Act of 1973 (Section 504) and the Americans with Disabilities Act Amendments of 2008 (ADAAA), which prohibits discrimination against students with disabilities. Section 504 and the ADA define a disability as a “physical or mental impairment which substantially limits one or more major life activities, has a record of such impairment; or is regarded as having such an impairment.” The Center for Wellness and Disability Services seeks to ensure that students with disabilities receive support, guidance, and reasonable accommodations.

To be considered eligible for accommodations, a student must schedule an appointment with a counselor in the Center for Wellness and Disability Services, complete the Voluntary Disclosure form, and submit appropriate documentation of a disability.

Please contact the Center for Wellness and Disability Services at (617) 989-4390 or [counseling@wit.edu](mailto:counseling@wit.edu) with any questions regarding student disabilities, or to schedule an appointment. For additional information, visit the Disability Services website.



# ACADEMIC RESOURCES

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## ACCELERATE, WENTWORTH INNOVATION + ENTREPRENEURSHIP CENTER

ACCELERATE, Wentworth Innovation + Entrepreneurship Center, was conceived as a logical extension of Wentworth's already existing strengths and disciplines to drive thought partnerships, interdisciplinary engagement, and out-of-the-box ideas among students, alumni, industry, and the Boston community. ACCELERATE aims to build innovative thinking and entrepreneurial confidence in our students.

Since our inception in 2012, more than 5,500 participants have engaged in our programs. ACCELERATE has proven to be a catalyst for encouraging students' passion, whether it is to start their own venture, work in a startup, or become entrepreneurs for an established company. The experiences and education gained through ACCELERATE will position them for the future.

### The Startup Challenge

The Startup Challenge provides a platform for students to form interdisciplinary teams and develop an idea they are passionate about.

### The Social Innovation Lab

The Social Innovation Lab is a 12-week interdisciplinary and immersive experience encouraging co-op students to create innovations that matter, solve real-world issues, and work in a high-intensity environment.

### Innovation Methodologies

Innovation Methodologies are proactive tools and techniques to inject innovative thinking and entrepreneurial confidence through pop-up workshops in classrooms and around campus.

### External Collaborations

In collaboration with external partners such as the City of Boston, ThinkTanks are one-day innovation sprints that bring together industry leaders, students, faculty, and community partners across disciplines to tackle future trends, opportunity spaces, and develop real-world solutions.

## ACADEMIC ADVISING

Academic advising is an integral part of the Wentworth student experience with a primary objective of encouraging students to take full advantage of the learning environment and available resources. Wentworth's advisors assist students in becoming aware of their interests, talents, values, and priorities. They facilitate the connection between a student's academic experience and future life plans. In essence, the goal of Wentworth's advising system is to equip students with the tools and resources necessary to negotiate higher education.

All students are assigned a primary advisor findable on Leopardweb. Advisors counsel students on curricular matters, monitor student academic progress, review academic policies and procedures when necessary, review student course selections prior to registration, and answer questions regarding student career and educational objectives. First-year students are required to meet with their primary advisor to discuss curricular decisions and to obtain a Registration Access Code (RAC). They will be introduced to their primary advisor during Wentworth Opening Week (WOW) or within the first few days of classes.

Students are encouraged to discuss academic problems and seek help from their instructors and advisors as early as possible. In addition, the Center for Academic Excellence provides many resources to help students reach their full learning potential and exceed academically.

In the College of Professional and Continuing Education, academic advisors are also available to assist adult students in reaching their educational goals. Once accepted into the College of Professional and Continuing Education, students will be assigned their own, dedicated academic advisor. Students are encouraged to reach out to their advisor regularly. An academic advisor at Wentworth will help students stay on track with their schedule and address concerns along the way. A list of our advisors for specific programs can be found on the Advising Staff Page.

## CENTER FOR ACADEMIC EXCELLENCE

The Center for Academic Excellence, located in Beatty 402, is open Monday through Friday. Specific hours and a complete list of services can be accessed through the Center for Academic Excellence website at [wit.edu/cae](http://wit.edu/cae).

The Center for Academic Excellence facilitates academic success for each Wentworth student and helps them achieve their individual learning potential. Students may choose to receive individual assistance through one-on-one tutoring in many subjects, including math, science, writing, and major classes. In addition, the Center for Academic Excellence offers Facilitated Study Groups (FSGs), tutor-led study tables, Learning Lab review sessions, academic workshops, and learning strategy consultations. The peer tutoring program is certified by the College Reading and Learning Association's International Tutor Training Certification program.

The Center for Academic Excellence provides academic assistance free of charge to any Wentworth student. The staff includes:

- Peer tutors, who assist students with mathematics, science, and major subjects
- Faculty from various departments, who assist with mathematics and technical courses
- Writing tutors, who assist students with questions about writing papers, conducting research, preparing outlines, or brainstorming ideas.

## CENTER FOR COOPERATIVE EDUCATION AND CAREER DEVELOPMENT (CO-OPS + CAREERS)

**Robbin Beauchamp, Director**

Wentworth Hall, Room 101

(617) 989-4101

[coopsandcareers@wit.edu](mailto:coopsandcareers@wit.edu)

Wentworth's Center for Cooperative Education and Career Development (Co-ops + Careers) offers students and graduates a full range of career services, including cooperative education and career advising, career information and resources, graduate school planning, and opportunities to network with employers. The office is located in Wentworth Hall and is open Monday through Friday, 8:15 a.m. to 4:45 p.m., and some evenings.

### Co-ops + Careers Advising

Co-ops + Careers advisors provide career advising to students and alumni at any point in their college or post-college experience. Co-ops + Careers staff help students and alumni research occupational and employment information, establish short- and long-term career goals, explore different career paths, and make informed and purposeful career decisions.

## Cooperative Education (Co-op)

As a requirement for graduation, undergraduate day-program students complete two cooperative education semesters, typically one in each of the junior and senior years. Students must register in Leopardweb for COOP 3500 or COOP 4500 to fulfill a co-op requirement and report the co-op hire on WITworks ([wit.edu/career-services/current/WITworks.html](http://wit.edu/career-services/current/WITworks.html)), an online job-posting and co-op management system. Typically, students will not take other courses during their co-op semesters. Enrollment in a co-op course maintains a student's full-time student status. Students must obtain prior approval when registering for additional courses during their co-op semester: co-op overload form required.

Transfer students must complete at least one semester in residence at Wentworth before being eligible for the cooperative education program.

Students must be in good academic standing to enroll in a co-op. Students not meeting this standard by the end of the semester immediately preceding their co-op term will not be eligible for co-op. These students will be dropped from their co-op enrollment.

Upon completion of the co-op and required assignments, students earn a satisfactory/unsatisfactory (S/U) grade, which is recorded on the student's academic transcript.

Occasionally students enter the baccalaureate programs with substantial work experience in their major field. With the approval of the dean of the college, with consultation from the director of the Center for Cooperative Education and Career Development, this work experience may be substituted for one of the cooperative education requirements. Students must formally petition to receive this course substitution to the Co-ops + Careers Office.

Two semesters of optional co-op education are also offered, typically one in the summer prior to junior year for students who have completed all prerequisites for junior year courses and are in good academic standing, the other for students who have successfully completed their two required semesters of co-op and obtained permission from their academic department and Co-op + Career Advisor.

There is no co-op requirement for students in the College of Professional and Continuing Education.

## Co-op Schedule

### *Undergraduate*

- First Year Fall: Class
- First Year Spring: Class
- Second Year Fall: Class
- Second Year Spring: Architecture Required 1
- Second Year Summer: Optional Co-op\*; Math Three-Year Required 1
- Third Year Fall: Class
- Third Year Spring: Co-op Required 1\*; Math Three-Year Required 2
- Third Year Summer: Architecture Required 2; Electromechanical Required 1; Math Four-Year Required 1
- Fourth Year Fall: Co-op Required 2\*
- Fourth Year Spring: Math Four-Year Required 2
- Fourth Year Summer: Electromechanical Required 2
- Fifth Year, Electromechanical ONLY:
  - Fall: Class
  - Spring: Class
  - Summer: Class

\* Co-op semesters for all other majors not listed.

## Co-op Institute

This seminar provides students with the skills and knowledge needed to successfully obtain a co-op position. Students are taught by their Co-op + Career advisor, who supports their individual majors. Guest instructors include industry employers and students who have successfully completed a co-op. Students learn about résumé and cover letter development, job search strategies, interviewing skills, professionalism on the job, networking, and how to successfully register for their co-op semesters and report their co-op on WITworks. Students typically take Co-op Institute the semester prior to their first co-op. Student-athletes and international students are encouraged to take Co-op Institute two semesters prior to their first co-op.

## Career Tools

Co-ops + Careers assists students and alumni who seek to explore possibilities that match their career goals, develop job-search competencies and methods to present themselves effectively, obtain information on employment opportunities (full-time and co-op) and prospective employers, connect with employers, and develop and maintain relationships with employers.

Through WITworks, co-op and career fairs, and specialized recruiting events, such as mock interview day, students and employers can connect for co-op and full-time job opportunities. Resources for the co-op and full-time search are available in our office, on our website and in the library.

The ASPIRE@Wentworth program is offered to students who find social interactions a significant challenge, such as interviewing. Co-ops + Careers has partnered with the Massachusetts General Hospital's ASPIRE program to provide personal job coaches to students who need intensive assistance before and during the interviews and during co-op. ASPIRE@Wentworth meets with each student to help them assess the level of assistance they need and provide practice interviewing. To learn more about the program, students can contact their Co-op + Career advisor.

Students participate in a variety of professional activities throughout their time at Wentworth. At WITwear, students can borrow professional attire for free, with options available for all genders. All items have been donated by staff, faculty, students, alumni, and employer partners and are dry cleaned after every use. For hours contact the Co-ops + Careers office. WITwear is located in Tudbury Hall, Lower Level, Room #11-020. Lastly, the Co-ops + Careers staff provides many additional resources to assist students in their co-op search and career development. There are printed resources available in our office and the library, online resources on the Co-ops + Careers website, the award winning WITWorks Radio show, available live and on demand, and the WITSHappening Blog.

## Co-ops + Careers Graduate School Planning

Co-ops + Careers assists students and alumni in obtaining information on graduate/professional schools and preparing for the graduate/professional school application process.

## DOUGLAS D. SCHUMANN LIBRARY & LEARNING COMMONS

### Beatty Hall Second and Mezzanine Floors

(617) 989-4040, Text: (617) 600-5989

Website: <http://library.wit.edu/home>

Fenway Library Organization (FLO): <http://libraries.flo.org/home>

Circulation Desk: [circdesk@wit.edu](mailto:circdesk@wit.edu)

Reference Desk: [ref@wit.edu](mailto:ref@wit.edu)

Facebook: [www.facebook.com/WITLibrary](http://www.facebook.com/WITLibrary)

Twitter/Instagram: @WITLibrary

## About

The Douglas D. Schumann Library & Learning Commons is a dynamic, technology-driven space where students and faculty can collaborate and learn. The library is open seven days per week during the semester and offers extended hours during final exam periods. For the most current information about our hours, check the Douglas D. Schumann Library & Learning Commons website ([library.wit.edu](http://library.wit.edu)).

## Collections

Our librarians select materials in multiple subjects to meet the curricular, informational, and educational needs of the Wentworth community. The collection includes physical and digital access to books, journals, databases, and multimedia, with new resources added regularly.

## Technology Sandbox

The Douglas D. Schumann Library & Learning Commons provides access to cutting-edge technology tools in the Lloyd Andres Carney Technology Sandbox. Located on the first level, the Tech Sandbox provides 3D printing and scanning to print 3D models. The library loans technology resources—including digital cameras, 360-degree cameras, Arduinos, and Raspberry Pis—to students and is constantly adding new technology to our lending library. Visit [library.wit.edu/tech-sandbox/technology-lending](http://library.wit.edu/tech-sandbox/technology-lending) for updates.

## Borrowing

Materials from beyond Wentworth can also be borrowed through our online FLO catalog, featuring nine other FLO libraries. If something is not available through FLO, we can get it through our Interlibrary Loan service (ILL). Walk-in research assistance is available at the library's Reference Desk.

Wentworth community members who work, own property, or live (even temporarily, as a student) in Massachusetts are eligible to borrow materials from the Boston Public Library. Online registration affords you access to BPL's e-resources, and you may upgrade your privileges to borrow physical materials if you appear in person with proof of your eligibility. Visit the BPL website for more information about borrowing: <http://www.bpl.org/general/circulation/whocard.htm>. You can also call (617) 536-5400, or email [ask@bpl.org](mailto:ask@bpl.org).

## Research Help

Walk-in research assistance is available at the library's Reference Desk. If you need more in-depth assistance with a specific assignment, project, or theme, a one-on-one or group session can be scheduled with a librarian who can offer customized help. The Douglas D. Schumann Library & Learning Commons librarians prioritize helping students learn to identify and evaluate the many information resources that can be found on site, or online, for their careers at Wentworth and beyond.

## Study Space

The Douglas D. Schumann Library & Learning Commons is also a great place to study. With eight high-tech group study rooms, a quiet reading room, and many flexible collaboration areas, you will find a spot that fits your needs, whether you are engaged in interdisciplinary learning with classmates or looking for a solitary space.

## Fenway Library Consortium and Fenway Libraries Online

The Douglas D. Schumann Library & Learning Commons is a member of the Fenway Library Consortium and Fenway Libraries Online (FLO), which gives Wentworth students and faculty access to more than three million volumes and numerous other online databases, resources and services. Presentation of a valid Wentworth ID is all that is needed to use or borrow books at Emerson College, Emmanuel College, Hebrew College, Simmons College, Wheelock College, Lesley University, Massachusetts College of Art and Design, MCPHS University, Museum of Fine Arts Library, New England Conservatory of Music, New England College of Optometry, Roxbury Community College, Suffolk University, University of Massachusetts Boston, and the Brookline Public Library. Information about the collections in the above libraries (identifying the members of Fenway Libraries Online and Fenway Library Consortium) is available through the library website at [library.wit.edu](http://library.wit.edu).

## LABORATORY & STUDIO FACILITIES

Wentworth's laboratory and studio facilities are equipped with the tools, materials, apparatus, instrumentation, and machinery necessary to provide students with a variety of hands-on technical, industrial, and design experiences. This detailed listing of laboratory and studio facilities demonstrate the range of practical learning opportunities afforded to Wentworth students.

### Additive Manufacturing Center (CEIS 107)

The Additive Manufacturing Center houses several 3D-printing technologies, including Fused Deposition Modeling (FDM), Selective Laser Sintering (SLS), Stereolithography (SLA), PolyJet, Multi-Jet Fusion, and FDM/Sinter Metal printing. This facility also includes a dedicated Finishing Room for post-processing 3D-printed parts and assemblies as well as an integrated instruction area for up to 24 students.

### Altschuler Computer Center (Wentworth 004)

The Altschuler Computer Center is outfitted with the latest data-center technology including Dell servers, Cisco routers and switches, patch panels, UPS systems, and an EMC VNX housed in server racks. Students work with a variety of operating systems and tools, including enterprise virtualization software, while creating a multitude of network and system configurations.

### Architecture Center for Applied Research (Annex North)

The Department of Architecture's Center for Applied Research (CfAR) is a student-focused collaborative environment for investigating emerging fabrication technologies and methods. CfAR supports the department's core principle of thinking through making by providing a dynamic network of spaces for prototyping and applied research. Students have access to equipment, expertise, and guidance across many areas of fabrication including CNC milling, 3D printing, woodworking, laser-cutting, and robotics.

#### Architecture Design Studios (Annex North)

The Department of Architecture's design studios comprise of three floors of the Annex North building. These large loft-like spaces with natural light and outside views provide dedicated work space for each student, as well as critique rooms for group reviews.

### Bio-Fluids Lab (CEIS 223)

The Biofluids Lab will be mainly used for the laboratory section of the new course titled, Biofluids and Biotransport, in addition to being used for selected projects in the BME Senior Design Calculus.

This laboratory serves as the base for explorations of biomedical devices and biological systems involving transport phenomena, including but not limited to fluid mechanics, heat transfer and diffusion. Examples of laboratory exercises to be completed in this lab include measuring different fluid properties and other physical constants, studying the sneeze, paper-based diagnostics and microfluidic biological fluid processing. As part of several of these lab modules, the lab will also contain the equipment and materials necessary for fabrication and testing of microfluidic devices, which will also be used in interdisciplinary design and research projects.

### Biochemistry Lab (CEIS 312)

This lab will be equipped to teach biochemistry and related subjects to undergraduates in several programs at the Institute. Instrumentation that can probe biological questions at a molecular level, including gel electrophoresis, PCR, and UV-Vis spectrometers, will be housed in this space. Laboratory experiences for students will range from DNA sequencing to protein analysis.

### Biological Engineering Projects Lab (CEIS 318)

The Biological Engineering Projects Lab is the hub of the biological engineering curriculum, enabling the faculty to integrate hands-on coursework and student design projects throughout the program. The proximity of this lab to both biological and chemical instrumentation is ideal for the study of the convergence of the life sciences and engineering processes. This lab will host many capstone and undergraduate research projects spanning all aspects of biological engineering and applied biochemical sciences.

## **Biology Laboratories (Ira Allen 122, 210)**

The Department of Sciences has two biology labs in the Center for Sciences and Biomedical Engineering. These labs are outfitted with the newest equipment for conducting experiments in cell and molecular biology and biotechnology, and for performing studies for anatomy and physiology courses. These labs contain compound light microscopes, micropipettes, and spectrophotometers for introductory courses, as well as thermal cyclers and molecular imaging systems for DNA and protein analysis. The labs also feature such cutting-edge devices as fluorometers, a fluorescent microscope, and a real-time-PCR system for more sophisticated experiments. A dedicated space within the biology labs is designed for performing and teaching cell culture techniques, which includes a biosafety cabinet and incubator. Collectively, the biology labs are well equipped to provide students with the necessary tools and technology to gain relevant lab experience and skills for studying the natural world.

## **Biology Labs (CEIS 319 and CEIS 321)**

There are a number of sub-disciplines found within the field of biology that explore biological forms, functions, and behavior. One of these new labs will be equipped with advanced equipment to introduce students to novel techniques used in molecular biology, cellular physiology, and microbiology. The other of the two new biology labs will allow for the study of genetics. Genetics is at the forefront of biomedical progress, as there is mounting evidence that personalized approaches to combatting disease and regenerating tissue are essential for effective therapies. In that regard, enhanced knowledge of biological blueprints has allowed scientists to develop synthetic structures and life forms as alternative approaches to outdated interventions. These labs will be at the forefront of modern biological science, focusing on genetic interventions to model organisms, as well as training students in tissue engineering and synthesis of biomaterials.

## **Biomechanics Lab (CEIS 220)**

The Biomechanics lab is used for the courses on Biomechanics (BMED 4400), Design of Prosthetics and Implants (BMED 3800) and selected projects in the course Senior Design (BMED 5000).

The overall objective of the Biomechanics course is to train students on problem-posing and problem-solving skills and illustrating how the fundamentals of mechanics are applied to biological problems. This course offers insight into the mechanics of hard tissue, musculoskeletal soft tissue, joint articulating surface motion, analysis of gait, mechanics of head and neck, biomechanics of chest and abdomen impact, cardiac biomechanics, heart and valve dynamics, molecular transport and regulation in microcirculation, modeling in cellular biomechanics and introduction to sports biomechanics. Examples of topics discussed in the course are: How the ACL ligament injury will affect the function of the knee joint of a basketball player; how does aging affect the biomechanics of the joints in patients suffering from hip and knee disease; how does rotator cuff tear affect the motion of the shoulder joint, and how to evaluate the biomechanics of a heart valve function. Design of Prosthetics and Implants course is intended for the students to learn the design process of prosthetic devices from concept development through implementation. The students will learn about challenges involved in the design of prosthetics and implants and aspects of product development from technical and regulatory perspectives. This course offers insight into the concept development, design for manufacturing, design optimization and validation, material selection, and biomechanical analysis of the prosthetic devices. Example of projects the students will work on include devices designed for people with limb amputation; assistive devices for older people who have joint disorders; prosthetic devices for professional athletes who suffered injury or have amputations to help them to get back to the professional sport practice.

The major equipment required for the lab experiments are listed below.

Force Plate and Platform are used in required for Kinetic analysis and measurement of ground reaction forces during different activities, e.g., running, jumping, and postural sway, to facilitate understanding the properties of the joints and design of design of prosthetic devices.

Motion analysis camera system and accelerometers are very helpful in doing biomechanical analysis and understanding of joint range of motions during various physiological activities.

Force/strain sensors or switches are devices are useful in measuring in-vivo deformation of the tissue during different activities.

An EMG system will be utilized to show the students how the actual activation of each muscle bundle in the body can be measured and be used in biomechanics analysis of the prosthetics.

Computational modeling package is a tool for biomechanical analysis and design evaluation.

Students will gain a deeper understanding of gait analysis and joint biomechanics through the use of different types of measuring devices in conjunction with computational modeling software which enables them to simulate different anatomical conditions and surgical treatment scenarios. The lab will be intended to provide a robust example of biomechanics applications and bridging the gap between the classroom experience and clinical applications.

MTS mechanical testing unit can be used to evaluate the mechanical properties of the hard and soft tissue and the materials used in medical devices. The biological tissues have much more complex mechanical properties than many engineered materials; these units can be used to demonstrate the students how to assess the mechanical properties of the tissues and project prototypes.

### **Biomedical Devices Lab (Ira Allen 125-Fall / CEIS 212-Spring)**

The Biomedical Devices lab is used for courses involving medical devices and systems, namely, (BMED 3200) Medical Devices and Systems, (BMED 4100) Clinical Engineering Practice (BMED 4100), a new elective course titled Medical Device Networks (BMED 3800), and selected projects for the Senior BME Design course (BMED 5000).

The Medical Devices and Systems course covers various types of medical devices and systems. The topics include biosensors, signal processing and analysis, cardiac diagnostic and therapeutic devices involving electrophysiology and hemodynamics, respiratory, renal and neural devices and systems in clinical practice, life support and life saving devices, implants and artificial organs, imaging systems, anesthesia machines, electrosurgical units, clinical laboratory equipment, Quality Assurance, standards, regulatory affairs, FDA approval, and medical device design.

Clinical Engineering Practice covers the basic models of clinical engineering practices and the role of clinical engineers in health-care delivery organizations such as hospitals and clinics. Topics include clinical engineering department operations, managing safety programs, technology assessment, medical equipment planning, acquisition, commissioning and management, selection of equipment in the design of clinical facilities, safe, effective, ethical use of medical devices in compliance with applicable regulatory standards, and a clinical engineering design project.

Medical Device Networks course covers the application of internet networking in medical devices and systems. Topics include basics of networking, hospital network architecture and applications, and industry trends such as Internet-of-Things applied to medical devices in a hospital environment.

Some of the major equipment in the lab includes biomedical electrical safety analyzers, heart rate and blood pressure monitors, pulse oximeters, electronic stethoscopes, ECG monitors, telemetry and nurse call systems, External Pacemakers, Defibrillators, AED's, Neonatal and Transport Incubators, Electrolyte and Blood Gas Analyzers, Automated Blood Cell Counters and Patient Monitors as well as several special purpose simulators. The lab is also equipped with general test and calibration equipment with access to commonly used engineering software and specialized biomedical software.

### **Biomedical Instrumentation Lab (Ira Allen 124-Fall / CEIS 214-Spring)**

The Biomedical Instrumentation lab is used for several courses required for the students in the Biomedical Engineering major. (ENGR 1000) Intro to Engineering, (ENGR 1500) Intro to Engineering Design, and (BMED 2500) Biomedical Electronics and Instrumentation.

Intro to Engineering is a required course for the students in all engineering programs. The students work on different lab modules of Biomedical Engineering. The experiments involve measurement of heart rate, at rest and after exercise, pulse oximetry, acquisition and analysis of electrocardiographic (ECG) signals, and basics



of orthopedic implants. Topics include task/time management, effective use of notes, engineering research, oral and written communications, problem-solving techniques, ethics and professional responsibility and Institute resources and learn to develop skills such as engineering. In the laboratory, students work in teams to complete a variety of engineering tasks.

Intro to Engineering Design is a project-based engineering design course, introducing students to the fundamentals of engineering design and professional practices. Students learn about the design cycle and the steps necessary to work on a successful design as a member of a team. Topics include problem identification, brainstorming, project planning, and design alternatives. In addition, cost, safety and environmental issues are considered as well as ethical and professional responsibilities. In the lab, students work on designing and developing basic medical devices.

Biomedical Electronics and Instrumentation is an introduction to biomedical electronics and instrumentation for clinical applications. Students learn about sensors for measurement of biomedical signals, bioelectric phenomena, nerve and muscle potentials, electrodes and biosignal amplifiers, electrocardiography, blood pressure, heart sounds, respiratory pressure, gas concentration, blood-gases, electromyography, electroencephalography, therapeutic and prosthetic devices, electrical safety of medical devices, and advances in medical instrumentation and work on related lab experiments.

The Biomedical Instrumentation lab is equipped with medical electronic sensors, data acquisition systems, and signal processing units. The lab also houses several general test and calibration equipment with access to commonly used engineering software and specialized biomedical software.

## **Biomedical Projects Lab (CEIS 221)**

The BME Design Projects Lab is used mainly for the Capstone Project courses (BMED 5000) BME Senior Design I and (BMED 5500) BME Senior Design II, as well as (BMED 2990) Independent Study course.

BME Senior Design I is a course for seniors that allows them to work in a group or as an individual to further their studies in a project-oriented style. Students in this course will work on their area of focus by taking an interdisciplinary approach to solve a technological problem in the biomedical field. The projects selected by the students could be industry-sponsored projects, or projects with research grants obtained by one of more faculty members, or, special topics of research of mutual interest between the student group and supervising faculty. The design course is required for final year students to work on their senior interdisciplinary projects. Projects topics vary widely. The topics may include wearable devices design, medical software design, prosthetic design, etc. The project work done in this course will be performed under the supervision of one or more faculty advisors. Oral and written progress reports are reviewed and iteratively refined throughout the semester. The technical report of the work at the end of the semester is coupled with a formal presentation to the class. This course is followed by BME Senior Design II.

BME Senior Design II is a continuation of BME Senior Design I. Students are expected to continue with their design and development activities from the previous course and focus on design improvements and applications of the product. Supervising faculty and invited industry professionals will review the student's prototypes and make recommendations. Students will submit a report on the designed product and make a presentation to the class, supervisors, invited faculty, alumni and other interested parties. Independent Study investigates a topic of special interest to faculty and students that is outside regular course offerings. A few sections with different credit hour weights are generally offered in this course.

## **Blaisdell Biodiesel Lab (Ira Allen 105)**

This laboratory is equipped to handle the production and testing of biodiesel, as well as other advanced chemical experimentation. The lab houses a biodiesel reactor constructed by Wentworth students. There are two chemical hoods, as well as a large drop hood to handle larger equipment requiring ventilation. The laboratory is also equipped with other advanced chemical apparatus for refinement and analysis of chemical products.

## **Casella Robotics Laboratory (Rubenstein 101)**

This laboratory is used in the study of robotic systems, as well as study of digital hardware including microprocessors, microcontrollers, digital signal processing technology, and FPGA- (field-programmable gate array) integrated circuits. The laboratory is equipped with two robotic arm systems, in addition to translational and rotational vibration modules that can be used as one- or multi-degree freedom vibrational systems. There are eight computers in this laboratory, which are linked together by a general-purpose interface bus to their own set of digital test equipment.

## **Chemistry Laboratories (Ira Allen 326, 329, and 330)**

Each of the chemistry labs is outfitted with the newest equipment for conducting experiments in general chemistry and selected topics in general chemistry, as well as organic and biochemistry. The chemistry labs contain integrated safety showers and eyewash stations, in addition to traditional chemistry laboratory equipment including centrifuges, hoods, micropipettes, and computer integrated spectrophotometers, ion-selective electrodes, conductivity meters, electrochemistry apparatus, Galvanic cells, spectroscopes heating and drying ovens, distillation equipment, constant temperature baths, and related devices. A dedicated space proximate to the chemistry labs is designed for performing and teaching use of IR (Infrared) spectrophotometers and other sensitive chemistry instrumentation. Collectively, the chemistry labs are well equipped to provide students with the necessary tools and technology for a collaborative learning environment.

## **Concrete Laboratory (Annex Central 012)**

The lab's major pieces of equipment include two concrete mixers, sieve shakers, sample splitters, curing tank, scales, air content, slump and unit weight testing equipment, and drying ovens. Students learn the fundamentals of concrete mix design and testing in this lab. Tests are run on aggregates, as well as on the freshly made and hardened concrete. Students can measure the effect that different aggregate gradations, varying amounts of water, and the use of admixtures have on a concrete mix. The lab is also used to test and assemble other building materials and is used by civil engineering, construction management. The lab is used by the Student Chapter of the American Society of Civil Engineers Concrete Canoe Team.

## **Construction Management Project Laboratory (Annex South 002 and 004)**

The construction management lab provides students with place to apply the technical skills of a construction project from concept to completion. Some of the skills developed here include resource management, time, cost, and quality with an emphasis on team building. During a student's collaboration here they will complete projects using such proficiencies as budgeting, scheduling, estimating, engineering fundamentals, and analytical and communication skills. Computer monitors are available for each work station, and both labs have a smart board and screens for presentations.

## **Construction Outdoor Laboratory**

This paved outdoor space provides construction management students with an area to erect masonry and timber structures, and evaluate various construction methods and practices.

## **Electromagnetics and Telecommunications Laboratory (Wentworth 003)**

The Electromagnetics and Telecommunications Laboratory is intended primarily to meet the needs of the rapidly growing telecommunications industry. This student work area is currently equipped with 10 of the latest RF network analyzers and 10 computers for work in electromagnetic field theory.

## **Electronics Laboratory (Dobbs 202)**

The Electronics Laboratory is a core work area for all electrical and computer engineering, and technology students. Twenty computers, each linked by a general purpose interface bus to its own set of test equipment, enable students to perform computer-aided tests, circuit analysis and simulation tasks, and to solve data acquisition and process control problems. Each computer is loaded with an array of current software packages and is connected for email and internet access.

## **Electronics Project Laboratory (Dobbs 303A)**

This laboratory provides students with an area to build and test their prototypes. The laboratory contains standard electronic bench equipment (oscilloscope, digital multimeter, function generator, and power supply), and workbenches and similar equipment are available for component assembly and packaging, and mechanical assembly.

## **Environmental Laboratory (Annex North 003-Fall / CEIS 409-Spring)**

This laboratory houses a variety of typical laboratory analytical equipment and assorted glassware including incubators for B.O.D. testing and incubating biological samples, a water distillation column, biological and chemical testing instrumentation, batch mixers, gas chromatograph, flame and graphite furnace atomic absorption spectrophotometer, six chemical hoods, various pumps filters, metering instruments, assorted glassware, and six bench microscopes.

## **Fluid Mechanics Laboratory (Kingman 101)**

This laboratory contains an array of fluid testing and propulsion equipment, such as a subsonic wind tunnel, a variable-frequency drive pumping station, a supersonic/compressible flow system, a friction pressure drop piping system for circulating water, a Saybolt Universal Viscosimeter, and a velocity profile/pitot tube apparatus.

## **Fluids Laboratory (Annex Central 005-Fall / CEIS 413-Spring)**

Equipment in this laboratory is used to demonstrate the basic principles of hydraulics and fluid flow in both open channels and closed conduits. Students learn the concepts of buoyancy, velocity of flow, energy losses in bends and restrictions, sediment transport, and pump efficiency. Each of the large benches has a reservoir and a pump to circulate water. Individual experiments can be hooked up to these, allowing students to have separate workstations. The lab also includes two five-meter flumes.

## **Gelfand Strength of Materials Laboratory (Dobbs 008)**

The Gelfand Strength of Materials Laboratory houses electrodynamic and hydraulic testing equipment, which allows students to investigate important material properties such as tensile strength, shear stress, and elasticity. Other major apparatus featured in this lab include a fatigue tester, a beam deflection station, a rotating beam device, an impact tester, a temperature creep tester, and electronic strain gages. Students also analyze various structures and profile the results using graphics software.

## **Geotechnical Laboratory (Annex Central 009-Fall / CEIS 411-Spring)**

The major pieces of equipment in this laboratory include a triaxial machine, two direct-shear machines, two unconfined compression machines, four consolidometers, sieve shaker and several data acquisition systems. Tests on field-obtained soil samples can be performed to characterize and classify soil and to determine the strength, settlement, and drainage characteristics of soil deposits, information which is essential to the design of shallow and deep foundations, embankments, retaining walls, and base courses for highways.

## **Heat Transfer Laboratory (Kingman 102)**

The Heat Transfer Lab enables students to study principles of heat conduction, convection, and radiation. It includes equipment for axial and radial conduction experiments, a shell and tubes and a plate heat exchanger. The lab also contains equipment and sensors that allow students to investigate transient heat transfer and lumped system analysis, radiation properties, heat sink, and heat pipes.

## **Infrastructure Laboratory (Annex North 001-Fall / CEIS 414-Spring)**

This laboratory is home to the American Society of Civil Engineers Student Chapter. It is also used for Structural Analysis modelling, and Surveying lab preparation and Advanced Surveying lectures. The laboratory includes several tables with monitors for group design work.

## **Instrumentation Lab (Kingman 102)**

The Instrumentation laboratory enables mechanical engineering and electromechanical engineering students to learn moist air properties and air-conditioning processes, and also investigate various heating, ventilation, and air conditioning (HVAC) systems and refrigeration cycles. This lab houses several basic vapor

compression refrigeration systems, and an industrial type vapor-compression system with double evaporator and water cooled condenser. It is also equipped with a basic air-conditioning system to study psychometric processes, as well as general engineering instrumentation processes.

### **Industrial Design Studios (Annex East and Annex South)**

Beginning a student's sophomore year, the Department of Industrial Design provides dedicated studio space for each student. Studios include space for classes and individual work during evening and weekend hours. The studios also include several model shops equipped with traditional machines, as well as rapid prototyping fabrication. Full-time lab technicians monitor all model shops. There is also a digital imaging lab for drawing and photography.

### **Interior Design Studios (Annex South)**

Starting in the sophomore year, the Interior Design Department provides dedicated studio space for each student. Studios include space for classes and individual work during evening and weekend hours. The studios also include critique spaces and a materials resource room.

### **Manufacturing Center (Williston 001)**

The Manufacturing Center has four laboratory areas: the machining lab, the rapid prototyping lab, the metal fabrication space, and the foundry lab.

The machining lab has six computer numerically controlled (CNC) lathes, six CNC three-axis knee mills, a CNC three-axis bed mill, and two vertical machining centers. Through experiential laboratory activities, students learn the principles of material removal, from basic, manual operations through the most advanced computer aided manufacturing (CAM) processes.

The Rapid Prototyping (RP) lab contains multiple 3D printing processes enabling students to fabricate models for projects courses and sand casting patterns for the foundry. As is true in the machining section, all RP processes are on the Institute network, allowing remote access file handling.

The metal fabrication area contains basic sheet metal fabrication equipment. There are six multi-process gas metal arc welding (GMAW) stations on downdraft tables.

The foundry lab is used to pour aluminum parts using the green sand casting process.

### **Materials Science Laboratory (Dobbs 104D)**

The Materials Science Laboratory is equipped with all of the necessary equipment to introduce students to the concepts and fundamentals of materials. Metallographic samples are prepared with the help of diamond cut-off saws and electro-hydraulic automatic mounting presses. Microstructural analysis can be performed on one of several inverted microscopes equipped with digital imaging hardware. High temperature, industrial box furnaces, and cold-rolling equipment are used to demonstrate the relationship of manufacturing processes and resulting material properties. Other topics of experimentation include electrochemical corrosion and polymer-matrix composite materials.

### **Materials Testing Laboratory (Annex Central 007)**

This laboratory space is used for soil identification and analysis. It contains ovens, sieves, scales, and two concrete cylinder compression machines.

### **Medical Imaging Lab (CEIS 216)**

The Medical Imaging lab is mainly used for (BMED 4850) Medical Imaging and Optics and for some modules of (BMED 4800) Telemedicine and Health Informatics, as well as for selected senior design/capstone projects.

Medical Imaging and Optics course covers medical imaging modalities used in clinical settings for diagnosing abnormalities and disease conditions. The topics include X-ray, digital subtraction angiography, mammography, computed tomography (CT), ultrasound, magnetic resonance imaging (MRI), microscopy, spectroscopy, and endoscopy.

Telemedicine and Health Informatics will expose the students to the fields of telemedicine and medical informatics. Topics covered include telemedicine technologies, telemedicine consultations, internet in telemedicine, mobile technology, health-care data, storage of health data, analytics, electronic health records and health information exchange, medical coding, health information privacy, and security in health informatics. An overview of some experiments in the Medical Imaging Lab is given in the following section.

In the ultrasonic imaging modules, students will have hands-on experience with different ultrasound devices and learn about operation, maintenance, and principles and image processing techniques. Students will learn how different imaging systems function and learn the applications of different types of ultrasound devices, as well as their usage in clinical settings. Having different ultrasound devices will allow students to compare the models, applications, and operations of each, thus enabling their critical thinking on different design implementations.

A miniature simulated design of an MRI system will be used for teaching the principles of magnetic resonance imaging. The unit uses the Earth's magnetic field as the primary field. Students will learn to demonstrate Spin-Echo Imaging, Gradient Echo Imaging and Filtered Back Projection Imaging to check T1, T2, spin echo, and pulsed gradient spin echo.

In the modules on optics, students will learn principles of imaging and optics which are essential for most of imaging techniques. Experiments would emphasize the effects of reflection, refraction, interference, dispersion, diffraction, and the like on resulting output image.

In the spectrophotometer module, students will study the basis of spectroscopy of chemical elements in the body as well as time characteristic spectra in life science as applications. Having different systems will enable students to compare the characteristics and performance.

Phantoms are used as substitutes for human body to test the imaging units and assess the image quality. The phantoms are essential for students to learn to apply technology for simulating human characteristics. Having an endoscopy system will help students to work on the hardware, software, principles, operation, and applications. Microscopes and selected slides will enable the students to learn observing slide and learn the characteristics and identifying the abnormalities. Students will also learn about fluorescence, confocal microscopy, and dark-field microscopy.

## **Nanotechnology Laboratory (Dobbs 006)**

This laboratory is used to supplement nanotechnology courses. The lab supports undergraduate research through senior design offerings and special student projects, and allows for teaching across engineering disciplines to promote cross-disciplinary teamwork at Wentworth. The laboratory encompasses a nanoparticle deposition system capable of generating nanoparticles of different sizes from different materials in a differential pressure vacuum system, along with an atomic force microscope, and other test and characterization equipment.

## **Organic Chemistry Lab (CEIS 311)**

This lab is designed to allow students to synthesize and characterize organic molecules. Standard synthetic equipment including micro-kits, columns for chromatography, and rotary evaporators, as well as equipment for analysis such as GC-MS (Gas Chromatograph-Mass Spectrometer) and IR Spectrophotometers, will be available. This lab, complemented by the new biology labs, will allow for the offering of a full pre-med program to those students who desire it.

## Physics Laboratories

### (Ira Allen 201, 206, 207, 211, 212-Fall / Ira Allen 124, 125, 206, 207, 211, 212-Spring)

The Physics Laboratories are equipped to support introductory experiments in mechanics, fluids, sound, waves, electric and magnetic fields, and optics. They are also equipped to support more advanced physics experiments such as spectrum of gases, interferometry, photo-electric effect, electron to mass ratio, electron beam deflection by electric and magnetic forces, and X-rays. These experiments are performed with the help of a variety of precise and/or complex instruments that include electron tubes, an X-ray machine, precision interferometers, spectrometers, acoustic devices, an optic table, oscilloscopes, function generators, helium-neon lasers, and a complete microwave optics system. One of the labs is designed to perform light sensitive experiments in optics. The department also has its own weather station, providing a variety of weather-related data.

## Power and Controls Laboratory (Wentworth 007)

The Power and Controls Laboratory is a specialty lab dedicated to the study of various sized motors and generators, and to the analysis and design of analog and digital feedback control systems. Centered on four machine sets, this student work area is supported by 10 computers, digital oscilloscopes, and digital multimeters.

## Project Laboratory (Kingman 103)

This multi-purpose laboratory space is dedicated to student-based innovative projects. Machining equipment, welding facilities, and a variety of tools are available in this area.

## Survey Locker (Annex North)

This locker houses an impressive collection of state-of-the-art equipment for making linear and angular measurements, as well as locating points with a high degree of accuracy. Included are 10 automatic levels, 10 theodolites, five total stations with internal data collectors, one electronic digital level, one laser level, and two global positioning systems with multiple receivers. Students in the Civil Engineering and Construction Management programs are introduced to the theory of measurement in lecture and gain practical experience by using the instruments in lab. The lab is also used in coursework for the minor in Surveying. Surveying is conducted on and around the campus.

The Biomedical Engineering department has three labs in the Center for Sciences and Biomedical Engineering: the Biomedical Instrumentation and Medical Devices Lab (BMIL), the Bioelectronics and Biofluids Lab (BEFL), and the Biomedical Engineering Project Lab (BEPL). Several medical devices used in clinical diagnosis, therapy, research, and development are housed in these labs in support of several lab-based courses in the biomedical engineering program. The devices in BMIL include biomedical electrical safety analyzers, heart rate and blood pressure monitors, pulse oximeters, electronic stethoscopes, ECG monitors, telemetry and nurse call systems, external pacemakers, defibrillators, AED's, neonatal and transport incubators, electrolyte and blood gas analyzers, automated blood cell counters, and patient monitors, as well as a collection of special purpose simulators. BEFL contains several medical electronic sensors and signal processing units, biological work tables, centrifuges, microtome, cryostat, and infusion pumps. Both BMIL and BEFL include general test and calibration equipment, and provide access to commonly-used engineering software and specialized biomedical software. BEPL is designed for final-year students to work on their senior interdisciplinary projects.

## Thermodynamics Laboratory (Rubenstein 005)

The Thermodynamics Laboratory serves students enrolled in mechanical and electromechanical degree programs and enables them to study the use of energy for the purposes of mechanical and electrical power production. This lab features a turbo-charged diesel engine/generator station, a calorimeter for fuel analysis, an air heat-recovery ventilator (white enclosure) for indoor air quality, a state-of-the-art small engine dynamometer, and an aircraft gas turbine. Students are introduced to pressure, temperature, and humidity testing devices such as transducers, vacuum gages, thermocouples, and barometers. Engine efficiency and performance tests are conducted, and students learn basic properties of various fluids.

### Unit Operations and Process Controls Lab (CEIS 310)

This Lab will focus around fundamental design and operation principles of biological engineering systems, including topics such as phase transfer, separation, synthesis, and mass transfer of biomaterials. Equipment and facilities housed within this lab will include bioreactors, centrifuges, and processors.

## DIVISION OF TECHNOLOGY SERVICES

### Tech Spot

Beatty Hall, Room 320

Help Desk (617) 989-4500, helpdesk@wit.edu

wit.edu/dts

The Division of Technology Services supports all aspects of technology at the University.

### Vision

To provide technologies that will:

- Enrich the experience of Wentworth's stakeholders
- Enhance the reputation of the University
- Facilitate a culture of innovation and creativity through technology

### Mission

Build relationships across the University to ensure that technology solutions are creating opportunities to improve effectiveness and efficiencies, and are agile enough to facilitate growth, innovation, and creativity.

### Divisional Goals

- Operational excellence
- Information security/regulatory compliance
- Customer service
- Collaboration and mobility
- Financial stewardship
- Leadership, partnership, and business enabling

### Operational Goals

- Employ best practices in managing technology operations to ensure cost-effective delivery of reliable, scalable services.
- Stability and reliability of core services
- Innovation
- High-quality personnel
- Exceptional planning and project management

### Programs of Service

- Administrative and Business Enterprise and local services that support the administrative and business functions of an institution. Includes reporting, descriptive analytics, finance, student information systems, advancement, and conference and event support.
- Communication and Collaboration IT services that facilitate institutional communication and collaboration needs. Includes email, calendaring, telephony/VoIP, video/web conferencing, unified communications, digital and web communications, and media/AV services.
- End-Point Computing Services that enable community members to do their day-to-day work, including providing access to enterprise services. Includes network access, user file storage, end-point computing backup solutions, desktop support, computer labs, and printing/plotting.
- Infrastructure-Enterprise level hardware, software, systems, and network infrastructure that provide underlying support for Institute activities. Includes data centers, Internet access, wired and wireless networking, telephony and collaboration tools, central storage and backup solutions, virtual servers, and systems management.

- IT Professional Services that are consultative in nature; these may be a combination of customer-facing and non-customer-facing services. Includes IT training, consulting/advisory services, business continuity/disaster recovery, enterprise architecture, portfolio/project management, business systems analysis, and IT Service Management.
- Security Infrastructure and services that provide security, data integrity, and compliance for institutional activities. Includes services such as virus protection, encryption, privacy impact assessments, risk management, emergency preparedness, data security, access controls (i.e., accounts, passwords), audit and monitoring systems, and stewardship.
- Teaching and Learning management system and academic technology infrastructure and services to support course consulting, meaningful integration of instructional technology, and resources directly supporting face-to-face, hybrid, online delivery. Includes: course design, teaching with technology, engaging students, using Bb Learn, and learning analytics.

## LEARNING, INNOVATION, AND TECHNOLOGY

### **Tes Zakrzewski, Director of Learning Innovation and Technology**

Annex Central, Room 208

(617) 989-4989

lit@wit.edu

wit.edu/lit

Learning Innovation and Technology (LIT) is dedicated to supporting academic excellence by awakening, nurturing, and empowering all faculty members to be effective educators able to ensure quality student learning at Wentworth Institute of Technology by:

- Delivering flexible, creative, multimodal programs and resources to create transformational learning experiences, and deepen student engagement
- Enhancing faculty's ability to design and facilitate experiential courses (classroom-based, technology-enabled, hybrid, or fully online) aligned with program and Wentworth goals
- Fostering informal learning and interdisciplinary collaboration among faculty around experiential, project-based teaching, learning, and scholarship

By advancing our mission, participating faculty will, in part, be able to:

- Use effective, dynamic teaching practices that cultivate experiential learning environments
- Reflect on teaching practices for continual development
- Design courses and curricula that maximize course alignment and academic effectiveness
- Use and/or develop appropriate tools and practices for assessing student work
- Collaborate with other faculty to support growth and collegiality



# STUDENT SERVICES & FACILITIES

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## ATHLETICS & RECREATION

### **Cheryl Aaron, Director**

Nelson Recreation Center Room 202A

(617) 989-4159

Wentworth sponsors 17 varsity sports teams, and offers students the opportunity to participate in intramural, club, and recreational athletic programs. Specific information regarding varsity sports is available in the Athletic Department Office, located on the second floor of the Nelson Recreation Center. Wentworth is an NCAA Division III member and competes in the Commonwealth Coast Conference (CCC) for the majority of its sports. The men's volleyball team competes in the Great Northeast Athletic Conference (GNAC) and the men's rowing and men's indoor track teams are independent.

### Varsity Sports

Wentworth sponsors 11 varsity sports for men in baseball, basketball, cross country, golf, ice hockey, lacrosse, rowing, soccer, tennis, indoor track, and volleyball. Six varsity sports for women exist in basketball, lacrosse, soccer, softball, tennis, and volleyball. Schedules, game scores, contact information, and athletics-related news can be found on the Wentworth Athletics website at [www.wentworthathletics.com](http://www.wentworthathletics.com).

### Intramural and Club Sports

Wentworth offers students the opportunity to compete in several sports—including basketball, flag football, indoor soccer, dodgeball, softball, volleyball, and whiffle ball—through the Colleges of the Fenway (COF) intramural program. A full listing of intramural and club sports offerings are available on the Colleges of the Fenway website and the Wentworth Student Life.

### Tansey Gymnasium and Nelson Recreation Center

Tansey Gymnasium and the Nelson Recreation Center contain three standard basketball courts and facilities for volleyball, and similar sports. A fitness center is located on the third floor. Sweeney Field, an outdoor athletic complex on campus, consists of regulation lacrosse, soccer, and softball fields with lighting for evening use.

## CENTER FOR COMMUNITY & LEARNING PARTNERSHIPS

### **Erik Miller, Director**

553 Huntington Avenue

(617) 989-4993

Website - [www.wit.edu/clp](http://www.wit.edu/clp)

Social Media - Instagram & Twitter: @CLPWentworth

Wentworth has a long and rich history of engaging its neighbors, strengthening relationships, and creating long-term partnerships with community residents, organizations, and local public schools. Wentworth encourages students to not only master their area of technical expertise, but also to bring their passion and talents to real-world problems, making a true difference in the community.

As a result of years of faculty, staff, student, and community efforts in response to community needs, Wentworth founded the Center for Community and Learning Partnerships (CLP). CLP provides Wentworth students and community members with a shared experience to help solve the many challenges confronting Boston neighborhoods and its residents. Through CLP, Wentworth creates a platform for students to get

involved in community-based projects and programs to positively impact the neighborhoods where students and local residents live, work, study, and play.

Since 2005, CLP has facilitated community-related activities between Wentworth and Boston-based, community organizations; focused on developing, implementing and assessing community engagement and service-learning projects for faculty, staff, students, and alumni; and has provided college access programming for Boston youth. In addition to our education activities for Boston youth, CLP has been an advocate for the community voice through community engagement projects and programs. CLP has collaborated with numerous community organizations and nonprofits throughout the City of Boston to help address capital needs and increase capacity building for our partners. These partnerships are maintained and strengthened through several programs run out of CLP:

- **Community Work Study (CWS)**—CLP partners with local community-based, nonprofit organizations to help build community capital by placing students in real-world, work-based opportunities. All positions are paid.
- **Alternative Spring Break (ASB)**—A great opportunity for students who want to experience different parts of the country while participating in a week of hands-on, service projects.
- **Co+build**—An innovative, community-driven design and build program that pairs Wentworth students and faculty/staff experts with both short-term and long-term service opportunities throughout the City of Boston and beyond.
- **Volunteer Income Tax Assistance (VITA)**—A local organization trains students to become certified tax preparers to help provide preparation services to local residents free of charge.

Service learning projects, like these, can be executed through coursework under the direction of faculty; through participation in student clubs and organizations; through community cooperative learning positions with community organizations; or through the Institute-wide, required senior-year capstone. Students who excel in providing service to organizations throughout Boston are eligible to enroll with CLP to earn a Certificate in Community Learning, a distinction announced during graduation.

CLP is a department of the Office of Community Affairs and External Relations, which is committed to building and maintaining exemplary relationships with the City of Boston, its neighborhood residents, and elected officials.

Information about CLP’s many projects, programs, and resources can be found on the CLP website, through our social media outlets, or by stopping by the office at 553 Huntington Avenue.

## **CENTER FOR STUDENT ENGAGEMENT**

### **Carissa Durfec, Director**

026 Flanagan Campus Center, Beatty Hall  
(617) 989-4080

The Center for Student Engagement connects the Wentworth community by providing resources, helping students explore interests, and celebrating the achievements of the student body. The center provides services in many areas to ensure students are successful from the moment they arrive on campus for orientation through the last moments as a student during senior celebrations.

## **New Student Orientation and Transition Programs**

New students begin their transition to Wentworth through two different programs. The first, New Student Orientation (NSO), is a two-day, overnight introduction to the Wentworth community for all first-year students. NSO provides students with the basic knowledge of the campus community, as well as the resources and services Wentworth offers.

The second component, referred to as Wentworth Opening Week (WOW), is the official welcome program for all first-year and transfer students. Every new student at Wentworth participates in this three-day introduction to college life, which occurs immediately prior to the first day of class. WOW is an Institute-wide initiative that brings all students, staff, and faculty together to help welcome new students and transition them into life at Wentworth. During WOW, students connect with their classmates, receive their laptop, meet with their primary advisor, and learn more about their academic program and campus resources.

## First Year Seminar

First-Year Seminar develops students as engaged learners. The program focuses on the development of positive academic behaviors, assists students in their transition to Wentworth, and supports their personal growth. Through a combination of lecture, discussion, group work and activities, all new students learn about the academic, social, and cultural expectations at Wentworth, and they develop skills necessary for success at Wentworth.

In addition to teaching the curriculum, instructors serve as a resource to new students, providing transitional and developmental advisement. First-Year Seminar instructors partner with primary advisors to promote academic advising, counsel at-risk students experiencing academic difficulty, and make appropriate referrals as necessary. Instructors also perform outreach to students in their class to assist with personal transition issues.

## Student Organizations

Organizations related to majors, social interests, and club sports are all run through the Center for Student Engagement. A complete listing of student organizations may be found at [wit.edu/student-engagement](http://wit.edu/student-engagement). Email [studentengagement@wit.edu](mailto:studentengagement@wit.edu) to find out more about clubs and organizations or for information on how to start your own club. The Involvement Fair in September finds representatives from each club on the quad sharing more about the offerings. Email [studentengagement@wit.edu](mailto:studentengagement@wit.edu) to find out more about clubs and organizations, or for information on how to start your own club.

## Leadership

Students may self-select to participate in the Wentworth Leadership Institute, aimed at developing leadership skills, engaging in the practice of leadership, and offering students the opportunity to develop their own leadership style. This is done through workshops, experiential exercises, and non-credit courses.

## Commuter Programs

The Center for Student Engagement provides programs and services to support and enhance the commuter student experience. This includes weekly events held during the day and early evening to accommodate commuter student schedules, discounted MBTA Semester Pass sales, complimentary lockers, and individual outreach. Commuter assistants—who are current, experienced commuter students—create programs to build community, provide resources, and advocate for commuters. Commuter parking passes are available through the Student Service Center. Updated information can be found on Twitter by following [@witcommuters](https://twitter.com/witcommuters).

## Programs & Events

Student Engagement hosts a variety of large-scale events throughout the year, including Family and Alumni Weekend, Colleges of the Fenway events, senior celebrations, and the Institute Awards Program. The Wentworth Events Board lists a robust line up of events and activities throughout the year.

## CENTER FOR WELLNESS & DISABILITY SERVICES

### **Maura Mulligan, Director**

Assistant Dean of Students  
Watson Hall, Room 003  
(617) 989-4390

The Center for Wellness provides services to students needing mental health counseling, accommodations for documented disabilities, and education related to wellness. The ultimate objective is to support students in achieving their educational goals.

The Center for Wellness is staffed by professionally trained counselors who are available to discuss personal and mental health concerns with students. Counselors are consulted for a number of reasons, which may include anxiety, depression, sexual assault/sexual violence, problems in relationships, substance abuse, and adjustment to college life. Students may receive services on a short-term basis. When appropriate, students will be referred to a qualified professional in the community who can better meet their specific counseling needs. All services are free and confidential.

The Center for Wellness also houses Disability Services. It is important to note that Wentworth subscribes to the policies set forth in the Americans with Disabilities Act Amendments Act of 2008 (ADAAA) and in Section 504 of the Federal Rehabilitation Act of 1973, which mandates equal opportunity in educational programs and activities for students with disabilities. Students with physical, medical, psychiatric, and learning disabilities are eligible to access Disability Services to arrange for reasonable accommodations, assistance with advocacy, and liaisons with faculty.

The office is located on the ground floor of Watson Hall, Room 003, and is open Monday through Friday, 8:15 a.m. to 4:45 p.m. Appointments may be made in person or by calling (617) 989-4390. Questions may be emailed to [counseling@wit.edu](mailto:counseling@wit.edu). Night and weekend access to a counselor by phone is provided in partnership with ProtoCall. Students may call (617) 989-4390 and choose option #2 to speak with a counselor when the Center is closed.

The Office of Wellness Education supports student success by educating and empowering them to engage in healthy behaviors and decision-making around issues relating to alcohol and other drugs, relationships and sexual health, sleep, stress, nutrition, and fitness. The office is staffed by a full-time coordinator and part-time prevention specialist. Staff members are available to consult with individual students seeking information and advice on a variety of health and wellness topics. The Office of Wellness Education can be contacted by phone at (617) 989-4395 or by email at [wellness@wit.edu](mailto:wellness@wit.edu).

Faculty and staff can play an integral role in identifying students who may need a referral to The Center for Wellness. If a faculty or staff member has concerns about a student, they are encouraged to contact the office. For mental health emergencies during non-business hours, faculty and staff should contact Wentworth Public Safety at (617) 989-4444 to reach the counselor-on-call.

For more information, please visit our website at [www.wit.edu/center-wellness-disability-services](http://www.wit.edu/center-wellness-disability-services).

## FINANCIAL AID

### **Anne-Marie Caruso, Director**

Student Service Center, Williston Hall, Room 101  
(617) 989-4174

Wentworth Institute of Technology is committed to offering financial support to those who qualify for assistance. We encourage all students to apply for financial aid. Wentworth believes that the primary responsibility for meeting your cost of education rests with you and your family. Financial assistance is intended to supplement your own resources.

## How to Apply for Financial Aid

Financial assistance decisions are made on the basis of financial need, satisfactory academic progress, and the availability of funds. In order to determine your financial need, you must file the Free Application for Federal Student Aid (FAFSA) each year to determine eligibility. This form can be completed on line at <https://fafsa.ed.gov> any time after October 1. In order to complete this form, a student must apply for an FSA ID. In the case of a dependent student, the parent completing the FAFSA must also apply for an FSA ID.

Students who applied for financial aid the previous year can complete the Renewal FAFSA for the next academic year. The Renewal FAFSA contains preprinted information based on the previous year. Students must update any information that has changed, such as income, assets, and other related items, if necessary. Wentworth's priority filing date is May 1 for returning students and March 1 for new students.

The federal application (FAFSA) is used to determine your eligibility for all need-based financial aid offered by Wentworth. New students who meet Wentworth's priority filing date can expect to receive a financial aid package in the months of March and April. Returning students who meet their priority filing date will receive a financial aid package in the months of May and June.

## General Eligibility Requirements

In order to be eligible for any of the Federal Aid programs, a student must:

- Be a US citizen or eligible non-citizen
- Be admitted to an eligible program
- Be registered with the Selected Services if male between the ages of 18 and 25
- Not owe a refund or a grant, or be in default status on any federal student loan
- Not have borrowed in excess of the annual aggregate loan limits
- Have financial need as determined by the federal formulas and need analysis guidelines
- Be enrolled at least half time (six credits) for Federal Direct loans per semester
- Maintain Satisfactory Academic Progress (SAP) [See requirements listed in this catalog]

## International Students

International students are not eligible for federal financial aid, but may be eligible for a limited number of merit scholarships.

## Types of Financial Aid

### Federal Programs

Wentworth Institute of Technology is approved by the United States Department of Education for the following aid programs:

#### *Direct Federal PLUS Loan*

This is a federal loan available for the parents of dependent undergraduate students, and for graduate and professional students. Parent PLUS loans are not based on financial need. A credit check is performed to determine the borrower's eligibility. A parent may borrow any amount up to the dependent student's cost of attendance minus the student's financial assistance. The Direct PLUS loan interest rate is fixed at 7.6% for 2018-19, with a 4.248% loan origination fee. The repayment period for the PLUS loan begins the day the loan is fully disbursed. PLUS borrowers may defer repayment while the student is enrolled at least half-time and for an additional six months after you graduate, withdraw, or drop below half-time. The first payment will be due within 45 days after your deferment ends.

## *Direct Stafford Loan Program*

Federal Stafford Loans are either subsidized (the government pays the interest while the student is in school) or unsubsidized (the student pays all the interest, although the payments can be deferred until after graduation). Direct Stafford loans have annual and aggregate loan limits. There are instances when a first-time borrower may lose eligibility for a Subsidized Stafford Loan if he/she has received loans for 150% of their current academic program.

The interest rate for Direct Stafford loans is fixed at 5.05% for undergraduate students and 6.6% for graduate students for 2018-19, with a 1.1.0620% loan origination fee. Repayment begins six months after the student graduates, withdraws or ceases to be enrolled on a half-time basis. To receive a subsidized Federal Direct loan, the student must be able to demonstrate financial need. Students who are borrowing for the first time through the Direct Loan Program (subsidized and/or unsubsidized) must complete a Federal Stafford Master Promissory Note (MPN) online and complete an Entrance Interview in order to receive their Federal Stafford Loan funds at [www.studentloans.gov](http://www.studentloans.gov) graduate students are not eligible for the Federal Direct Subsidized Stafford loan.

## *Federal Pell Grant*

This is a federal grant that does not have to be repaid. Eligibility for this grant is determined by the federal government and is based on financial need. The grant amounts range from \$652 to \$6,095 yearly for 2018-19.

Federal Supplemental Educational Opportunity Grant (FSEOG)

A federal grant that does not have to be repaid. The amount of the award is based on financial need and is determined by a financial formula.

## *Federal Work Study*

This work program provides access to employment on Wentworth's campus during the academic year and is awarded based on financial need. A student's total allotment will be outlined on the award letter. A student will receive a bi-weekly pay check for the hours that the student actually works. Although the student is awarded federal work-study, it is the student's responsibility to obtain a position on campus.

## *Veterans Benefits*

Veterans planning on enrolling full-time or part-time in credit courses (day, evening, or Saturday) and who are eligible to receive benefits at Wentworth must work closely with the Veterans Administration (VA) certifying official, who is located in the Student Service Center on the first floor of Williston Hall. The official will provide the procedural details for receiving veteran's benefits.

The Yellow Ribbon GI Education Enhancement Program (Yellow Ribbon Program) is a provision of the Post-9/11 Veterans Educational Assistance Act of 2008. This program allows degree-granting institutions in the United States to voluntarily enter into an agreement with the VA to fund tuition expenses that exceed the highest public in-state undergraduate tuition rate. The institution can contribute up to \$5,000 of those expenses and VA will also contribute a portion of the tuition.

## **State Programs**

Many states, including Massachusetts, offer state grants, which may be applied to your educational expenses at Wentworth. These grants are based on eligibility, which is determined by the state based on the information provided to them by your FAFSA. Below are the eligibility requirements for the common state grant programs at Wentworth. Please note that, if eligible, these grants will not be added to the student's account until September of each year. If you do not see your state listed and would like further information, please reach out to that State Grant office. Below are the eligibility requirements for participating states:

## Massachusetts:

- FAFSA must be completed by May 1 of each year
- Expected Family Contribution (EFC) between 0 and 5198. These may change for the 2018-19 academic year.
- Student must be a Massachusetts resident
- Must be a full-time student receiving a first bachelor's degree

## Vermont:

- FAFSA should be filed as soon as possible as funds are awarded on first-come, first-serve basis
- Student must be a Vermont resident
- Student must fill out Vermont State Grant application

## Institutional Aid

### *Graduate Fellowships*

This merit-based fellowship is awarded to graduate students upon admission to the Master of Architecture program. No separate application is required. Fellowships are applied toward tuition charges only. The fellowship cannot be combined with any past institutional scholarships received (such as Arioch, Merit Award, and President's Scholarships) during undergraduate study.

### *Merit Award Scholarships*

This merit-based scholarship is available to all new (freshman and transfer) applicants, and admitted students are automatically considered with no separate application is required. Eligibility is based on a combination of factors, including SAT scores and grades. Students must maintain a 2.5 institutional cumulative GPA as determined by the Satisfactory Academic Progress Policy to retain eligibility for these scholarships in subsequent years and be enrolled full-time. If conditions are not met in any year, the scholarship may no longer be renewable. Merit award scholarships are applied toward tuition charges only. Therefore, any semester in which tuition charges are covered by another scholarship—such as ROTC—the Merit award scholarship will be cancelled for that semester.

Visit Wentworth's website at <https://wit.edu/student-life/ssc/billing-financial-aid/scholarships-and-...> for information on scholarships.

### *Wentworth Community Scholarship*

Applicants must have demonstrated the highest level of commitment to the Wentworth community through involvement in social, administrative, charitable, and athletic activities while excelling in academics. Students who have completed four semesters and earned 60 semester credit hours with a GPA of 3.0 or better are eligible to apply for this \$2,500 per-year scholarship. Students need to reapply each year and be enrolled full-time. Funds from this scholarship are applied toward tuition charges. Visit <https://wit.edu/student-life/ssc/billing-financial-aid/scholarships-and-...> for information on scholarships.

### *WIT Works*

The program is designed to give students access to employment that will help them meet living expenses such as books, supplies, and transportation. To receive a WIT Works award, a student must file their FAFSA and demonstrate financial need according to federal guidelines. They must also be enrolled at least half-time in a degree program, maintain satisfactory academic progress, and be either a U.S. citizen or an eligible non-citizen. WIT Work-Study follows all of the same guidelines and policies as Federal Work Study and is need-based.

## Endowment Scholarships

Additional endowed scholarships are offered at Wentworth through the generosity of donors. Students need to complete the FAFSA form and a Wentworth Endowed Scholarship application to apply. The application is available in February and is due in June. Students are automatically considered for all scholarships for which they are eligible. Some scholarships have a separate application; information on these scholarships, including application information and deadlines, is available on LConnect.

## Financial Aid Satisfactory Academic Progress Policy

The Financial Aid office is required by federal regulations to periodically review the academic progress of financial aid recipients to ensure that they are moving toward the completion of their program of study. A student is considered to be making Satisfactory Academic Progress (SAP) if the student meets both qualitative and quantitative standards described below.

### Qualitative Standard

A student must maintain a minimum cumulative grade point average as noted below to be considered as making satisfactory academic progress.

#### *Total credits Earned: 0-31*

Minimum Cumulative Grade Point Average Required For SAP – Undergraduate Day and CPCE: 1.75

Minimum Cumulative Grade Point Average Required For SAP – Graduate: 3.0

#### *Total credits Earned: 32+*

Minimum Cumulative Grade Point Average Required For SAP – Undergraduate Day and CPCE: 2.0

Minimum Cumulative Grade Point Average Required For SAP – Graduate: 3.0

### Quantitative Standard

A student must successfully complete at least 66.67% of the total credits attempted. All attempted credits resulting in either an academic grade or administrative transcript notation may be included in the quantitative calculation.

For example, a student who enrolled and attempted 18 credits in the semester must earn at least 12 credits in order to be making satisfactory academic progress.

In general, coursework that is taken while in attendance at Wentworth Institute of Technology, and applies to the student's academic program, is taken into account when reviewing satisfactory academic progress (SAP). However, there are some exceptions. Please refer to the information below for a breakdown of how each type of course or credit is treated in the review.

Regular courses in a program of study:

Cumulative GPA – Y

Completion Rate – Y

Maximum Timeframe – Y

Repeat Courses:

Cumulative GPA – Y

Completion Rate – Y

Maximum Timeframe – Y

Transfer Credits:

Cumulative GPA – N

Completion Rate – Y

Maximum Timeframe – Y



Consortium Credits:

Cumulative GPA – N (unless grades are notated in the student’s transcript)

Completion Rate – Y

Maximum Timeframe – Y

Incompletes:

Cumulative GPA – N

Completion Rate – Y

Maximum Timeframe – Y

A student may receive student federal aid for any attempted credits towards their program of study as long as those credits do not exceed 150% of the published length of the student’s program of study. For example, a student enrolled in an eligible 138 credit baccalaureate program can receive financial aid for up to 207 credits attempted.

## Satisfactory Academic Progress (SAP) Review Process

Q: When is my academic progress reviewed?

A: At the end of each semester

Q: Are there warning periods?

A: Yes, there is one warning period

Q: Is there an appeal process?

A: Yes

Q: Can I regain financial aid eligibility once I lose it?

A: Yes

## Academic Periods Included in the Review

A student’s Satisfactory Academic Progress (SAP) will be evaluated each semester at the end of the payment period and for all periods of enrollment regardless of whether or not Financial Aid was received. Students who meet SAP standards will be coded as making satisfactory academic progress and will retain eligibility for financial assistance funds for the following semester.

Students who do not meet SAP standards will be placed on SAP warning for one semester. Students placed on SAP warning will retain their eligibility for Student Federal Aid during the warning semester. The student will be notified of a SAP warning by email to their WIT email address followed by a letter to their permanent address.

At the end of the warning period, SAP standards will be reviewed. If the student meets SAP standards, they will once again be coded as making satisfactory academic progress and will retain eligibility for Student Federal Aid for the following semester.

If the student is unable to meet the standards for SAP, they will be placed on Financial Aid Suspension and will no longer be eligible to receive financial assistance funds at the institution until such time that they are able to meet the standards of SAP. The student will be notified of a SAP suspension by email to their WIT email address followed by a letter to their permanent address.

## Appeal Process

Students who become ineligible for federal student aid due to not meeting the financial assistance standards of satisfactory academic progress may appeal for a review of that determination. A student who believes he or she has extenuating circumstances that affected his or her ability to progress satisfactorily should appeal utilizing

the appeal application within 30 days of the date of the letter indicating a loss of financial aid eligibility. Examples of cases that may be considered are as follows:

- Student becomes seriously ill
- Student's relative dies
- Student is severely injured

Other cases may be considered and are reviewed on a case-by case basis. The appeal should be addressed to the Financial Aid Appeals Committee and be submitted to the Financial Aid office. The appeal should include a completed appeal form, a letter to the Financial Aid Appeals Committee requesting a reevaluation of the student's aid eligibility. The letter should include an explanation of the student's past academic performance and the reason the student's aid eligibility should be reinstated. Additionally, the student must submit an approved academic plan from their academic advisor.

An appeal may be approved only if

- Wentworth determines that the student will be able to meet SAP standards after the subsequent semester; or
- the student has an approved academic plan that will ensure that the student will be able to meet SAP standards by a specific point in time or successfully complete their academic program.

Appeals will be reviewed by the Financial Aid Appeals Committee for reconsideration based on extenuating circumstances presented by the student. Decisions by this committee are considered final. If the appeal is approved, the student will be placed on financial aid probation and will have one semester (or time as specified by the approved academic plan) to meet SAP requirements and remain eligible for financial aid.

## **Other Important Considerations**

### *Change of Program*

A student who changes their academic program may request an appeal in that determination if he or she has changed programs while enrolled at their current school. All courses attempted will be evaluated for the maximum timeframe component.

### *Co-op*

Unsuccessful completion of a required co-op impacts SAP, whether the student withdraws from the co-op or receives a "U" grade. A student who does not successfully complete a required co-op will be placed on SAP warning or SAP suspension depending upon the SAP standing with which the student started the semester.

### *Consortium Credits*

All courses taken at an institution other than the home institution through an official consortium are included in the calculation for completion rate and maximum timeframe components, but may be excluded from the student's cumulative GPA component (unless grades are notated in the student's transcript).

### *Course Withdrawal*

Course withdrawal may affect a student's eligibility for financial assistance funds.

### *Incompletes*

All incompletes must be resolved by the midpoint of the semester following the receipt of the incomplete grade. If not resolved, the grade is either automatically changed to an "F" or is considered to be an "F" for all components of the satisfactory academic progress review. Financial assistance funds can be withheld until incompletes are resolved.

## *Repeat Courses*

Only the most recent grade for a course that has been repeated will count toward a student's cumulative GPA. Therefore, grades from prior attempts will be excluded from the student's cumulative GPA. However, all attempts, including the most current, will be included in the calculation for the completion rate and maximum timeframe components. Financial assistance funds will cover a repeated course only when it is repeated to replace an unacceptable grade as determined by a specific course and/or major.

## *Transfer Credits*

Credits that are transferred in from another institution and apply to the most current major will be excluded from the student's cumulative GPA. However, they will be included in the calculation for the maximum timeframe component and the completion rate components.

## *Remedial Course Credits*

Remedial course credits approved by the student's academic department and attempted are included in the calculation for completion rate, cumulative GPA and maximum timeframe components.

## *Treatment of Federal Financial Aid When a Student Withdraws*

The US Department of Education requires Wentworth Institute of Technology to maintain and disseminate a written policy regarding federal financial aid recipients who withdraw or otherwise fail to complete the term for which their financial aid was disbursed.

Federal financial aid funds are awarded to a student under the assumption that the student will attend school for the entire period for which the assistance is awarded. When a Federal financial aid student withdraws, the student may no longer be eligible for the full amount of Federal financial aid funds that the student was originally scheduled to receive.

Up through the 60% point in each semester, a prorata schedule is used to determine the amount of Federal financial aid funds the student has earned at the time of withdrawal. After the 60% point of the semester, federal regulations affirm that a student has earned 100% of the Federal financial aid funds he or she was scheduled to receive during the semester. For a student who withdraws after the 60% point-in-time, all funds are earned.

If the recipient of a Federal grant or Federal loan withdraws from school after beginning attendance, the amount of the Federal grant or Federal loan assistance earned by the student must be determined. If the amount disbursed to the student is greater than the amount the student earned, unearned funds must be returned.

## *Withdrawal Procedure*

Students who wish to withdraw from Wentworth are required to submit a completed the Voluntary Withdrawal Form to the Registrar's Office. If you live in a residence hall, you must meet with the Resident Life Staff and submit the appropriate forms.

## **Withdrawal Date and Calculation of Earned and Unearned Federal Financial Aid**

For purposes of this policy, the date of withdrawal will be the date the student begins the withdrawal process or the date, as determined by Wentworth, that the student otherwise notified Wentworth in writing or verbally, of their intent to withdraw to zero credits.

The amount of aid earned is calculated by dividing the number of calendar days from the beginning of the term of the point of withdrawal by the total number of days in the term. This percentage is multiplied by the amount

of federal financial aid that was awarded and accepted for the term and becomes the amount of aid that was earned. This amount is subtracted from the amount of aid disbursed and the balance becomes the amount of unearned aid that must be returned.

Responsibility for repayment of these funds will be shared by Wentworth and the student, per policies and procedures contained within the federal formula for proration of refunds of unearned Federal Financial Aid.

## **Post-Withdrawal Disbursements**

A student may be eligible for a post-withdrawal disbursement if the amount of earned aid is less than the disbursed aid. Students will be notified at the point of withdrawal if they are eligible for a post-withdrawal disbursement as determined by the Financial Aid Office.

## **Distribution of Unearned Federal Financial Aid**

In compliance with federal regulations, a school must return Federal financial aid funds to the programs from which the student received federal aid during the payment period or period of enrollment as applicable, in the following order, up to the net amount disbursed from each source:

- Unsubsidized Federal Direct loans
- Subsidized Federal Direct loans
- Federal Perkins loans
- Federal Direct PLUS loans
- Federal Pell Grants
- Federal Supplemental Educational Opportunity Grants (FSEOG)

Federal Work-Study funds paid to recipients will not be included in the computation of earned Federal financial aid, nor will these funds be refunded to the federal account from which they were paid.

Unearned Federal grant and Federal loan funds due from WIT will be repaid to the federal accounts for the specified semester. Unearned portions of Federal grant aid due from the student will also be repaid to the federal accounts by WIT. All repayments made by WIT pursuant to this policy will be charged to your student account. Any refund amount above the amount of unearned aid will be returned to the federal aid programs per the distribution of Unearned Federal Financial Aid schedule.

## **Unofficial Withdrawals**

Federal Regulations require that an institution must have a procedure in place for determining whether a Federal financial aid recipient who began attendance during a payment period completed the period. For students enrolled in 15-week courses, if a student earns a passing grade in one or more of his or her classes offered over an entire period, for that class, WIT will presume that the student completed the course and thus completed the period of enrollment. For students enrolled in seven-week courses, the student is considered to have withdrawn from a payment period in which the student began enrollment if the student ceased attendance without completing all the days the student was scheduled to complete in the period.

The determination of unofficial withdrawals will occur after grades are posted at the end of each semester for 15-week courses and at the end of each term for seven-week courses. Barring the availability of information to ascertain the student's last day of attendance at an academically related event, the institution may assume the student has ceased participation in academic activities at the mid-point of the semester. The student will be responsible for any balance from the loss of funding.

## HEALTH SERVICES

### Massachusetts College of Art and Design

Optum Health Center  
578 Huntington Avenue  
(617) 879-5220

Optum Health Center is open weekdays from 9:00 a.m. to 6:00 p.m. year-round. Please call (617) 879-5220 to schedule an appointment.

Wentworth students have year-round after-hours urgent care access at Atrius Health Care in their Kenmore Square location, 133 Brookline Avenue, when the Optum Health Center is closed. Such hours would include weekday mornings from 8:00 to 9:00 a.m., weekday evenings from 6:00 to 8:00 p.m., Saturdays from 10:00 a.m. to 5:00 p.m., and Sundays and holidays from noon to 5:00 p.m.

Students are strongly encouraged to register as a patient with Optum Health Services before their first appointment. Please identify yourself as a Wentworth student, and have your insurance information (i.e. insurance card) available.

Optum Health Services will bill students' insurance plans for all services rendered. Students attending appointments at the Optum Health Center will not need to pay the standard co-pay. Students must present their student identification cards and health insurance cards at every appointment.

Optum Health Services respects student confidentiality under the HIPPA laws. No health information is released to parents or college staff without the student's written authorization unless required by law or in a life-threatening situation. For additional information about Optum Health Services, visit [wit.edu/health-services](http://wit.edu/health-services).

Medical advice is also available to students during times when the Optum Health Center Office is closed by calling (617) 879-5220.

In the case of a life-threatening emergency, students should immediately contact Wentworth Public Safety at (617) 989-4444.

## HOUSING & RESIDENTIAL LIFE

### Phillip Bernard, Director

The Apartments @ 525, Room 101  
(617) 989-4160

The Office of Housing and Residential Life (OHRL) promotes a safe and inclusive residential community that supports student success through intentionally designed programs and services.

Wentworth accommodates more than 2,200 students in 15 residential buildings that are organized into seven communities.

- **Baker Hall** is a traditional-style residence hall that houses first-year students in double bedrooms, and shared-floor showers and bathrooms. The five floors in Baker Hall provide a community atmosphere with frequent opportunities to interact with other students. The building has community lounges for group studying or socializing.
- **Evans Way Hall/Tudbury Hall** is a first-year residence hall comprised of suites accommodating four to 12 students. Each suite contains a central living room, one to two bathrooms, and two to four bedrooms. This community also has a study room, exercise room, and multi-purpose auditorium.
- **The Apartments @ 525** houses upper-class students in apartments of four to five people. Seventy percent of the bedrooms are singles, and each apartment has a common area, kitchen with a dishwasher, bathroom, and washer/dryer. The building also features a bicycle storage room and public meeting rooms.

- **610 Huntington Avenue** houses upper-class students in apartments with double bedrooms, a common area, kitchen, and bathroom. The building also features an exercise room, a large lounge, a pool room, and a meeting/study area.
- **555 Huntington Avenue** houses upper-class students in apartments ranging from four to nine students in single, double, and triple bedrooms. All apartments have a kitchen area, a common area, and bedrooms. Each floor has a lounge/study area.
- **Edwards/Rodgers Apartments** houses upper-class students in two-person studios and three-person, one-bedroom apartments. Non-studio apartments contain a kitchen and dining area, bathroom, living room, and bedroom. Studios consist of rooms comprised of a living space and bedroom.
- **Louis Prang/Vancouver Apartments** are available for upper-class students. These apartments offer a variety of living arrangements from studio apartments to multiple-person apartments. All units have kitchen and bathroom facilities and provide an off-campus apartment feel with the convenience of living on campus.

Each of the residential communities are coeducational and overseen by a building staff, which includes a live-in professional staff member (assistant director, resident director, and/or assistant resident director) and student resident assistants. Building staff are responsible for creating an inclusive, welcoming, educational and purposeful community that focuses on personal and social student development. If students have questions or concerns about their living situation, they are encouraged to seek the help of the resident assistants or the professional staff members who oversee their residential community.

For more information, visit [wit.edu/reslife](http://wit.edu/reslife), email [housing@wit.edu](mailto:housing@wit.edu), call (617) 989-4160, or visit the Housing and Residential Life Office located in The Apartments @ 525, room 101.

## INTERNATIONAL STUDENT SERVICES

### **Jeanmarie Ambrose, Director**

Student Service Center  
Phone: (617) 989-4391

### **Dena Reuben, Assistant Director**

Student Service Center  
Phone: (617) 989-4680

International Student Services (ISS) staff members are available to assist international students in maintaining their legal non-immigrant status in the United States (U.S.) and strive to ensure that students experience a smooth transition to life in the U.S. through International Student Orientation and other programs throughout the year. ISS is available to assist students individually in their personal, social, and academic adjustment to Wentworth and the U.S.

ISS is the source of information at Wentworth regarding the regulations and policies of the U.S. government as they pertain to international students. Any international student with questions regarding his or her F-1 Student status should contact ISS to obtain an analysis of, and recommendations for, his or her specific situation. ISS will address questions related to employment, maintaining valid status, obtaining a new visa or Form I-20 and any other related topic.

It is the responsibility of each student to maintain his or her valid status in the United States. Student and Exchange Visitor Information System (SEVIS) records of international students are maintained through ISS in order to provide information to Immigration and Customs Enforcement (ICE) on each student as required by law.

## PUBLIC SAFETY

### **William Powers, Director**

610 Huntington Avenue  
(617) 989-4400

The 24-hour Public Safety Office is located at 610 Huntington Avenue on the first level of the residence hall. The department provides 24-hour police, medical, and security services to the campus community. Public Safety assistance or safety escorts may be obtained by calling (617) 989-4400 or activating an information/emergency call box located throughout campus. In case of an emergency, call (617) 989-4444.

We strongly encourage all community members to promptly report criminal and suspicious activity, potential threats to the community, and other emergencies to the Department of Public Safety.

## **RESERVE OFFICERS TRAINING CORP**

### **Air Force**

Air Force Reserve Officers Training Corps (ROTC) is an educational and leadership program designed to provide young men and women the opportunity to become Air Force officers while completing a bachelor's or master's degree. The Air Force ROTC program prepares students to assume challenging positions of responsibility and importance in the Air Force.

Through a cross-enrolled program with Boston University, interested Wentworth Institute of Technology students may participate in the Air Force ROTC program. Requirements include yearly aerospace studies classes, leadership laboratory classes, and physical fitness training. Mandatory weekly time commitments range from five to seven hours. Once students complete their degree, the Air Force offers a wide variety of career fields from which to choose including flying opportunities as a pilot, navigator, or weapons controller. The Air Force has opportunities for students primarily in engineering majors. In addition to leadership and management training, cadets can benefit from several scholarship programs.

Students interested in joining the Air Force ROTC program or wanting more information should contact the Department of Aerospace Studies, Boston University, 118 Bay State Road, Boston, MA, 02215, or at 617-353-6316. Classes are held at Boston University. A student can also visit the detachment website at [www.bu.edu/af-rotc](http://www.bu.edu/af-rotc).

### **Army**

Army ROTC has been a part of Wentworth's curriculum for many years. Sponsored through Northeastern University, ROTC offers three-year and four-year Army officer training programs that complement Wentworth's educational program.

### **General Objectives**

The Department of Military Science of Northeastern University administers the ROTC program for Wentworth students. Army ROTC provides leadership training on campus and leadership exercises at local off-campus training sites. The goal of the program is to commission the future officer leadership of the United States Army.

### **Courses of Study**

The Army ROTC program consists of two phases: the basic course (freshman and sophomore years for five-year program students; freshman year for four-year program students), which incurs no obligation on non-scholarship students; and the advanced course (taken during the remaining years of the academic program). Eligibility for the advanced course is conditional upon satisfactory completion of the basic course or its equivalent. Participation in the basic course provides students with an excellent opportunity to decide if they wish to become Army officers.

### **Army Financial Assistance**

1. Wentworth cadets can apply for a ROTC scholarship in their freshman or sophomore years. Scholarship benefits are awarded up to \$25,000 per year to be used toward tuition and mandatory fees not related to room and board.
2. Every scholarship recipient receives up to \$1,200 per year for books and supplies, and a monthly stipend of \$420 while in school.

## Wentworth Financial Assistance

Wentworth students who receive military scholarships from the Army ROTC programs will be granted a room scholarship for each year the military scholarship is in effect. Recipients should notify the Office of Financial Aid.

Army Commission and Service Requirements:

- Basic course (freshman/sophomore) cadets, who are not scholarship recipients, do not incur any military obligation, and may withdraw from the program at any time.
- Any contracted cadets agree to accept an Army commission and serve on either active duty (full-time) or reserve duty (part-time) with duty in the Army Reserve or the National Guard (one weekend each month and two weeks each year).
- The commitment requirements are three (3) one-hour morning physical training sessions per week, one to three hours of class per week, a one-and-a-half-hour weekly leadership laboratory session, and one weekend field training exercise per semester.
- Cadets will be commissioned as second lieutenants and fulfill an eight-year service obligation with active duty, or reserve, or a combination thereof.

Interested students should contact:

CPT Vincent Mullen  
Northeastern University  
335A Huntington Avenue  
Boston MA 02115  
(617) 373-2375  
v.mullen@northeastern.edu

Contact at Wentworth:  
Professor Gloria Monaghan  
Monaghang@wit.edu

## STUDENT AFFAIRS

**Rubenstein Hall 003**  
(617) 989-4702  
osa@wit.edu  
wit.edu/student-affairs  
sites.wit.edu/witdeans/

The Office of Student Affairs acts as a resource, referral agent, and advocate for students so they may live and learn successfully throughout their Wentworth experience. Staffed by the vice president for student affairs/dean of students, associate vice president for student affairs, assistant dean of students, coordinator of community standards, care specialist, and assistant to the deans, the Office of Student Affairs provides advice or support on academic or personal matters, assisting students in accessing the resources and solutions they need. In the past, Student Affairs has helped students with such concerns as missing a significant number of classes due to illness or injury, experiencing financial hardships, or difficulties with the transition into college life.

### Through the Office of Student Affairs, students can:

- Receive support for personal, financial, or academic matters
- File an official concern/complaint at the university
- Receive assistance with long-term absences from the university (including hospitalization, bereavement, or religious observance) and submitting an Absence Notification Request
- Obtain a Wentworth Student Planner
- Receive information about the Student Emergency Fund
- Access the Wentworth Supply Closet
- Receive information about the Wentworth Student Handbook



- Speak with a member of our staff to share a concern about another student
- Bring forward a Title IX complaint
- Report a violation of the Student Code of Conduct
- Seek assistance to request a Medical Leave of Absence
- Receive information about fulfilling your Jury Duty service as a student
- Receive assistance with Student Code of Conduct violations
- Receive information regarding the Family Educational Rights and Privacy Act (FERPA)

Student Affairs oversees the following departments: Athletics, Center for Cooperative Education + Career Development, Center for Diversity a Social Justice Programs, Center for Student Engagement, Center for Wellness and Disability Services, Fitness and Recreation, and Housing and Residential Life. Additionally, the Office of Student Affairs oversees compliance and enforcement of the Student Code of Conduct throughout the Wentworth community.

## STUDENT FINANCIAL SERVICES

### Financial Information

Patricia Osgood

Director, Student Financial Services

Student Service Center, Williston Hall, Room 101

(617) 989-4020

## Tuition, Fees, and Other Expenses

### Fees and Deposits

#### *Application Fees*

Students in Undergraduate, Master of Science, and College of Professional and Continuing Education (CPCE) programs must submit a \$50 fee with their application to Wentworth Institute of Technology.

#### *Tuition Deposits*

New undergraduate students entering in the fall semester must pay a \$250 tuition deposit by May 1. Deposits are non-refundable after May 1. New undergraduate students entering in the spring must make a \$250 tuition deposit, which is non-refundable.

New graduate students must pay a non-refundable tuition deposit of \$250 following notification of acceptance. Please note that the College of Professional and Continuing Education (CPCE) does not require a deposit.

#### *Housing Deposits*

Any day program or Master of Architecture student who requests to live on campus for the fall and spring semesters must make a \$500 deposit. For new undergraduate students, the deposit is non-refundable after May 1. For all other students, deadlines will be published by the Office of Housing and Residence Life. New students starting in the spring who request to live on campus must also make a \$500 deposit, which is non-refundable. Deposits will not be accepted from students who owe a balance for the current or prior semester(s). Students planning to live on campus for periods other than the fall and spring semester also pay a housing deposit based on the semester(s) they intend to live on campus. These rates will be announced by the Office of Housing and Residence Life.

For returning students, housing deposit refund requests received in writing (or email) and postmarked before the start of room selection will be granted. No verbal requests will be honored.

All housing deposit refund requests must be emailed to [housing@wit.edu](mailto:housing@wit.edu) or in writing to:

Director of Housing and Residential Life  
Wentworth Institute of Technology  
550 Huntington Avenue  
Boston MA 02115

## Tuition

At the discretion of the Institute, tuition and fees are subject to change at any time.

- Day Undergraduate: Full-time tuition (annual based on two semesters) – \$33,950; per credit \$1,060
- College of Professional and Continuing Education (CPCE): per credit \$475
- Master of Architecture: Full-time tuition (annual based on two semesters) – \$36,750; per credit \$1,020
- Master of Construction Management – per credit \$1,135
- Master of Facility Management – per credit \$1,135
- Master of Technology Management – per credit \$1,135
- Master of Engineering in Civil Engineering – per credit \$1,135
- Master of Applied Computer Science – per credit \$1,135
- Certificate Programs – See current CPCE schedule for rates

Undergraduate students who take fewer than 12 credits in a semester will be charged per credit rather than the flat full-time rate. Undergraduate students who overload (take more than 20 credits in a semester) will be charged at the per credit rate for each credit over 20.

CPCE students who are approved to take a day undergraduate course will pay the day per-credit rate for that course.

Graduate students who take an undergraduate course will pay the graduate per-credit rate for that course.

## Living Accommodations

### *Annual Room Rates with \$3,100 Mandatory Board Plan Included:*

- Baker Hall: Single \$15,450; Double \$14,190; Triple \$14,190
- Evans Way: Single \$15,450; Double \$14,190; Triple \$13,670; Quad \$13,290
- Tudbury Hall: Single \$15,450; Double \$14,190; Triple \$13,670; Quad \$13,290

All first-year students are required to purchase a \$3,100 annual board plan regardless of their room assignment.

### *Annual Room Rates with \$870 Mandatory Board Plan Included:*

- Louis Prang: Studio Single \$14,500; Single \$13,900; Double \$13,370; Triple \$13,370
- Vancouver: Studio Single \$14,500; Single \$13,900; Double \$13,370; Triple \$13,370
- Edwards/Rodgers: Double \$13,370; Triple \$13,370
- 555 Huntington: Single \$14,670; Double \$13,900; Triple \$13,900
- 610 Huntington: Double \$13,900; Triple \$13,900
- 525 Huntington: Single \$14,950; Double \$14,090

Any student in Edwards/Rodgers, Vancouver, Louis Prang, 610, 555, and 525 Huntington Avenue may elect to increase his or her board plan to the following amounts:

- Optional Board Plan A (\$1,550 per semester) \$3,100
- Optional Board Plan B (\$435 per semester) \$870

## Other Expenses

### *Health Insurance*

Massachusetts state law requires all students registered for nine or more credits, including a semester of co-op, to provide proof of health insurance coverage. To comply with this law, students who meet the criteria are assessed a charge for a student health insurance plan. If a student is already covered by an alternate plan that offers comparable coverage and would like to waive the school's insurance plan, the student **MUST** complete a waiver online by the deadline. Wentworth health insurance must be purchased or waived each academic year, typically in the fall semester. Information and deadlines for completing the waiver are published by Student Financial Services on Leopardweb and by targeted communications.

The standard fee for health insurance for the 2018-2019 academic year is \$1,862.00.

### *Parking*

- Day (Commuter) Pass - Cost per Semester: \$200
- Applicate Lots and Times: Annex, Parker, Sweeney (7:00 a.m. – 10:00 p.m.); West (3:00 – 10 p.m.)
- Evening and Weekend Pass - Cost per Semester: \$70
- Applicate Lots and Times: Annex, Sweeney, West (3:00 – 10:00 p.m. M-F, 7:00 a.m. – 10:00 p.m. Saturday)
- Overnight (On-campus residents only) - Cost per Semester: \$400
- Applicate Lots and Times: Annex, East (overnight)

Students must be financially clear to purchase parking passes. Passes are sold on a first-come, first-serve basis, and must be paid for at the time of purchase. Students cannot use an anticipated credit balance to purchase a parking pass.

Overnight parking passes are sold only to junior, senior or master's students. A limited number of passes are available each semester.

### *Books, Supplies, and Equipment*

Each student provides at his/her own expense the necessary textbooks, equipment, and instructional supplies. The cost of books and supplies is estimated at \$800 to \$1,200 per year. Costs will vary depending upon the curriculum and whether new or used books are purchased. Payments for books and supplies purchased at the Wentworth bookstore are made directly to the bookstore, located in the basement of the Flanagan Center, and accessible online through the LConnect Campus Services tab.

Wentworth provides all full-time undergraduate day freshmen with a laptop computer outfitted with the software used in their academic programs. Students are required to graduate from Wentworth in order to keep the laptop. Students who withdraw voluntarily or who are academically withdrawn must return the laptop or be charged a recovery fee. Information on Wentworth's laptop program may be found at [wit.edu/laptop](http://wit.edu/laptop).

### *Sibling Discount*

Wentworth Institute of Technology is pleased to offer a tuition discount to siblings who are enrolled concurrently in traditional day undergraduate degree programs, as specified below. **The sibling discount only applies to tuition charges.** To qualify for the discount, all siblings must be matriculated and enrolled fulltime, in a day undergraduate program, for each period (semester) of eligibility:

- 10 percent tuition discount per student for the first and second siblings, enrolled concurrently
- 20 percent tuition discount for the third and additional siblings, enrolled concurrently

The sibling discount does not apply to, and, if applicable, will be removed in the following situations:

- 1) One of the siblings “walks away,” withdraws, or graduates from Wentworth.
- 2) One of the siblings enrolls in the Master of Architecture program while the other sibling is enrolled as an undergraduate.

One sibling must complete the sibling discount application form, found on the Student Service Center website, and return it to the Student Service Center.

## **Payment Information**

Students in undergraduate day programs and the Master of Architecture program are billed prior to the start of each semester they are expected to attend. Bills are electronic only, and can be accessed through Leopardweb. Payment is due approximately one month prior to the start of the semester.

Students in CPCE undergraduate, certificate, and workforce development programs, and students in the Master of Construction Management, Master of Facility Management, or Master of Technology Management, will be billed within 24 hours after they register. The bill due date is the last day of the official add/drop registration period. Many students in these programs are also eligible to participate in the 3-Payment Plan. Please contact the Student Service Center at (617) 989-4020 or (800) 222-9368 for details.

All students must pay for each semester’s classes by the due date or the class schedule will be canceled due to non-payment.

## **Alternative Payment Options**

### *Monthly Payment Plan*

Undergraduate and Master of Architecture students have the option to enroll in a monthly payment plan. Wentworth partners with an outside provider, Tuition Management Systems (TMS), to offer yearlong or semester payment plans. TMS charges a one-time enrollment fee, and all plans are interest free. For more information, please contact the Student Service Center at (617) 989-4020 or (800) 222-9368.

### *3-Payment Plan*

The “3-Payment Plan” is available to eligible CPCE degree seeking students and for individual non-credit courses with semester tuition greater than \$1,000. The payment plan is only offered at the beginning of each semester. Students enrolled only for the second seven-week session courses are not eligible for the 3-Payment Plan. Students must enroll online through the e-bill, and the first payment is required at the time of registration. Students are required to enter payment information for automatic payment for the second and third payments. The second and the third payment due dates are published on the e-contract and will be automatically charged to your account. If payment cannot be processed in accordance with the schedule, a late payment fee of \$50 may be assessed for each late/missed installment. Students who fail to meet these terms will not be eligible to participate in this plan for future semesters. Students who were referred to outside collection agencies in the past or have more than two late fees on their account may not qualify for payment plans and must pay in full by the due date. The Student Financial Services staff reserves the right to deny enrollment in the 3-Payment Plan. Directions for enrolling in the 3-Payment Plan can be found online.

## **Registration Cancellation for Non-Payment**

Students who have not paid their accounts in full by the tuition due date, completed required financial aid paperwork, or have not made payment arrangements with Student Financial Services, class registration and/or housing assignments may be cancelled for non-payment.

If a student's class registration and/or housing assignment is cancelled for non-payment, the student may re-register for classes, depending on class availability and provided appropriate payment arrangements are made. If a student's housing assignment is cancelled, there is no guarantee that the student will receive on-campus housing.

## Returned Check

A \$30 fee will be placed on the student's account for any check returned to Wentworth by the bank. This fee may not be reversed. The Student Service Center will not accept a personal check, including web checks, if there have been two (2) returned checks on a student's account. Wentworth also reserves the right to refuse checks for a past-due balance, to request a transcript, or for payments made within two (2) weeks of graduation.

## Late Payments and Delinquent Accounts

Failure to pay a student's account balance in full on or before the bill due date (see PAYMENT INFORMATION section) will result in cancellation of a student's class schedule as well as a student's housing assignment (if applicable). Wentworth reserves the right to charge a \$100 late fee to any past due account balances. A student whose account shows an outstanding balance will not be allowed to register or attend classes for future semesters.

Wentworth reserves the right to hold diplomas, grades, and transcripts from all students who have not paid all bills due the Institute. It is a Wentworth policy that only those students who have met all the academic and financial requirements for graduation may participate in the graduation ceremony.

Wentworth reserves the right to refer any delinquent account balance to an outside collection agency. Once the account is referred to an outside collection agency, a collection fee, which could be up to 40 percent of the principal balance, will be added to the student's total account balance. If the agency decides to pursue litigation on the outstanding balance, students will also be liable for any additional late fees, interest, or legal fees incurred.

## Credit Balance Policy

Institutional and federal financial aid will disburse to student accounts approximately four weeks into the term if all the financial aid requirements are complete. Typically, there will not be a credit balance until all institutional and federal aid disburses. Once this occurs, and if it creates a credit balance, any remaining credit will be refunded as follows:

- If a credit balance is a result of federal Stafford loans, alternative loans, and/or grants, the refund will be issued to the student based on the refund option they choose.
- If a credit balance is the result of a Parent Plus loan, the refund will be issued to the parent borrower unless refund to the student is selected by the borrower when the loan is applied for.
- If a credit balance is a result of Tuition Management Systems (TMS) payments, the refund will be issued to the TMS plan payer. Any credit balances resulting from a TMS payment will not be refunded until the TMS plan is completed and/or withdrawn.
- If a credit balance is a result of a credit card payment, and the payment was made within the past 90 days, the refund will be credited back to the credit card used for the transaction. If the credit card payment was made more than 90 days ago, the refund will be issued via the method the student chose as their preferred method of disbursement.

A credit balance transfer will be processed only at the student's or parent's request when there is a credit balance on the student's account. Any credit on the account due to federal financial aid will be refunded back to the appropriate party at the end of the academic year.

## Withdrawal from Wentworth

Before withdrawing, it is highly recommended that a student seek counseling from his or her faculty advisor, or the Counseling Services if the withdrawal is medical in nature. Students should also consult with the appropriate Student Financial Services and Financial Aid counselors in the Student Service Center to discuss any financial consequences of voluntary withdrawal.

A student who needs to withdraw from Wentworth during the semester must complete a voluntary withdrawal petition and follow the voluntary withdrawal procedures outlined in the catalog. Laptop computers must be returned to the DTS Helpdesk, located on the third floor of Beatty Hall. Students who do not return a laptop will be billed a recovery fee equal to the cost of the computer system as stipulated in the Laptop Program Student Agreement. All students are liable for tuition, room and board, and laptop fees in accordance with the adjustment policy below.

## Tuition Adjustments

Tuition adjustment for a withdrawing student is initiated based on the point in the semester at which the student files voluntary withdrawal paperwork with the Student Service Center. Non-attendance of classes does not constitute an official withdrawal, and no adjustments will be made based solely on lack of attendance.

Students who register for classes, fail to appear for those classes, and who do not notify Wentworth of their intention to withdraw from classes, are liable for all tuition and fees assessed for that semester.

Tuition and fees will not be adjusted until the Student Service Center receives the official withdrawal request from students. Withdrawal forms received after the proration period will not initiate adjustments. Adjustments are made as follows:

For 15-Week Courses:

- If withdrawal is filed by the end of the drop/add period, tuition reversal amount is 100 percent, minus non-refundable \$250 deposit, if applicable.
- If withdrawal is filed by the end of the second week of the semester, tuition reversal amount is 75 percent.
- If withdrawal is filed by the end of the third week of the semester, tuition reversal amount is 50 percent.
- If withdrawal is filed by the end of the fourth week of the semester, tuition reversal amount is 25 percent.
- If withdrawal is filed by the fifth week of the semester and later, no reversal of tuition charges.

For Six- or Seven-Week Courses:

- If withdrawal is filed by the end of the first week of the course, tuition reversal amount is 100 percent.
- If withdrawal is filed by the end of the second week of the course, tuition reversal amount is 50 percent.
- If withdrawal is filed by the third week of the course and later, no reversal of tuition charges.

Students who withdraw from Wentworth and receive Federal Student Financial Aid are subject to a refund policy as prescribed by Federal Regulations. Students should contact the Student Service Center to obtain the appropriate financial aid refund schedule as well as to discuss any remaining financial obligations with a Student Financial Services or Financial Aid counselor.

Fees are not refundable. Students are liable for tuition and fees in accordance with the published refund policy.

## Room and Board Adjustment

A student's room and board charges are determined by the date which the student's room key(s) is returned to the Resident Hall director. A student who withdraws within the first four weeks of the semester is responsible for board charges based on actual meal points used. From week five through the end of the semester, the student will be responsible for the entirety of the board plan charged.

To receive a pro-rated room charge refund, a student must withdraw in writing and check out with a Resident Hall

director within the first four weeks of the current semester. After the fourth week of classes, no adjustment will be made to a student's room charge if he or she decides to withdraw from Wentworth or leave the residence halls.

No adjustments to room or board charges will be made to the account of any student who is withdrawn for discipline sanctions. For more information, please contact the Office of Housing and Residential Life at [housing@wit.edu](mailto:housing@wit.edu) or (617) 989-4160.

## **Housing Agreement Release**

Students living on campus for the fall and spring semesters sign a two-semester Housing Agreement. Students who withdraw from housing without a valid reason will be charged a Housing Agreement Release Fee of \$1,000 if they withdraw from the residence halls after the fourth week of the fall semester or through the fourth week of the spring semester. Students withdrawing from the residence halls after this point are responsible for the full spring room charge.

For more information please refer to [wit.edu/reslife/](http://wit.edu/reslife/) or contact the Office of Housing and Residence Life at (617) 989-4160.

## **Refund of Payments**

After all necessary adjustments have been made to a student's account, any credits resulting from payments made will be refunded in accordance with the manner in which they were received.

## **Federal Funds Refund**

If a student withdraws from Wentworth during the semester, the total refunded amount is determined according to federal and institutional refund policy. The refund will be returned to the individual programs in the following order: 1) Federal Unsubsidized Stafford Loan, 2) Federal Subsidized Stafford Loan, 3) Federal Perkins Loan, 4) Federal PLUS Loan, 5) Federal Pell Grant, 6) Federal Supplemental Educational Opportunity Grant, 7) State funded Grants, 8) Private funded programs, and 9) Wentworth Institutional Aid. Specific questions regarding the refund policy can be addressed with a student's Financial Aid counselor in the Student Service Center.

In some cases, a student's account may end up having a balance due after the federal financial aid adjustment is done. Students will be notified and billed for the balance and any account balance becomes due immediately.

## **STUDY ABROAD OPPORTUNITIES**

Wentworth seeks to strengthen our students' educational experience by offering an opportunity for global learning. Wentworth study abroad programs are designed to immerse students in foreign cultures through classroom instruction and field experiences and to gain a comprehensive education marked by high standards and quality.

Wentworth has established partnerships around the world with a select group of affiliated programs that have demonstrated a proven track record for academic integrity and earned a reputation for excellence in providing solid support throughout their study abroad programs. Wentworth also offers faculty-led study abroad programs which provide a unique opportunity to gain a credit bearing international experience under the instruction of members of the WIT faculty. For a full list of study abroad options visit the study abroad website: [wit.edu/academics/academic-student-support/study-abroad-overview](http://wit.edu/academics/academic-student-support/study-abroad-overview).

Several Wentworth departments have developed study abroad programs such student exchange programs

and faculty-led programs with other institutions. In past years, students have studied in Germany, France, England, Istanbul, Switzerland, China, Australia, and many other countries through these programs. Please refer to the study abroad website at [wit.edu/study-abroad](http://wit.edu/study-abroad) for more information.

Wentworth students can also take advantage of the Global Education Opportunities (GEO) Center at the Colleges of the Fenway for assistance in finding abroad opportunities. Please see [cof.studioabroad.com](http://cof.studioabroad.com) for more information. All travel by Wentworth staff, faculty, or students for Wentworth-related or -sponsored activities must be registered through the GEO Center COF database.

All courses taken during a study abroad semester require preapproval and are submitted to the Office of the Registrar on a completed International Transfer Credit Pre-approval form. Students must meet with their department chair to determine if the available courses will satisfy requirements within their major. In many cases an established course equivalency list is available. In instances where an equivalency has not been established, prior approval of the department chair is required.

Courses completed that have not been preapproved will not become part of the student's WIT academic record unless approved by the department chair. Approval is not guaranteed. All accepted international credits will be held to the same minimum grade requirements as at Wentworth Institute of Technology. Approved courses will appear on a student's official transcript with grades of "TR" (transfer credit) and are not calculated into a student GPA.

## Visiting/Exchange Students

Students pursuing degrees abroad at institutions with a signed articulation agreement with Wentworth Institute of Technology may apply to enroll at Wentworth for one or two semesters as a non-matriculating/exchange student with the approval of their home institution.

Visiting/exchange students are required to purchase health insurance through Wentworth. Applications for enrollment will be reviewed for academic eligibility by the appropriate academic department and by the Office of the Provost for eligibility for non-immigrant student status.

Visiting/exchange students are regarded as members of the Wentworth community and as such are encouraged to participate in campus life through engagement in student club activities, etc. Visiting/exchange students are also responsible for adhering to the Student Code of Conduct as well as any other rules set forth by the University.



# COLLEGE OF ARCHITECTURE, DESIGN, AND CONSTRUCTION MANAGEMENT

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**Charles Hotchkiss, Dean**

Annex North Room 105

(617) 989-4831

## *Our Vision*

To position our college and prepare our students for leadership in design and the built environment professions.

## *Our Mission*

In the College of Architecture, Design and Construction Management, students learn to design, construct, adapt, and manage the built environment in ways that reflect the highest standards of technological innovation, craftsmanship, and sustainability. Students acquire skills, knowledge, and habits of thought and practice that allow them to create lives of meaning and purpose as engaged citizens and productive and creative professionals.

The College of Architecture, Design, and Construction Management offers four undergraduate degree programs:

- Bachelor of Science in Architecture
- Bachelor of Science in Construction Management (with concentrations in Facilities Management and Commercial Real Estate)
- Bachelor of Science in Industrial Design
- Bachelor of Science in Interior Design

The undergraduate programs in Construction Management, Industrial Design, and Interior Design all hold full professional accreditation. The B.S. in Architecture is a four-year, pre-professional degree.

The College also offers three graduate degrees:

- Master of Science in Architecture, a fully accredited professional degree
- Master of Science in Construction Management, a fully accredited professional degree
- Master of Science in Facility Management

## DEPARTMENT OF ARCHITECTURE

### **Sharon Matthews, Interim Department Chair**

Annex North, Room 114

617-989-4622

Kelly Hutzell, Director of Graduate Programs

Annex North, Room 106

617-989-4494

## Faculty

### *Professors*

- Ann Borst
- Robert Cowherd, Ph.D.
- Garrick Goldenberg
- Manuel Delgado
- John Ellis
- Mark A. Klopfer
- Thomas M. Lesko
- Mark Pasnik

### *Associate Professors*

- Carol Burna
- Charles J. Cimino
- Lora Kim
- Antonio Furgiuele
- Kelly Hutzell
- Troy Peters
- Ann Pitt
- Robert Trumbour

### *Assistant Professors*

- Jennifer Lee Michaliszyn
- Anne-Catrin Schultz, Ph.D.
- Ingird Strong

### *Study Abroad*

- Rolf Backmann, Director (Germany)

## Department Mission Statement

The Architecture program at Wentworth embraces the art of making. We are committed to the traditional role of the practitioner and master builder: to design and construct buildings that contribute to society and enrich people's lives. To that end, the curriculum promotes research and design based on the linkages between conceptual frameworks and the tangible nature of architecture. Through rigorous investigations into the history, theory and material culture of the built environment, students engage design as a fusion of the art and science of building.

## Degree Programs

The department offers two separate degree programs:

- Bachelor of Science in Architecture
- Master of Architecture – three tracks
  - The one-year, Master of Architecture professional degree: Internal Candidates
  - The two-year, Master of Architecture professional degree for external candidates who have successfully completed a pre-professional degree in Architecture from a NAAB-accredited program: External Candidates
  - The three-year, Master of Architecture professional degree for external candidates who have a four-year Bachelor of Arts or Bachelor of Science in an unrelated discipline: External Candidates

In addition, the department offers a Minor in Architectural Studies open to students in all other departments at Wentworth.

In the United States, most registration boards require a degree from an accredited professional degree program as a prerequisite for licensure. The National Architectural Accrediting Board (NAAB), which is the sole agency authorized to accredit professional degree programs in architecture offered by institutions with U.S. regional accreditation, recognizes three types of degrees: the Bachelor of Architecture, the Master of Architecture, and the Doctor of Architecture. A program may be granted an eight-year, three-year, or two-year term of accreditation, depending on the extent of its conformance with established educational standards.

Doctor of Architecture and Master of Architecture degree programs may require a pre-professional undergraduate degree in architecture for admission. However, the pre-professional degree is not, by itself, recognized as an accredited degree.

## ARCHITECTURE BACHELOR'S DEGREE REQUIREMENTS

### Architecture (B.S. Arch)

#### Leading to a Bachelor of Science in Architecture degree

##### *Program Description*

The Bachelor of Science in Architecture (B.S.Arch) program's rigorous course of study centers on the design studio, where students work closely with faculty in their explorations of design and design methods. Associated courses in history, theory, technology, and professional practice are often closely related to design studio problems. Student learning is enhanced by two semesters of cooperative work experience as well as study abroad options.

All entering freshmen are admitted to the four-year B.S.Arch program. During the junior year students focus their educational interests by choosing one of the three concentrations outlined below.

##### *B.S.Arch Program Concentrations*

The undergraduate program in architecture offers three areas of concentration, which allow students to pursue a particular focus within their study of architecture. The core architectural education is equivalent across concentrations, and all achieve the same learning outcomes. All students are required to select a concentration at the end of their first semester in junior year.

##### *Adaptive Interventions*

This concentration investigates architecture as a discipline in which the primary focus is on interventions into contingent existing conditions. Adaptive re-use, regenerative urbanism, sustainability, critical regionalism and related strategies are addressed at scales ranging from the individual building to the urban environment.

## *Emerging Technologies*

This concentration explores the material nature of architecture, the craft of building, and the role of emerging technologies as they inform the design process. It emphasizes the broad architectural and cultural implications of technology, and advances an ethos of research through making.

## *Urbanism*

This concentration focuses on the influence of the arts and humanities, ecology and landscape, economics and politics, and society on design at the urban scale. It challenges students to explore the representation of complex social, cultural and ecological systems as a form of research and offers students the skills and insights necessary to collaborate across disciplinary boundaries and to provide leadership in reshaping our cities.

## *Cooperative Work Experience*

The Architecture Department has a substantial and well-established cooperative education component embedded in the curriculum. B.S.Arch students spend two semesters working in an architectural or allied design professional office. The department collaborates with the Institute's Center for Cooperative Education and Career Services to reinforce the learning content of these placements. Work experience may be applied to the Architectural Experience Program (AXP) ARCH 2222—a required step toward professional licensure. In the semester prior to their first cooperative education experience, students take ARCH2225 Professional Practice Preparation (PPP). This course will introduce students to the program of housing.

## *Study Abroad Programs*

The Department of Architecture offers semester-long study abroad options in Berlin and Barcelona/Girona for students in the B.S.Arch program. These programs are led by resident architects/Wentworth faculty members. During their time abroad, students work closely with local design and planning professionals as well as with regionally based students and community groups. Intensive travel-oriented coursework gives students an additional cultural perspective. The curriculum is fully aligned with required courses in Boston, allowing normal progress toward graduation. The study abroad program accepts a limited number of students by application and are selective.

## *Degree Details*

Total credits for degree: 135

This is a four-year program that begins in the fall of the student's first year and is planned to end in the spring semester of the fourth year.

Starting in the second semester of their junior year, students select one of three concentrations – Adaptive Interventions, Emerging Technologies, or Urbanism – which is the focus of selected courses through their senior year.

## *Special Grade Requirement*

The Architecture Department has a special grade requirement that applies to all design studio courses from the sophomore year onward. Students in the B.S.Arch degree program must comply with the following design studio grade requirement:

Final grade must be C or better if the final grade in the previous design studio is less than a C.

Students who receive a final grade below C for two consecutive semesters are not permitted to continue in the program until they successfully repeat the second studio for which they received a sub-standard grade.

In the first three semesters, students get a broad introduction to the field of architecture, which serves as the foundation for the curriculum:

**Freshman Year, Fall Semester (total credits 14)**

ARCH1000	Studio 01 (6 credits)
MATH1000	College Mathematics I (4 credits)
ENGLISH	English Sequence, See ENGL/HSS note below * (4 credits)

**Freshman Year, Spring Semester (total credits 14)**

ARCH1500	Studio 02 (6 credits)
MATH1500	Precalculus (4 credits)
ENGLISH	English Sequence, See ENGL/HSS note below * (4 credits)

**Sophomore Year, Fall Semester (total credits 18)**

ARCH2000	Studio 03 (6 credits)
ARCH2100	History/Theory 01 (4 credits)
ARCH2200	Technology 01 (4 credits)
ARCH2222	AXP Registration (0 credits)
ARCH2225	Pro Practice Prep (0 credits)
HSS ELECTIVE	See ENGL/HSS note below *(4 credits)

**Sophomore Year, Spring Semester**

COOP3500	Co-op Work Term
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In the following three semesters, students gain knowledge in integrative design:

**Sophomore Year, Summer Semester (total credits 18)**

ARCH2500	Studio 04 (6 credits)
ARCH2600	History/Theory 02 (4 credits)
ARCH2700	Technology 02 (4 credits)
PHYS1000	College Physics I (4 credits)

**Junior Year, Fall Semester (total credits 17)**

ARCH3000	Studio 05 (6 credits)
ARCH3200	Technology 03 (4 credits)
ARCH3400	Structures 01 (4 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

In the fall semester of the junior year, students choose one of three concentrations. In the spring of their third year, students will take their first concentration seminar, designed to introduce them to the history and theory of their chosen concentration. This seminar will be followed in the fourth year with another concentration seminar as well as a concentration-specific studio.

**Architecture - Urbanism Concentration**

**Junior Year, Spring Semester (total credits 17)**

ARCH3500	Studio 06 (6 credits)
ARCH3700	Concentration Studies 01(4 credits)
ARCH3900	Structures 02 (3 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

### **Junior Year, Summer Semester**

COOP4500 Co-op Work Term II

### **Senior Year, Fall Semester (total credits 19)**

ARCH4000 Studio 07 (6 credits)  
ARCH3750 Concentration Studies 02 (4 credits)  
ELECTIVE General Elective (5 credits)  
HSS ELECTIVE See ENGL/HSS note below \* (4 credits)

### **Senior Year, Spring Semester (total credits 18)**

ARCH5500 Studio 08 (6 credits)  
ELECTIVE Architecture (4 credits)  
ELECTIVE Architecture (4 credits)  
HSS ELECTIVE See ENGL/HSS note below \* (4 credits)

## **Architecture - Emerging Technologies Concentration**

### **Junior Year, Spring Semester (total credits 17)**

ARCH3500 Studio 06 (6 credits)  
ARCH3700 Concentration Studies 01 (4 credits)  
ARCH3900 Structures 02 (4 credits)  
HSS ELECTIVE See ENGL/HSS note below \* (4 credits)

### **Junior Year, Summer Semester**

COOP4500 Co-op Work Term II

### **Senior Year, Fall Semester (total credits 19)**

ARCH4025 Studio 07 (6 credits)  
ARCH3750 Concentration Studies 02 (4 credits)  
ELECTIVE General Elective (5 credits)  
HSS ELECTIVE See ENGL/HSS note below \* (4 credits)

### **Senior Year, Spring Semester (total credits 18)**

ARCH5500 Studio 08 (6 credits)  
ELECTIVE Architecture (4 credits)  
ELECTIVE Architecture (4 credits)  
HSS ELECTIVE See ENGL/HSS note below \*\*\* (4 credits)

## **Architecture - Adaptive Interventions Concentration**

### **Junior Year, Spring Semester (total credits 17)**

ARCH3500 Studio 06 (6 credits)  
ARCH3700 Concentration Studies (4 credits)  
ARCH3900 Structures 02 (4 credits)  
HSS ELECTIVE See ENGL/HSS note below \*(4 credits)

### **Junior Year, Summer Semester**

COOP4500 Co-op Work Term II

## Senior Year, Fall Semester (total credits 19)

ARCH4050	Studio 07 (6 credits)
ARCH3750	Concentration Studies 02 (4 credits)
ELECTIVE	General Elective (5 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

## Senior Year, Spring Semester (total credits 18)

ARCH5500	Studio 08 (6 credits)
ELECTIVE	Architecture (4 credits)
ELECTIVE	Architecture (4 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

\*ENGL/HSS Note:

Day program students are required to complete:

- At least one course in Humanities
- At least one course in the Social Sciences
- The remaining courses from either the Humanities or Social Sciences category.

Students with a three English course sequence may use the third English course to satisfy a Humanities requirement.

## Architecture Electives

Students are encouraged to pursue breadth, as well as depth in their architectural studies. The following list is indicative of the department's elective course offerings in recent years: (all courses are 4 credits unless otherwise noted)

ARCH3800	Advanced Hand Drawing for Architecture
ARCH3800	Architecture in the Information Age
ARCH3800	Architecture, Place and the Social Contract
ARCH3800	Axonography
ARCH3800	Fleshing Buildings
ARCH3800	BIM in Sustainable Design
ARCH3800	Building Community
ARCH3800	Cinema and the Contemporary Asian City
ARCH3800	Collage and Architecture
ARCH3800	Color Relationships
ARCH3800	Construction Documents using Revit Architecture
ARCH3800	Contemporary Approaches to the Public Realm
ARCH3800	Design Entrepreneurship
ARCH3800	Design Methods
ARCH3800	Dynamic Tectonics – Between Structure and Story
ARCH3800	Inquiry into Creative Spatial Design and Computation
ARCH3800	Kinetic Predictive Facades
ARCH3800	Material Readings
ARCH3800	Modernism and Contemporary Trends in House and Garden
ARCH3800	Negotiation in the Design of Cities
ARCH3800	Net Zero Energy Housing
ARCH3800	Project Planning
ARCH3800	Prototyping Architecture
ARCH3800	Responsive Architecture
ARCH3800	Sculpt Modeling
ARCH3800	Sketching the Urban and Natural Landscape in Pen, Pencil, and Watercolor
ARCH3800	Theories of Urban Design
ARCH3800	The Pritzker Prize

ARCH3800	Unfolding the Plane
ARCH3800	Understand Design Composition through Drawing & Painting
ARCH3800	Visualization Through Hand Drawing
ARCH3850	Animated Processes
ARCH3850	ARTitecture
ARCH3850	Building the City of the Future
ARCH3850	City of Skins
ARCH3850	Experimental Structures
ARCH3850	Sustainable Urban Architecture

## Minor in Architectural Studies

The Department of Architecture offers a minor in Architectural Studies open to students enrolled in all other departments at Wentworth. The course sequence includes two classes in architectural history and three with a focus on technology. The history courses introduce students to the masterpieces of architecture across several millennia through lectures and assignments that concentrate on analytical sketching and critical writing. In the technology courses, students focus on site design concepts and environmental building strategies. The study methods for achieving visual, thermal, and acoustical comfort in buildings using climate, form, orientation, materials, and structure. The minor in Architectural Studies exposes students to the fundamentals and complexities of the built environment, an area of expertise relevant for many professions and careers.

To earn the minor, the student must complete the following five courses in this order:

ARCH2100	History / Theory 01
ARCH2200	Technology 01
ARCH2600	History / Theory 02
ARCH2700	Technology 02
ARCH3200	Technology 03

Total credits for minor: 20

## ARCHITECTURE MASTERS' DEGREE REQUIREMENTS

### Architecture (M. Arch)

#### Leading to a Master of Architecture degree

While there are many places to study architecture, Boston's rich tapestry of contemporary and historic buildings make it one of the best cities in the country to be a graduate student of architecture. Students at Wentworth experience a practice-based education in design, fabrication, and building, use the advanced digital tools found in leading edge architectural firms, and conceive of imaginative solutions that address real-world challenges and opportunities.

At Wentworth, our graduate curriculum promotes design investigation and research based on the tangible nature of architecture. Our students apply critical thinking skills in design research and have the freedom to explore their interests and express their creativity.

#### *M.Arch Degree Program Application Process*

The department offers three Master of Architecture degree tracks:

- The one-year, Master of Architecture professional degree: Internal Candidates
- The two-year, Master of Architecture professional degree for external candidates who have successfully completed a pre-professional degree in Architecture from a NAAB-accredited program: External Candidates
- The three-year, Master of Architecture professional degree for external candidates who have a four-year Bachelor of Arts or Bachelor of Science in an unrelated discipline: External Candidates



## Degree Details

Total credits for degree: 36 (one-year) or 72 (two-year), or 108 (three-year)

This is a program that begins in the fall of the student's first year and is planned to end in the spring semester of the first, second, or third year.

Students in the M.Arch program must maintain a 3.0 GPA to be in good academic standing.

### Master of Architecture (One-Year)

#### First Year, Fall Semester (total credits 18)

ARCH9000	Studio 09: Special Topics (6 credits)
ARCH9200	Thesis Preparation I (4 credits)
ARCH9300	Thesis Preparation II (4 credits)
ELECTIVE	Architecture (4 credits)

#### First Year, Spring Semester (total credits 18)

ARCH9500	Studio 10: Thesis (6 credits)
ARCH9600	Professional Perspectives (4 credits)
ARCH9700	Advanced Topics (4 credits)
ELECTIVE	Architecture (4 credits)

### Master of Architecture (Two-Year)

#### First Year, Fall Semester (total credits 18)

ARCH8000	Advanced Graduate Studio 01 (6 credits)
ARCH8250	Advanced Technology & Materials (4 credits)
ARCH8300	Applied Research & Design 01 (4 credits)
AND	
ARCH8400	Structures 01 (4 credits) OR
ARCH8750	Concentration Studies (4 credits) OR
ELECTIVE	Architecture (4 credits)

#### First Year, Spring Semester (total credits 18)

ARCH8500	Advanced Graduate Studio 02 (6 credits)
ARCH8650	Fabrication Methods (4 credits)
ARCH8700	Applied Research & Design 02 (4 credits)
AND	
ARCH8750	Concentration Studies (4 credits) OR
ARCH8800	Structures 02 (4 credits) OR
ELECTIVE	Architecture (4 credits)

#### Second Year, Fall Semester (total credits 18)

ARCH9000	Studio 09: Special Topics (6 credits)
ARCH9200	Thesis Preparation I (4 credits)
ARCH9300	Thesis Preparation II (4 credits)
ELECTIVE	Architecture (4 credits)

#### Second Year, Spring Semester (total credits 18)

ARCH9500	Studio 10: Thesis (6 credits)
ARCH9600	Professional Perspectives (4 credits)
ARCH9700	Advanced Topics (4 credits)
ELECTIVE	Architecture (4 credits)

## Master of Architecture (Three-Year)

### First Year, Fall Semester (total credits 18)

ARCH7000	Graduate Foundation Studio 01 (6 credits)
ARCH7250	Graduate History Lecture (4 credits)
ARCH7300	Technology 01 (4 credits)
ARCH7350	2D/3D Media Processes (4 credits)

### First Year, Spring Semester (total credits 18)

ARCH7500	Graduate Foundation Studio 02 (6 credits)
ARCH7550	History/Theory Seminar (4 credits)
ARCH7600	Technology 02 (4 credits)
AND	
ARCH8750	Concentration Studies (4 credits) OR
ELECTIVE	Architecture (4 credits)

### Second Year, Fall Semester (total credits 18)

ARCH8000	Advanced Graduate Studio 01 (6 credits)
ARCH8250	Advanced Technology & Materials (4 credits)
ARCH8300	Applied Research & Design 01 (4 credits)
AND	
ARCH8400	Structures 01 (4 credits) OR
ARCH8750	Concentration Studies (4 credits) OR
ELECTIVE	Architecture (4 credits)

### Second Year, Spring Semester (total credits 18)

ARCH8500	Advanced Graduate Studio 02 (6 credits)
ARCH8650	Fabrication Methods (4 credits)
ARCH8700	Applied Research & Design 02 (4 credits)
AND	
ARCH8750	Concentration Studies (4 credits) OR
ARCH8800	Structures 02 (4 credits) OR
ELECTIVE	Architecture (4 credits)

### Third Year, Fall Semester (total credits 18)

ARCH9000	Studio 09: Special Topics (6 credits)
ARCH9200	Thesis Preparation I (4 credits)
ARCH9300	Thesis Preparation II (4 credits)
ELECTIVE	Architecture (4 credits)

### Third Year, Spring Semester (total credits 18)

ARCH9500	Studio 10: Thesis (6 credits)
ARCH9600	Professional Perspectives (4 credits)
ARCH9700	Advanced Topics (4 credits)
ELECTIVE	Architecture (4 credits)

## CONSTRUCTION MANAGEMENT DEPARTMENT

### **E. Scott Sumner, Department Chair**

Annex South, Room 008B  
(617) 989-4259

## Faculty

### *Professors*

- Cristina Cosma, Ph.D., P.E.
- Mark Hasso, Ph.D., P.E.

### *Associate Professors*

- E. Scott Sumner, CCM
- Ilyas Bhatti, P.E.
- Monica Snow, Ph.D., P.E.
- Payam Bakhshi, Ph.D., P.E.
- Thomas A. Taddeo

### *Assistant Professors*

- Bill Kearney, CCM
- John D. Cribbs, Ph.D., LEED AP
- Todd Johnson, CPC
- Richard Christiano, CFM
- Afshin Pourmokhtarian, Ph.D.

### *Staff*

- John Gariepy, Academic Coordinator
- Michael D'Agostino, Laboratory Technician

## Department Vision/Mission Statement/Goals

The Construction Management program provides students with both the education and work experience to enter the construction profession as productive team members who possess the potential to become innovative technical problem-solvers and industry leaders. The philosophy of the program is to offer a curriculum that challenges, shapes, and encourages students to think about and apply their expanding technical knowledge and organizational skills to the solution of contemporary problems. This philosophy is supported by the educational mission of the Institute that emphasizes physics and mathematics (both theoretical and applied), humanities and social sciences, communication skills, and computer science. Students are prepared through their educational experience to adapt to changes in society, technology, and the profession.

There are several goals of the Construction Management program:

- Maintain accreditation by the American Council of Construction Education (ACCE), which promotes, supports, and accredits construction education programs.
- Successfully place students in positions appropriate for college graduates in the construction industry.
- Maintain class sizes of no more than 30 students in each lecture and no more than 20 students in each lab.
- Provide Students with the knowledge and skills to succeed in supervisory and management roles in construction related fields.

The following are the learning outcomes that will be used to assess the Construction Management program.

- Create oral presentations appropriate to the construction discipline.
- Create written communications appropriate to the construction discipline.
- Create a construction project safety plan.
- Create construction project estimates.
- Create construction project schedules.
- Analyze professional decisions based upon ethical principles.
- Analyze construction documents for planning and management of construction processes.
- Analyze methods, materials, and equipment used on construction projects.
- Apply construction management skills as an effective member of a multi-disciplinary team.
- Apply electronic-based technology to manage the construction process.
- Apply basic surveying techniques for construction layout and control.
- Analyze different methods of project delivery and the roles and responsibilities of all constituencies involved in the design and construction process.
- Understand construction risk management.
- Understand construction accounting and cost control.
- Understand construction quality assurance and control.
- Understand construction project control processes.
- Understand the legal implications of contract, common, and regulatory law to manage a construction project.
- Understand the basic principles of sustainable construction.
- Understand the basic principles of structural behavior.
- Understand the basic principles of mechanical, electrical, and piping systems.

## Degree Programs

- Construction Management (BSCM)
  - Construction Management with a Concentration in Facility Management
  - Construction Management with a Concentration in Commercial Real Estate
- Minor in Construction Management
- Master of Science in Construction Management (MSCM)
- Master of Science in Facility Management (MSFM)

## CONSTRUCTION MANAGEMENT DEGREE REQUIREMENTS

### Construction Management (BSCM)

#### Leading to the Bachelor of Science degree

The Construction Management program provides a background of technical skills to apply to a construction project from conception to completion. Students are taught the skills necessary to manage resources, time, cost, and quality with an emphasis on team building. Skills developed during the program include management, budgeting and cost control, cost estimating, scheduling, engineering fundamentals, and the development of analytical and communication skills. The Construction Management program has a cooperative education program where hands-on experience is acquired. Career opportunities for the construction manager are found throughout the industry and include positions with construction companies, government agencies, architectural and engineering firms, industrial firms, and manufacturing and materials suppliers.

#### *Degree Details*

Credits for Degree: 134

This is a four-year, American Council for Construction Education (ACCE) accredited program that begins in the fall of the student's first year and is planned to finish in the summer semester of the student's fourth year. This period includes two semesters of cooperative work experience. A graduate of the program can earn a

Construction Manager in Training (CMT) certificate, the first step in gaining a Certified Construction manager (CCM) professional registration.

Students should contact their academic advisor or academic department office for information regarding the construction management elective.

### *Special Graduation Requirement*

Students in the Bachelor of Science in Construction Management program must demonstrate completion of a U.S. Department of Labor Occupational Safety and Health Administration (OSHA) 30-hour training course in Construction Safety & Health. Submission to the Registrar of a photocopy of either the signed and dated card or verification and dating of entrance ticket or receipt indicating that the student actually attended the training will serve as adequate proof.

## **Construction Management (BSCM)**

### **Freshman Year Fall Semester (total credits 19)**

CONM1000	Introduction to CM/FM/RE (3 credits)
CONM1200	Building Construction (4 credits)
CHEM1000	Chemistry for the Built Environment (4 credits)
MATH1000	College Mathematics I (4 credits)
ENGLISH	English Sequence, See ENGL/HSS note below * (4 credits)

### **Freshman Year Spring Semester (total credits 18)**

CONM1500	Construction Graphics (3 credits)
CONM1600	Heavy Construction Equipment (3 credits)
PHYS1000	College Physics I (4 credits)
MATH1500	Precalculus (4 credits)
ENGLISH	English Sequence, See ENGL/HSS note below * (4 credits)

### **Sophomore Year Fall Semester (total credits 19)**

CONM2000	Construction Surveying (4 credits)
CONM2100	Statics and Strength of Materials (4 credits)
CONM2200	Estimating (4 credits)
MGMT2700	Financial Accounting (3 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

### **Sophomore Year Spring Semester (total credits 15)**

CONM2500	Building Systems (4 credits)
CONM2600	Wood and Steel Analysis & Design (3 credits)
MATH1030	Statistics and Applications (4 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

### **Sophomore Year Summer Semester**

COOP3000	Pre-Cooperative Work Term (Optional)
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### **Junior Year, Fall Semester (total credits 16)**

CONM3000	Materials Testing and Quality Control (4 credits)
CONM3100	Construction Project Management (4 credits)
CONM3201	Construction Project Scheduling (4 credits)
MGMT3000	Managing & Leading Organizations (4 credits)

## Junior Year Spring Semester

COOP 3500 Co-op Work Term I

## Junior Year Summer Semester (total credits 15)

CONM3500 Advanced Estimating and Bid Analysis (4 credits)

CONM3600 Concrete Analysis + Design (4 credits)

CONM3800 CM Elective (3 credits)

HSS ELECTIVE See ENGL/HSS note below \* (4 credits)

## Senior Year Fall Semester

COOP4500 Co-op Work Term II

## Senior Year Spring Semester (total credits 18)

CONM4000 Construction Project Control (3 credits)

CONM4100 Construction Business and Finance (4 credits)

CONM4200 Construction Safety and Risk Management (3 credits)

MGMT4100 Power and Leadership (4 credits)

HSS ELECTIVE See ENGL/HSS note below \* (4 credits)

## Senior Year Summer Semester (total credits 14)

CONM5500 BSCM Senior Project (4 credits)

CONM4650 Business, Construction Law and Government Regulations (3 credits)

MGMT3600 Labor Relations (3 credits)

HSS ELECTIVE See ENGL/HSS note below \* (4 credits)

\*ENGL/HSS Note:

Day program students are required to complete:

- At least one course in Humanities
- At least one course in the Social Sciences
- The remaining courses from either the Humanities or Social Sciences category.

Students with a three English course sequence may use the third English course to satisfy a Humanities requirement. Of the five humanities and social science electives, BSCM students must include the following HSS Directed Electives

ECON4102 Principles of Economics

PYSC4552 Industrial Organizational Psychology

## Construction Management (BSCM)

### Leading to a Bachelor of Science Degree with a concentration in Facilities Management

The concentration in Facilities Management is a specialized track within the Construction Management program. It aims to develop in its students recognized management skills along with the knowledge concerning current technologies that are necessary for entry-level professional practice. Facilities Management practice can be regarded as the management of a company's or institution's physical assets. The management of these assets involves short-term and long-term planning for physical facilities and real properties that integrates the organization's strategic business plan and the technical components for that plant. The quality of work life and cost effectiveness of the organization's environment are the goals of the facilities manager.

Building on a practical core of oral and written communications, mathematics, science, and business principles, the Facilities Management concentration introduces students to a wide range of facilities and

management issues including construction, energy management techniques, building management, facility assessment, and real estate principles. An integral aspect of the concentration is the experience students gain through two semesters of cooperative employment in facilities management offices.

## *Degree Details*

Credits for Degree: 134

This is a four-year program that begins in the fall of the student's first year and is planned to finish in the summer semester of the student's fourth year. The Facilities Management track is accredited by IACBE (International Assembly of Collegiate Business Education). Students in this track will be accepted into the Construction Management program. Prior to their sophomore year, students can formally elect to enter the Facilities Management concentration. Upon graduating, students in the Facilities Management concentration will have the opportunity to continue in the Wentworth Masters of Science in Facilities Management program.

## **Construction Management (BSCM) with concentration in Facilities Management**

### **Freshman Year Fall Semester (total credits 19)**

CONM1000	Introduction to CM/FM/RE (3 credits)
CONM1200	Building Construction (4 credits)
CHEM1000	Chemistry for the Built Environment (4 credits)
MATH1000	College Mathematics I (4 credits)
ENGLISH	English Sequence, See ENGL/HSS note below * (4 credits)

### **Freshman Year Spring Semester (total credits 18)**

CONM 1500	Construction Graphics (3 credits)
CMFM 2400	Property Management (3 credits)
PHYS 1000	College Physics I (4 credits)
MATH 1500	Precalculus (4 credits)
ENGLISH	English Sequence, See ENGL/HSS note below * (4 credits)

### **Sophomore Year Fall Semester (total credits 18)**

CMFM 3300	Building Operations (3 credits)
CONM 2100	Statics and Strength of Materials (4 credits)
CONM 2200	Estimating (4 credits)
MGMT 2700	Financial Accounting (3 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

### **Sophomore Year Spring Semester (total credits 16)**

CONM 2500	Building Systems (4 credits)
CMFM 3200	Project Management for Facility Managers (4 credits)
MGMT1500	Decision Analysis for Business (4 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

### **Sophomore Year Summer Semester**

COOP 3000	Pre-Cooperative Work Term (Optional)
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### **Junior Year Fall Semester (total credits 16)**

CMFM 4100	Facility Assess. + Forecasting (4 credits)
CONM 3100	Construction Project Management (4 credits)
CONM 3201	Construction Project Scheduling (4 credits)
MGMT 3000	Managing & Leading Organizations (4 credits)

### **Junior Year Spring Semester**

COOP 3500 Co-op Work Term I

### **Junior Year Summer Semester (total credits 14)**

CMFM 2300 Space Planning (4 credits)  
CMFM 4200 Energy and Sustainability (3 credits)  
CMFM 4600 Principles of Real Estate for FM (3 credits)  
HSS ELECTIVE See ENGL/HSS note below \*(4 credits)

### **Senior Year Fall Semester**

COOP 4500 Co-op Work Term II

### **Senior Year Spring Semester (total credits 18)**

MGMT 4400 Business Negotiation Principles (3 credits)  
MGMT 3500 Financial Management (4 credits)  
CONM 4200 Construction Safety and Risk Management (3 credits)  
MGMT 4100 Power and Leadership (4 credits)  
HSS ELECTIVE See ENGL/HSS note below \*(4 credits)

### **Senior Year Summer Semester (total credits 14)**

CMFM 5500 Capstone FM (4 credits)  
CONM 4650 Business, Construction Law and Government Regulations Law (3 credits)  
MGMT 3600 Labor Relations (3 credits)  
HSS ELECTIVE See ENGL/HSS note below \*(4 credits)

\*ENGL/HSS Note:

- At least one course in Humanities
- At least one course in the Social Sciences
- The remaining courses from either the Humanities or Social Sciences category.

Students with a three English course sequence may use the third English course to satisfy a Humanities requirement. Of the five humanities and social science electives, BSCM students must include the following HSS Directed Electives:

ECON4102 Principles of Economics  
PYSC4552 Industrial Organizational Psychology

## **Construction Management (BSCM) with a concentration in Commercial Real Estate**

The concentration in Commercial Real Estate is a specialized track within the Construction Management program. Commercial real estate is the real property used by a company for its own operational purposes. It provides corporations with a productive environment to house employees, manufacture and distribute products, and provide services to the market. Commercial real estate touches all classes of property, land and buildings such as office facilities, data centers, manufacturing facilities, logistic centers, corporate headquarters, distribution facilities, retail stores, and hotels. Requires excellent communication skills, analytical approach to problem solving and attention to detail.

Building on a practical core of oral and written communications, mathematics, science, and business principles, the Commercial Real Estate concentration introduces students to a wide range of real estate and management issues including construction, leasing, property evaluation, real estate financial analysis and real estate principles. An integral aspect of the concentration is the experience students gain through two semesters of cooperative employment in corporate real estate offices.



## Degree Details

Credits for Degree: 133

This is a four-year program that begins in the fall of the student's first year and is planned to finish in the summer semester of the student's fourth year. Students in this track will be accepted into the Construction Management program. Prior to their sophomore year, students can formally elect to enter the Commercial Real Estate concentration.

### Construction Management (BSCM) with concentration in Commercial Real Estate

#### Freshman Year, Fall Semester (total credits 19)

CONM1000	Introduction to CM/FM/RE (3 credits)
CONM1200	Building Construction (4 credits)
CHEM1000	Chemistry for the Built Environment (4 credits)
MATH1000	College Mathematics I (4 credits)
ENGLISH	English Sequence, See ENGL/HSS note below *(4 credits)

#### Freshman Year, Spring Semester (total credits 18)

CONN1500	Construction Graphics (3 credits)
CMRE1500	Principles of Commercial Real Estate (3 credits)
PHYS 1000	College Physics I (4 credits)
MATH 1500	Precalculus (4 credits)
ENGLISH	English Sequence, See ENGL/HSS note below *(4 credits)

#### Sophomore Year, Fall Semester (total credits 18)

CMRE2000	Real Estate Investment (3 credits)
CONM2100	Statics and Strength of Materials (4 credits)
CONM2200	Estimating (4 credits)
MGMT 2700	Financial Accounting (3 credits)
ECON4102	Principles of Economics (4 credits)

#### Sophomore Year, Spring Semester (total credits 15)

CONM 2500	Building Systems (3 credits)
CMFM 2400	Property Management. (4 credits)
MATH1030	Statistics and Applications (4 credits)
HSS ELECTIVE	See ENGL/HSS note below *(4 credits)

#### Sophomore Year, Summer Semester

COOP 3000	Pre-Cooperative Work Term (Optional)
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#### Junior Year, Fall Semester (total credits 15)

CMRE3000	Property Analysis (3 credits)
CONM3100	Construction Project Management (4 credits)
CONM3201	Construction Project Scheduling (4 credits)
MGMT3000	Managing & Leading Organizations (4 credits)

#### Junior Year, Spring Semester

COOP 3500	Co-op Work Term I
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**Junior Year, Summer Semester (total credits 17)**

CMFM2300	Space Planning (4 credits)
CMFM4200	Energy and Sustainability (3 credits)
CONM3800	CM Elective (3 credits)
CMFM4600	Principles of Real Estate for Facility Managers (3 credits)
PSYC4552	I/O Psychology (4 credits)

**Senior Year, Fall Semester**

COOP 4500	Co-op Work Term II
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**Senior Year, Spring Semester (total credits 17)**

CMRE4000	Real Property Securitization (3 credits)
MGMT4100	Power & Leadership (4 credits)
MGMT4400	Business Negotiation Principles (3 credits)
MGMT2065	Introduction to Entrepreneurship (3 credits)
HSS ELECTIVE	See ENGL/HSS note below *(4 credits)

**Senior Year, Summer Semester (total credits 14)**

CONM 5500	Senior Project (4 credits)
CONM 4650	Business, Construction Law and Government Regulations (3 credits)
MGMT 3600	Labor Relations (3 credits)
HSS ELECTIVE	See ENGL/HSS note below *(4 credits)

\*ENGL/HSS Note:

At least one course in Humanities

At least one course in the Social Sciences

The remaining courses from either the Humanities or Social Sciences category.

Students with a three English course sequence may use the third English course to satisfy a Humanities requirement. Of the five humanities and social science electives, BSCM students must include the following HSS Directed Electives

ECON4102	Principles of Economics
PSYC4552	Industrial Organizational Psychology

**Minor in Construction Management**

The minor in construction management provides students with a greater knowledge of the discipline that compliments their major courses.

To earn the minor, the student must complete the following five courses in the listed order:

CONM1200	Building Construction
CONM1500	Construction Graphics
CONM2200	Estimating
CONM3200	Construction Project Scheduling
CONM3100	Construction Project Management

Total credits for Minor: 19

# CONSTRUCTION MANAGEMENT MASTER'S DEGREE REQUIREMENTS

## Master of Science in Construction Management (MSCM) Program Leading to the Master of Science in Construction Management Degree

**Philip Hammond, Director of Graduate Programs**

Dobbs Hall, Room 107

(617) 989-4300

The Master of Science in Construction Management (MSCM) program at Wentworth Institute of Technology is accredited by the American Council for Construction Education (ACCE).

The Master of Science in Construction Management (MSCM) program is designed to educate students in fundamental post-graduate management principles. Students will gain a strong understanding of construction and business management concepts, from pre-design through construction closeout. Graduates of the MSCM program will be prepared to assume leadership positions across the construction industry.

The Master of Science in Construction Management (MSCM) at Wentworth Institute of Technology College of Professional and Continuing Education (CPCE) is a program of study for construction professionals. Started in 2010, the program is designed to educate students in foundational post graduate management principles combined with relevant construction education and experience in topics that are specific to preparing and advancing professionals' skills in administrative and executive leadership positions in design and construction companies and related disciplines.

### Mission, Goals and Outcomes

#### *Mission*

The Master of Science in Construction Management (MSCM) program at Wentworth Institute of Technology College of Professional and Continuing Education (CPCE) is a graduate program of study for construction professionals. The program is designed to educate students in foundational post graduate management principles combined with relevant construction education and experience in topics that are specific to preparing and advancing professional skills in administrative and executive leadership positions in design firms, construction companies and related disciplines. Both thesis and non-thesis options are available which allow for a variety of employment or educational opportunities including but not limited to working for general contractors, real-estate developers, sub-contractors, construction management and architectural/engineering firms, as well as advanced education and teaching options.

The Master of Science in Construction Management (MSCM) program at Wentworth Institute of Technology is accredited by the American Council for Construction Education (ACCE). The primary goal of ACCE is to promote and improve construction education in colleges and universities. By working together through ACCE, people representative of the total construction community and the public at large, construction educators and constructors, establish and maintain standards and criteria for accreditation, provide guidance to those programs seeking to achieve accredited status, and carry out the accreditation process.

ACCE accreditation serves the interests of:

- Students: by helping them identify institutions and programs that offer quality education in construction education
- The construction Industry: by enabling employers to identify persons who have the potential for making lasting contributions to the construction industry and their profession, and
- Owners / Users of Constructed Facilities and the Public at Large: by raising the professional caliber of constructors and thus the quality of the construction for which they assume responsibility

Specifically, accreditation of a construction education program by ACCE assures

- Students and prospective employers that the program has met stringent industry standards of content and quality
- That program graduates have been provided a quality education enabling them to perform a broad range of professional responsibilities
- The construction industry and students that the program performs periodic self-evaluations to keep current with emerging technologies and requirements of the construction industry

Accreditation by ACCE assists an institution and its construction education program in maintaining contact with other programs and practicing construction professionals, and enables the program to

- keep current with emerging technologies in the field
- Increase awareness of current courses, facilities, and services provided by other accredited programs
- Improve instructional techniques; and
- Access construction industry contacts nationwide

## Goals

To accomplish the mission of the Master of Science in Construction Management program, the following program goals have been developed in order to prepare students academically for personal and professional success in the built environment. The attainment of goals is evaluated through the program's outcome assessment program.

- Present opportunities to develop metacognitive and life-long learning skills for students seeking increasingly complex management responsibilities, new leadership roles and overall career advancement
- Expose students to subject matter and industry experts and the latest technological and managerial/ leadership advancements and their effects on the Construction Industry.
- Prepare and develop students from related disciplines to advance into the field of Construction Management.

## Student Learning Outcomes

The operation, academic integrity and improvement of the MSCM program is based on the relationship of MSCM Program Course and Learning Outcomes to American Council for Construction Educators (ACCE) Required Program Learning Outcomes (PLO). MSCM Course and Student Learning Outcomes (SLO) are mapped to the ten (10) PLOs required by American Council for Construction Educators (ACCE).

1. Critical thinking and creativity – MSCM students analyze and integrate information to conduct critical, reasoned arguments.
2. Problem solving and decision making - MSCM students design, evaluate, and implement strategies using advanced construction management concepts and practices.
3. Effective and professional oral and written communications - MSCM students produce effective and professional communication in written and oral formats.
4. Use of information and communication technology - MSCM students put into practice computer systems, productivity tools, software, and other information and communication technology.
5. Principles of leadership in business and management - MSCM students apply practical management decision-making tools and techniques and leadership best practices.
6. Current issues in construction - MSCM students demonstrate knowledge from industry experiences and keep up-to-date on developments, best practices, as well as tools and techniques in the field.
7. Complex project decision making and associated risk management - MSCM students recognize, weigh, and analyze risks associated with complex construction projects.
8. Professional ethics including application to situations and choices - MSCM students identify ethical dilemmas in construction and apply practical skills to ethical situations.
9. Advanced construction management practices - MSCM students demonstrate knowledge of contemporary construction industry methods and construction management principles and practices.
10. Research methods - MSCM students recognize and conduct valid, data-supported, and appropriate research in construction management.

## Degree Details

This is a five-semester program that begins in the fall semester of the student's first year and is planned to end after the spring semester of their second year. An optional thesis may be taken in the following summer semester.

## Construction Management Electives

During the MSCM program, students take one elective in the spring semester of the second year from offerings that may include: CONM7250, Conflict Resolution & Negotiation for CM; CONM7050, Research Methods for CM; CONM 7500, International Construction; a class from the MS in Facility Management program; or a class from the MS in Technology Management program.

## MSCM Recommended Schedule

### Year One

#### Semester One

MGMT7000	Business Relations & Human Resources Management (3)
CONM7000	Executive Management for CM (3)

#### Semester Two

MGMT7050	Business Finance and Investments (3)
CONM7400	Advanced Project Controls (3)

#### Semester Three

MGMT7150	Business Operations & Process Management (3)
CONM7100	Modern Construction Delivery Methods (3)

### Year Two

#### Semester One

CONM7200	Construction Law for CM (3)
CONM7300	Real Estate Development (3)

#### Semester Two

Construction Management Elective (3)	
CONM8000	Capstone Project in Construction Management (3)

#### Semester Three (Thesis Option Only)

CONM8900	Construction Management Thesis (6)
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Total credits for degree: 30 (36 with optional thesis)

# Master of Science in Facility Management (MSFM) Program

## Leading to a Master of Science in Facility Management Degree

The Master of Science in Facility Management (MSFM) program is designed to educate students in foundational post-graduate management principles and enhanced facility management skills and knowledge. Students will learn the leadership and business skills necessary to respond to the demand to keep their facilities highly efficient and functional. Coursework will also integrate elements of several related disciplines, including: project management, finance, real estate, humans and their working environment, space planning, building operations and maintenance, and quality assessment. Graduates of the MSFM program will be prepared for leadership roles in facility management and related industries.

### Mission, Goals and Outcomes

#### *Mission*

A key feature of the program is the opportunity to build strong professional relationships. Our instructors are proven leaders in the field and many of them work full-time in facility management and closely related areas. Our students also work in facility management and related industries, which creates an ideal learning environment in which students learn from both their instructor and their peers. Many of the concepts learned in the classroom can be immediately applied on the job. Facility Management is the holistic management of real property and the infrastructure of an organization with the aim of improving the productivity of its core business. It is the practice of coordinating the physical workplace with the people and work of the organization; it integrates the principles of business administration, project management, architecture and the behavioral and engineering sciences.

#### *Goals*

The Master of Science in Facility Management (MSFM) program is designed to combine common general management techniques with current facility management practices and technologies. The curriculum will provide graduates with the tools and managerial decision-making processes related specifically to maintaining and managing the built environment. The MSFM program is designed for working professionals, as an on-campus format (as well as an online format) with convenient evening classes and a cohort format that allows students to complete the degree in less than two years while still being able to work full-time and fulfill their personal responsibilities.

#### *Student Learning Outcomes*

Graduates of the Master of Science in Facility Management (MSFM) program will be able to:

- Describe and demonstrate the implementation of management principles relating specifically to maintaining and managing the built environment.
- Formulate effective communication strategies/processes for delivering concepts, financial information, and strategic and tactical information regarding real property, equipment and staffing to all levels of staff in a business organization.
- Demonstrate leadership skills by leading a team from conception through completion and closeout of an assigned project.
- Demonstrate teamwork skills by participating constructively as a team member on an assigned project.
- Develop a facilities technology strategy for a business or other organization that demonstrates knowledge of different technology platforms, workplace management systems and CAFM; and of the larger social, ethical, and legal issues related to information, telecommunications and other supporting technologies.
- Demonstrate knowledge of research tools appropriate for analyzing and developing solutions for facilities management problems.
- Describe what constitutes effective sustainable policy and use that knowledge to develop a corporate sustainable program.

- Create an energy policy for a business or organization that reflects knowledge of how buildings use energy, and of proven methods to reduce energy consumption.
- Formulate and complete a complex project that demonstrates mastery of both the technical and managerial aspects of strategic facility management.

## *Degree Details*

This is a five-semester program, starting in the fall of the student's first year and planned to end in the summer semester of the student's second year. Students may choose to complete an optional thesis during a sixth semester; it is not required for graduation.

## **MSFM Recommended Schedule**

### **Year One**

#### **Semester One**

MGMT7400	Executive Leadership
MGMT7100	Project Management Applications

#### **Semester Two**

MGMT7050	Business Finance and Investments
MGMT7450	Communication Strategies

#### **Semester Three**

FMGT7100	Contemporary Issues in Managing Technology
MGMT7250	Strategic Financial Decision Making

### **Year Two**

#### **Semester One**

MGMT7500	Quantitative Methods in FM Research
FMGT7300	Facility Operations

#### **Semester Two**

FMGT7200	Energy/Sustainability
FMGT8000	Facility Management Capstone

#### **Semester Three (Thesis Option Only)**

FMGT8900	Facility Management Thesis (6 credits)
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Total credits for degree: 30 (36 with optional thesis)

## INDUSTRIAL DESIGN DEPARTMENT

**Sam Montague, IDSA, Department Chair**

Annex South Room 101E

(617) 989-4640

### Faculty

#### *Assistant Professors*

- Carlos Villamil, IDSA
- Derek Cascio, IDSA

#### *Associate Professors*

- Jeffrey Michael, IDSA
- Nick Ortolino, CAA
- Robert Meszaros, AIGA
- Sam Montague, IDSA
- Simon Williamson, IDSA

### Department Vision and Mission Statement

The Department of Industrial Design (product design) prepares students to be thoughtful and creative problem-solvers. Through studio-focused, project-based learning, industrial design students develop skills in sketching, form development, CAD, traditional prototyping, rapid prototyping, and human factors. Our product design students apply their skills toward human centered design by developing creative products and experiences to improve the world in which we live.

## INDUSTRIAL DESIGN DEGREE REQUIREMENTS

### Undergraduate Studies – Industrial Design Leading to a Bachelor of Industrial Design degree (BIND)

Professional industrial designers (product designers) work at the intersection of art, business, and technology to provide innovative vision for companies, services, and individuals. Using research and experience as catalysts, designers translate our psychological and social desires and aspirations into improved products and systems for better enjoyment of our world.

As a graduate, you will have opportunities to create products for all levels of production. Areas of possibility include consumer electronics, education, toys, sports, medical equipment, footwear, housewares, furniture, and exhibit design. Many graduates begin their careers immediately, designing either as a consultant, or as an in-house designer for some of the nation's leading brands. As they continue to grow professionally, graduates often end up in leadership roles within their respective companies, making top-level decisions as a design director or creative manager.

Much of your educational experience will consist of experiential project-based studios, as well as courses in drawing, model making, manufacturing technologies (such as computer-aided design and rapid prototyping), user research, and design history. Classroom and studio experiences are complemented by two required cooperative work experiences. The co-op experience reinforces curricular goals and accelerates an understanding of professional practice. A one-semester study abroad program in Europe is offered in the junior year, which includes all courses to continue on track for graduation. Students apply for study abroad in the fall of the junior year (the program accepts a limited number of students).



Wentworth's Industrial Design program leads to a Bachelor of Science degree in Industrial Design. It is a four-year program, fully accredited by the National Association of Schools of Art and Design (NASAD).

### *BIND Sophomore Review*

A portfolio is not required for admission into the Industrial Design Program (BIND). However, BIND students must maintain a minimum program GPA of 2.5 for all DSGN and INDS courses (49 credits) by the end of the sophomore year (spring semester) in order to advance into the junior year. Students who do not meet this requirement can either transfer to a different degree program or repeat selected courses from the BIND program sophomore year.

To assess student accomplishment during the freshman and sophomore year, each student will take part in a comprehensive exhibition of design projects (in DSGN and INDS courses) at the end of each spring semester. The intent of the exhibit is to gauge students' success in their respective classes for student advising and program assessment.

### *Degree Details*

Total credits for degree: 136

This is a four-year program, which begins in the fall semester of the student's first year and is planned to end after the summer semester of the student's fourth year.

The Industrial Design Department has a special grade requirement that applies to all design studio courses from the sophomore year onward:

Final grade must be C or better if the final grade in the previous design studio is less than a C.

Students who receive a final grade below C for two consecutive semesters are not permitted to continue in the program until they successfully repeat the 2nd studio for which they received a sub-standard grade.

## **Industrial Design (BIND)**

### **Freshman Year Fall Semester (total credits 17)**

DSGN1000	Visualization 1/Drawing 1 (3 Credits)
DSGN1100	Design Magic (2 Credits)
DSGN1200	Color & Composition (4 Credits)
INDS1000	Industrial Design Studio 1 (4 Credits)
ENGLISH	English Sequence, See ENGL/HSS note below * (4 Credits)

### **Freshman Year, Spring Semester (total credits 19)**

INDS1500	Industrial Design Studio 2 (4 Credits)
INDS1750	Visual Communication (4 Credits)
INDS1850	Visualization 2: Advanced Perspective (3 Credits)
MATH1020	Plane and Solid Geometry (4 Credits)
ENGLISH	English Sequence, See ENGL/HSS note below * (4 Credits)

### **Sophomore Year, Fall Semester (total credits 19)**

INDS2000	Industrial Design Studio 3 (4 Credits)
INDS2350	Visualization 3: Drawing and Thinking (3 Credits)
INDS2300	3D Realization 1 (4 Credits)
PHYS1010	Conceptual Physics (4 Credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 Credits)

**Sophomore Year, Spring Semester (total credits 18)**

INDS2500	Industrial Design Studio 4 (4 Credits)
INDS2600	CAD 1: Surface Modeling (3 Credits)
INDS2800	3D Realization 2 (4 Credits)
INDS2850	Visualization 4: Presentation Illustration (3 Credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 Credits)

**Sophomore Year, Summer Semester**

COOP3000	Pre-Cooperative Work Term (Optional)
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**Junior Year, Fall Semester (total credits 17)**

INDS3000	Industrial Design Studio 5 (4 Credits)
INDS3200	Human Factors in Design (3 Credits)
INDS3100	CAD2: Solid Modeling (3 Credits)
INDS3300	Information Architecture 1 (3 Credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 Credits)

**Junior Year, Spring Semester**

COOP3500	Co-op Work Term I
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**Junior Year, Summer Semester (total credits 14)**

INDS3500	Industrial Design Studio 6 (4 Credits)
INDS3600	Manufacturing in Design (3 Credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 Credits)
ELECTIVE	Technical (3 Credits)

**Senior Year, Fall Semester**

COOP4500	Co-op Work Term II
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**Senior Year, Spring Semester (total credits 18)**

INDS4000	Industrial Design Studio 7 (4 Credits)
INDS4300	Information Architecture 2 (3 Credits)
INDS4011	Design Perspectives: Topics in History (4 Credits)
INDS5000	Research: Senior Studies (3 Credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 Credits)

**Senior Year Summer Semester (total credits 14)**

INDS4500	Business in Design (3 Credits)
INDS4750	Senior Seminar (3 Credits)
INDS5500	Senior Studies (4 Credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 Credits)

\*ENGL/HSS Note:

Day program students are required to complete:

- At least one course in Humanities
- At least one course in the Social Sciences
- The remaining courses may be from either the Humanities or Social Sciences category

Students with a three-English course sequence may use the third English course to satisfy a Humanities requirement. Of the six humanities and social science electives, BIND students must include the following

**HSS Directed Electives:**

- A Design History Elective
- An Art History Elective
- PSYC/SOCL Elective

## INTERIOR DESIGN DEPARTMENT

Sean Stewart, AIA LEED NCIDQ, Department Chair  
Annex South, Room 101F  
(617) 989-4469

### Faculty

#### *Associate Professors*

- Lynette Panarelli, IIDA, NCIDQ
- Nick Ortolino, CAA
- Peter Greenberg, AIA, IDEC, LEED AP, NCIDQ
- Robert Meszaros, AIGA

#### *Assistant Professor*

- Jennifer Sarabia, ASID, NCIDQ

### Department Vision and Mission Statement

The Bachelor of Science in Interior Design program recalls and reinforces the mission of the Institute by preparing and graduating students with excellent, diverse skills qualifying them for the demands of professional life.

The program recognizes that academic preparation is the foundation of lifelong learning in a dynamic and evolving profession, and seeks to develop student fluency and competence in an array of basic skills and processes. More precisely, the program graduates students with a broad overview of the profession by balancing a curriculum equally weighted in creativity—the art of design—and fundamental technical knowledge with an appreciation for the iterative design process required to realize their creative goals.

The program orientation and the structure of the curriculum rest on a tripartite base: Wentworth’s “Student Learning Goals,” accreditation standards, and the definition of the professional interior designer. These three standards recognize the specialized and diverse knowledge and skills required in practice, and afford graduates substantial preparation for professional certification (also licensure where applicable). To achieve this balanced orientation, the program seeks to:

- Demonstrate creativity and artistic vision.
- Demonstrate fluency with a design process.
- Broaden intellectual depth.
- Demonstrate technical skills and the craft of making.
- Introduce students to the business of design.
- Offer students the opportunity to work efficiently, both independently and collaboratively in teams, and to recognize the broad professional fiduciary responsibilities to the general public including but not limited to ethical practice, regulatory requirements, and resource conservation and sustainability.

## INTERIOR DESIGN DEPARTMENT DEGREE REQUIREMENTS

### Interior Design (BINT)

#### Leading to the Bachelor of Science Degree

##### *Program Description*

This is a four-year program, starting in the fall semester of the student's first year and planned to end in the summer semester of the student's fourth year. Each graduate will complete eight academic semesters plus two semesters of full-time cooperative work experience. The first co-op work semester is scheduled in the junior year, and the second in the senior year. An optional co-op experience is offered in the summer between the sophomore and junior year. Select foundation courses in the first semester are shared with the Industrial Design program. A portfolio is not required for admission.

The program is accredited by the Council for Interior Design Accreditation (CIDA). Graduates of the program may seek employment as interior design professionals in interior design and architectural firms, corporations, institutions, government offices, or as design and sales professionals for systems furnishing and interior design product manufacturers. Some graduates have pursued advanced degrees in interior design, architecture, fine arts, facilities management, and business administration. After 3,520 hours of qualified professional work experience (half of which may be completed as a student via co-op), graduates may sit for the NCIDQ examination for professional certification.

##### *Degree Details*

Total credits for degree: 134

##### *Design Studio Grade Requirement*

The following grade requirement must be achieved to earn a Bachelor of Science degree in Interior Design. This requirement applies to: Interior Studio I (INTD1000), Interior Studio II (INTD1500), Interior Studio III (INTD2000), Interior Studio IV (INTD2500), Interior Studio V (INTD3000) and Interior Studio VI (INTD3500), Interior Studio VII (INTD4000), and Senior Project: Design (INTD5500).

The final grade must be a C or better if the final grade in the previous design studio was less than a C. Students who receive a grade below a C for two consecutive semesters are not permitted to continue in the studio sequence until they successfully repeat the second studio for which they received a substandard grade.

### Interior Design (BINT)

#### **Freshman Year, Fall Semester (total credits 17)**

DSGN1000	Drawing I/Visualization I (3 credits)
DSGN1100	Design Magic (2 credits)
DSGN1200	Color & Composition (4 credits)
INTD1000	Interior Design Studio I (4 credits)
ENGLISH	English Sequence, See ENGL/HSS note below * (4 credits)

#### **Freshman Year, Spring Semester (total credits 18)**

INTD1500	Interior Design Studio II (4 credits)
INTD1600	History of ID I (3 credits)
INTD1750	Drawing II (3 credits)
MATH1020	Plane and Solid Geometry (4 credits)
ENGLISH	English Sequence, See ENGL/HSS note below * (4 credits)

## Sophomore Year, Fall Semester (total credits 19)

INTD2000	Interior Design Studio III (4 credits)
INTD2100	Materials (3 credits)
INTD2250	Drawing III (4 credits)
PHYS1010	Conceptual Physics (4 credits)
HSS ELECTIVE	See ENGL/HSS note below and above * (4 credits)

## Sophomore Year, Spring Semester (total credits 18)

INTD2500	Interior Design Studio IV (4 credits)
INTD2600	History of ID II (3 credits)
INTD2700	Building Systems I (3 credits)
INTD2800	Presentation Techniques (4 credits)
HSS ELECTIVE	See ENGL/HSS note below and above * (4 credits)

## Sophomore Year, Summer Semester

COOP3000	Pre-Cooperative Work Term (Optional)
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## Junior Year, Fall Semester (total credits 17)

INTD3000	Interior Design Studio V (6 credits)
INTD3100	Construction Documents (4 credits)
INTD3300	Behavioral Aspects of Design (3 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

## Junior Year, Spring Semester

COOP3500	Co-op Work Term I
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## Junior Year, Summer Semester (total credits 16)

INTD3600	Lighting (3 credits)
INTD3500	Interior Design Studio VI (6 credits)
ELECTIVE	Design (3 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

## Senior Year, Fall Semester

COOP4500	Co-op Work Term II
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## Senior Year, Spring Semester (total credits 16)

INTD4000	Interior Design Studio VII (6 credits)
INTD4100	Building Regulations (3 credits)
INTD5000	Senior Project: Research (3 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

## Senior Year, Summer Semester (total credits 13)

INTD4600	Professional Practice (3 credits)
INTD5500	Senior Project: Design (6 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

\*ENGL/HSS Note:

Day program students are required to complete:

- At least one course in Humanities
- At least one course in the Social Sciences
- The remaining courses from either the Humanities or Social Sciences category

Students with a three-English course sequence may use the third English course to satisfy a Humanities requirement. Of the six humanities and social science electives, BINT students must include the following HSS Directed Electives:

- An Art History Elective
- A PSYC/SOCL Elective

# COLLEGE OF ARTS AND SCIENCES

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**Patrick F. Hafford, Dean**

Dobbs Hall, Room 301

(617) 989-4870

## *Mission*

The College of Arts and Sciences is essential to the education of all students at Wentworth Institute of Technology. Our college provides students in all disciplines with a deeper understanding of the foundations of their work, as well as the global challenges that require innovation and creativity. Courses and programs emphasize critical thinking, problem solving, data interpretation, ethics, and diverse communication and leadership skills. Our students hone the professional skills and theoretical expertise that distinguish them, beyond their specialization, as self-motivated and engaged citizens who possess the ability to adapt to the evolving future requirements of society.

## *Vision*

To be recognized as a provider of cutting-edge interdisciplinary education that will offer students opportunities for personal growth and creativity, which will serve as the cornerstone of their successful careers.

The College of Arts and Sciences offers four undergraduate programs and two graduate programs:

- The Bachelor of Science in Applied Mathematics (BSAM) program is a three-year degree (a four-year option is also available) that is geared toward students who wish to apply mathematics to solve problems faced by industry, government, biological science, and physical science.
- The Bachelor of Science in Business Management (BSM) degree is designed to help students become leaders by acquiring knowledge and competencies in management with optional concentrations in either project management or entrepreneurship.
- The Bachelor of Science in Computer Information Systems (BSIS) is an interdisciplinary major offering a solid background in the analysis, design, development, deployment, and administration of computer-based information systems within a business management context.
- The Master of Science in Technology Management (MSTM) is offered jointly with the College of Professional and Continuing Education in a fully online format. Classes are geared toward working professionals seeking to develop the knowledge and skills necessary to lead and manage in a technologically focused business environment. The online degree is designed to elevate students' business acumen, strategic thinking, and people skills, all within the context of the issues and challenges specific to the technical world.
- The Master of Science in Project Management (MSPM) is offered jointly with the College of Professional and Continuing Education in a fully online format. The program provides graduates with a clear understanding of the management skills, expertise and ethics necessary to be successful as a project and project portfolio manager. Topics to be covered include communication strategies, technology project management, leadership, leveraging technical innovation and intellectual property, accounting and finance, new product development and commercialization, and global operations.

## DEPARTMENT OF APPLIED MATHEMATICS

Amanda Hattaway, Ph.D., Department Chair  
Ira Allen Building, Room 319  
(617) 989-4368

### Faculty

#### *Professors*

- Gary M. Simundza

#### *Associate Professors*

- Amanda Hattaway, Ph.D.
- Dwight Horan
- Emma Smith Zbarsky, Ph.D.
- Robert C. Cournoyer

#### *Assistant Professors*

- Barry Husowitz, Ph.D.
- John Haga, Ph.D.
- Mami Wentworth Ph.D.
- Mark Mixer, Ph.D.
- Melody Takeuchi, Ph.D.
- Melvin Henriksen
- Rachel Maitra, Ph.D.
- Semere Gebresilasie, Ph.D.
- Steven Morrow, Ph.D.
- Youssef Qranfal, Ph.D.

## Department Vision and Mission Statement

### *Vision*

The Applied Mathematics Department is an integral part of the larger academic community at Wentworth. Our course offerings reflect our commitment to students' mastery of both mathematical principles and their applications in other disciplines. Through coursework, research projects, cooperative work experiences, and seminars, students hone their problem-solving skills and develop subject matter expertise that will serve them in a wide range of careers.

### *Mission*

Wentworth's Applied Mathematics Department promotes the academic community's understanding of mathematics and its applications by:

- Reinforcing the utility of mathematical expertise in engineering, technology, and/or design;
- Providing opportunities for students to gain broad foundational working expertise in mathematical techniques and experience in finding mathematical solutions;
- Creating situations where students are driven to consider the necessity for mathematical models, rigor, and thought, in the careful and effective application of mathematical tools to problems related to industry, science, and technology;
- Collaborating with other departments to help formulate and resolve research problems and to meet the mathematical needs of their students;

- Collaborating with industry partners to solve mathematical problems, create student job opportunities, and seek curricular advice;
- Supporting the mission of the university by empowering, inspiring, and innovating through experiential learning by means of our departmental offerings.

*Note: For information on the Wentworth course challenge exams in mathematics, please refer to the academic policies section.*

## APPLIED MATHEMATICS DEGREE REQUIREMENTS

### Applied Mathematics (BSAM) Leading to the Bachelor of Science Degree

Wentworth Institute of Technology offers a three-year B.S. in Applied Mathematics, in which Applied Math majors take six semesters of classes and complete two marketable applied math internships. Graduates, in addition to continuing their education at the graduate level, may seek employment in a variety of fields including government, finance, risk-management and actuarial science, predictive modeling, research, operations research, quality assurance, software engineering, statistics, biomedicine, and informatics.

While the degree is designed as a three-year program, students may opt to complete the degree in four years. Please contact the Applied Mathematics department for more information.

#### *Applied Mathematics Program Outcomes*

Program graduates will be able to:

- Apply mathematical concepts to perform computations, model phenomena, and write proofs.
- Effectively use mathematical software packages for computation, modeling, and presentations.
- Write code in a high-level computer programming language.
- Deliver clear and precise, written and oral presentations, demonstrating: (1) comprehension of mathematical content and (2) the ability to communicate that mathematical content to different audiences.
- Apply mathematics in a professional setting.

#### *Degree Details*

Total Required Credits: 120

A total of 20 semester credit hours of technical electives must be taken as a part of the program. Students may choose, after consultation with their faculty advisor, among the electives offered each semester. Technical elective courses include biological, financial, and physical science applications through courses offered by the Applied Mathematics Department including Actuarial Mathematics, Introduction to Abstract Algebra, Calculus IV, Machine Learning, Dynamical Systems and Chaos, Complex Variables, Real Analysis I, Real Analysis II, Topology, Math Methods in Science/Engineering, Financial Mathematics, Time Series, Cryptology, and Special Topics courses, as well as courses offered by other departments (with approval from the Applied Math Department Chair, and/or the student's advisor). Examples include MGMT 2750 Integrative Financial Accounting, COMP3673 Introduction to Biostatistics with Applications, and COMP3370 Algorithm Design and Analysis.

Please note that one of the five technical electives must be either Real Analysis I, Complex Variables, or Introduction to Abstract Algebra.



## Applied Mathematics (BSAM)

All courses are four (4) credits unless otherwise noted

### First Year, Fall Semester (total credits 20)

MATH1550	Foundations of Applied Mathematics
MATH1750	Engineering Calculus I
PHYS1250	Engineering Physics I
COMP1000	Computer Science I
ENGLISH,	English Sequence, See ENGL/HSS note below *

### First Year, Spring Semester (total credits 20)

MATH1850	Engineering Calculus II
MATH2300	Discrete Mathematics
COMP1050	Computer Science II
PHYS1750	Engineering Physics II
ENGLISH	English Sequence, See ENGL/HSS note below *

### First Year, Summer Semester

COOP3000	Pre-Cooperative Work Term (Optional)
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### Second Year, Fall Semester (total credits 20)

MATH2100	Probability and Statistics for Engineers
MATH2025	Multivariable Calculus
MATH2550	Transition to Advanced Mathematics
MATH3900	Numerical Analysis I
HSS ELECTIVE	See ENGL/HSS note below *

### Second Year, Spring Semester (total credits 20)

MATH2200	Advanced Statistics
MATH2500	Differential Equations
MATH2860	Linear Algebra & Matrix Theory
MATH3950	Numerical Analysis II
HSS ELECTIVE	See ENGL/HSS note below *

### Second Year, Summer Semester

COOP3500	Co-op Work Semester I (0 credits)
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### Third Year, Fall Semester (total credits 20)

MATH4900	Partial Differential Equations
MATH3700	Operations Research
TECHNICAL ELECTIVE	
TECHNICAL ELECTIVE	
HSS ELECTIVE	See ENGL/HSS note below *

### Third Year, Spring Semester

COOP4500	Co-op Work Semester II (0 credits)
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### Third Year, Summer Semester (total credits 20)

MATH5000	Applied Mathematics Final Year Design
TECHNICAL ELECTIVE	
TECHNICAL ELECTIVE	
HSS ELECTIVE	See ENGL/HSS note below *
HSS ELECTIVE	See ENGL/HSS note below *

## Non-coursework requirement

In addition to the above coursework requirements, students are required to complete the following non-coursework degree requirements:

- Applied Math website
- Applied Math poster
- One talk

\*ENGL/HSS Note:

Day program students are required to complete:

At least one course in Humanities

At least one course in the Social Sciences

The remaining courses may be from either the Humanities or Social Sciences category

Students with a three English course sequence may use the third English course to satisfy a Humanities requirement.

## Concentration in Financial Mathematics

The Concentration in Financial Mathematics provides students with the fundamentals of risk and financial modeling. Additionally, students will be well-prepared to take the first two Society of Actuaries (SOA) exams: Exam P, Probability and Exam FM, Financial Math. To earn a concentration in Financial Mathematics students must complete a total of sixteen (16) credits, which may also satisfy the sixteen (16) credits of required Technical Electives for Applied Mathematics majors. Non-majors will also be required to complete the three (3) pre-requisite courses (12 credits) prior to entering the required course sequence for the Concentration in Financial Mathematics.

### *Pre-requisite courses: (12 credits)*

MATH1750	Engineering Calculus I OR MATH1775 Integrated Engineering Calculus I
MATH1850	Engineering Calculus II OR MATH1875 Integrated Engineering Calculus II
MATH2100	Probability and Statistics for Engineers

### *Core Requirements: (16 credits)*

MATH1950	Financial Mathematics
MATH2250	Time Series
MATH4475	Actuarial Mathematics

### *Select one (1) Economics course from the following list*

ECON4102	Principles of Economics
ECON4152	Macroeconomics
ECON4154	Microeconomics

## Minor in Applied Mathematics

The minor in Applied Mathematics provides a focus for students who are interested in the subject and want to integrate an aspect of applied mathematics with their major. To earn the minor, the student must complete three core courses and two elective courses, all with a grade of “C” or higher.

### *Required Courses: Select three (3) courses from the following list (12 credits)*

MATH2100	Probability and Statistics for Engineers
MATH2750	Differential Equations and Systems Modeling OR MATH2500 Differential Equations
MATH2860	Linear Algebra and Matrix Theory

*Elective Requirement: Select two (2) courses from the following list (8 credits)*

MATH2200	Advanced Statistics
MATH2300	Discrete Mathematics
MATH3500	Calculus IV
MATH3700	Operations Research
MATH3800	Special Topics, when offered as minor elective
MATH3900	Numerical Analysis I
MATH4150	Math Methods in Science/Engineering
MATH4400	Introduction to Abstract Algebra
MATH4475	Actuarial Math
MATH4575	Complex Variables
MATH4675	Topology
MATH4875	Real Analysis I
MATH4975	Real Analysis II
MATH4900	Partial Differential Equations
MATH4950	Dynamical Systems and Chaos
MATH4050	Machine Learning

Total credits: 20

Please note that the above minor elective list is not inclusive. Additional options will be added as new courses are developed in the Applied Mathematics minor. Students with an Applied Mathematics minor will be notified by the Mathematics Department of Special Topics and new mathematics course offerings as they become available.

### **Minor in Financial Mathematics**

The minor in Financial Mathematics provides students with the fundamentals of risk and financial modeling. Additionally, students will be well-prepared to take the first two Society of Actuaries (SOA) exams: Exam P, Probability and Exam FM, Financial Math. To earn a minor in Financial Mathematics students must complete a total of sixteen (16) credits. Students will also be required to complete the three (3) pre-requisite courses (12 credits) prior to entering the required course sequence. The Financial Mathematics minor is not available to Applied Mathematics majors.

*Pre-requisite courses: (12 credits)*

MATH1750	Engineering Calculus I OR MATH1775 Integrated Engineering Calculus I
MATH1850	Engineering Calculus II OR MATH1875 Integrated Engineering Calculus II
MATH2100	Probability and Statistics for Engineers

*Core Requirements: (16 credits)*

MATH1950	Financial Mathematics
MATH2250	Time Series
MATH4475	Actuarial Mathematics

*Select one (1) Economics course from the following list (4 credits)*

ECON4102	Principles of Economics
ECON4152	Macroeconomics
ECON4154	Microeconomics

Total credits: 16

## DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

### **Ronald R. Bernier, Ph.D., MBA, Department Chair**

Beatty Hall, Room 404  
(617) 989-4353

## Faculty

### *Professors*

- Ronald R. Bernier, Ph.D., M.B.A., M.A.
- Leon L. Cort, Ph.D., M.A.
- Christopher S. Gleason, Ph.D., M.F.A.
- Gloria Monaghan, M.A.
- Jonathan G. Ripley, Ph.D., M.Ph., M.A.
- Elaine Slater, M.A.

### *Associate Professors*

- Beth Anne Cooke-Cornell, M.A.
- David J. Downey, M.A.
- Lisa Falvey, Ph.D., M.F.A., M.A.
- Jody Michael Gordon, Ph.D., M.A.
- Ella Howard, Ph.D., M.A.
- Kristen Nielsen, Ph.D., M.A.
- Edward Rooney, M.F.A.
- Phyllis Wentworth, Ph.D., M.A.

### *Assistant Professors*

- Paul Firenze, Ph.D., M.A.
- Mark John Isola, Ph.D., M.A.
- Allison K. Lange, Ph.D., M.A.
- Faith Litchcock-Morellato, M.A.T.
- Juval Racelis, Ph.D., M.A.
- Kristen Hudak Rosero, Ph.D., M.A.
- Cynthia Schoolar Williams, Ph.D., M.A.
- Ronen Shay, Ph.D., M.A.
- Allen Wong, Ph.D., M.A.

## Department Vision and Mission Statement

The Department of Humanities and Social Sciences plays a crucial role in the Wentworth undergraduate experience. The goal of the disciplines that our students study is to use design, engineering, and technology to make life “better.” The purpose of Humanities and Social Sciences is to help students define “better” by identifying a set of values that will help them exercise integrity, vision, community involvement, and knowledge of self and other. Students must understand the application of their discipline to contemporary issues, they must acquire strong communication, interdisciplinary and team-building skills, and they must understand the definitions of leadership, personal responsibility, creativity, and professionalism.

The Humanities and Social Sciences curriculum provides students the opportunity to explore and master critical-thinking skills, essential for the basis of lifelong learning. Innovative problem-solving skills develop when students engage in a wide variety of learning opportunities and challenges, such as are offered by this department.

To ensure consistency of academic rigor across the curriculum, all Humanities and Social Science electives will require students to write an average of 20 pages during the course of the semester and read an average of 40 pages per week.

The curriculum begins with the student's placement into an English sequence, the purpose of which is to instill in our students the skills necessary to communicate, both orally and in writing, in their classes, in the workplace, and in their communities. Subsequent courses consist of a wide variety of humanities and social science electives that introduce students to the concepts of community, society, and self.

Students are required to complete a minimum of 28 credits from the department offerings, comprised of the English sequence and five electives in humanities and social science courses, with at least one course from the humanities and one course from the social sciences.

## English Requirement

Students must successfully complete an English sequence in order to enroll in humanities and social science electives. Which English sequence a student must complete is determined by the results of the English placement process. Based on the student's English placement, day students will be required to complete one of the following English sequences:

- English I (ENGL1100) and English II (ENGL2200)
- English Language Skills (ENGL0900), English I (ENGL1100) and English II (ENGL2200)
- English as a Second Language I (ENGL0700), English as a Second Language II (ENGL0800) and, English I (ENGL1100)
- English as a Second Language II (ENGL0800), English I (ENGL1100), and English II (ENGL2200)

Once matriculated, students' English sequence, as determined by placement, must be completed at Wentworth. In circumstances that warrant it, exceptions to this policy may be made at the discretion of the chair of the Department of Humanities and Social Science; in such cases, students must appeal to the chair of HSS directly, who may also defer to the expertise of the English faculty.

## Humanities and Social Sciences Elective Requirement

Satisfactory completion of an English Sequence is prerequisite to all other courses in the Humanities and Social Sciences Department. All full-time students must complete a minimum of 28 credits, including English courses, from the Humanities and Social Sciences Department. Because the Humanities and Social Sciences Department believes there should be a balance of electives in the student's program, day program students are required to complete:

- At least one course in humanities
- At least one course in the social sciences
- The remaining courses from either the humanities or social sciences category

To complete the humanities and social science graduation requirement, the entire 20 elective credits may not be taken exclusively in humanities or exclusively social sciences. Students whose English Sequence requires three English courses may use the third English course to satisfy a humanities elective requirement.

Students in programs with Directed HSS Electives may use the directed elective course(s) to satisfy the humanities or social science as determined by that HSS course.

A minimum of 28 credits total, including English, humanities, and social science credit, is required to complete the humanities and social sciences graduation requirement.

## Minor in Media, Culture, and Communication Studies

The Media, Culture, and Communication Studies (MCCS) minor is aimed at providing a focus for students who, while completing their humanities and social sciences electives, are interested in exploring the role of the digital technologies in the study of contemporary culture.

MCCS Learning Outcomes and Objectives:

- Project-based experiential learning
- Facility with interactive digital learning tools and media
- Familiarity with current and emerging technologies in media and culture
- Media literacy from written, production, and analytical perspectives
- Close reading and textual analysis
- Critical thinking and persuasive writing

### Minor Requirements

To earn the Minor in Media, Culture, and Communications Studies, students must select from the following courses, as listed below, earning a grade of “C” or better. (All courses are 4 credits unless otherwise noted)

### Required Courses

HUMN4051	Media, Culture, and Communications Studies
HUMN4053	MCCS Studio

### Select three (3) electives from the following list

COMM4112	Social Perspectives of Journalism
COMM4262	Public Relations
HUMN4225	Television Studies
HUMN4231	Film and Literature: Art of Adaptation
HUMN4241	Graphic Novel to Film
HUMN4243	Contemporary Art & Theory
HUMN4275	Myth America: From Colonies to Culture Wars
HUMN4345	History of American Folk Music
HUMN4373	Shakespeare on Film
SOCL4212	Art & Technology

Special Topics courses in Humanities and Social Science (3800) when offered may satisfy one or more of the elective requirements\*

Total credits: 20

\* All 3800 courses will require a Course Substitution Form submitted to the SSC to insure they are applied to the Media, Culture, and Communications Studies requirement/s. Contact the Department of Humanities and Social Science for a list of courses available by semester.

### Minor in Performing Arts

The minor in performing arts is offered through the Colleges of the Fenway, and allows students to explore the performing arts in both academic and performance settings.

To earn the minor, students must complete the following:

Five courses, including:

- Introduction to Performing Arts, offered at Emmanuel College in the spring semester.
- One course each in music, dance, and theater, for three total courses. The Colleges of the Fenway provides a list of appropriate courses on their website ([www.colleges-fenway.org](http://www.colleges-fenway.org)) prior to each semester.
- One upper-level elective course, with appropriate courses also provided via the COF website.
- Three semesters of participation in an approved performing arts ensemble. The ensembles include but are not limited to: COF Orchestra, COF Chorus, COF Dance Project, COF Theater Project, COF Jazz Band, Emmanuel College Theater Productions, Emmanuel College Perf. Tech. for the Singing Actor, Simmons Concert Choir, and the Wheelock Family Theater.

More information on the Colleges of the Fenway and the performing arts can be found at [www.colleges-fenway.org/performingarts/performing-arts-academics/](http://www.colleges-fenway.org/performingarts/performing-arts-academics/).

## DEPARTMENT OF MANAGEMENT

**Len DeLosh, MBA, Department Chair**

Beatty Hall, Room 403

(617) 989-4336

### Faculty

#### *Professors*

- Cindy P. Stevens, Ph.D.
- Hossein Noorian, M.B.A.

#### *Associate Professors*

- Hollis Greenberg, M.B.A.
- Michael Mozill, M.B.A.
- Fredrick Trilling, J.D., M.B.A.

#### *Assistant Professors:*

- Leonard DeLosh, M.B.A.
- Santiago Umaschi, M.B.A.

## Department Vision and Mission Statement

The Department of Management's mission is to offer a comprehensive educational experience through relevant course work, seminars, and exercises in management to enable students to become successful industry professionals and leaders of the 21st century. We challenge our students to develop the skills to analyze and solve problems, and to develop an aptitude for lifelong learning. We offer interesting and challenging programs leading to exciting careers in the various fields of management and computer information systems.

## DEPARTMENT OF MANAGEMENT DEGREE REQUIREMENTS

### Business Management (BSM)

#### Leading to the Bachelor of Science Degree

Students enrolled in the Business Management (BSM) program are exposed to the functional areas of management and gain the various managerial and analytical skills necessary to successfully administer human, natural, and technological resources within an organization. A study of financial analysis, marketing

principles, operations management, manufacturing, strategic management, economics, organizational behavior, information systems, and the legal aspects of business are introduced in this program. In addition, Business Management (BSM) students have the opportunity to select a four-course concentration in either Project Management or Entrepreneurship. The management skills that students acquire in the classroom are applied during two required cooperative work semesters.

The discipline of management requires of practitioners both technical knowledge and the skills to communicate. From the first year through the senior year, BSM students are required to compile an electronic career portfolio (ECP) of their work in consultation with their academic advisors. The ECP requirement guidelines are available in the Management Department office. In the spring semester of the senior year, seniors register for their final graded portfolio assessment.

Graduates of the Business Management (BSM) program may seek entry-level management positions in project management, marketing and communications, IT management, accounting and finance, entrepreneurship, human resources, and research and operations management. They may also pursue positions as field service engineers, product support specialists, MIS specialists, or quality assurance analysts. It is possible for students to pursue graduate degrees in business, law, public administration, and other related fields.

By the time of graduation, students will be able to:

- Demonstrate knowledge of the fundamental principles in the functional areas of business
- Explain the global dimensions of business
- Apply ethical principles to leadership decisions
- Apply quantitative decision-support tools in decision making
- Demonstrate effective professional communication skills
- Integrate learning to address real world problems

## *Degree Details*

Total credits for degree: 135

This is a four-year program, which starts in the fall semester of the student's first year and is planned to end in the summer semester of the student's fourth year.

Additionally, students in this major complete four courses in either Project Management or Entrepreneurship as part of the degree requirements.

## **Business Management (BSM)**

### **Freshman Year, Fall Semester (total credits 16)**

MGMT1000	Introduction to Management (4 credits)
MGMT1025	Computers and Business Applications (4 credits)
MATH1040	Applied Mathematics for Business (4 credits)
ENGLISH	English Sequence, See ENGL/HSS note below * (4 credits)

### **Freshman Year, Spring Semester (total credits 16)**

MGMT1500	Decision Analysis for Business (4 credits)
MGMT2750	Integrative Financial Accounting (4 credits)
SCIENCE ELECTIVE	Lab Science (4 credits)
ENGLISH	English Sequence, See ENGL/HSS note below * (4 credits)



**Sophomore Year, Fall Semester (total credits 16)**

MGMT2000	Management Information Systems (4 credits)
MGMT2100	Management Communications (4 credits)
MGMT2200	Research Methods in Business (4 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

**Sophomore Year, Spring Semester (total credits 18)**

MGMT2500	System Analysis and Design (3 credits)
MGMT2850	Principles of Marketing (4 credits)
MGMT3250	Managerial Accounting (4 credits)
MGMT ELECTIVE	Concentration Course I (3 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

**Sophomore Year, Summer Semester**

COOP3000	Pre-Cooperative Work Term (Optional)
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**Junior Year, Fall Semester (total credits 18)**

MGMT3000	Managing and Leading Organizations (4 credits)
MGMT3650	Business Law (4 credits)
MGMT ELECTIVE	Concentration Course II (3 credits)
GENERAL ELECTIVE	General Elective (3 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

**Junior Year, Spring Semester**

COOP3500	Co-op Work Term I
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**Junior Year, Summer Semester (total credits 19)**

MGMT3500	Financial Management (4 credits)
MGMT3700	Human Resources and Labor Management (3 credits)
MGMT3900	Operations Management (4 credits)
MGMT ELECTIVE	Concentration Course III (4 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

**Senior Year, Fall Semester**

COOP4500	Co-op Work Term II
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**Senior Year, Spring Semester (total credits 18)**

MGMT4250	Strategic Management (4 credits)
MGMT4300	Integrative Seminar (3 credits)
MGMT4400	Business Negotiation Principles (3 credits)
MGMT ELECTIVE	Concentration Course IV (4 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

**Senior Year, Summer Semester (total credits 14)**

MGMT5500	Senior Project (4 credits)
MGMT4000	International Business (3 credits)
MGMT ELECTIVE	Management Elective (3 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

## Project Management or Entrepreneurship Concentrations (Optional)

### *Project Management Concentration Courses*

Complete the following courses:

MGMT2060	Introduction to Technology Project Management (3 credits)
MGMT3060	Technology Acquisition Project (3 credits)
MGMT3560	Group Processes & Team Building (4 credits)
MGMT4060	Technology Project Management Seminar (4 credits)

Total Credits: 14

### *Entrepreneurship Concentration Courses*

Complete the following courses:

MGMT2065	Introduction to Entrepreneurship (3 credits)
MGMT3065	Entrepreneurial Marketing (3 credits)
MGMT3565	Technology Entrepreneurship (4 credits)
MGMT4165	Creating New Ventures (4 credits)

Total Credits: 14

\*ENGL/HSS Note:

Day program students are required to complete:

At least one course in Humanities

At least one course in the Social Sciences

Of the six humanities and social science electives, BSM students must include the following HSS

### **Directed Electives:**

ECON4154	Microeconomics
ECON4152	Macroeconomics
An Ethics elective	

### **Minor in Business Management**

There are three options for the Business Management minor. Each option includes three common core courses and two additional courses, for a total of five courses accounting for 17 to 19 credits, depending on the courses taken.

### **3 Required Minor Courses**

MGMT2700	Financial Accounting
MGMT3000	Managing & Leading Organizations
MGMT2850	Principles of Marketing

### **Option 1: General Business, choose 2 of the following courses**

MGMT2500	Systems Analysis & Design
MGMT3650	Business Law
MGMT3700	Human Resources & Labor Management
MGMT4400	Business Negotiation Principles

## Option 2: Entrepreneurship, 2 required courses

MGMT2065	Introduction to Entrepreneurship
MGMT4165	Creating New Ventures

## Option 3: Project Management, 2 required courses

MGMT2060	Introduction to Technology Project Management
MGMT3560	Group Processes & Team Building

Total minor credits: 17-19 (depending upon option selected)

## Computer Information Systems (BSIS) Leading to the Bachelor of Science Degree

The B.S. in Computer Information Systems links the worlds of business and computer science. It is the study of business organizations and the programming, databases, and networks that support them. Functioning at the intersection of business and technology, it offers an interdisciplinary education that neither discipline alone can provide. Courses span computer science, business management, math, science, humanities, and social sciences. Three open electives (two in computer science and one in management) give students the option to choose courses from either business management (such as project management or finance) or computer science (such as databases or software development).

This program offers a solid background in the analysis, design, development, deployment, and administration of computer-based information systems within a business management context. Students will complement business skills with strong technical skills in databases, systems analysis and design, business processes, organizational behavior, networking and telecommunications, and project management, along with problem solving skills. Graduates will be well prepared for the growing number of opportunities in CIS and information technology.

By the time of graduation, students will be able to:

- Support the delivery and management of information systems within a specific application environment
- Analyze a problem, and identify and define the computing requirements appropriate to its solution
- Demonstrate effective professional communication skills
- Function effectively on teams to accomplish a common goal
- Analyze the global impact of technology on individuals, organizations, and society
- Make judgments and draw appropriate conclusions based on quantitative analysis
- Apply ethical principles to professional activities and duties

The B.S. in Computer Information Systems links the worlds of business and computer science. It is the study of business organizations and the programming, databases, and networks that support them. Functioning at the intersection of business and technology, it offers an interdisciplinary education that neither discipline alone can provide. Courses span computer science, business management, math, science, humanities, and social sciences. Three open electives give students the option to choose a focus from either business management (such as project management or finance) or computer science (such as databases or software development), or they can design an area of study from electives that fits their desired goals.

This program offers a solid background in the analysis, design, development, deployment, and administration of computer-based information systems within a business management context. Students will complement business skills with strong technical skills in databases, systems analysis and design, business processes, organizational behavior, networking and telecommunications, and project management, along with problem solving skills. Graduates will be well prepared for the growing number of opportunities in CIS and information technology.

By the time of graduation, students will be able to:

- Support the delivery and management of information systems within a specific application environment
- Analyze a problem, and identify and define the computing requirements appropriate to its solution
- Demonstrate effective professional communication skills
- Function effectively on teams to accomplish a common goal
- Analyze the global impact of technology on individuals, organizations, and society
- Make judgments and draw appropriate conclusions based on quantitative analysis
- Apply ethical principles to professional activities and duties

## Degree Details

Total credits for degree: 134

This is a four-year program starting in the fall semester of the student's first year and planned to end in the summer semester of the student's fourth year.

Management or Computer Electives are chosen in consultation with the student's primary advisor.

## Computer Information Systems (BSIS)

### Freshman Year, Fall Semester (total credits 16)

MGMT1025	Computer and Business Applications (4 credits)
MGMT1000	Introduction to Management (4 credits)
MATH1000	College Mathematics (4 credits)
ENGLISH	English Sequence, See ENGL/HSS note below * (4 credits)

### Freshman Year, Spring Semester (total credits 16)

COMP1000	Computer Science I (4 credits)
MGMT2000	Management Information Systems (4 credits)
MATH2800	Finite Math (4 credits)
ENGLISH	English Sequence, See ENGL/HSS note below * (4 credits)

### Sophomore Year, Fall Semester (total credits 16)

COMP1050	Computer Science II (4 credits)
MGMT1500	Decision Analysis for Business (4 credits) OR MATH1030 Statistics and Applications (4 credits)
MGMT2100	Management Communications (4 credits)
COMP1100	Introduction to Networks (4 credits)

### Sophomore Year, Spring Semester (total credits 19)

MGMT2500	Systems Analysis and Design (3 credits)
COMP2650	Databases (4 credits)
MATH1900	Introduction to Operations Research (4 credits)
MGMT2550	Applied Project Management (4 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

### Sophomore Year, Summer Semester

COOP3000	Pre-Cooperative Work Term (Optional)
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**Junior Year, Fall Semester (total credits 19)**

MGMT3060	Technology Acquisition (3 credits)
COMP2500	Security Principles (4 credits)
MGMT2750	Integrative Financial Accounting (4 credits)
MGMT ELECTIVE	Management Elective (4 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

**Junior Year, Spring Semester**

COOP3500	Co-op Work Term I
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**Junior Year, Summer Semester (total credits 16)**

SCIENCE ELECTIVE	Lab Science (4 credits)
MGMT3650	Business Law (4 credits)
MGMT2850	Principles of Marketing (4 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

**Senior Year, Fall Semester**

COOP4500	Co-op Work Term II
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**Senior Year, Spring Semester (total credits 16)**

MGMT3500	Financial Management (4 credits)
MGMT3000	Managing and Leading Organizations (4 credits)
COMP ELECTIVE	Computer Elective (4 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

**Senior Year, Summer Semester (total credits 16)**

MGMT5500	Senior Project (4 credits)
MGMT3100	E-Commerce (4 credits)
COMP ELECTIVE	Computer Elective (4 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

\*ENGL/HSS Note:

Day program students are required to complete at least:

- One course in Humanities
- One course in the Social Sciences
- The remaining courses may be from either the Humanities or Social Sciences category

Of the five listed humanities and social science electives, BSIS students must include the following HSS

**Directed Electives:**

- ECON 4102 Principles of Economics
- An Ethics elective

## DEPARTMENT OF MANAGEMENT MASTER'S DEGREE REQUIREMENTS

### Master of Science in Project Management (MSPM) Leading to a Master of Science Degree

The Master's of Project Management is comprised of 10 courses including Agile Project Management, Managing Troubled Projects, Managing Enterprise Resource Planning (ERP), Global and Virtual Project Management, and Portfolio and Program Management. Classes are taught by Wentworth's prestigious faculty who are industry experts, and have earned their Project Management Institute certification. The program is fully online, enabling part-time students to complete the Master's degree in less than 2 years. The knowledge and skills learned in the program are applicable in a wide range of industries including business, government, healthcare, IT and others. Students from all undergraduate areas will benefit from this prestigious degree.

Specifically, all Wentworth Master of Science in Project Management graduates will be able to:

- Create, manage and control a project plan from throughout its complete life cycle in a timely and profitable manner
- Evaluate potential projects and justify the selection of an appropriate project portfolio
- Effectively communicate and ethically manage project teams, including virtual teams, using appropriate project management tools and techniques
- Manage ERP projects and gain efficiencies through business process integration and automation.

These graduate students will be provided with a platform from which they can establish a sound basis on which to build life-long learning skills to initiate, critically examine, and adapt to today's rapidly changing business environment across all disciplines.

The Master of Science in Project Management (MSPM) is designed for working professionals who want to advance their technical skills while learning the most up-to-date and innovative management strategies. In this program, students will gain valuable, hands-on experience in initiating, planning, executing, controlling, and closing a project—on time and on budget—using the latest project management software and technology. Our unique mix of courses, including Troubled Projects, ERP, and Virtual Project Management, will give you a competitive advantage in today's rapidly changing IT environment and can get you well on the road to becoming a skilled project manager in as little as two years.

Topics covered in the MSPM include:

- Communications strategies
- Technology project management
- Leadership
- Leveraging technical innovation and intellectual property
- Accounting and finance
- New product development and commercialization
- Global operations

#### *Program Objectives*

- Create, manage and deliver a project plan from inception to completion, including project scope, risk, quality and performance metrics
- Evaluate potential projects and justify the selection of an appropriate project portfolio
- Effectively communicate and ethically manage project teams, including virtual teams, using appropriate project management tools and techniques
- Manage ERP projects and gain efficiencies through business process integration and automation.

## Student Learning Outcomes

Upon completion, Master of Science in Project Management graduates will be able to:

- Create, manage and deliver a project plan from inception to completion, including project scope, risk, quality and performance metrics
- Evaluate potential projects and justify the selection of an appropriate project portfolio
- Effectively communicate and ethically manage project teams, including virtual teams, using appropriate project management tools and techniques
- Manage ERP projects and gain efficiencies through business process integration and automation

## Degree Details

All courses are three (3) credits unless otherwise noted

### Required Courses

MGMT7025	Project Scheduling and Cost Planning
MGMT7125	Risk Management
MGMT7450	Communication Strategies
MGMT7225	Project Team Building and Leadership
MGMT7325	Agile Project Management
MGMT7425	Managing Troubled Projects
MGMT7525	Global and Virtual Project Management
MGMT7625	Managing Enterprise Resource Planning (ERP) Systems
MGMT7725	Portfolio and Program Management
MGMT7825	MSPM Capstone

### Recommended Schedule for MS in Project Management (MSPM)

All courses are three (3) credits unless otherwise noted

#### Year One

##### Semester One

MGMT7025	Project Scheduling and Cost Planning
MGMT7125	Risk Management

##### Semester Two

MGMT7450	Communication Strategies
MGMT7225	Project Team Building and Leadership

##### Semester Three

MGMT7325	Agile Project Management
MGMT7425	Managing Troubled Projects

#### Year Two

##### Semester One

MGMT7525	Global and Virtual Project Management
MGMT7625	Managing Enterprise Resource Planning (ERP) Systems

##### Semester Two

MGMT7725	Portfolio and Program Management
MSPM7825	Capstone

Total credits for degree: 30 (36 with optional thesis).

# Master of Science in Technology Management (MSTM)

## Leading to a Master of Science Degree

The Master of Science in Technology Management (MSTM) degree is designed to elevate students' business acumen, strategic thinking, and people skills, all within the context of the issues and challenges specific to the technical world. Graduates of the MSTM program will be equipped with the management skills, expertise, and ethics necessary to be successful within technology-based enterprises.

The MSTM program is designed for technical professionals who desire to manage and lead within a technical environment. The program is offered in a fully online delivery format through our College of Professional and Continuing Education to provide maximum flexibility, and is designed to be completed in under two years on a part-time basis.

Online course discussion groups are a key component of the MSTM program, allowing students to regularly interact with and learn from both their instructors and fellow classmates. MSTM instructors are both subject matter experts and industry practitioners. Furthermore, most MSTM students are currently employed in a technical environment, facilitating peer to peer learning.

By the time of graduation, students will be able to:

- Understand the theory and application of advanced business management theories.
- Demonstrate an understanding of strategic technology management.
- Demonstrate an understanding of finance and accounting.
- Demonstrate leadership qualities.
- Understand the critical success factors for leading teams and related organizational development issues.
- Understand the relevance of the increasingly international business environment.
- Demonstrate executive level decision-making and critical thinking skills.
- Demonstrate the ability to deal with complex business challenges and utilize best practices to arrive at solution sets required of mid- and senior-level technology managers.

The Master of Science in Technology Management (MSTM) degree is designed to elevate students' business acumen, strategic thinking, and people skills, all within the context of the issues and challenges specific to the technical world. Graduates of the MSTM program will be equipped with the management skills, expertise, and ethics necessary to be successful within technology-based enterprises.

The MSTM program is designed for technical professionals who desire to manage and lead within a technical environment. The program is offered in a fully online delivery format to provide maximum flexibility, and is designed to be completed in under two years on a part-time basis.

Online course discussion groups are a key component of the MSTM program, allowing students to regularly interact with and learn from both their instructors and fellow classmates. MSTM instructors are both subject matter experts and industry practitioners. Furthermore, most MSTM students are currently employed in a technical environment, facilitating peer to peer learning.

## Mission, Goals and Outcomes

### *Mission*

The MSTM program is designed to combine common general management techniques with current technology management practices and technologies. The curriculum will provide graduates with the tools and managerial decision-making processes related specifically to maintaining and managing in a technical environment. The MSTM program will be taught using a combination of technologies and team instruction. It is anticipated that courses will utilize both industry professionals as well as academic experts. The program will provide graduates with a clear understanding of the management skills, expertise and ethics necessary to be successful within the technology-based enterprises. Topics to be covered will include: communication strategies, technology project management, leadership, leveraging technical innovation and intellectual property, accounting and finance, new product development and commercialization, and global operations.



## Goals

Graduates of the Master of Science in Technology Management program will be prepared for a variety of managerial positions in the technical world. The program will be to provide graduates with the knowledge and skill sets needed to function successfully in middle and upper level technology management positions.

## Student Learning Outcomes

Wentworth Master of Science in Technology Management graduates will:

- Understand the theory and application of advanced business management theories.
- Demonstrate an understanding of strategic technology management.
- Demonstrate an understanding of finance and accounting.
- Demonstrate leadership qualities.
- Understand the critical success factors for leading teams and related organizational development issues.
- Understand the relevance of the increasingly international business environment.
- Demonstrate executive level decision-making and critical thinking skills.
- Demonstrate the ability to deal with complex business challenges, and utilize best practices to arrive at solution sets required of mid and senior level technology managers.

## Required Courses

All courses are three (3) credits unless otherwise noted

MGMT7000	Business Relations & HR Management
MGMT7100	Project Management Applications
MGMT7050	Business Finance and Investments
MGMT7450	Communication Strategies
MGMT7150	Business Operations and Process Management
TMCT8000	Strategic Technology Business Management
MGMT7200	Leadership
TMCT8100	Management of New Product Development
MGMT7350	Marketing Management
TMCT8900	Technology Management Capstone

## Degree Details

Total credits for degree: 30

## MSTM Recommended Schedule

All courses are three (3) credits unless otherwise noted

### Year One

#### Semester One

MGMT7000	Business Relations & HR Management
MGMT7100	Project Management Applications

#### Semester Two

MGMT7050	Business Finance and Investments
MGMT7450	Communication Strategies

## Semester Three

MGMT7150 Business Operations and Process Management  
TMCT8000 Strategic Technology Business Management

## Year Two

### Semester One

MGMT7200 Leadership  
TMCT8100 Management of New Product Development

### Semester Two

MGMT7350 Marketing Management  
TMCT8900 Technology Management Capstone

Total credits for degree: 30

## DEPARTMENT OF SCIENCES

### James C. O'Brien, Ph.D., Department Chair

Ira Allen Room 317  
(617) 989-4426

## Faculty

### *Associate Professors*

- Laurie Grove, Ph.D.
- Robert Moran, Ph.D.
- James O'Brien, Ph.D.
- Richard Shurtelff, M.S.
- Greg Sirokman, Ph.D.

### *Assistant Professors*

- Douglas Goodman, Ph.D.
- Joseph Harney, M.S.
- Ben Placek, Ph.D.
- Naomi Ridge, Ph.D.
- Ryan Rogers, Ph.D.
- Franz Rueckert, Ph.D.
- William Spinella, Ph.D.
- Nadine Stecher, Ph.D.
- Omair Zubairi, Ph.D.

## Department Mission and Vision Statement

### *Mission*

The Sciences Department delivers a variety of challenging and motivating scientific experiences in chemistry, biology, physics, and undergraduate research designed to impart scientific literacy and support student success across all programs at the Institute.

## *Vision*

Our vision is to deliver science through EPIC (externally collaborative, project-based, interdisciplinary culture) Learning to students to create lifelong learners, and to foster a deep appreciation for the sciences.

### **Minor in Bioinformatics**

For students with an interest in the applications of bioinformatics in drug discovery, diagnostics, and disease management, this minor is expected to supplement their major with a stronger foundation in the life sciences, computer science, and mathematics, which allows the student to access and manipulate the wealth of data now emerging from new technologies relating to genes, genomes, and the molecules they produce in health and disease. This minor is offered in collaboration with the Biomedical Engineering and Computer Science and Networking departments.

To complete the minor, students must pass all three core courses and any two elective courses.

#### *Required courses*

BIOL1100	Cell and Molecular Biology
COMP3672	Introduction to Bioinformatics
COMP3750	Introduction to Biostatistics

#### *Choose two elective courses*

BIOL1500	Introduction to Medical Biotechnology
CHEM2000	Basics of Organic and Biochemistry
CHEM2200	Proteins, Medicine and Disease

Plus designated BIOL3800, Special Topics in Biology when offered as minor electives

Total credits for minor: 20

### **Minor in Biology**

The minor in biology allows students with an interest in biology applications and/or research to supplement their major with a foundation in the biological sciences and the potential for participating in interdisciplinary research-based projects.

To earn the minor, students must pass two core courses and two elective courses. At least one of the minor courses must be a research-based directed study.

#### *Required courses*

BIOL1100	Cell and Molecular Biology
BIOL1700	Anatomy and Physiology I

#### *Choose two elective courses*

BIOL1750	Anatomy and Physiology II
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Plus designated BIOL2990, Independent Study in Biology, when offered as minor electives \*

Plus designated BIOL3800, Special Topics in Biology, when offered as minor electives \*

\*May fulfill the directed research requirement. Please check with the instructor and/or department chair.

Total credits for minor: 16

## Minor in Chemistry

This minor allows students to supplement their major with a stronger foundation in the physical sciences. Students will be exposed to the foundations of chemistry and laboratory techniques, including common analytical instrumentation. Students will also have the opportunity to explore a topic in a subfield of chemistry through directed research or independent study.

### *Required Core Chemistry Course (4 credits)*

CHEM1100            Engineering Chemistry I (4 credits)

### *Organic Chemistry Requirement (4 credits) select one course*

CHEM 2000            Basics of Organic and Biochemistry (4 credits)

CHEM 2500            Organic Chemistry (4 credits)

### *Chemistry Electives (8 credits)*

CHEM1600            Engineering Chemistry II (4 credits)

CHEM2200            Proteins, Medicine & Disease (4 credits)

CHEM2990            Independent Study in Chemistry (1 – 4 credits)

CHEM3500            Organic Chemistry II (4 credits)

CHEM3550            Biochemistry (4 credits)

CHEM3800            Special Topics in Chemistry: Renewable Energy (4 credits)

CHEM3800            Special Topics in Chemistry: Inorganic Chemistry (4 credits)

Total Credits 16

## Minor in Physics

The physics minor gives students a stronger foundation in the physical sciences and provides the opportunity to work directly on the scientific method in a sub-field of physics of their choice in a collaborative, interdisciplinary research-based project.

To earn the minor, students must pass two core courses and two elective courses. One elective course must be a directed research course.

### *Required Courses (8 credits)*

PHYS1250            Engineering Physics

PHYS1750            Engineering Physics I

### *Select two (2) courses from the following list (8 credits minimum)*

PHYS2500            Modern Physics

PHYS3000            Computational Physics

PHYS2990            Independent Study in Physics, when offered as minor electives \*

PHYS3800            Special Topics in Physics, when offered as minor electives \*

\* May satisfy the directed research requirement. Please check with the instructor and/or department chair.

\*\* All 3800 courses will require a Course Substitution Form submitted to the SSC to insure they are applied to the Physics minor requirement/s. Contact the Department of Science for a list of courses available by semester

Total Credits 16

## BIOLOGICAL ENGINEERING PROGRAM

**Nakisa Alborz, Ph.D. , LEED AP BD+C, Co-Chair**  
Rubenstein Hall 202A  
617-989-4705

**James O'Brien, Ph.D., Co-Chair**  
Ira Allen Building 308  
617-989-4426

### **Biological Engineering (BSBE) Leading to the Bachelor of Science Degree**

#### *Program Mission Statement*

The mission of the Biological Engineering program is to prepare students to become practicing engineers/scientists, who will go on to be innovative problem solvers in industry, government, and academia.

#### *Program Overview*

Biological engineering is at the leading edge of emerging engineering disciplines, applying the engineering principles of analysis, synthesis, and design to biology at the molecular and cellular levels to create new products and processes. By understanding biological functions at the fundamental level, and how systems and processes are structured, new technologies, materials, and systems can be created to improve quality of life through a broad array of sectors from health care to the environment. The Biological Engineering program provides opportunities for students who wish to study engineering, but also want to study biology because it is the fundamental building block of life sciences. This program opens opportunities for students to study science and engineering and apply the principles of each area while working with diverse applications involving living organisms.

#### *Biological Engineering Program Objectives*

Within three to five years after graduation, graduates of the Biological Engineering program will:

- Contribute significantly in the design and development of complex biological systems.
- Work effectively as members of multidisciplinary teams that analyze data critically, synthesize information and implement ethical solutions for the betterment of society.
- Prepare and present technical and scientific information professionally to various audiences.
- Further their education either through directed or independent studies to advance them personally and professionally.

#### *Biological Engineering Program Outcomes*

By the time of graduation, students enrolled in the Biological Engineering program will be able to demonstrate the following outcomes:

1. An ability to identify, formulate, and resolve complex engineering problems by applying principles of engineering, science and mathematics.
2. An ability to apply engineering design to produce solutions that meet specific needs with consideration of public health, safety and welfare, as well as global, cultural, social, environmental and economic factors.
3. An ability to communicate effectively with a range of audiences.

4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts.
5. An ability to function effectively on a team whose members together provide leadership, create collaborative and inclusive environment, and societal contexts.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

## Degree Details

Total credits for degree: 132

This is a four-year program, starting in the fall of the student's first year and ending in the summer semester of the student's fourth year.

## Biological Engineering (BSBE)

### Freshman Year Fall Semester (total credits 19)

ENGR1000	Introduction to Engineering (3 credits)
CHEM1100	Engineering Chemistry I (4 credits)
MATH1750	Engineering Calculus I (4 credits)
PHYS1250	Engineering Physics I (4 credits)
ENGLISH	English Sequence, See ENGL/HSS note below * (4 credits)

### Freshman Year, Spring Semester (total credits 17)

ENGR1500	Introduction to Engineering Design (3 credits)
BIOL1100	Cell and Molecular Biology (4 credits)
MATH1850	Engineering Calculus II (4 credits)
ENGR1600	Fundamentals of CAD and CAM (1 credit)
ENGR1800	Programming with MATLAB (1 credit)
ENGLISH	English Sequence, See ENGL/HSS note below * (4 credits)

### Sophomore Year, Fall Semester (total credits 16)

BIOL2200	Advanced Molecular Biology (4 credits)
BIOE2000	Fundamentals of Biological Engineering (4 credits)
MATH2500	Differential Equations (4 credits)
PHYS1750	Engineering Physics II (4 credits)

### Sophomore Year, Spring Semester (total credits 16)

BMED4600	Biostatistics (4 credits)
CHEM1600	Engineering Chemistry II (4 credits)
BIOE2500	Biological Instrumentation and Measurement (4 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

### Sophomore Year, Summer Semester

COOP 3000	Pre-Cooperative Work Term (Optional)
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### Junior Year, Fall Semester (total credits 16)

CHEM2500	Organic Chemistry (4 credits)
BIOE3500	Genetics and Transgenetics (4 credits)
ELECTIVE	Biology Elective/EPIC (4 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

### **Junior Year, Spring Semester**

COOP3500 Co-op Work Term I

### **Junior Year, Summer Semester (total credits 16)**

CHEM3550 Biochemistry (4 credits)  
BIOE3025 Biomaterials and Tissue Engineering (4 credits)  
BIOE3555 Unit Operations and Process Control (4 credits)  
HSS ELECTIVE See ENGL/HSS note below \* (4 credits)

### **Senior Year, Fall Semester**

COOP4500 Co-op Work Term II

### **Senior Year, Spring Semester (total credits 16)**

BIOE4000 Cell Physiology and Signaling (4 credits)  
BIOE4500 Bio-Transport Phenomena (4 credits)  
ENGR5000 Engineering Senior Design I (4 credits)  
HSS ELECTIVE See ENGL/HSS note below \* (4 credits)

### **Senior Year, Summer Semester (total credits 16)**

BIOL4400 Synthetic Biology (4 credits)  
ELECTIVE Biology Elective/EPIC (4 credits)  
ENGR5500 Engineering Senior Design II (4 credits)  
HSS ELECTIVE See ENGL/HSS note below \* (4 credits)

\*ENGL/HSS Note:

Day program students are required to complete:

- At least one course in Humanities
- At least one course in the Social Sciences
- The remaining courses from either the Humanities or Social Sciences category

Students with a three-English course sequence may use the third English course to satisfy a Humanities requirement.

# COLLEGE OF ENGINEERING AND TECHNOLOGY

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**Frederick F. Driscoll, Dean**  
Rubenstein Hall Room 207  
(617) 989-4135

## *Vision*

Our students change the world.

## *Mission*

To foster the education of competent, creative, entrepreneurial engineering and computer science students by dedicated faculty in innovative programs.

## *Goals*

## *Education Model*

Our students develop a strong technical foundation, nurture their creativity and problem-solving skills on real-world projects, sharpen innovation and entrepreneurship skills in a collaborative diverse environment, and complete at least two required semesters of co-operative work experience.

## *Laboratory Experience*

Our students apply the theory of their discipline in state-of-the-art laboratories throughout their time at the university.

## *Global Impact*

Our students develop competencies necessary to impact business, academia, and government in the areas of engineering and computer science for the betterment of society with broad global perspective.



## BIOMEDICAL ENGINEERING DEPARTMENT

### **Shankar Krishnan, Ph.D., Department Chair**

The Center for Sciences and Biomedical Engineering, Room 115  
(617) 989-4266

### **Faculty**

#### *Professor*

- Shankar Krishnan, Ph.D.

#### *Associate Professor*

- Weihui Li, Ph.D.

#### *Assistant Professors*

- Uri Feldman, Ph.D.
- Ali Kiapour, Ph.D.
- Joseph Martel-Foley, Ph.D.
- Hamed Salehizadeh, Ph.D.

### **Department Mission Statement**

The Bachelor of Science in Biomedical Engineering program is accredited by the Engineering Accreditation Commission of ABET ([www.abet.org](http://www.abet.org)). Wentworth's Biomedical Engineering program is intended to train future biomedical engineers through a practice-oriented education coupled with a solid theoretical background, providing graduates with the ability to utilize technological advancements, contribute to innovative biomedical engineering design solutions in a collaborative environment, and make appropriate decisions for their areas of professional responsibility, to improve the quality of human life.

## BIOMEDICAL ENGINEERING DEPARTMENT DEGREE REQUIREMENTS

### **Biomedical Engineering (BBME) Leading to the Bachelor of Science Degree**

#### *Program Overview*

The Biomedical Engineering program focuses on designing, building, and supporting biomedical instrumentation, devices, and systems that provide solutions at the intersection of biology and medicine. The program leverages the proximity and strength of the nearby medical community to allow students to engage in valuable learning experiences and prepare them for rewarding careers in healthcare-related industries, hospitals, academic, and government research laboratories, regulatory agencies, and service agencies. It will also prepare students who may want to pursue advanced studies in graduate education in Biomedical Engineering, as well as professional programs such as medicine, dentistry, law, and business. Students will learn and build skills and expertise in electronics, signals and systems, instrumentation, biomechanics, biomaterials, and biostatistics, and collaboratively carry out interdisciplinary Biomedical Engineering capstone projects.

Students will have a choice to select from an array of Biomedical Engineering courses, including Medical Devices and Systems, Medical Imaging and Optics, Medical Informatics and Telemedicine, Clinical Engineering Practice, Design of Prosthetics and Implants, Medical Robotics and Assistive Technologies, and Artificial Intelligence and Analytics in Healthcare. The program is designed with an emphasis on Medical Devices and Systems.

## Biomedical Engineering Program Objectives

Graduates of the Biomedical Engineering Program will be able to:

- Advance in their careers or pursue higher education in biomedical engineering or a related field.
- Apply the acquired comprehensive knowledge and engage in lifelong learning opportunities to meet the needs of the profession.
- Contribute responsibly and ethically towards impacting the biomedical engineering profession and improving human health.

## Biomedical Engineering Program Outcomes

Graduates of Wentworth's Biomedical Engineering program will have attained the following student outcomes.

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Total credits for degree: 136

This is a four-year program, starting in the fall of the student's first year and ending in the summer semester of the student's fourth year.

After taking the prerequisite courses in math, physics, chemistry, biology, anatomy and physiology, and basic organic and biochemistry, as well as in basic electrical and mechanical engineering, the students in the Biomedical Engineering major are required to take the core courses, namely, Biomedical Electronics and Instrumentation, Signals and Systems for Biomedical Engineering, Biomechanics, Biomaterials & Tissue Engineering, Biostatistics, Engineering in Biomedicine, and BME Senior Design I & II. Three Biomedical Engineering elective courses are required for this program. The Biomedical Engineering electives include courses such as: Medical Devices and Systems, Medical Imaging and Optics, Clinical Engineering Practice, Medical Informatics and Telemedicine, Medical Robotics, AI & Analytics in Healthcare and Medical Robotics & Assistive Technologies. In addition, students may choose a suitable engineering elective course either within or outside of the Biomedical Engineering discipline for their Engineering Elective. In addition, there are two EPIC courses offered jointly with the Department of Computer Science and Networking: Medical Device Networks and Mobile Health Technologies and Applications. It is recommended that students discuss with their faculty advisor prior to registering for courses.

### Freshman Year, Fall Semester (total credits 19)

ENGR1000	Introduction to Engineering (3 credits)
BIOL1100	Cell and Molecular Biology (4 credits)
MATH1750	Engineering Calculus I (4 credits)
PHYS1250	Engineering Physics I (4 credits)
ENGLISH	English Sequence, See ENGL/HSS note below *(4 credits)

### Freshman Year Spring Semester (total credits 17)

ENGR1500	Introduction to Engineering Design, (3 credits)
CHEM1100	Engineering Chemistry (4 credits)
MATH1850	Engineering Calculus II, (4 credits)
ENGR1600	Fundamentals of CAD and CAM (1 credit)

ENGR1800	Programming with MATLAB (1 credit)
ENGLISH	English Sequence, See ENGL/HSS note below * (4 credits)

### **Sophomore Year, Fall Semester (total credits 16)**

BIOL1700	Anatomy and Physiology I (4 credits)
COMP1000	Computer Science I (4 credits)
ELEC2299	Electric Circuit Analysis and Design (4 credits)
PHYS1750	Engineering Physics II (4 credits)

### **Sophomore Year Spring Semester (total credits 19)**

BMED2500	Biomedical Electronics and Instrumentation (4 credits)
BIOL1750	Anatomy and Physiology II (4 credits)
ELEC2699	Integrated Electronics (3 credits)
MATH2025	Multivariable Calculus (4 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

### **Sophomore Year Summer Semester**

COOP3000	Pre-Cooperative Work Term (Optional)
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### **Junior Year Fall Semester (total credits 16)**

CHEM2000	Basics of Organic and Biochemistry (4 credits)
MATH2750	Differential Equations and Systems Modeling (4 credits)
ELECTIVE	Biomedical Engineering (4 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

### **Junior Year Spring Semester**

COOP3500	Co-op Work Term I
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### **Junior Year Summer Semester (total credits 16)**

MECH3599	Engineering Mechanics (4 credits)
ELECTIVE	Biomedical Engineering (4 credits)
ELECTIVE	Engineering (4 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

### **Senior Year Fall Semester**

COOP4500	Co-op Work Term II
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### **Senior Year Spring Semester (total credits 17)**

BMED5000	Biomedical Senior Design I (3 credits)
BMED4300	Signals and Systems for Biomedical Engineering (3 credits).
BMED4400	Biomechanics (4 credits)
BMED4200	Biomaterials/Tissue Engineering (3 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

### **Senior Year Summer Semester (total credits 16)**

BMED5500	Biomedical Senior Design II (3 credits)
BMED4600	Biostatistics (4 credits)
BMED4500	Engineering in Biomedicine (1 credit)
ELECTIVE	Biomedical Engineering (4 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

\*ENGL/HSS Note:

Day program students are required to complete:

- At least one course in Humanities
- At least one course in the Social Sciences
- The remaining courses from either the Humanities or Social Sciences category

Students with a three-English course sequence may use the third English course to satisfy a Humanities requirement.

## DEPARTMENT OF CIVIL ENGINEERING AND TECHNOLOGY

**John W. Duggan, Ph.D., P.E., Department Chair**

Annex South, Room 101C

(617) 989-4181

### Faculty

#### *Professors*

- Jack Duggan, Ph.D.
- James Lambrechts, M.S.

#### *Associate Professors*

- Leonard Anderson, Ph.D.
- Gautham Das, Ph.D.
- Anuja Kamat, Ph.D.

#### *Assistant Professors*

- Tugba Arsava, Ph.D.
- Abigail Charest, Ph.D.
- Hadi Kazemiroodsari, Ph.D.
- Vitaliy Saykin, Ph.D.
- Richard Vannozzi, M.S.

#### *Visiting Assistant Professors*

- Hajar Jafferji, Ph.D.

#### *Laboratory Technicians*

- Phillip Curtsmith, M.S.
- William Cashel-Cordo

#### *Academic Coordinator*

- Rachael Beauchemin

### Department Overview

The Department of Civil Engineering and Technology is home to Wentworth's ABET-accredited Bachelor of Science in Civil Engineering degree and the Master of Engineering in Civil Engineering degree. The department also offers a minor in Civil Engineering to non-civil engineering majors, and minors in Environmental Engineering and Surveying to civil engineers and other qualified students. Civil engineering students in the Bachelor of Science program may also concentrate their civil engineering elective courses in the areas of geotechnical engineering, structural engineering, transportation engineering or site development/project management.

#### *Civil Engineering*

Civil Engineers are entrusted by society to create a sustainable future and enhance the quality of life for individuals and communities as planners, designers, contractors, and operators of one of society's economic and social engines—the built environment. They serve as stewards of the natural environment and its resources,

as innovators and integrators of ideas and technology across public and private sectors, and as leaders in discussions and decisions shaping public, environmental, and infrastructure policy.

### *Department Vision*

To build a better world

### *Department Mission*

To provide students with the necessary civil engineering, team-work and communication skills to have career success designing and building safe, sustainable, effective, and efficient systems and infrastructure for the built environment and to protect natural resources for future generations.

## **DEPARTMENT OF CIVIL ENGINEERING DEGREE REQUIREMENTS**

### **Civil Engineering (BSCE)**

#### **Leading to the Bachelor of Science Degree**

The Bachelor of Science in Civil Engineering program is accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org>

### *Program Description*

The Civil Engineering program offers a rigorous curriculum designed to prepare students to enter this dynamic profession, pursue advanced studies, and become a licensed professional civil engineer.

### *Educational Objectives*

After graduation, civil engineering graduates should demonstrate the following abilities:

1. Lifelong Learning—to pursue professional development by obtaining professional licensure, certifications or by post-graduate study as appropriate to meet and adapt to emerging and evolving technology and infrastructure challenges.
2. Successful Careers—to have a successful career in the field of civil engineering or a related field.
3. Professionalism—to contribute to the field of civil engineering or a related field as a professional.

### *Educational Outcomes*

1. An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply both analysis and synthesis in the engineering design process, resulting in designs that meet desired needs.
3. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
4. An ability to communicate effectively with a range of audiences.
5. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
6. An ability to recognize the ongoing need for additional knowledge and locate, evaluate, integrate, and apply this knowledge appropriately.
7. An ability to function effectively on teams that establish goals, plan tasks, meet deadlines, and analyze risk and uncertainty.

## Degree Details

Total credits for degree: 136

This is a four-year program starting in the fall semester of the student's first year and planned to end in the summer semester of the student's fourth year.

### Freshman Year Fall Semester (16 credits)

MATH1750	Engineering Calculus (4 credits)
PHYS1250	Engineering Physics I (4 credits)
FYS1000	First Year Seminar (0 credit)
ENGR1000	Introduction to Engineering (3 credits)
ENGR1600	Fundamentals of CAD & CAM (1 credit) or ENGR1800 Introduction to MATLAB (1 credit)
ENGLISH	English Sequence, See ENGL/HSS note below * (4 credits)

### Freshman Year, Spring Semester (16 credits)

MATH1850	Engineering Calculus II (4 credits)
PHYS1750	Engineering Physics II (4 credits)
ENGR1500	Introduction to Engineering Design (3 credits)
ENGR1600	Fundamentals of CAD & CAM (1 credit) or ENGR1800 Introduction to MATLAB (1 credit)
ENGLISH	English Sequence, See ENGL/HSS note below * (4 credits)

### Sophomore Year, Fall Semester (19 credits)

MATH2025	Multivariable Calculus (4 credits)
CHEM1100	Engineering Chemistry I (4 credits)
CIVE2205	Introduction to Geomatics (4 credits)
CIVE2000	Statics and Mech Materials I (3 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

### Sophomore Year, Fall Semester (18 credits)

MATH2500	Differential Equations (4 credits)
CIVE2400	Civil Engineering Materials (3 credits)
CIVE2500	Statics and Mech II (4 credits)
CIVE2300	Civil CAD (3 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

### Junior Year, Fall Semester (19 credits)

CIVE3000	Fluid Mechanics (4 credits)
CIVE3200	Structural Analysis (4 credits)
CIVE3300	Soil Mechanics (4 credits)
CIVE3100	Environmental Engineering (4 credits)
ELECTIVE	Civil Engineering or ENGR EPIC (3 credits)

### Junior Year, Spring Semester (0 credits)

COOP 3500

### Junior Year, Summer Semester (15 credits)

CIVE3900	Hydraulic Engineering (4 credits)
CIVE3700	Highway Engineering (4 credits)
ELECTIVE	Civil Engineering or ENGR EPIC (3 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

## Senior Year, Fall Semester (0 credits)

COOP4500

## Senior Year, Spring Semester (18 credits)

CIVE4000	Design Projects (4 credits)
SCIENCE	Elective Biology or Geology (4 credits)
MGMT3200	Engineering Economy (3 credits)
ELECTIVE	Civil Engineering or ENGR EPIC (3 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

## Senior Year, Summer Semester (15 credits)

CIVE5500	Civil Engineering Capstone (4 credits)
MATH2100	Probability and Statistics for Engineers (4 credits)
ELECTIVE	Civil Engineering or ENGR EPIC (3 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

## Civil Engineering Electives

CIVE3150	Advanced Surveying (3 credits)
CIVE3250	GIS Applications in Civil Engineering (3 credits)
CIVE3350	Green Engineering (3 credits)
CIVE3450	Legal Aspects of Boundary Surveying (3 credits)
CIVE4050	Boundary Surveying (3 credits)
CIVE4100	Water Resources and Hydrology (3 credits)
CIVE4225	Environmental Unit Operations (3 credits)
CIVE4250	Structural Steel Design (3 credits)
CIVE4300	Foundation Engineering (3 credits)
CIVE4350	Reinforced Concrete Design (3 credits)
CIVE4375	Water and Wastewater Treatment (3 credits)
CIVE4400	Municipal Planning (3 credits)

To meet the 12 CE elective requirements, a student may take a combination of Civil Engineering electives, Wentworth Master of Engineering in Civil Engineering courses and EPIC courses. With approval from the chair of Civil Engineering and Technology, Civil Engineering electives may be substituted for with a Wentworth engineering course from another program, another engineering course from an engineering program other than Wentworth or other relevant coursework.

\*ENGL/HSS Note:

Day program students are required to complete:

- At least one course in Humanities
- At least one course in the Social Sciences
- The remaining courses may be from either Humanities or Social Sciences category

Students with a three English course sequence may use the third English course to satisfy a Humanities requirement. Of the five humanities and social science electives, BSCE students must include the following

### HSS Directed Electives:

ECON4102	Principles of Economics
HUMN4355	Boston Voyages

## Minor in Civil Engineering

The minor in Civil Engineering encompasses three objectives:

- Provide a meaningful experience in civil engineering, including advanced undergraduate courses, to students outside of the civil engineering major
- Allow students in other majors to explore and analyze topics in the built environment that civil engineering encompasses
- Enhance the learning experience of all students, including civil engineering majors, by having students from multiple majors in civil engineering courses, facilitating the interdisciplinary project work

To complete the minor students must take five civil engineering courses. Students must complete all pre-requisites (or be registered for any co-requisites) required for the courses. Available courses include but are not limited to:

### *Select five (5) courses from the following list*

CIVE2205	Introduction to Geomatics (4 credits)
CIVE2400	Civil Engineering Materials (3 credits)
CIVE3000	Fluid Mechanics (4 credits)
CIVE3100	Environmental Engineering (4 credits)
CIVE4100	Water Resources and Hydrology (3 credits)
CIVE4150	Land Use Planning (3 credits)
CIVE4200	Geology for Civil Engineers (3 credits)
CIVE4350	Reinforced Concrete Design (3 credits)
CIVE4400	Municipal Planning (3 credits)
ENGR1500	Introduction to Engineering Design (3 credits)

Total credits for minor: 15 (minimum)

Other courses from the civil engineering program may be used to complete minor requirements with approval from the civil engineering and technology department.

## Minor in Environmental Engineering

The Environmental Engineering minor creates a new professional opportunity for engineering students. The minor is designed for engineering students who would like to expand their area of expertise by incorporation of the appraisal of human activity impacts on the environment, minimization and mitigation of such impact and the tending to the natural environment as the earth's life support system.

To complete the minor students must take four civil engineering courses. Students must complete all pre-requisites (or be registered for any co-requisites) required for the courses. Available courses include but are not limited to:

### *Pre-requisite courses*

CHEM1100	Engineering Chemistry (4 credits)
CIVE2205	Introduction to Geomatics (4 credits)
CIVE3100	Environmental Engineering (4 credits)

### *Required courses*

CIVE3350	Green Engineering (3 credits)
CIVE4100	Water Resource and Hydrology (3 credits)
CIVE4225	Environmental Unit Operations (3 credits)
CIVE4375	Water and Wastewater Treatment (3 credits)

Total credits for minor 12 (minimum)



## Minor in Surveying

To complete the minor students must take four civil engineering courses. Students must complete all pre-requisites (or be registered for any co-requisites) required for the courses. Available courses include but are not limited to:

### *Pre-requisite course*

CIVE2205 Introduction to Geomatics (4 credits)

### *Required courses*

CIVE3150 Advanced Surveying (3 credits)  
CIVE3250 GIS Applications for Civil Engineers (3 credits)  
CIVE3450 Legal Aspects of Boundary Surveying (3 credits)  
CIVE4050 Boundary Surveying (3 credits)

Total credits for minor 12 (minimum)

## MASTERS' DEGREE PROGRAMS - CIVIL ENGINEERING (MEngCE)

### Master of Engineering in Civil Engineering (MEng CE) Leading to a Master of Engineering in Civil Engineering Degree

The Master of Engineering in Civil Engineering (MEng CE) program is designed to educate technical professionals in post-graduate civil engineering principles. The program is designed for part-time students, provides maximum flexibility relative to academic delivery and format, and can be completed in less than two (2) years. The curriculum is organized into two (2) areas of specialization, construction engineering and infrastructure engineering.

#### *Construction Specialization*

Designed to provide the student with coursework in the construction area of civil engineering, including topics specified in the Civil-Construction PE exam: estimating and scheduling, construction operations, and relevant geotechnical, structural and environmental aspects of construction.

#### *Infrastructure Specialization*

Designed to provide the student with coursework focused on the design of major infrastructure projects. This curriculum emphasizes transportation and public works infrastructure projects and includes advanced transportation, structural, geotechnical, and environmental coursework.

## Mission, Goals and Outcomes

### *Mission*

The Master of Engineering in Civil Engineering (MEng CE) program is designed to meet the criteria outlined by the American Society of Civil Engineers (ASCE) regarding post baccalaureate education in addressing current and future local, national, and global needs. The curriculum of the program has been developed to ensure the alignment of learning objectives with the skills, competencies, and attributes which industry and prospective employers are looking for in our graduates.

## Goals

The Master of Engineering in Civil Engineering (MEng CE) program places emphasis on addressing real-world engineering problems as a practicing professional engineer, while addressing the American Society of Civil Engineers (ASCE) recommended body of knowledge for future civil engineers. Per the recommendation of the ASCE ([www.asce.org](http://www.asce.org)) and as required by state by state regulations, civil engineering graduates and practitioners are strongly encouraged to become licensed engineers, which allows engineers to take personal responsibility for the work they perform for public and private clients.

The MEng CE program addresses ASCE's strategic initiative entitled "Competency – Raise the Bar" through the master's degree in civil engineering for students seeking professional licensure, which is an important credential in the field of civil engineering. The MEng CE program is designed to meet criteria outlined by ASCE regarding post baccalaureate education by addressing current and future local, national, and global needs and is widely supported by representatives of the private, public and academic sectors of the civil engineering profession.

## Student Learning Outcomes

Graduates of the Master of Engineering in Civil Engineering (MEng CE) program will be able to:

- Demonstrate competence in computer simulation in civil engineering.
- Demonstrate competence in sustainable engineering design.
- Identify, evaluate, and apply project management tools and techniques to engineering issues as they pertain to intra-disciplinary and inter-disciplinary teams.
- Research, analyze and communicate information related to advanced topics and designs.
- Demonstrate the knowledge, tools and techniques associated with advanced topics and designs.

The Master of Engineering in Civil Engineering (MEng CE) program contains three (3) required courses that are common to each area of specialization; Project Management Principles and Practices, Engineering Modeling and Analysis Methods and Environmental Systems. To complete the thirty (30) credit graduate program students are required to take four (4) courses in their area of MEng CE specialization and two (2) other relevant graduate courses. The culminating experience of the MEng CE program is a final capstone design course.

## MEng CE Courses and Areas of Specialization

All courses are three (3) credits unless otherwise noted

### Required Courses

CIVE8000	Project Management Principles and Practices
CIVE8100	Engineering Modeling and Analysis Methods
CIVE8200	Environmental Systems
CIVE8950	Master of Engineering Civil Engineering (MEng CE) Capstone

### Construction Area of Specialization

CIVE8250	Engineering Estimating and Scheduling
CIVE8350	Construction Operations, Methods and Quality Control
CIVE8450	Temporary Structures
CIVE8550	Site Planning and Development

### Infrastructure Area of Specialization

CIVE8300	Traffic Analysis and Safety
CIVE8400	Highway Design and Transportation Planning
CIVE8500	Geotechnical Engineering for Infrastructure

CIVE8600	Advanced Concrete and Steel Design
CIVE8700	Bridge Design
CIVE8800	Infrastructure Renewal

## Degree Details

Total credits for degree: 30

MEng CE students may select courses with the approval of the Department Chair, graduate courses from Wentworth's Master of Science in Construction Management (MSCM) and Master of Science in Facility Management (MSFM) graduate programs, specifically;

CONM7100	Modern Construction Delivery Methods
CONM7200	Construction Law for Construction Management
CONM7300	Real Estate for Construction Management
FMGT7200	Energy/Sustainability
FMGT7300	Facility Operations

## Recommended Schedule MEng CE Construction Specialization

All courses are three (3) credits unless otherwise noted

### YEAR ONE

#### Semester One

CIVE8000	Project Management Principles and Practices
CIVE8200	Environmental Systems

#### Semester Two

CIVE8100	Engineering Modeling and Analysis Methods
CIVE8250	Engineering Estimating and Scheduling

#### Semester Three

CIVE8450	Temporary Structures
and one (1) CIVE/CONM/FMGT course subject to availability	
CIVE8300	Traffic Analysis and Safety
CIVE8350	Construction Operations, Methods and Quality Control
CIVE8400	Highway Design and Transportation Planning
CIVE8500	Geotechnical Engineering for Infrastructure
CIVE8600	Advanced Concrete and Steel Design
CIVE8700	Bridge Design
CIVE8800	Infrastructure Renewal
CONM7100	Modern Construction Delivery Methods
CONM7200	Construction Law for Construction Management
CONM7300	Real Estate for Construction Management
FMGT7200	Energy/Sustainability
FMGT7300	Facility Operations

### YEAR TWO

#### Semester One

CIVE8550	Site Planning and Development
and Select one (1) CIVE/CONM/FMGT course subject to availability	

*All courses are three (3) credits unless otherwise noted*

CIVE8300	Traffic Analysis and Safety
CIVE8350	Construction Operations, Methods and Quality Control
CIVE8400	Highway Design and Transportation Planning
CIVE8500	Geotechnical Engineering for Infrastructure
CIVE8600	Advanced Concrete and Steel Design
CIVE8700	Bridge Design
CIVE8800	Infrastructure Renewal
CONM7100	Modern Construction Delivery Methods
CONM7200	Construction Law for Construction Management
CONM7300	Real Estate for Construction Management
FMGT7200	Energy/Sustainability
FMGT7300	Facility Operations

## Semester Two

CIVE8950, Master in Engineering for Civil Engineering Capstone (3)  
and

Select one (1) CIVE/CONM/FMGT course subject to availability

*All courses are three (3) credits unless otherwise noted*

CIVE8300	Traffic Analysis and Safety
CIVE8400	Highway Design and Transportation Planning
CIVE8500	Geotechnical Engineering for Infrastructure
CIVE8600	Advanced Concrete and Steel Design
CIVE8700	Bridge Design
CIVE8800	Infrastructure Renewal
CONM7100	Modern Construction Delivery Methods
CONM7200	Construction Law for Construction Management
CONM7300	Real Estate for Construction Management
FMGT7200	Energy/Sustainability
FMGT7300	Facility Operations

Total credits for degree: 30

## Recommended Schedule MEng CE Infrastructure Specialization

All courses are three (3) credits unless otherwise noted

### YEAR ONE

#### Semester One

CIVE8000	Project Management Principles and Practices
CIVE8200	Environmental Systems

#### Semester Two

CIVE8100	Engineering Modeling and Analysis Methods
CIVE8300	Traffic Analysis and Safety *

#### Semester Three

CIVE8400	Highway Design and Transportation Planning *
CIVE8500	Geotechnical Engineering for Infrastructure *

## YEAR TWO

### Semester One

CIVE8600	Advanced Concrete and Steel Design *
CIVE8700	Bridge Design *

### Semester Two

CIVE8800	Infrastructure Renewal *
CIVE8950	Master of Engineering in Civil Engineering Capstone

\* Students may opt to replace a maximum of two courses with any available (3) credit CIVE course and/or any of the following electives:

CONM8300	Real Estate for Construction Management
CONM8400	Construction Law for Construction Management
CONM7100	Modern Construction Delivery Methods
FMGT7200	Energy/Sustainability
FMGT7300	Facility Operations

Total credits for degree: 30

## DEPARTMENT OF COMPUTER SCIENCE & NETWORKING

### Charlie Wiseman, Ph.D., Department Chair

Dobbs Hall, Room 142  
(617) 989-4704

## Faculty

### *Professors*

- Leonidas Deligiannidis, Ph.D.
- Hong-Sheng Wu, Ph.D.

### *Associate Professors*

- Raymond Hansen
- Durga Suresh-Menon
- Charles Wiseman, Ph.D.
- Jones Yu, Ph.D.
- Mira Yun, Ph.D.

### *Assistant Professors*

- Magdy Ellabidy
- Memo Ergezer, Ph.D.
- Salem Othman, Ph.D.
- Cuong Pham, Ph.D.
- Micah Schuster, Ph.D.

### *Visiting Assistant Professors*

- Mohammed Anwaruddin
- Leo Carey
- Frank Kreimendahl
- Arthur Straffuss

## *Computer Lab Manager/Systems Administrator*

- Jeffrey Williams

## *Academic Coordinator*

- David Albanese, Ph.D.

## **Department Vision**

Our graduates will solve challenging problems facing society, adapt to changing technologies, promote diversity and inclusivity, and be responsible and enlightened citizens of today's interconnected world.

## **Department Mission**

The Department of Computer Science and Networking prepares graduates for productive and impactful careers in computing through experiential learning and co-operative educational experiences.

## **Department Overview**

The Department of Computer Science and Networking is dedicated to providing its students with a foundation for continuous learning and an understanding of contemporary computer science and networking applications and concepts. The department introduces students to this field by using introductory programming and networking courses. Students develop the necessary skills to acquire and apply new knowledge in courses such as data structures, algorithms, databases, programming languages, operating systems, routing, security, and system administration. The department strives to prepare its graduates for productive and challenging careers in private practice, industry, and government, and to provide a solid foundation for lifelong professional development, including graduate programs.

The department's dedicated networking laboratory provides students with a hands-on learning experience. Students have the opportunity to work with state-of-the-art servers, switches, and routers both for network design and administration. The department also involves students in their professions through its support of related student organizations and co-operative educational experiences.

## **DEPARTMENT OF COMPUTER SCIENCE & NETWORKING DEGREE REQUIREMENTS**

### **Computer Networking (BSCN)**

#### **Leading to the Bachelor of Science Degree**

The Bachelor of Science in Computer Networking program is accredited by the Computing Accreditation Commission of ABET ([www.abet.org](http://www.abet.org)).

Students in Computer Networking (BSCN) gain valuable skills in switching and routing, network and computer security, administration, web development, databases, and scripting. Coursework emphasizes practical applications of these skills in designing, configuring, documenting, and maintaining complex systems. Students also apply these skills directly in the work environment through two required co-op work semesters beginning junior year.

#### *Program Educational Objectives for Computer Networking*

Within three to five years of graduation:

- Graduates are proficient at solving computer networking problems in the workplace.
- Graduates pursue productive careers in computer networking or a related computing field.

- Graduates are engaged in continuing professional development or professional societies in computer networking, or a related computing field.
- Graduates follow standards set forth by professional societies of which they are members.

## *Student Outcomes for Computer Networking*

Graduates of the program will have an ability to:

1. Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
2. Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
3. Communicate effectively in a variety of professional contexts.
4. Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
5. Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.

## **Curriculum for Computer Networking (BSCN)**

Total credits for degree: 128

This is a four-year program, starting in the fall semester of the student's first year and planned to end in the summer semester of the student's fourth year. The courses are as follows:  
(all courses are 4 credits unless otherwise noted.)

### **Freshman Year Fall Semester (total credits 16)**

COMP1100	Introduction to Networks
COMP1000	Computer Science I
ENGLISH	English Sequence, See ENGL/HSS note below *
MATH1500	Precalculus

### **Freshman Year Spring Semester (total credits 16)**

COMP1150	Routing and Switching
COMP1050	Computer Science II
ENGLISH	English Sequence, See ENGL/HSS note below *
MATH2300	Discrete Math

### **Sophomore Year Fall Semester (total credits 16)**

COMP1200	Computer Organization
COMP2500	Security Principles
HSS ELECTIVE	See ENGL/HSS note below *
MATH1030	Statistics and Applications

### **Sophomore Year Spring Semester (total credits 16)**

COMP2150	Network Administration
COMP2650	Databases
COMP2160	Wireless Networks
HSS ELECTIVE	See ENGL/HSS note below *

### **Sophomore Year Summer Semester (total credits 0)**

COOP3000	Pre-Cooperative Work Term (Optional)
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### **Junior Year Fall Semester (total credits 16)**

COMP3500	Network Security
COMP3100	System Administration

NET ELECTIVE	Computer Networking Elective, see ** below
HSS ELECTIVE	See ENGL/HSS note below *

### Junior Year Spring Semester (total credits 0)

COOP3500	Co-op Work Term I
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### Junior Year Summer Semester (total credits 16)

COMP3550	Computer Security
NET ELECTIVE	Computer Networking Elective, see ** below
HSS ELECTIVE	See ENGL/HSS note below *
MATH1900	Introduction to Operations Research

### Senior Year Fall Semester (total credits 0)

COOP4500	Co-op Work Term II
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### Senior Year Spring Semester (total credits 16)

COMP4950	Project Management
COMP4650	Web Development
NET ELECTIVE	Computer Networking Elective, see ** below
HSS ELECTIVE	See ENGL/HSS note below *

### Senior Year Summer Semester (total credits 16)

COMP5500	Senior Project
NET ELECTIVE	Computer Networking Elective, see ** below
SEC ELECTIVE	Advanced Security Elective, see ** below
SCIENCE ELECTIVE	Science Elective, see *** below

\*ENGL/HSS Note:

Day program students are required to complete at least:

- One course in Humanities
- One course in the Social Sciences
- The remaining courses may be from either the Humanities or Social Sciences category

Students with a three English course sequence may use the third English course to satisfy a Humanities requirement. Of the five listed humanities and social science electives, BSCN students must include the following HSS Directed Elective:

- An Ethics elective

## Networking and Security Electives

Computer Networking students take a total of five major electives. At least one of these electives must be selected from the Advanced Security Elective list below. The Computer Networking Elective courses to be offered in a particular semester will be selected by the Computer Science and Networking department. Note that some courses are required in other programs. Students may take these courses provided that they have passed the course prerequisites. The Computer Networking Elective courses may include, but are not limited to:

COMP2000	Data Structures
COMP2350	Algorithms
COMP3200	Assembly Language
COMP3400	Operating Systems
COMP3450	Parallel and Distributed Computing
COMP3800	Special Topics BCOS BSCN (with department approval)
COMP4150	Advanced System Administration



The Advanced Security Elective courses may include, but are not limited to:  
COMP3800 Special Topics BCOS BSCN (with department approval)

### *Science Elective*

Computer Networking students are required to take one science elective. The science elective can be a 4-credit course in Biology, Chemistry, or Physics for which the student has the prerequisite courses.

## **Minor in Computer Networking**

The minor in Computer Networking provides students with an opportunity to learn how the Internet works. Students will gain a solid grounding in the protocols that allow networking devices and systems to communicate. This includes the configuration and management of core networking hardware such as routers and switches as well as end systems such as servers, laptops, and mobile devices. Programming and scripting also plays an important role in the ongoing management and automation of systems, so students are required to take a single course from that area.

To earn the Minor in Computer Networking, students must complete the courses (20 total credits) as outlined below. All courses are four credits.

### **Core Courses (12 credits, all three courses required)**

COMP1100	Introduction to Networks
COMP1150	Routing and Switching
COMP2150	Network Administration

### **Scripting Courses (4 credits, choose one course from the list)**

COMP1000	Computer Science I
COMP1099	Computer Science I with C
COMP3100	System Administration
COMP4150	Advanced System Administration

### **Advanced Courses (4 credits, choose one course from the list)**

COMP2160	Wireless Networks
COMP2500	Security Principles
COMP2650	Databases
COMP3100	System Administration
COMP3571	Cryptography and Network Security
COMP4450	Systems Programming

## **Computer Science (BCOS) Leading to the Bachelor of Science Degree**

Bachelor of Science in Computer Science program is accredited by the Computing Accreditation Commission of ABET, [www.abet.org](http://www.abet.org).

Students in Computer Science (BCOS) gain valuable skills in software design, programming languages, systems, and development in high-level computer languages. Related courses including databases, software engineering, networking, and operating systems are also integral in this program. Elective courses are available in a wide variety of computing areas including web development, mobile development, embedded computing, artificial intelligence, and machine learning. Students also apply these skills directly in the work environment through two required co-op work semesters beginning junior year.

## Program Educational Objectives for Computer Science

Within three to five years of graduation:

- Graduates are proficient in applying computer science principles and best practices to problems in the workplace.
- Graduates attain productive and challenging computer science and/or software engineering careers in private practice, industry, or government.
- Graduates are engaged in continuing professional development or professional societies in computer science or a related computing field.
- Graduates follow standards set forth by professional societies of which they are members.

## Student Outcomes for Computer Science

Graduates of the program will have an ability to:

1. Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
2. Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
3. Communicate effectively in a variety of professional contexts.
4. Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
5. Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
6. Apply computer science theory and software development fundamentals to produce computing-based solutions.

## Curriculum for Computer Science (BCOS)

Total credits for degree: 128

This is a four-year program, starting in the fall semester of the student's first year and planned to end in the summer semester of the student's fourth year. The courses are as follows:

(all courses are 4 credits unless otherwise noted.)

### Freshman Year, Fall Semester (total credits 16)

COMP1000	Computer Science I
MATH2300	Discrete Math
MATH1750	Engineering Calculus I or MATH1775 Applications in Engineering Calculus I
ENGLISH	English Sequence, See ENGL/HSS note below *

### Freshman Year, Spring Semester (total credits 16)

COMP1050	Computer Science II
COMP1200	Computer Organization
MATH1850	Engineering Calculus II or MATH1875 Integrated Engineering Calculus II
ENGLISH	English Sequence, See ENGL/HSS note below *

### Sophomore Year, Fall Semester (total credits 16)

COMP2000	Data Structures
COMP2100	Network Programming
MATH2860	Linear Algebra & Matrix Theory
HSS ELECTIVE	See ENGL/HSS note below *

**Sophomore Year, Spring Semester (total credits 16)**

COMP2350	Algorithms
COMP2650	Databases
MATH2100	Probability and Statistics for Engineers
HSS ELECTIVE	See ENGL/HSS note below *

**Sophomore Year, Summer Semester (total credits 0)**

COOP3000	Pre-Cooperative Work Term (Optional)
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**Junior Year, Fall Semester (total credits 16)**

COMP3400	Operating Systems
COMP ELECTIVE	Computer Science Elective, see ** below
MATH or SCIENCE	Math or Science Elective, see *** below
HSS ELECTIVE	See ENGL/HSS note below *

**Junior Year, Spring Semester (total credits 0)**

COOP3500	Co-op Work Term I
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**Junior Year, Summer Semester (total credits 16)**

COMP3350	Programming Languages
COMP3450	Parallel and Distributed Computing
COMP ELECTIVE	Computer Science Elective, see ** below
MATH or SCIENCE	Math or Science Elective, see *** below

**Senior Year, Fall Semester (total credits 0)**

COOP4500	Co-op Work Term II
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**Senior Year, Spring Semester (total credits 16)**

COMP4960	Software Engineering
COMP ELECTIVE	Computer Science Elective, see ** below
COMP ELECTIVE	Computer Science Elective, see ** below
HSS ELECTIVE	See ENGL/HSS note below *

**Senior Year, Summer Semester (total credits 16)**

COMP5500	Senior Project
COMP ELECTIVE	Computer Science Elective, see ** below
MATH or SCIENCE	Math or Science Elective, see *** below
HSS ELECTIVE	See ENGL/HSS note below *

\*ENGL/HSS Note:

Day program students are required to complete at least:

- One course in Humanities
- One course in the Social Sciences
- The remaining courses may be from either the Humanities or Social Sciences category

Students with a three English course sequence may use the third English course to satisfy a Humanities requirement. Of the five listed humanities and social science electives, BSCN students must include the following HSS Directed Elective:

- An Ethics elective

## Computer Science Electives

Computer Science students take a total of five computer science electives. At least two of these electives must be selected from the Advanced Computer Science Elective list below. The Computer Science Elective courses to be offered in a particular semester will be selected by the Computer Science and Networking department. Note that some courses are required in other programs. Students may take these courses provided that they have passed the course prerequisites. The Computer Science Elective courses may include, but are not limited to:

COMP2500	Security Principles
COMP3100	System Administration
COMP3660	Mobile App Development
COMP3750	Introduction to Biostatistics
COMP3800	Special Topics BCOS BSCN (with department approval)
COMP4050	Machine Learning
COMP4150	Advanced System Administration
COMP4650	Web Development
COMP 4950	Project Management

The Advanced Computer Science Elective courses may include, but are not limited to:

COMP3200	Assembly Language
COMP4450	Systems Programming
COMP4460	Compilers
COMP4700	Artificial Intelligence
COMP3800	Special Topics BCOS BSCN (with department approval)

## Math or Science Electives

BCOS students must take three math or science electives total. Of these, at least one must be a 3-2-4 science elective with the exception of PHYS1000, and PHYS1500. Math electives include any Applied Math minor course.

## Minor in Computer Science

The minor in Computer Science provides students with the fundamentals of computer programming and design. Students will become proficient with problem solving and algorithmic thinking.

The minor itself requires 16 total credits, however, to enroll in the minor a student must complete each of the prerequisite courses.

### Prerequisite Courses

COMP1000	Computer Science I
or	
ELEC3150	Object Orientated Programming
COMP1050	Computer Science II
MATH2300	Discrete Mathematics

### Required Core Courses (8 credits)

COMP2000	Data Structures
COMP2350	Algorithms

### *Elective Courses- Select one course from the following list (4 credits)*

COMP1200	Computer Organizations
COMP2100	Network Programming
COMP2650	Databases
COMP3660	Mobil App Development
COMP3750	Introduction to Biostatistics
COMP4050	Machine Learning

### *Advanced Electives – Select one course from the following list (4 credits)*

COMP3200	Assembly Language
COMP3350	Programming Languages
COMP3400	Operating Systems
COMP3450	Parallel and Distributed Computing
COMP4450	Systems Programming
COMP4460	Compilers
COMP4700	Artificial Intelligence
COMP4960	Software Engineering

## **MASTERS' DEGREE PROGRAMS - APPLIED COMPUTER SCIENCE (MSACS)**

### **Computer Science and Networking (MSACS) Program**

#### **Leading to a Master of Science in Applied Computer Science Degree**

The Master of Science in Applied Computer Science (MSACS) program is designed to educate professionals in the application of technical computing and management skills required to plan, design, implement, deploy, and operate computer-based solutions within an organization. This 100% online program is designed for part-time students and can be completed in under two (2) years. Candidates should be able to demonstrate competencies in three (3) areas: programming, fundamentals of computer science (including computer organization, operating systems, databases, and data communication), as well as statistics.

### **Mission, Goals and Outcomes**

#### *Mission*

The Master of Science in Applied Computer Science (MSACS) program at Wentworth Institute of Technology is designed to educate professionals in the application of technical computing and management skills required to plan, design, implement, deploy and operate computer-based solutions within an organization.

#### *Goals*

The MSACS program will provide graduates with the knowledge and skill sets needed to successfully function in middle and upper level Applied Computer Science positions with a technical focus, including leading teams of professionals. The MSACS will be to link theory and practice to create real world applications and value, create and introduce new software and technology, and apply basic managerial skills to provide leadership to a computing team.

#### *Student Learning Outcomes*

Graduates of the Master of Science in Applied Computer Science graduates will:

- Demonstrate and function effectively in a team, engage in the process of modeling, designing, and implementing computer-based systems of varied complexity utilizing multiple technologies.
- Maintain effective communication with stakeholders in a typical software development environment by preparing and delivering effective technical presentations using appropriate technologies writing clear and accurate technical documents.

- Learn new models, techniques, and technologies as they emerge, and appreciate the necessity for continuing professional development.
- Demonstrate an ability to model, analyze and design computing processes and systems.
- Analyze a current significant software technology, articulate its strengths and weaknesses, and specify and promote improvements or extensions to that technology.
- Recognize and analyze social and professional issues and responsibilities faced by computing professionals.

## *Degree Details*

All courses are three (3) credits unless otherwise noted

### **Required Courses**

COMP7000	Foundations of Computer Science
COMP7050	Programming Paradigms and Systems
COMP7100	Managing Software Development
COMP7150	Data Science and Web Services
COMP7200	Mobile Application Development
COMP7250	Enterprise Computing
COMP7300	Computer Security
COMP7500	MSACS Capstone

### **Computing Electives**

COMP7400	Big Data
COMP7425	Data Mining
COMP7450	Software Engineering

### **Management Electives**

MGMT7100	Project Management Applications
MGMT7200	Leadership
TMGT8000	Strategic Technology Business Management
TMGT8100	Management of New Product Development

Total credits for degree: 30

### **Recommended Schedule**

All courses are three (3) credits unless otherwise noted

#### **YEAR ONE**

##### **Semester One**

COMP7000	Fundamentals of Computer Science
COMP7050	Programming Paradigms and Systems

##### **Semester Two**

COMP7100	Managing Software Development
COMP7150	Data and Web Services

##### **Semester Three**

COMP7200	Mobile Application Development
COMP7250	Enterprise Computing

## YEAR TWO

### Semester One

COMP7300 Computer Security  
MGMT/TMGT Management Elective

### Semester Two

COMP ELECTIVE Computing Elective  
COMP7500 MSACS Capstone

Total credits for degree: 30

## DEPARTMENT OF ELECTRICAL ENGINEERING AND TECHNOLOGY

### Ali Khabari, Ph.D., Department Chair

Dobbs Hall, Room 205  
(617) 989-4124

## Faculty

### *Professors*

- Ali Khabari, Ph.D.
- Frederick Driscoll
- Associate Professors
- Douglas Dow, Ph.D., Douglas D. Schumann Professor
- James McCusker, Ph.D.
- Jenny Song, Ph.D., Henry C. Lord Professor
- Joseph Santacroce, P.E.
- Scott Grenquist, SciEdD
- Siben Dasgupta, P.E.

### *Assistant Professors*

- Aaron Carpenter, Ph.D.
- Omar Mansour, Ph.D.
- Yugu Yang-Keathley, Ph.D.
- Wayne Bynoe, Ph.D.
- Marisha Rawlins, Ph.D.
- Afsaneh Ghanavati, Ph.D.

### *Visiting Assistant Professors*

- Bruce Decker, P.E.
- Samuel Zeman
- Thomas Fuller

### *Department Technicians*

Doreen Cialdea  
Joseph Diecidue  
Yi Zou

## Department Vision Statement

The department strives to prepare its students for productive and challenging careers, and to provide a solid foundation for lifelong professional development.

## Department Mission Statement

The mission of the department is to develop students' analytical and technical skills to enable them to identify and solve problems for the benefit of society, the environment, and quality of life. The department curricula equip students for successful professional practice in their respective technical disciplines. Through a rigorous balance of theory and practice, our programs aim to cultivate in students the ability to adapt to workplace changes, communicate proficiently, and to work effectively in a team environment.

## DEPARTMENT OF ELECTRICAL ENGINEERING AND TECHNOLOGY DEGREE REQUIREMENTS

### Computer Engineering (BSCO) Leading to the Bachelor of Science Degree

The Bachelor of Science in Computer Engineering program is accredited by the Engineering Accreditation Commission of ABET ([www.abet.org](http://www.abet.org)). Computer engineering builds on the fundamentals of the electrical engineering and computer science fields. Computer engineers are involved in many hardware and software aspects of computing, from the design of digital circuits to computer networks. They design, build, analyze, and evaluate computer systems. Students in this program take courses in logic design, computer organization and architecture, embedded computer systems, operating systems, computer networks, digital signal processing, software engineering, database systems, circuits, electronics, and engineering design. The curriculum incorporates both theory and practice in a learning environment that emphasizes hands-on experience and teamwork. Our graduates are well prepared for pursuing both an advanced degree and a professional career.

### *Computer Engineering Program Objectives*

After graduation, program graduates should demonstrate these abilities:

- Lifelong learning—Pursue professional development to meet and adapt to the emerging and evolving technology.
- Successful careers—Embark on a successful career in the field of computer engineering or related fields.
- Professionalism—Graduates will contribute to their fields or professions.

### *Computer Engineering Program Outcomes*

Students should demonstrate the following abilities upon graduation:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.



Total credits for degree: 134

This is a four-year program, starting in the fall semester of the student's first year and planned to end in the summer semester of the student's fourth year.

## Special Requirement for Graduation

In addition to the general graduation requirements of the Institute, specific graduation requirements from the Computer Engineering (BSCO) program with a Bachelor of Science degree include maintaining a minimum cumulative grade point average of 2.0 for all technical courses. The courses used to determine the cumulative grade point average for all BSCO technical courses are courses with ELEC and ENGR prefixes. If another Wentworth course is substituted for one of these listed courses, the substitute course will be calculated into this cumulative grade point average for all technical courses.

### Freshman Year, Fall Semester (total credits 16)

ENGR1000	Introduction to Engineering (3 credits)
ENGR1800	Introduction to MATLAB (1 credit)
OR	
ENGR1600	Fundamentals of CAD and CAM (1 credit)
MATH1750	Engineering Calculus I (4 credits)
PHYS1250	Engineering Physics I (4 credits)
ENGLISH	English Sequence, See ENGL/HSS note below * (4 credits)

### Freshman Year, Spring Semester (total credits 16)

ENGR1500	Introduction to Engineering Design (3 credits)
ENGR1800	Introduction to MATLAB (1 credit)
OR	
ENGR1600	Fundamentals of CAD and CAM (1 credit)
MATH1850	Engineering Calculus II (4 credits)
PHYS1750	Engineering Physics II (4 credits)
ENGLISH	English Sequence, See ENGL/HSS note below (4 credits)

### Sophomore Year, Fall Semester (total credits 16)

ELEC2275	Digital Logic (4 credits)
ELEC2250,	Network Theory I (4 credits)
MATH2500	Differential Equations (4 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

### Sophomore Year, Spring Semester (total credits 20)

ELEC2850	Microcontrollers Using C Programming (4 credits)
ELEC2750	Network Theory II (4 credits)
MATH2025	Multivariable Calculus (4 credits)
MATH2300	Discrete Mathematics (4 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

### Sophomore Year, Summer Semester

COOP3000	Pre-Cooperative Work Term (Optional)
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### Junior Year, Fall Semester (total credits 18)

ELEC3150	Object-Oriented Programming for Engineers (4 credits)
ELEC3250	Analog Circuit Design (4 credits)
COMP3725	Computer Architecture (3 credits)
ELECTIVE	Technical or EPIC (3 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

## Junior Year, Spring Semester

COOP3500 Co-op Work Term I

## Junior Year, Summer Semester (total credits 18)

ELEC3200 Advanced Digital Circuit Design (4 credits)  
ELEC3225 Applied Programming Concepts (3 credits)  
ELEC3550 Computer Networks for Engineers (4 credits)  
ELEC3600 Signals and Systems (4 credits)  
ELECTIVE Technical or EPIC (3 credits)

## Senior Year Fall Semester

COOP4500 Co-op Work Term II

## Senior Year, Spring Semester (total credits 16)

ELEC4075 Engineering Operating Systems (4 credits)  
ENGR5000 Engineering Senior Design I (4 credits)  
MATH2100 Probability & Statistics for Engineers (4 credits)  
HSS ELECTIVE See ENGL/HSS note below \* (4 credits)

## Senior Year, Summer Semester (total credits 14)

ENGR5500 Engineering Senior Design II (4 credits)  
MGMT3200 Engineering Economy (3 credits)  
ELECTIVE Technical or EPIC (3 credits)  
HSS ELECTIVE See ENGL/HSS note below \* (4 credits)

\*ENGL/HSS Note:

Day program students are required to complete:

- At least one course in Humanities
- At least one course in the Social Sciences
- The remaining courses may be from either the Humanities or Social Sciences category

Students with a three-English course sequence may use the third English course to satisfy a Humanities requirement.

## Electrical Engineering (BSEE)

### Leading to the Bachelor of Science Degree

The Bachelor of Science in Electrical Engineering program is accredited by the Engineering Accreditation Commission of ABET ([www.abet.org](http://www.abet.org)).

Electrical engineers study, model, analyze, and design the electrical and electronic systems on which modern society relies. The curriculum includes a solid foundation in mathematics, science, and engineering principles. Students in this program take courses in analog and digital circuit design, electronics, electromagnetics, signal processing, communications, power systems, control systems, embedded computer systems, and engineering design. The curriculum incorporates both theory and practice in a learning environment that emphasizes hands-on experience and teamwork. Our graduates are well prepared for pursuing both an advanced degree and a professional career.

### *Electrical Engineering Program Objectives*

After graduation, program graduates should demonstrate these abilities:

- Lifelong learning—Pursue professional development to meet and adapt to the emerging and evolving technology.

- Successful Careers—Enjoy a successful career in the field of electrical engineering or related fields.
- Professionalism—Graduates will contribute to their fields or professions.

## Electrical Engineering Program Outcomes

Students should demonstrate the following abilities upon graduation:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Total credits for degree: 135

This is a four-year program, starting in the fall semester of the student's first year and planned to end in the summer semester of the student's fourth year.

## Special Requirement for Graduation

In addition to the general graduation requirements of the Institute, specific graduation requirements from the Electrical Engineering (BSEE) program with a Bachelor of Science degree include maintaining a minimum cumulative grade point average of 2.0 for all technical courses. The courses used to determine the cumulative grade point average for all BSEE technical courses are courses with ELEC and ENGR prefixes. If another Wentworth course is substituted for one of these listed courses, the substitute course will be calculated into this cumulative grade point average for all technical courses.

### Freshman Year, Fall Semester (total credits 16)

ENGR1000	Introduction to Engineering (3 credits)
ENGR1800 (1 credit)	Introduction to MATLAB (1 credit) Or ENGR1600 Fundamentals of CAD and CAM
MATH1750	Engineering Calculus I (4 credits)
PHYS1250	Engineering Physics I (4 credits)
ENGLISH	English Sequence, See ENGL/HSS note below * (4 credits)

### Freshman Year, Spring Semester (total credits 16)

ENGR1500	Introduction to Engineering Design (3 credits)
ENGR1800 (1 credit)	Introduction to MATLAB (1 credit) Or ENGR1600 Fundamentals of CAD and CAM
MATH1850	Engineering Calculus II (4 credits)
PHYS1750	Engineering Physics II (4 credits)
ENGLISH	English Sequence, See ENGL/HSS note below (4 credits)

### Sophomore Year, Fall Semester (total credits 20)

ELEC2250	Network Theory I (4 credits)
ELEC2275	Digital Logic (4 credits)

CHEM1100	Engineering Chemistry I (4 credits)
MATH2500	Differential Equations (4 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

**Sophomore Year, Spring Semester (total credits 16)**

ELEC2750	Network Theory II (4 credits)
ELEC2850	Microcontrollers Using C Programming
MATH2025	Multivariable Calculus (4 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

**Sophomore Year, Summer Semester**

COOP3000	Pre-Cooperative Work Term (Optional)
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**Junior Year, Fall Semester (total credits 19)**

ELEC3250	Analog Circuit Design (4 credits)
ELEC3600	Signals and Systems (4 credits)
MECH3599	Engineering Mechanics (4 credits)
ELECTIVE	Technical or EPIC (3 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

**Junior Year, Spring Semester**

COOP3500	Co-op Work Term I
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**Junior Year, Summer Semester (total credits 18)**

ELEC3150	Object-Oriented Programming for Engineers (4 credits)
ELEC3350	Solid State Devices (4 credits)
ELEC4050	Motors and Controls (4 credits)
ELEC4475	Feedback and Control (4 credits)
ELECTIVE	Technical or EPIC (3 credits)

**Senior Year, Fall Semester**

COOP4500 COOP	Work Term II
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**Senior Year, Spring Semester (total credits 15)**

ENGR5000	Engineering Senior Design I (3 credits)
MGMT3200	Engineering Economy (3 credits)
MATH2100	Probability & Statistics for Engineers (4 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

**Senior Year, Summer Semester (total credits 15)**

ELEC4300	Engineering Communications Systems (4 credits)
ENGR5500	Engineering Senior Design II (3 credits)
ELMC3250	Electromechanical Field Theory (3 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

\*ENGL/HSS Note:

Day program students are required to complete at least:

- One course in Humanities
- One course in the Social Sciences
- The remaining courses may be from either the Humanities or Social Sciences category

Students with a three-English course sequence may use the third English course to satisfy a Humanities requirement.

## Minor in Electrical Engineering

The minor in electrical engineering provides additional knowledge in the field for non-majors, which will help students integrate electrical engineering into their course of study and allow the student to explore a wider array of careers upon graduation.

To earn the minor, the student must pass the following four courses:

### *Required courses*

ELEC2250	Network Theory I
ELEC2275	Digital Logic
ELEC2750	Network Theory II
ELEC3250	Analog Circuit Design

Total credits: 16

## DEPARTMENT OF INTERDISCIPLINARY ENGINEERING

**Nakisa Alborz, Ph.D. , LEED AP BD+C, Department Chair**  
Rubenstein Hall, Room 202A  
(617) 989-4705

### Faculty

#### *Associate Professor*

- Christopher Brigham, Ph.D.

#### *Assistant Professors*

- Nakisa Alborz, Ph.D., LEED AP BD+C, Department Chair
- Nick Simpson, Ph.D.

#### *Visiting Assistant Professor*

- Sina Youssefian, Ph.D.

### Department Vision

Our students solve global challenges and change lives.

### Department Mission

To provide students multidisciplinary analytical and technical engineering skills complemented by non-engineering skills to solve global challenges and practice positive global citizenry. Our programs allow students to custom design their areas of interest, study abroad and diversify their skillsets.

## DEPARTMENT OF INTERDISCIPLINARY ENGINEERING

### Electromechanical Engineering (BELM) Leading to the Bachelor of Science Degree

The Bachelor of Science in Electromechanical Engineering is accredited by the Engineering Accreditation Committee of ABET ([www.abet.org](http://www.abet.org)).

The Electromechanical Engineering (BELM) program is a five-year engineering program with a dynamic interdisciplinary character and unique approach to learning. Grounded in a solid foundation of mathematics, science, and humanities and social sciences, the BELM program incorporates all the essential elements of an electrical and mechanical engineering curriculum. The BELM program features engineering design courses, extensive exposure to engineering problem solving, and a faculty committee management structure that responds quickly to industrial change and academic needs. Wentworth stresses the importance of hands-on experience and extensive lab work. BELM students spend a significant amount of time working in our state-of-the-art laboratories with computers and microprocessors being a large part of the program. Students use computers and test equipment extensively to verify and develop principles of engineering in diverse areas including mechanics of materials, embedded microcontroller systems, analog and digital circuit design, thermodynamics, vibrations, materials science, feedback controls, and machine design.

#### *Electromechanical Engineering Program Mission Statement*

The mission of this interdisciplinary electrical and mechanical program is to prepare students to become practicing engineers who will become innovative problem solvers in robotics, industry, government, and academia.

#### *Electromechanical Engineering Program Objectives*

The educational objectives of this program, which describe the expectations of our graduates a few years after graduation, are as follows:

- Contribute significantly in the design and development of complex electromechanical systems
- Work effectively as members of multidisciplinary teams that analyze data critically, synthesize information and implement ethical solutions for the betterment of society
- Prepare and present technical information professionally and effectively to various audiences
- Further their education through directed or independent studies to advance themselves personally and professionally

The Electromechanical Engineering program at Wentworth is committed to both a collaborative teaching model and a committee management structure, thereby providing the students access to many innovative interdisciplinary educational opportunities.

#### *Electromechanical Engineering Program Outcomes*

Students should demonstrate these abilities upon graduation:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

## Career Opportunities

Electromechanical Engineering is a cooperative education program that provides students with one of the most important aspects of a Wentworth education. Electromechanical Engineering students will complete at least two non-consecutive semesters of full-time cooperative work experience in industry in fields related to electromechanical engineering. Graduates may continue their studies at the graduate level or pursue an industrial career. Wentworth Electromechanical Engineering graduates are multidisciplinary engineers, with expertise in electrical and mechanical engineering, and as such, are in high demand and well prepared to meet the professional challenges of a constantly changing and increasingly global work force.

## Degree Details

Total credits for degree: 174 credits

This is a five-year program, starting in the fall semester of the student's first year and planned to end in the spring semester of the student's fifth year.

## Electromechanical Engineering (BELM) Curriculum

### Freshman Year, Fall Semester (total credits 16)

ENGR1000	Introduction to Engineering (3 credits)
ENGR1800	Introduction to MATLAB (1 credit) or ENGR1600 Fundamentals of CAD and CAM (1 credit)
MATH1750	Engineering Calculus I (4 credits)
PHYS1250	Engineering Physics I (4 credits)
ENGLISH	English Sequence, See ENGL/HSS note below * (4 credits)
FYS100	Freshman Year Seminar (0 credit)

### Freshman Year, Spring Semester (total credits 16)

ENGR1500	Intro to Engineering Design (3 credits)
ENGR1800	Introduction to MATLAB (1 credit) or ENGR1600 Fundamentals of CAD and CAM (1 credit)
MATH1850	Engineering Calculus II (4 credits)
PHYS1750	Engineering Physics II (4 credits)
ENGLISH	English Sequence, See ENGL/HSS note below* (4 credits)

### Sophomore Year, Fall Semester (total credits 19)

ELEC2250	Network Theory I (4 credits)
ELEC2275	Digital Logic (4 credits)
MATH2500	Differential Equations (4 credits)
ELECTIVE	General (3 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

### Sophomore Year, Spring Semester (total credits 19)

ELEC2750	Network Theory II (4 credits)
MECH2000	Engineering Statics (4 credits)
MECH2300	Engineering Graphics (4 credits)
CHEM1100	Engineering Chemistry (4 credits)
MATH2025	Multivariable Calculus (4 credits)

## **Sophomore Year, Summer Semester**

COOP3000 Pre-Cooperative Work Term (Optional)

## **Junior Year, Fall Semester (total credits 20)**

ELEC2850 Microcontrollers Using C Programming (4 credits)  
ELEC3250 Analog Circuit Design (4 credits)  
MECH2250 Engineering Thermodynamics (4 credits)  
MECH2500 Mechanics of Materials (4 credits)  
MATH2860 Linear Algebra & Matrix Theory (4 credits)

## **Junior Year, Spring Semester (total credits 19)**

ELEC3150 Object Oriented Programming for Engineers (4 credits)  
ELMC3000 Electromechanical Design/EPIC (3 credits)  
MECH3100 Engineering Fluid Mechanics (4 credits)  
MECH3600 Materials Science (4 credits)  
MATH2100 Probability and Statistics for Engineers (4 credits)

## **Junior Year, Summer Semester**

COOP3500 Co-op Work Semester I

## **Senior Year, Fall Semester (total credits 19)**

ELEC3920 Engineering Signals & Systems (4 credits)  
ELEC4050 Motors and Controls (4 credits)  
MECH3900 Engineering Heat Transfer (4 credits)  
HSS ELECTIVE See ENGL/HSS note below \* (4 credits)  
ELECTIVE Technical/ EPIC (3 credits)

## **Senior Year Spring Semester (total credits 16)**

ELEC4475 Feedback and Control (4 credits)  
MECH3850 Engineering Dynamics (4 credits)  
MECH6000 Advanced Thermodynamics (4 credits)  
HSS ELECTIVE See ENGL/HSS note below \* (4 credits)

## **Senior Year, Summer Semester**

COOP4500 Co-op Work Semester II

## **Fifth Year, Fall Semester (total credits 15)**

ELMC5005 Electromechanical Systems I (4 credits)  
ELMC5000 Senior Design I (4 credits)  
ELECTIVE Technical or EPIC (3 credits)  
HSS ELECTIVE See ENGL/HSS note below \* (4 credits)

## **Fifth Year, Spring Semester (total credits 15)**

ELMC550 Electromechanical Systems II (3 credits)  
ELMC5500 Senior Design II (4 credits)  
MGMT3200 Engineering Economy (4 credits)  
HSS ELECTIVE See ENGL/HSS note below \* (4 credits)

\*ENGL/HSS Note:

Day program students are required to complete:

- At least one course in Humanities
- At least one course in the Social Sciences
- The remaining courses may be from either Humanities or Social Sciences category



## BIOLOGICAL ENGINEERING PROGRAM

**Nakisa Alborz, Ph.D. , LEED AP BD+C, Co-Chair**  
Rubenstein Hall 202A  
617-989-4705

**James O'Brien, Ph.D., Co-Chair**  
Ira Allen Building 308  
617-989-4426

### **Biological Engineering (BSBE) Leading to the Bachelor of Science Degree**

#### *Program Mission Statement*

The mission of the Biological Engineering program is to prepare students to become practicing engineers/scientists, who will go on to be innovative problem solvers in industry, government, and academia.

#### *Program Overview*

Biological engineering is at the leading edge of emerging engineering disciplines, applying the engineering principles of analysis, synthesis, and design to biology at the molecular and cellular levels to create new products and processes. By understanding biological functions at the fundamental level, and how systems and processes are structured, new technologies, materials, and systems can be created to improve quality of life through a broad array of sectors from health care to the environment. The Biological Engineering program provides opportunities for students who wish to study engineering, but also want to study biology because it is the fundamental building block of life sciences. This program opens opportunities for students to study science and engineering and apply the principles of each area while working with diverse applications involving living organisms.

#### *Biological Engineering Program Objectives*

Within three to five years after graduation, graduates of the Biological Engineering program will:

- Contribute significantly in the design and development of complex biological systems.
- Work effectively as members of multidisciplinary teams that analyze data critically, synthesize information and implement ethical solutions for the betterment of society.
- Prepare and present technical and scientific information professionally to various audiences.
- Further their education either through directed or independent studies to advance them personally and professionally.

#### *Biological Engineering Program Outcomes*

By the time of graduation, students enrolled in the Biological Engineering program will be able to demonstrate the following outcomes:

1. An ability to identify, formulate, and resolve complex engineering problems by applying principles of engineering, science and mathematics.
2. An ability to apply engineering design to produce solutions that meet specific needs with consideration of public health, safety and welfare, as well as global, cultural, social, environmental and economic factors.
3. An ability to communicate effectively with a range of audiences.

4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts.
5. An ability to function effectively on a team whose members together provide leadership, create collaborative and inclusive environment, and societal contexts.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

## Degree Details

Total credits for degree: 132

This is a four-year program, starting in the fall of the student's first year and ending in the summer semester of the student's fourth year.

## Biological Engineering (BSBE)

### Freshman Year Fall Semester (total credits 19)

ENGR1000	Introduction to Engineering (3 credits)
CHEM1100	Engineering Chemistry I (4 credits)
MATH1750	Engineering Calculus I (4 credits)
PHYS1250	Engineering Physics I (4 credits)
ENGLISH	English Sequence, See ENGL/HSS note below * (4 credits)

### Freshman Year, Spring Semester (total credits 17)

ENGR1500	Introduction to Engineering Design (3 credits)
BIOL1100	Cell and Molecular Biology (4 credits)
MATH1850	Engineering Calculus II (4 credits)
ENGR1600	Fundamentals of CAD and CAM (1 credit)
ENGR1800	Programming with MATLAB (1 credit)
ENGLISH	English Sequence, See ENGL/HSS note below * (4 credits)

### Sophomore Year, Fall Semester (total credits 16)

BIOL2200	Advanced Molecular Biology (4 credits)
BIOE2000	Fundamentals of Biological Engineering (4 credits)
MATH2500	Differential Equations (4 credits)
PHYS1750	Engineering Physics II (4 credits)

### Sophomore Year, Spring Semester (total credits 16)

BMED4600	Biostatistics (4 credits)
CHEM1600	Engineering Chemistry II (4 credits)
BIOE2500	Biological Instrumentation and Measurement (4 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

### Sophomore Year, Summer Semester

COOP 3000	Pre-Cooperative Work Term (Optional)
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### Junior Year, Fall Semester (total credits 16)

CHEM2500	Organic Chemistry (4 credits)
BIOE3500	Genetics and Transgenetics (4 credits)
ELECTIVE	Biology Elective/EPIC (4 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

### Junior Year, Spring Semester

COOP3500	Co-op Work Term I
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### **Junior Year, Summer Semester (total credits 16)**

CHEM3550	Biochemistry (4 credits)
BIOE3025	Biomaterials and Tissue Engineering (4 credits)
BIOE3555	Unit Operations and Process Control (4 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

### **Senior Year, Fall Semester**

COOP4500	Co-op Work Term II
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### **Senior Year, Spring Semester (total credits 16)**

BIOE4000	Cell Physiology and Signaling (4 credits)
BIOE4500	Bio-Transport Phenomena (4 credits)
ENGR5000	Engineering Senior Design I (4 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

### **Senior Year, Summer Semester (total credits 16)**

BIOL4400	Synthetic Biology (4 credits)
ELECTIVE	Biology Elective/EPIC (4 credits)
ENGR5500	Engineering Senior Design II (4 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

\*ENGL/HSS Note:

Day program students are required to complete:

- At least one course in Humanities
- At least one course in the Social Sciences
- The remaining courses from either the Humanities or Social Sciences category

Students with a three-English course sequence may use the third English course to satisfy a Humanities requirement.

## **ENGINEERING**

### **Engineering (BSEN) Leading to the Bachelor of Science Degree**

The Bachelor of Science in Engineering is accredited by the Engineering Accreditation Committee of ABET ([www.abet.org](http://www.abet.org)).

The Bachelor of Science in Engineering (BSEN) degree program is a four-year innovative curriculum providing students the flexibility to customize their engineering degree. Students are able to integrate an engineering concentration course of study with directed studies (minors) of their choice to broaden their education for their professional and personal goals. Students work with the department chair and/or a full-time faculty mentor to customize their education. Advice shall be provided for both their specialized area of engineering study (concentration) and an area of directed studies (minor). The BSEN program allows students to complement an engineering curriculum with directed study courses to expand their education beyond a single area of study.

Students in the BSEN program are required to select one area of engineering concentration at the end of their freshman year from the following concentrations: Biomedical, Civil, Computer, Electrical, Mechanical or Manufacturing, as well as a minor/directed studies. Recommended plans of study are indicated below in the concentration curriculum sheets for the various engineering concentration tracks. Students are required to consult with their academic advisors to identify their concentration track and directed studies path. Students may plan to study abroad for one semester, ideally during the fall semester of their junior year.

All concentrations of the BSEN curriculum include the following:

- A set of core engineering concentration courses
- A set of mathematics and science courses that support the engineering discipline
- A set of general education courses that provide the foundation to understand the role and responsibility of an engineer in society, and in a global environment
- A set of directed study courses/minor courses that provide a pathway for a student's future goals. A set of interdisciplinary design courses allowing students to collaborate with one another on a variety of projects

BSEN curriculum total credit hours for all concentration tracks:

- Engineering Concentration courses: 52 credits
- Mathematics and Basic Science: 32 credits
- General Education: 28 credits
- Directed Studies and other electives: 16 credits
- Business / Management: 6 credits

## *BSEN Program Mission Statement*

The mission of the BSEN engineering program is to prepare students to become practicing engineers who are entrepreneurs, innovative problem solvers, engineering managers, system engineers, engineers having multidisciplinary skills, and engineering design professionals.

## *Engineering Program Objectives*

The educational objectives of this program, which describe the expectations of our graduates a few years after graduation, are as follows:

- Develop creative solutions for the benefit of society while working in multidisciplinary engineering teams
- Communicate effectively to present technical information to various audiences
- Pursue directed or independent study to advance professionally

## *Engineering Program Outcomes*

Upon graduation, BSEN graduates demonstrate the following outcomes:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

## *Career Opportunities*

The Bachelor of Science in Engineering (BSEN) is a cooperative education program that provides students with one of the most important aspects of a Wentworth education. BSEN students must complete at least two non-consecutive semesters of full-time cooperative work experience in industry in fields related to their engineering concentration and directed study courses. Graduates may continue their studies at the graduate

level or pursue an industrial career. Wentworth BSEN graduates are multidisciplinary engineers, and as such, are in high demand and well prepared to meet the professional challenges of a constantly changing and increasingly global workforce.

## *Degree Details*

Total credits for degree: 135

Wentworth's Bachelor of Science in Engineering (BSEN) is a 4-year innovative interdisciplinary degree for students who wish to create a curriculum integrating their engineering and non-engineering interests in a structured manner. Study Abroad is also highly encouraged with various study abroad and COOP abroad options to select from.

BSEN students are required to select a concentration from six possible engineering areas (1) Biomedical, (2) Civil, (3) Computer, (4) Electrical, (5) Mechanical, (6) Manufacturing; and directed studies/minors areas (please check each department for minors offered).

## **Minor Option**

Students may select a minor from a variety of departments through the College of Engineering and Technology, College of Arts and Sciences, College of Architecture, Design and Construction Management to fulfill their directed studies requirements.

Or

## **Directed Studies Option**

Students may select electives that match their personal interests and broaden their career options. The combinations are varied and limited only by student interests and imagination. Our engineering students have focused on fields ranging from Sustainability, Life Cycle Analysis, Business Management, Computer Science, Applied Math and Sciences, Music, and Art.

Working closely with the Department Chair and/or a full-time faculty member, students design an engineering education meeting individualized personal and professional goals.

### **Freshman Year, Fall Semester (total credits 16)**

ENGR1000	Introduction to Engineering (3 credits)
MATH1750	Engineering Calculus I (4 credits)
ENGLISH	English Sequence * (4 credits)
PHYS1250	Engineering Physics I (4 credits)
ENGR1600	Fundamentals of CAD & CAM OR ENGR1800 Introduction to MATLAB (1 credit)
FYS1000	First Year Seminar (0 credit)

### **Freshman Year, Spring Semester (total credits 16)**

ENGR1500	Introduction to Engineering Design (3 credits)
MATH1850	Engineering Calculus II (4 credits)
PHYS1750	Engineering Physics II (4 credits)
ENGLISH	English Sequence * (4 credits)
ENGR1600	Fundamentals of CAD & CAM OR ENGR1800 Introduction to MATLAB (1 credit)

### **Sophomore Year, Fall Semester (total credits 18)**

MATH2025	Multivariable Calculus (4 credits)
ELECTIVE	Directed Studies (3 credits)
COMP	Computer Science Elective (4 credits)
ELECTIVE	Directed Studies (4 credits)
ENGINEERING COURSE (EC)	Engineering Concentration (3 credits)

**Sophomore Year, Spring Semester (total credits 18)**

MATH2500	Differential Equations (4 credits)
ELECTIVE	Directed Studies (3 credits)
EC	Engineering Concentration (3 credits)
EC	Engineering Concentration (4 credits)
HUSS	Humanities/Social Science Elective* (4 credits)

**Sophomore Year, Summer Semester**

COOP3000	Pre-Cooperative Work Term (Optional)
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**Junior Year, Fall Semester (total credits 18)**

ELECTIVE	Directed Studies (3 credits)
EC	Engineering Concentration (4 credits)
EC	Engineering Concentration (4 credits)
MGMT	Management Elective (3 credits)
HUSS	Humanities/Social Science Elective* (4 credits)

**Junior Year, Spring Semester**

COOP3500	Co-op Work Term I
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**Junior Year, Summer Semester (total credits 15)**

ENGR3500	Engineering Junior Design (4 credits)
EC	Engineering Concentration (4 credits)
MGMT	Management Elective (3 credits)
HUSS	Humanities/Social Science Elective* (4 credits)

**Senior Year, Fall Semester**

COOP4500,	Co-op Work Term II
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**Senior Year, Spring Semester (total credits 18)**

ENGR5000	Engineering Senior Design I (3 credits)
EC	Engineering Concentration (4 credits)
EC	Engineering Concentration (4 credits)
HUSS	Humanities/Social Science Elective* (4 credits)
ELECTIVE	Directed Studies or General (3 credits)

**Senior Year, Summer Semester (total credits 16)**

ENGR5500	Engineering Senior Design II (4 credits)
EC	Engineering Concentration (4 credits)
MATH/SCIENCE	Math/Science Elective (4 credits)
HUSS	Humanities/Social Science Elective (4 credits)

\*ENGL/HSS Note:

Day program students are required to complete:

- At least one course in Humanities
- At least one course in the Social Sciences
- The remaining courses may be from either the Humanities or Social Sciences category.

## BSEN Program Timeline

Action	Year	Term	Next Step
Registration Access Codes	Freshman and 1st Semester Sophomore Semester	FALL/SPRING	Meet with (RACs or 'Alternate PIN') Advisor/Academic Coordinator
Concentration Declaration	Freshman	FALL (BMED)/SPRING	Meet with Advisor/Academic Coordinator
Minor Declaration	Freshman	FALL (BMED)/SPRING	Meet with Advisor/Academic Coordinator
Study Abroad interest	Freshman/ Sophomore		Meet with Advisor/Academic Coordinator
Study Abroad semester	Junior	FALL	Prior discussions and paperwork with Department Chair, Advisor and International CET liaison

## DEPARTMENT OF MECHANICAL ENGINEERING AND TECHNOLOGY

**Michael E. Jackson, Department Chair**  
 Rubenstein Hall, Room 208  
 (617) 989-4215

### Faculty

#### *Professors*

- Xiaobin Le, Ph.D.
- Masoud Olia, P.E., Ph.D.
- Gloria Ma, Ph.D.
- Ilie Talpasanu, Ph.D.
- Mansour Zenouzi, P.E., Ph.D.

#### *Associate Professors*

- Anthony Duva, M.S.
- Haifa El-Sadi, Ph.D.
- Theodore Greene, M.S.
- Michael Jackson, M.S.
- Richard Roberts, M.S.
- Peter Rourke, M.S.
- Douglas Sondak, Ph.D.
- Bo Tao, Ph.D.

## *Assistant Professors*

- Stephen Chomyszak, M.S.
- John Voccio, M.S.

## *Visiting Assistant Professors*

- Michael Cameron
- Radu Ceausu

## *Staff*

- Judith Duvivier, Academic Coordinator
- Herb Connors, Lab Technician
- Ryan Bakinowski, Lab Technician
- Francis Conlon, Lab Technician

## **Department Vision and Mission Statement**

The vision of the Department of Mechanical Engineering and Technology is to be recognized by industries hiring the department's graduates as providing an application-driven core curriculum based on the traditions of a Wentworth practice-based education. Through hands-on laboratory-based projects and a cooperative work experience, graduates will be recognized by employers as productive contributors in their respective fields immediately after graduation.

The mission of Wentworth's engineering and technology programs builds upon Wentworth's educational mission and curricular model used to assess the effectiveness of the educational programs. Central to Wentworth's cooperative education is the use of design and project courses throughout the curriculum to assist students in the integration and application of new knowledge into their developing professional practice skills. Wentworth's engineering and technology programs are intended to educate future engineers and technologists at the undergraduate level. Through a practice-oriented education, they will be able to utilize technological advancements, contribute to innovative design solutions in a collaborative environment, and make appropriate decisions for their respective areas of professional responsibility.

## **DEPARTMENT OF MECHANICAL ENGINEERING AND TECHNOLOGY DEGREE REQUIREMENTS**

### **Mechanical Engineering (BSME) Leading to the Bachelor of Science Degree**

The Bachelor of Science in Mechanical Engineering program is accredited by the Accreditation Board for Engineering and Technology (ABET).

The Mechanical Engineering (BSME) program is a four-year engineering program with an integrated project- and laboratory-based experience that provides a unique approach to applied learning. Grounded in a solid foundation of mathematics, science, and the humanities and social sciences, this program incorporates all the essential elements of a mechanical engineering curriculum. The program additionally integrates practical engineering design into courses throughout its study, extensive use of computers to solve engineering problems (including developing detailed documentation for manufacturing), and a faculty committed to maintaining a curriculum that parallels industrial changes.

BSME students spend a great deal of time working in our state-of-the-art laboratories, using computers and test equipment to verify and develop principles of engineering in diverse areas such as statics, thermodynamics, material science, data acquisition, structural analysis, and machine design.



Mechanical Engineering students complete two semesters of cooperative industrial work experience in fields related to mechanical engineering, giving Wentworth students an advantage over their peers at graduation. Graduates may continue their studies at the graduate level or pursue an industrial career. Wentworth BSME graduates are practical engineers, with expertise in mechanical engineering, and who are in high demand and well prepared to meet the professional challenges of a constantly changing and increasingly global workforce.

## *Mechanical Engineering Program Objectives*

The long-term objectives of the program are to ensure graduates succeed in their chosen field by:

- Contributing significantly in the design and development of complex systems within the field of engineering.
- Working effectively as members of multidisciplinary teams that analyze data critically, synthesize information, and implement ethical solutions for the betterment of society.
- Preparing and presenting technical information professionally to various audiences.
- Furthering their education either through directed or independent studies to advance them personally and professionally.

## *Mechanical Engineering Program Outcomes*

As an extension of the Institute's philosophy, the Mechanical Engineering program's mission is to admit qualified high school graduates and prepare them for productive professional careers in mechanical engineering. To fulfill this goal, the program offers students a rigorous, mathematically-based engineering education with a balanced laboratory experience that provides the technical knowledge and problem-solving skills needed for them to grow as intellectually inquisitive individuals, and as critically involved members of our society with a lifelong commitment to continued learning.

Graduates are expected leave Wentworth with:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

The Mechanical Engineering program at Wentworth is committed to a collaborative teaching model supported by its Industrial Program Advisory Committee, which provides students access to many innovative educational opportunities.

Total credits for degree: 136

Mechanical Engineering is a four-year program, starting in the fall semester of the student's first year and planned to end in the summer semester of the student's fourth year.

## **Special Requirement for Graduation**

In addition to the general graduation requirements of the university, specific graduation requirements from the Mechanical Engineering (BSME) program with a Bachelor of Science degree include maintaining a minimum cumulative grade point average of 2.0 for all technical courses. The courses used to determine the cumulative grade point average for all BSME technical courses are courses with ELEC and MECH prefixes. If another Wentworth course is substituted for one of these listed courses, the substitute course will be calculated into this cumulative grade point average for all technical courses.

**Freshman Year, Fall Semester (total credits 16)**

ENGR1000	Introduction to Engineering (3 credits)
PHYS1250	Engineering Physics I (4 credits)
MATH1750	Engineering Calculus I (4 credits)
ENGLISH	Sequence, See ENGL/HSS note below * (4 credits)
ENGR1600	Fundamentals of CAD & CAM (1 credit) OR ENGR1800 Introduction to MATLAB (1 credit)

**Freshman Year, Spring Semester (total credits 16)**

ENGR1500	Introduction to Engineering Design (3 credits)
MATH1850	Engineering Calculus II (4 credits)
ENGR1800	Introduction to MATLAB (1 credit) OR ENGR1600 Fundamentals of CAD & CAM (1 credit)
PHYS1750	Engineering Physics II (4 credits)
ENGLISH	Sequence, See ENGL/HSS note below * (4 credits)

**Sophomore Year, Fall Semester (total credits 18)**

MECH2000	Engineering Statics (4 credits)
MECH2300	Engineering Graphics (3 credits)
MATH2025	Multivariable Calculus (4 credits)
ELEC2799	Circuit Theory and Applications (3 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

**Sophomore Year, Spring Semester (total credits 20)**

MECH2500	Mechanics of Materials (4 credits)
MECH2250	Engineering Thermodynamics I (4 credits)
CHEM1100	Engineering Chemistry (4 credits)
MATH2500	Differential Equations (4 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

**Sophomore Year, Summer Semester**

COOP3000	Pre-Cooperative Work Term (Optional)
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**Junior Year, Fall Semester (total credits 19)**

MECH3000	Design of Machine Elements (4 credits)
MECH3100	Engineering Fluid Mechanics (4 credits)
MECH2750	Engineering Thermodynamics II (4 credits)
ELECTIVE	Technical Elective (3 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

**Junior Year, Spring Semester**

COOP350	Co-op Work Term I
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**Junior Year, Summer Semester (total credits 16)**

MATH2100	Probability and Statistics for Engineers (4 credits)
MECH3600	Materials Science (4 credits)
MECH3850	Engineering Dynamics (4 credits)
MECH3900	Engineering Heat Transfer (4 credits)

**Senior Year, Fall Semester**

COOP4500	Co-op Work Term II
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### Senior Year, Spring Semester (total credits 17)

MECH4000	Mechanical Vibrations (3 credits)
ELECTIVE	Technical Elective (3 credits)
MECH4200	Simulation Based Design (4 credits)
MECH5000	Mechanical Capstone Analysis (3 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

### Senior Year, Summer Semester (total credits 14)

MECH5500	Mechanical Capstone Project (4 credits)
ELECTIVE	Technical (3 credits)
ELECTIVE	General (3 credits)
HSS ELECTIVE	See ENGL/HSS note below * (4 credits)

\*ENGL/HSS Note:

- At least one course in Humanities
- At least one course in the Social Sciences
- The remaining courses may be from either Humanities or Social Sciences category

Students with a three English course sequence may use the third English course to satisfy a Humanities requirement. Of the five humanities and social science electives, BSME students must include the following **HSS Directed Electives**:

- An Economics elective
- An Ethics elective

## Minor in Aerospace Engineering

The Aerospace Engineering minor develops the engineering-analysis and design skills necessary for creating and understanding aerospace vehicles and their subsystems. The minor includes diverse topics relevant to applications in aerodynamics. Students in this minor will take at least three core aerospace courses.

### Required courses

MECH2300	Engineering Graphics (3 credits)
MECH2750	Thermodynamics II or MECH4400 Thermal Design (prerequisite) (4 credits)
MECH3200	Numerical Simulation and CFD (3 credits)
MECH3350	Gas Dynamics (prerequisites) (4 credits)
MECH3650	Aerodynamics (prerequisites) (4 credits)

Total Credits 18

## Minor in Manufacturing

Students pursuing a minor in Manufacturing will be required to take the Fundamentals of Manufacturing exam administered by the Society of Manufacturing Engineers (SME). If the exam is successfully passed the student will become a Certified Manufacturing Technologist (CMfgT).

### Required courses

MECH2300	Engineering Graphics (3 credits)
MANF1000	Manufacturing Processes (4 credits)
MANF2000	Computer Aided Manufacturing (3 credits)
MANF3000	Manufacturing Engineering (3 credits)
One course in economics (ECONXXXX, 4 credits)	
PSCH4552	Industrial and Organizational Psychology (4 credits)

Total Credits 21

# COLLEGE OF PROFESSIONAL AND CONTINUING EDUCATION

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**Deborah Wright, Dean**

Dobbs Hall, Room 122

(617) 989-4348

## College Vision and Mission Statement

By committing to serve the needs of part-time students, alumni, employers, and the community we live in, the College of Professional and Continuing Education (CPCE) is the gateway to lifelong learning. CPCE is recognized as a leader in providing part-time educational opportunities as well as corporate training, and continuing education in management, the build environment, and in STEM fields. The success of our alumni provides abundant testimony to the strength of our educational programs, and our commitment to providing our communities and employers with a talented and prepared workforce. The college will continue to develop new initiatives to serve the needs of changing industries.

Lifelong learning is a tradition at Wentworth Institute of Technology. The College of Professional and Continuing Education (CPCE) is committed to helping students achieve their educational and career goals with part-time evening, weekend, and online courses designed to accommodate their busy lifestyles. In addition to our degree programs, the College works directly with corporations, industry experts, and our community in developing specific educational programs that address the needs of our professional students. Students applying for associate, bachelor's, master's degrees, or certificate programs are academically counseled and considered for admission by the College.

Wentworth has a long tradition of offering specialized workforce training and development programs to people in various technical fields. Certificates, training, and seminars provided through CPCE are rigorous and relevant to the industry. Taught by instructors who are active and experienced in their disciplines, these courses provide students with the experience and credentials needed to make them competitive in today's job market. Several programs offer skills for licensing and certification. Students who have successfully completed a professional certificate program are eligible for transfer credit in specific CPCE degree programs. Please view the CPCE website at [wit.edu/continuing-ed](http://wit.edu/continuing-ed) or call CPCE at (617) 989-4300 for information on upcoming courses and programs of study.

## ASSOCIATE DEGREE PROGRAMS

### Engineering Technology (AENT)

#### Leading to the Associate in Applied Science Degree

This program provides students with the opportunity to explore a variety of technology disciplines. With the advice and approval of their assigned academic advisor, students can customize a program of study to meet individual needs and interests in engineering, science, technology and/or management.

Graduates may be hired by a wide range of technical firms. Possible job opportunities depend on the student's choice of electives and individual goals.

Graduates of this program may enter Wentworth's bachelor degree programs in Building Construction Management, Facilities Management, or Project Management. Admission to other bachelor degree programs would require specific technical electives. Consultation with the student's assigned academic advisor is essential to degree planning.

Total credits for degree: 60

## Degree Details

Elective	Technical Elective (4 credits)
MATH1005	Math A (3 credits)
Elective	Humanities/Social Science (3 credits)
MATH1035	Math B (3 credits)
MATH1035	Math C (3 credits)
Elective	Technical Elective (4 credits)
Elective	Technical Elective (4 credits)
PHYS1005	Physics A (3 credits)
Elective	Technical Elective (4 credits)
ENGL1050	English Composition (3 credits)
Elective	Technical Elective (4 credits)
ENGL1550	Literature and Composition (3 credits)
Elective	Technical Elective (4 credits)
Elective	Technical Elective (4 credits)
Elective	Technical Elective (4 credits)
Elective	Technical Elective (4 credits)
Elective	Technical Elective (3 credits)

## Building Construction Management (ABCM)

This program provides a solid foundation in the fundamentals of scheduling, surveying, CAD, estimating, programming, codes, and contracts. Graduates leave with a broad perspective on construction, including wood, masonry, concrete and steel, plumbing, electrical, and HVAC systems. Graduates are prepared to work on large commercial projects as well as residential construction. Possible job opportunities include job supervisors, inspectors, estimators, office managers, and field superintendents.

Graduates of this program may enter Wentworth's bachelor's degree programs in Building Construction Management or Project Management.

Students who have earned a Massachusetts State Supervisors License are eligible to receive four (4) credits of advanced standing for BLDG1050 Contract and Codes. Students who have completed Wentworth's non-credit Construction Certificate are eligible to receive advanced standing for BLDG1100 Construction Methods and BLDG1500 Construction Estimating.

## Degree Details

Total credits for degree: 64

### Major Requirements

BLDG1015	Construction Graphics
BLDG1050	Contracts and Codes
BLDG1100	Construction Methods
BLDG1500	Construction Estimating
BLDG2000	Structural Design I
BLDG1900	Basic Building Services
BLDG3200	Construction Project Scheduling
BLDG3700	Construction Safety and Risk Management
MGMT3050	Leadership and Management
MGMT3650	Business Law
SURV1000	Construction Surveying

## General Education Requirements

ENGL1050	English Composition
ENGL2050	English Literature and Composition
MATH1005	College Math A
MATH1035	College Math B
MATH1065	College Math C
PHYS1005	Physics A
ELECTIVE	Humanities or Social Science

## Building Construction Management (BBCM)

This program emphasizes the business and management aspects of construction, preparing graduates for upper-level management positions and management of large complex projects. It provides the skills necessary to carry out a construction project from conception to completion, which includes maximizing human resource potential and monitoring and controlling, time, cost and quality.

Construction and building design firms have hired graduates of this program. Possible job opportunities include construction managers, project managers, field engineers, estimators, schedulers, and superintendents.

### Degree Details

Total credits for degree: 128

### Major Requirements

BLDG1015	Construction Graphics
BLDG1050	Contracts and Codes
BLDG1100	Construction Methods
BLDG1500	Construction Estimating
BLDG1600	Horizontal Construction
BLDG2000	Structural Design I
BLDG1900	Basic Building Services
BLDG2600	Testing of Materials
BLDG3200	Construction Project Scheduling
BLDG3400	Construction Project Control & Cost Analysis
BLDG3600	Construction Management Theory
BLDG3100	Construction Operations
BLDG3700	Construction Safety and Risk Management
BLDG4250	Financing the Construction Project
BLDG5500	Senior Project
MGMT2700	Financial Accounting
MGMT3050	Leadership and Management
MGMT3650	Business Law
SURV1000	Construction Surveying

### General Education Requirements

ECON1102	Economics I
ENGL1050	English Composition
ENGL2050	English Literature and Composition
MATH1005	College Math A
MATH1035	College Math B
MATH1065	College Math C
PHYS1005	Physics A

## Science Elective/Physics B

ELECTIVE	Humanities (3 credits)
ELECTIVE	Social Science (6 credits)
ELECTIVE	General Education (9 credits)
ELECTIVE	General (16 credits)

## BACHELOR DEGREE PROGRAMS

### Project Management (BPM)

This program aims to produce leaders for business, industry, and government. Students are introduced to contemporary theories of management, leadership, and teamwork, as well as accounting, computer software systems, marketing, finance, and communication skills. Courses in planning, policy, and practice are geared to running today's enterprises.

A broad range of companies including computer, electronic, health, and manufacturing firms have hired graduates of this program. Possible job opportunities include project managers, business analysts, project engineers, operations coordinators and field service engineers. The Project Management degree is available in both hybrid and fully online formats.

### Degree Details

Total credits for degree: 128

### Major Requirements

MGMT1010	Introduction to Project Management
MGMT2100	Management Communications
MGMT2200	Research Methods in Business
MGMT2300	Organizational Behavior
MGMT2600	Project Risk Management
MGMT2700	Financial Accounting
MGMT2850	Principles of Marketing
MGMT3000	Managing and Leading Organizations
MGMT3250	Managerial Accounting
MGMT3300	Project Planning, Scheduling & Control
MGMT3500	Financial Management
MGMT3750	Project Evaluation and Performance
MGMT5000	Senior Project
MGMT5500	Project Management Capstone

### General Education

ENGL1050	English Composition
ENGL2050	English Literature and Composition
MATH1005	College Math A
MATH1030	Statistics and Applications
MATH1035	College Math B
ELECTIVE	Humanities, 6 credits
ELECTIVE	Natural/Physical Science, 3 credits
ELECTIVE	Social Science, 9 credits
ELECTIVE	General Education, 8 credits

### General Education Electives

ELECTIVE	General Electives
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## Facility Management (BSFM)

This program offers instruction which reflects the integrated nature of today's built environment and is designed to prepare students for professional careers in facility management for public, private and institutional organizations. Facility Management practice can be regarded as the management of a company's or institution's physical assets. The management of these assets involves long-term, as well as short-term, planning for physical facilities and real properties that integrates the organization's strategic business plan and the technical components for that plant.

Facility managers are involved in the short- and long-term planning that coordinates the physical workplace with the people and the work produced by an organization.

### *Degree Details*

Total credits for degree: 128

### *Major Requirements*

CPFM2000	Introduction to Facility Management
BLDG1900	Basic Building Services
BLDG2500	Project Estimating and Scheduling
COMM3100	Professional Communications
MGMT2700	Financial Accounting
MGMT3000	Managing and Leading Organizations
MGMT3500	Financial Management
MGMT3625	Labor Relations
CPFM2300	Space Planning
CPFM3200	Project Management for Facility Management
CPFM3300	Building Operations
CPFM4100	Facility Assessment and Forecasting
CPFM4200	Energy and Sustainability
CPFM4600	Principles of Real Estate and Property Management
CPFM5500	Capstone in Facility Management

### *General Education Requirements*

ENGL1050	English Composition
ENGL2050	English Literature and Composition
MATH1005	College Math A
MATH1035	College Math B
MATH1030	Statistics and Applications
PSYC4552	Industrial Organizational Psychology
ELECTIVE	Science, 3 credits
ELECTIVE	Humanities, 6 credits
ELECTIVE	Social Science, 9 credits
ELECTIVE	General Education, 4 credits
ELECTIVE	General, 37 credits



## MASTER DEGREE PROGRAMS

### Master of Science in Construction Management (MSCM) Program Leading to a Master of Science in Construction Management Degree

The Master of Science in Construction Management (MSCM) program at Wentworth Institute of Technology is accredited by the American Council for Construction Education (ACCE). [http://www.acce-hq.org/accredited\\_programs/category/masters-programs/](http://www.acce-hq.org/accredited_programs/category/masters-programs/)

The Master of Science in Construction Management (MSCM) program is designed to educate students in fundamental post-graduate management principles. Students will gain a strong understanding of construction and business management concepts, from pre-design through construction closeout. Graduates of the MSCM program will be prepared to assume leadership positions across the construction industry.

The Master of Science in Construction Management (MSCM) at Wentworth Institute of Technology College of Professional and Continuing Education (CPCE) is a program of study for construction professionals. Started in 2010, the program is designed to educate students in foundational post graduate management principles combined with relevant construction education and experience in topics that are specific to preparing and advancing professionals' skills in administrative and executive leadership positions in design and construction companies and related disciplines.

### Mission, Goals and Outcomes

#### *Mission*

The Master of Science in Construction Management (MSCM) program at Wentworth Institute of Technology College of Professional and Continuing Education (CPCE) is a graduate program of study for construction professionals. The program is designed to educate students in foundational post graduate management principles combined with relevant construction education and experience in topics that are specific to preparing and advancing professional skills in administrative and executive leadership positions in design firms, construction companies and related disciplines. Both thesis and non-thesis options are available which allow for a variety of employment or educational opportunities including but not limited to working for general contractors, real-estate developers, sub-contractors, construction management and architectural/engineering firms, as well as advanced education and teaching options.

The Master of Science in Construction Management (MSCM) program at Wentworth Institute of Technology is accredited by the American Council for Construction Education (ACCE). The primary goal of ACCE is to promote and improve construction education in colleges and universities. By working together through ACCE, people representative of the total construction community and the public at large, construction educators and constructors, establish and maintain standards and criteria for accreditation, provide guidance to those programs seeking to achieve accredited status, and carry out the accreditation process.

ACCE accreditation serves the interests of:

- Students: by helping them identify institutions and programs that offer quality education in construction education
- The construction Industry: by enabling employers to identify persons who have the potential for making lasting contributions to the construction industry and their profession, and
- Owners / Users of Constructed Facilities and the Public at Large: by raising the professional caliber of constructors and thus the quality of the construction for which they assume responsibility

Specifically, accreditation of a construction education program by ACCE assures

- Students and prospective employers that the program has met stringent industry standards of content and quality

- That program graduates have been provided a quality education enabling them to perform a broad range of professional responsibilities
- The construction industry and students that the program performs periodic self-evaluations to keep current with emerging technologies and requirements of the construction industry

Accreditation by ACCE assists an institution and its construction education program in maintaining contact with other programs and practicing construction professionals, and enables the program to

- Keep current with emerging technologies in the field
- Increase awareness of current courses, facilities, and services provided by other accredited programs
- Improve instructional techniques; and
- Access construction industry contacts nationwide

## *Goals*

To accomplish the mission of the Master of Science in Construction Management program, the following program goals have been developed in order to prepare students academically for personal and professional success in the built environment. The attainment of goals is evaluated through the program's outcome assessment program.

- Present opportunities to develop metacognitive and life-long learning skills for students seeking increasingly complex management responsibilities, new leadership roles and overall career advancement
- Expose students to subject matter and industry experts and the latest technological and managerial/ leadership advancements and their effects on the Construction Industry.
- Prepare and develop students from related disciplines to advance into the field of Construction Management.

## *Student Learning Outcomes*

The operation, academic integrity and improvement of the MSCM program is based on the relationship of MSCM Program Course and Learning Outcomes to American Council for Construction Educators (ACCE) Required Program Learning Outcomes (PLO). MSCM Course and Student Learning Outcomes (SLO) are mapped to the ten (10) PLOs required by American Council for Construction Educators (ACCE).

1. Critical thinking and creativity – MSCM students analyze and integrate information to conduct critical, reasoned arguments.
2. Problem solving and decision making - MSCM students design, evaluate, and implement strategies using advanced construction management concepts and practices.
3. Effective and professional oral and written communications - MSCM students produce effective and professional communication in written and oral formats.
4. Use of information and communication technology - MSCM students put into practice computer systems, productivity tools, software, and other information and communication technology.
5. Principles of leadership in business and management - MSCM students apply practical management decision-making tools and techniques and leadership best practices.
6. Current issues in construction - MSCM students demonstrate knowledge from industry experiences and keep up-to-date on developments, best practices, as well as tools and techniques in the field.
7. Complex project decision making and associated risk management - MSCM students recognize, weigh, and analyze risks associated with complex construction projects.
8. Professional ethics including application to situations and choices - MSCM students identify ethical dilemmas in construction and apply practical skills to ethical situations.
9. Advanced construction management practices - MSCM students demonstrate knowledge of contemporary construction industry methods and construction management principles and practices.
10. Research methods - MSCM students recognize and conduct valid, data-supported, and appropriate research in construction management.

## Degree Details

### Required Courses

*All courses are three (3) credits unless otherwise noted*

MGMT7000	Business Relations & Human Resources Management
CONM7000	Executive Management for Construction Management
MGMT7050	Business Finance and Investments
CONM7400	Advanced Project Controls
MGMT7150	Business Operations & Process Management
CONM7100	Modern Construction Delivery Methods
CONM7200	Construction Law for Construction Management
CONM7300	Real Estate Development
CONM8000	Capstone Project in Construction Management

### Electives

*All courses are three (3) credits unless otherwise noted*

CONM7050	Research Methods
CONM7250	Conflict Resolution & Negotiation
CONM7500	International Construction
MGMT7300	Economics & International Business
FMGT course from the MS in Facility Management program	
TMGT course from the MS in Technology Management program	

Total credits for degree: 30 (36 with optional thesis)

## Recommended Schedule for MS in Construction Management MSCM

*All courses are three (3) credits unless otherwise noted*

### YEAR ONE

#### Semester One

MGMT7000	Business Relations & Human Resources Management
CONM7000	Executive Management for CM

#### Semester Two

MGMT7050	Business Finance and Investments
CONM7400	Advanced Project Controls

#### Semester Three

MGMT7150	Business Operations & Process Management
CONM7100	Modern Construction Delivery Methods

### YEAR TWO

#### Semester One

CONM7200	Construction Law for Construction Management
CONM7300	Real Estate Development

#### Semester Two

#### Construction Management Elective

CONM8000	Capstone Project in Construction Management
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#### Semester Three (Thesis Option Only)

CONM8900	Construction Management Thesis (6 credits)
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Total credits for degree: 30 (36 with optional thesis)

# Master of Science in Facility Management (MSFM) Program

## Leading to a Master of Science in Facility Management Degree

The Master of Science in Facility Management (MSFM) program is designed to educate students in foundational post-graduate management principles and enhanced facility management skills and knowledge. Students will learn the leadership and business skills necessary to respond to the demand to keep their facilities highly efficient and functional. Coursework will also integrate elements of several related disciplines, including: project management, finance, real estate, humans and their working environment, space planning, building operations and maintenance, and quality assessment. Graduates of the MSFM program will be prepared for leadership roles in facility management and related industries.

### Mission, Goals and Outcomes

#### *Mission*

A key feature of the program is the opportunity to build strong professional relationships. Our instructors are proven leaders in the field and many of them work full-time in facility management and closely related areas. Our students also work in facility management and related industries, which creates an ideal learning environment in which students learn from both their instructor and their peers. Many of the concepts learned in the classroom can be immediately applied on the job. Facility Management is the holistic management of real property and the infrastructure of an organization with the aim of improving the productivity of its core business. It is the practice of coordinating the physical workplace with the people and work of the organization; it integrates the principles of business administration, project management, architecture and the behavioral and engineering sciences.

#### *Goals*

The Master of Science in Facility Management (MSFM) program is designed to combine common general management techniques with current facility management practices and technologies. The curriculum will provide graduates with the tools and managerial decision-making processes related specifically to maintaining and managing the built environment. The MSFM program is designed for working professionals, as an on-campus format (as well as an online format) with convenient evening classes and a cohort format that allows students to complete the degree in less than two years while still being able to work full-time and fulfill their personal responsibilities.

#### *Student Learning Outcomes*

Graduates of the Master of Science in Facility Management (MSFM) program will be able to:

- Describe and demonstrate the implementation of management principles relating specifically to maintaining and managing the built environment.
- Formulate effective communication strategies/processes for delivering concepts, financial information, and strategic and tactical information regarding real property, equipment and staffing to all levels of staff in a business organization.
- Demonstrate leadership skills by leading a team from conception through completion and closeout of an assigned project.
- Demonstrate teamwork skills by participating constructively as a team member on an assigned project.
- Develop a facilities technology strategy for a business or other organization that demonstrates knowledge of different technology platforms, workplace management systems and CAFM; and of the larger social, ethical, and legal issues related to information, telecommunications and other supporting technologies.
- Demonstrate knowledge of research tools appropriate for analyzing and developing solutions for facilities management problems.
- Describe what constitutes effective sustainable policy and use that knowledge to develop a corporate sustainable program.
- Create an energy policy for a business or organization that reflects knowledge of how buildings use energy, and of proven methods to reduce energy consumption.
- Formulate and complete a complex project that demonstrates mastery of both the technical and managerial aspects of strategic facility management.

## Degree Details

All courses are three (3) credits unless otherwise noted

### Required Courses

MGMT7400	Executive Leadership
MGMT7100	Project Management Applications
MGMT7050	Business Finance and Investments
MGMT7450	Communication Strategies
FMGT7100	Contemporary Issues in Managing Technology
MGMT7250	Strategic Financial Decision Making
MGMT7500	Quantitative Methods in FM Research
FMGT7200	Energy/Sustainability
FMGT7300	Facility Operations
FMGT8000	Facility Management Capstone

### Thesis Option Only

FMGT8900	Facility Management Thesis (6 credits)
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Total credits for degree: 30 (36 with optional thesis)

## Recommended Schedule for MS in Facility Management MSFM

*All courses are three (3) credits unless otherwise noted*

### YEAR ONE

#### Semester One

MGMT7400	Executive Leadership
MGMT7100	Project Management Applications

#### Semester Two

MGMT7050	Business Finance and Investments
MGMT7450	Communication Strategies

#### Semester Three

FMGT7100	Contemporary Issues in Managing Technology
MGMT7250	Strategic Financial Decision Making

### YEAR TWO

#### Semester One

MGMT7500	Quantitative Methods in FM Research
FMGT7300	Facility Operations

#### Semester Two

FMGT7200	Energy/Sustainability
FMGT8000	Facility Management Capstone

#### Semester Three (Thesis Option Only)

FMGT8900	Facility Management Thesis (6 credits)
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Total credits for degree: 30 (36 with optional thesis)

# Master of Science in Technology Management (MSTM) program

## Leading to a Master of Science in Technology Management Degree

The Master of Science in Technology Management (MSTM) degree is designed to elevate students' business acumen, strategic thinking, and people skills, all within the context of the issues and challenges specific to the technical world. Graduates of the MSTM program will be equipped with the management skills, expertise, and ethics necessary to be successful within technology-based enterprises.

The MSTM program is designed for technical professionals who desire to manage and lead within a technical environment. The program is offered in a fully online delivery format to provide maximum flexibility, and is designed to be completed in under two years on a part-time basis.

Online course discussion groups are a key component of the MSTM program, allowing students to regularly interact with and learn from both their instructors and fellow classmates. MSTM instructors are both subject matter experts and industry practitioners. Furthermore, most MSTM students are currently employed in a technical environment, facilitating peer to peer learning.

### Mission, Goals and Outcomes

#### *Mission*

The MSTM program is designed to combine common general management techniques with current technology management practices and technologies. The curriculum will provide graduates with the tools and managerial decision-making processes related specifically to maintaining and managing in a technical environment. The MSTM program will be taught using a combination of technologies and team instruction. It is anticipated that courses will utilize both industry professionals as well as academic experts. The program will provide graduates with a clear understanding of the management skills, expertise and ethics necessary to be successful within the technology-based enterprises. Topics to be covered will include: communication strategies, technology project management, leadership, leveraging technical innovation and intellectual property, accounting and finance, new product development and commercialization, and global operations.

#### *Goals*

Graduates of the Master of Science in Technology Management program will be prepared for a variety of managerial positions in the technical world. The program will be to provide graduates with the knowledge and skill sets needed to function successfully in middle and upper level technology management positions.

#### *Student Learning Outcomes*

Wentworth Master of Science in Technology Management graduates will:

- Understand the theory and application of advanced business management theories.
- Demonstrate an understanding of strategic technology management.
- Demonstrate an understanding of finance and accounting.
- Demonstrate leadership qualities.
- Understand the critical success factors for leading teams and related organizational development issues.
- Understand the relevance of the increasingly international business environment.
- Demonstrate executive level decision-making and critical thinking skills.
- Demonstrate the ability to deal with complex business challenges, and utilize best practices to arrive at solution sets required of mid and senior level technology managers.

## Required Courses

*All courses are three (3) credits unless otherwise noted*

MGMT7000	Business Relations & HR Management
MGMT7100	Project Management Applications
MGMT7050	Business Finance and Investments
MGMT7450	Communication Strategies
MGMT7150	Business Operations and Process Management
TMCT8000	Strategic Technology Business Management
MGMT7200	Leadership
TMCT8100	Management of New Product Development
MGMT7350	Marketing Management
TMCT8900	Technology Management Capstone

## Degree Details

Total credits for degree: 30

## MSTM Recommended Schedule

*All courses are three (3) credits unless otherwise noted*

### YEAR ONE

#### Semester One

MGMT7000	Business Relations & HR Management
MGMT7100	Project Management Applications

#### Semester Two

MGMT7050	Business Finance and Investments
MGMT7450	Communication Strategies

#### Semester Three

MGMT7150	Business Operations and Process Management
TMCT8000	Strategic Technology Business Management

### YEAR TWO

#### Semester One

MGMT7200	Leadership
TMCT8100	Management of New Product Development

#### Semester Two

MGMT7350	Marketing Management
TMCT8900	Technology Management Capstone

Total credits for degree: 30

# **Master of Engineering in Civil Engineering (MEng CE)**

## **Leading to a Master of Engineering in Civil Engineering Degree**

The Master of Engineering in Civil Engineering (MEng CE) program is designed to educate technical professionals in post-graduate civil engineering principles. The program is designed for part-time students, provides maximum flexibility relative to academic delivery and format, and can be completed in less than two (2) years. The curriculum is organized into two (2) areas of specialization, construction engineering and infrastructure engineering.

### *Construction Specialization*

Designed to provide the student with coursework in the construction area of civil engineering, including topics specified in the Civil-Construction PE exam: estimating and scheduling, construction operations, and relevant geotechnical, structural and environmental aspects of construction.

### *Infrastructure Specialization*

Designed to provide the student with coursework focused on the design of major infrastructure projects. This curriculum emphasizes transportation and public works infrastructure projects and includes advanced transportation, structural, geotechnical, and environmental coursework.

## **Mission, Goals and Outcomes**

### *Mission*

The Master of Engineering in Civil Engineering (MEng CE) program is designed to meet the criteria outlined by the American Society of Civil Engineers (ASCE) regarding post baccalaureate education in addressing current and future local, national, and global needs. The curriculum of the program has been developed to ensure the alignment of learning objectives with the skills, competencies, and attributes which industry and prospective employers are looking for in our graduates.

### *Goals*

The Master of Engineering in Civil Engineering (MEng CE) program places emphasis on addressing real-world engineering problems as a practicing professional engineer, while addressing the American Society of Civil Engineers (ASCE) recommended body of knowledge for future civil engineers. Per the recommendation of the ASCE ([www.asce.org](http://www.asce.org)) and as required by state by state regulations, civil engineering graduates and practitioners are strongly encouraged to become licensed engineers, which allows engineers to take personal responsibility for the work they perform for public and private clients.

The MEng CE program addresses ASCE's strategic initiative entitled "Competency – Raise the Bar" through the master's degree in civil engineering for students seeking professional licensure, which is an important credential in the field of civil engineering. The MEng CE program is designed to meet criteria outlined by ASCE regarding post baccalaureate education by addressing current and future local, national, and global needs and is widely supported by representatives of the private, public and academic sectors of the civil engineering profession.



## Student Learning Outcomes

Graduates of the Master of Engineering in Civil Engineering (MEng CE) program will be able to:

- Demonstrate competence in computer simulation in civil engineering.
- Demonstrate competence in sustainable engineering design.
- Identify, evaluate, and apply project management tools and techniques to engineering issues as they pertain to intra-disciplinary and inter-disciplinary teams.
- Research, analyze and communicate information related to advanced topics and designs.
- Demonstrate the knowledge, tools and techniques associated with advanced topics and designs.

The Master of Engineering in Civil Engineering (MEng CE) program contains three (3) required courses that are common to each area of specialization; Project Management Principles and Practices, Engineering Modeling and Analysis Methods and Environmental Systems. To complete the thirty (30) credit graduate program students are required to take four (4) courses in their area of MEng CE specialization and two (2) other relevant graduate courses. The culminating experience of the MEng CE program is a final capstone design course.

## MEng CE Courses and Areas of Specialization

*All courses are three (3) credits unless otherwise noted*

### Required Courses

CIVE8000	Project Management Principles and Practices
CIVE8100	Engineering Modeling and Analysis Methods
CIVE8200	Environmental Systems
CIVE8950	Master of Engineering Civil Engineering (MEng CE) Capstone

### Construction Area of Specialization

CIVE8250	Engineering Estimating and Scheduling
CIVE8350	Construction Operations, Methods and Quality Control
CIVE8450	Temporary Structures
CIVE8550	Site Planning and Development

### Infrastructure Area of Specialization

CIVE8300	Traffic Analysis and Safety
CIVE8400	Highway Design and Transportation Planning
CIVE8500	Geotechnical Engineering for Infrastructure
CIVE8600	Advanced Concrete and Steel Design
CIVE8700	Bridge Design
CIVE8800	Infrastructure Renewal

## Degree Details

Total credits for degree: 30

MEng CE students may select courses with the approval of the Department Chair, graduate courses from Wentworth's Master of Science in Construction Management (MSCM) and Master of Science in Facility Management (MSFM) graduate programs, specifically;

CONM7100	Modern Construction Delivery Methods
CONM7200	Construction Law for Construction Management
CONM7300	Real Estate for Construction Management
FMGT7200	Energy/Sustainability
FMGT7300	Facility Operations

# Recommended Schedule MEng CE Construction Specialization

All courses are three (3) credits unless otherwise noted

## YEAR ONE

### Semester One

CIVE8000	Project Management Principles and Practices
CIVE8200	Environmental Systems

### Semester Two

CIVE8100	Engineering Modeling and Analysis Methods
CIVE8250	Engineering Estimating and Scheduling

### Semester Three

CIVE8450	Temporary Structures
and one (1) CIVE/CONM/FMGT course subject to availability	
CIVE8300	Traffic Analysis and Safety
CIVE8350	Construction Operations, Methods and Quality Control
CIVE8400	Highway Design and Transportation Planning
CIVE8500	Geotechnical Engineering for Infrastructure
CIVE8600	Advanced Concrete and Steel Design
CIVE8700	Bridge Design
CIVE8800	Infrastructure Renewal
CONM7100	Modern Construction Delivery Methods
CONM7200	Construction Law for Construction Management
CONM7300	Real Estate for Construction Management
FMGT7200	Energy/Sustainability
FMGT7300	Facility Operations

## YEAR TWO

### Semester One

CIVE8550	Site Planning and Development
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and  
Select one (1) CIVE/CONM/FMGT course subject to availability

*All courses are three (3) credits unless otherwise noted*

CIVE8300	Traffic Analysis and Safety
CIVE8350	Construction Operations, Methods and Quality Control
CIVE8400	Highway Design and Transportation Planning
CIVE8500	Geotechnical Engineering for Infrastructure
CIVE8600	Advanced Concrete and Steel Design
CIVE8700	Bridge Design
CIVE8800	Infrastructure Renewal
CONM7100	Modern Construction Delivery Methods
CONM7200	Construction Law for Construction Management
CONM7300	Real Estate for Construction Management
FMGT7200	Energy/Sustainability
FMGT7300	Facility Operations

### Semester Two

CIVE8950	Master in Engineering for Civil Engineering Capstone (3)
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and  
Select one (1) CIVE/CONM/FMGT course subject to availability

*All courses are three (3) credits unless otherwise noted*

CIVE8300	Traffic Analysis and Safety
CIVE8400	Highway Design and Transportation Planning
CIVE8500	Geotechnical Engineering for Infrastructure
CIVE8600	Advanced Concrete and Steel Design
CIVE8700	Bridge Design
CIVE8800	Infrastructure Renewal
CONM7100	Modern Construction Delivery Methods
CONM7200	Construction Law for Construction Management
CONM7300	Real Estate for Construction Management
FMGT7200	Energy/Sustainability
FMGT7300	Facility Operations

Total credits for degree: 30

## Recommended Schedule MEng CE Infrastructure Specialization

*All courses are three (3) credits unless otherwise noted*

### YEAR ONE

#### Semester One

CIVE8000	Project Management Principles and Practices
CIVE8200	Environmental Systems

#### Semester Two

CIVE8100	Engineering Modeling and Analysis Methods
CIVE8300	Traffic Analysis and Safety *

#### Semester Three

CIVE8400	Highway Design and Transportation Planning *
CIVE8500	Geotechnical Engineering for Infrastructure *

### YEAR TWO

#### Semester One

CIVE8600	Advanced Concrete and Steel Design *
CIVE8700	Bridge Design *

#### Semester Two

CIVE8800	Infrastructure Renewal *
CIVE8950	Master of Engineering in Civil Engineering Capstone

\* Students may opt to replace a maximum of two courses with any available (3) credit CIVE course and/or any of the following electives:

CONM8300	Real Estate for Construction Management
CONM8400	Construction Law for Construction Management
CONM7100	Modern Construction Delivery Methods
FMGT7200	Energy/Sustainability
FMGT7300	Facility Operations

Total credits for degree: 30

# Computer Science and Networking (MSACS) Program

## Leading to a Master of Science in Applied Computer Science Degree

The Master of Science in Applied Computer Science (MSACS) program is designed to educate professionals in the application of technical computing and management skills required to plan, design, implement, deploy, and operate computer-based solutions within an organization. This 100% online program is designed for part-time students and can be completed in under two (2) years. Candidates should be able to demonstrate competencies in three (3) areas: programming, fundamentals of computer science (including computer organization, operating systems, databases, and data communication), as well as statistics.

### Mission, Goals and Outcomes

#### Mission

The Master of Science in Applied Computer Science (MSACS) program at Wentworth Institute of Technology is designed to educate professionals in the application of technical computing and management skills required to plan, design, implement, deploy and operate computer-based solutions within an organization.

#### Goals

The MSACS program will provide graduates with the knowledge and skill sets needed to successfully function in middle and upper level Applied Computer Science positions with a technical focus, including leading teams of professionals. The MSACS will be to link theory and practice to create real world applications and value, create and introduce new software and technology, and apply basic managerial skills to provide leadership to a computing team.

#### Student Learning Outcomes

Graduates of the Master of Science in Applied Computer Science graduates will:

- Demonstrate and function effectively in a team, engage in the process of modeling, designing, and implementing computer-based systems of varied complexity utilizing multiple technologies.
- Maintain effective communication with stakeholders in a typical software development environment by preparing and delivering effective technical presentations using appropriate technologies writing clear and accurate technical documents.
- Learn new models, techniques, and technologies as they emerge, and appreciate the necessity for continuing professional development.
- Demonstrate an ability to model, analyze and design computing processes and systems.
- Analyze a current significant software technology, articulate its strengths and weaknesses, and specify and promote improvements or extensions to that technology.
- Recognize and analyze social and professional issues and responsibilities faced by computing professionals.

#### Degree Details

*All courses are three (3) credits unless otherwise noted*

#### Required Courses

COMP7000	Foundations of Computer Science
COMP7050	Programming Paradigms and Systems
COMP7100	Managing Software Development
COMP7150	Data Science and Web Services
COMP7200	Mobile Application Development
COMP7250	Enterprise Computing

COMP7300	Computer Security
COMP7500	MSACS Capstone

### Computing Electives

COMP7400	Big Data
COMP7425	Data Mining
COMP7450	Software Engineering

### Management Electives

MGMT7100	Project Management Applications
MGMT7200	Leadership
TMGT8000	Strategic Technology Business Management
TMGT8100	Management of New Product Development

Total credits for degree: 30

### Recommended Schedule

*All courses are three (3) credits unless otherwise noted*

#### YEAR ONE

##### Semester One

COMP7000	Fundamentals of Computer Science
COMP7050	Programming Paradigms and Systems

##### Semester Two

COMP7100	Managing Software Development
COMP7150	Data and Web Services

##### Semester Three

COMP7200	Mobile Application Development
COMP7250	Enterprise Computing

#### YEAR TWO

##### Semester One

COMP7300	Computer Security
MGMT/TMGT	Management Elective

##### Semester Two

COMP ELECTIVE	Computing Elective
COMP7500	MSACS Capstone

Total credits for degree: 30

# Master of Science in Project Management (MSPM) program Leading to a Master of Science in Project Management Degree

to advance their technical skills while learning the most up-to-date and innovative management strategies. In this program, students will gain valuable, hands-on experience in initiating, planning, executing, controlling, and closing a project—on time and on budget—using the latest project management software and technology. Our unique mix of courses, including Troubled Projects, ERP, and Virtual Project Management, will give you a competitive advantage in today’s rapidly changing IT environment and can get you well on the road to becoming a skilled project manager in as little as two years.

## *Program Objectives*

- Create, manage and deliver a project plan from inception to completion, including project scope, risk, quality and performance metrics
- Evaluate potential projects and justify the selection of an appropriate project portfolio
- Effectively communicate and ethically manage project teams, including virtual teams, using appropriate project management tools and techniques
- Manage ERP projects and gain efficiencies through business process integration and automation.

## *Student Learning Outcomes*

- Upon completion, Master of Science in Project Management graduates will be able to:
- Create, manage and deliver a project plan from inception to completion, including project scope, risk, quality and performance metrics
- Evaluate potential projects and justify the selection of an appropriate project portfolio
- Effectively communicate and ethically manage project teams, including virtual teams, using appropriate project management tools and techniques
- Manage ERP projects and gain efficiencies through business process integration and automation

## *Degree Details*

All courses are three (3) credits unless otherwise noted

## *Required Courses*

MGMT7025	Project Scheduling and Cost Planning
MGMT7125	Risk Management
MGMT7450	Communication Strategies
MGMT7225	Project Team Building and Leadership
MGMT7325	Agile Project Management
MGMT7425	Managing Troubled Projects
MGMT7525	Global and Virtual Project Management
MGMT7625	Managing Enterprise Resource Planning (ERP) Systems)
MGMT7725	Portfolio and Program Management
MGMT7825	MSPM Capstone

## **Recommended Schedule for MS in Project Management (MSPM)**

All courses are three (3) credits unless otherwise noted

### **YEAR ONE**

#### **Semester One**

MGMT7025	Project Scheduling and Cost Planning
MGMT7125	Risk Management

## Semester Two

MGMT7450	Communication Strategies
MGMT7225	Project Team Building and Leadership

## Semester Three

MGMT7325	Agile Project Management
MGMT7425	Managing Troubled Projects

## YEAR TWO

### Semester One

MGMT7525	Global and Virtual Project Management
MGMT7625	Managing Enterprise Resource Planning (ERP) Systems

### Semester Two

MGMT7725	Portfolio and Program Management
MGMT7825	MSPM Capstone

Total credits for degree: 30 (36 with optional thesis)

## PROFESSIONAL UNDERGRADUATE CERTIFICATES

### Admissions Requirements

- Online Application
- Current Resume
- \$50 Application Fee

## Professional Certificate in Facilities Management

### *Student Learning Outcomes*

Earning a certificate in Facilities Management from Wentworth enables you to:

- Be eligible for 19 credits toward our Bachelor of Science in Facility Management
- Prepare for the Certified Facilities Manager exam, which offers a competitive career advantage
- Master the fundamentals of handling financial resources for facilities management
- Gain valuable leadership and project management skills

Wentworth's Facilities Management Certificate program is designed for both professionals in the field looking for credentials to prepare for the Certified Facility Manager exam from the International Facilities Management Association (IFMA) and for professionals who are looking to apply and build their experience toward a new, but related career.

Students will learn critical project management, real estate, property development, and financial skills that will enable you to rapidly advance your career in facilities management. Additionally, all the courses transfer into the Bachelor of Science in Facility Management degree when you decide to continue your studies.

The certificate in Facilities Management is awarded upon successful completion of the required six (6) courses. Each course takes only seven weeks to complete and they range from 3-to-4 credits. Throughout the program, you will enjoy access to all of Wentworth's resources and support services; including the library, academic advising, career counseling and technical support. 19 credits transferrable toward the CPCE Bachelor of Science in Facility Management Degree Seven weeks per course.

## Certificate Details

### Required courses

BLDG1900	Basic Building Services (4 credits)
CPFM2000	Introduction to Facility Management (3 credits)
CPFM3200	Project Management for Facility Managers (3 credits)
CPFM4100	Facility Assessment and Forecasting (3 credits)
CPFM4200	Energy and Sustainability (3 credits)
CPFM4600	Principles of Real Estate and Property Management (3 credits)

Total credits 19

## Professional Certificate in Managing Construction Projects

### Student Learning Outcomes

Earning a certificate in construction management from Wentworth enables you to:

- Be eligible for 20 credits toward our bachelor's degree program in Construction Management.
- Build core competencies in management theory, estimating, scheduling, control, contracts and codes.
- Gain valuable leadership skills to advance your construction career.
- Prepare for project management and related positions in private, non-profit and government sectors.

Wentworth's Managing Construction Projects certificate is designed for individuals who are interested in transitioning into a management-focused position in the construction industry. Students in this program build core competencies in: management theory, estimating, scheduling, control, contracts, and codes.

This program is conveniently formatted for adult learners, with 7-week courses that allow you to quickly gain career-enhancing skills. A certificate in managing construction projects will be awarded upon successful completion of the required five (5) courses.

## Certificate Details

### Required Courses

BLDG1015	Construction Graphics (4 credits)
BLDG1500	Construction Estimating (4 credits)
BLDG3200	Construction Project Scheduling (4 credits)
BLDG3450	Construction Project Control and Cost Analysis (4 credits)
BLDG3600	Construction Management Theory (4 credits)

Total credits 20

## Professional Certificate in Project Management (on-line)

### Admission Requirements

Applicants to the Project Management certificate program have three years of workforce experience.

### Student Learning Outcomes

Earning a certificate in construction management from Wentworth enables you to:

- Be eligible for 21 credits toward our Bachelor of Science in Project Management
- Prepare for the Project Management CAPM exam, which offers a competitive career advantage
- Master the fundamentals of handling the variety of resources for project management
- Gain valuable leadership and management skills



The online Project Management Certificate at Wentworth Institute of Technology provides professionals with the career-enhancing skills needed to assume project management and related positions in the private, non-profit, and government sectors. Through this certificate students are exposed to strategic leadership methods, project planning and control techniques, team management skills, and risk control.

### *Certificate Details*

#### *Required Courses*

MGMT2100	Management Communications (4 credits)
MGMT1010	Introduction to Project Management (4 credits)
MGMT2300	Organizational Behavior (3 credits)
MGMT3300	Project Planning & Control (4 credits)
MGMT2600	Project Risk Management & Evaluation (3 credits)
MGMT3750	Project Evaluation and Performance (3 credits)

Total Credits 21

### **Professional Certificate in Land Surveying (PLS)**

This Professional Land Surveying Certificate is intended for professionals currently working in the land surveying field, who are seeking to become a registered Professional Land Surveyor in Massachusetts. Competencies learned will be field measurement, survey calculations, evidence gathering and assessment, boundary determination, publication and presentation of final survey results, and the applicability of emerging technologies.

The PLS program is designed to be completed in one academic year when students complete 2 courses per semester. Students may opt to complete the program over a two-year period.

Students are allowed to transfer in one course in the PLS program.

#### *Professional Land Surveying (PLS)*

### **One Year**

#### **First Semester (total credits 7)**

SURV1100	Overview of Surveying Technology (3 credits)
SURV1200	Surveying Measurement I (4 credits)

#### **Second Semester (total credits 7)**

SURV1500	Legal Aspects of Land Surveying I (3 credits)
SURV2200	Surveying Measurement II (4 credits)

#### **Third Semester (total credits 6)**

SURV2250	Massachusetts Regulations Affecting the Surveying Profession (3 credits)
SURV2500	Legal Aspects of Land Surveying II (3 credits)

## **NON-CREDIT (CEU) UNDERGRADUATE CERTIFICATES**

### **Project Management (Online)**

Courses are designed to be taken one at a time and in sequence. A certificate will be awarded upon successful completion of the required five courses. Students earn 14 Continuing Education Units (CEU's) and can transfer up to 8 credits in general electives toward the Bachelor's in Project Management.

### **Managing Construction Projects**

Courses are designed to be taken one at a time and in sequence. A certificate will be awarded upon successful completion of the required five courses. Students earn 14 Continuing Education Units (CEU's) and can transfer up to 8 credits in general electives toward a bachelor degree program.

### **Facility Management**

Courses are designed to be taken one at a time and in sequence. A certificate will be awarded upon successful completion of the required four courses. Students earn 8.4 Continuing Education Units (CEU's) and can transfer up to 8 credits in general electives toward a bachelor degree program.

### **Building Information Modeling (BIM)**

Courses must be taken one at a time and in sequence. A certificate will be awarded upon successful completion of the required upon completion of the required two core courses and one of the electives. Students earn 6.3 Continuing Education Units (CEU's) and can transfer up to 4 credits in general electives toward a bachelor degree program.

### **Construction**

Courses are designed to be taken one at a time and in sequence. A certificate will be awarded upon successful completion of the required four courses. Students earn 14 Continuing Education Units (CEU's) and are eligible to receive 8 credits toward the associate degree in Building Construction. Credit will be granted for the Construction Methods and Construction Estimating undergraduate courses.

## **WORKFORCE TRAINING PROGRAMS: NON-CREDIT (CEU) COURSES**

### **Cisco Certified Network Associate (CCNA)**

Courses must be taken one at a time and in sequence. Students will be prepared to take the Cisco CCENT or Cisco CCNA certification exam. A certificate of completion will be awarded upon successful completion of the required four courses. Students earn 11.2 Continuing Education Units (CEU's).

### **Journeyman Electrician**

Courses are designed to be taken one level per semester in 4 semesters.

### **Electrician and System Installer Exam Information**

For exam information please call PSI at 800-733-9267 or visit [www.psiexams.com](http://www.psiexams.com) or visit the State Licensing Board at [www.mass.gov/ocabr/licensee/dpl-boards/el/forms/examinations](http://www.mass.gov/ocabr/licensee/dpl-boards/el/forms/examinations).

## **Master Electrician**

Students earn 15 Continuing Education Units (CEU's).

## **Autocad**

Students earn 4.8 Continuing Education Units (CEU's).

## **Fundamental of Engineering Review**

Students can choose from one of the following concentrations: Electrical, Mechanical, and Civil, and can earn from 3.0 – 3.6 Continuing Education Units (CEU's).

## **State Construction Supervisor License Commercial**

Students earn 2.1 Continuing Education Units (CEU's). Once students pass and provide a certified copy of the Massachusetts State Construction Supervisor License, they are eligible to receive four (4) credits of advanced standing towards the associate degree in Building Construction Management for Contracts and Codes.

## **Machine Tooling and Set Up**

Courses are designed to be taken one level at a time and in sequence. Students earn 31.5 Continuing Education Units (CEU's).

## **Welding**

Courses are designed to be taken one level at a time and in sequence. Students earn 9.0 Continuing Education Units (CEU's) per course. Students are assisted in completing American Welding Society (AWS) certifications. They are also instructed on how to maintain certification every six months. For more information about the certification, please visit [www.aws.org/certification/CW](http://www.aws.org/certification/CW).

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## ARCHITECTURE

### **ARCH 0100 SUMMER FAB: THINKING & MAKING**

This summer fabrication program bridges and connects thinking of architecture with making architecture. Students experience in a short timeframe all phases of a complete architectural project; from initial design concepts through development and refinement and including realization as a full-scale construction site. By intertwining thinking and making a process of design from beginning to end, we convey understanding, crucial for designers, that making is a form of thinking. Project sites typically will be located in Boston, either campus or community based. Projects, typically conceived as temporary, will generally be small in size, scale or both. They might include, for example, installations (as within a gallery setting), furniture (including near-furniture or furniture-like elements), or site-specific interventions (either outdoors or within existing structures). (4 credits) summer

Prerequisite: High School Summer Program

### **ARCH 1000 STUDIO 01**

This foundation studio focuses on techniques of visualization and representation (freehand drawing skills and model making) as they pertain to beginning design. Students develop fundamental design skills through orthographic drawing (plan, section & elevation), perspective drawing, model making and diagramming. (6 credits) fall

### **ARCH 1500 STUDIO 02**

This foundation studio studies general concepts of space, form, material and structure by using techniques in architectural representation and visualization, through a series of design problems. (6 credits) spring

Prerequisite: ARCH1000

### **ARCH 2000 STUDIO 03**

This studio course explores conceptual design through a series of elemental architectural exercises. Topics pertinent to the student's concentration are addressed. (6 credits) fall

Prerequisite: ARCH1500

### **ARCH 2100 HISTORY/THEORY 01**

This lecture course surveys world architecture, urbanism and landscapes from the ancient world through roughly 1700 CE. Lectures shall discuss architecture as a form of cultural expression and in relation to the artistic, political, religious, scientific, technological, and social developments. (4 credits) fall

### **ARCH 2200 TECHNOLOGY 01**

This lecture and workshop-based course focuses on site design skills and concepts, in urban and non-urban environments. The course also includes principles of building siting/orientation and an introduction to passive environmental building strategies. (4 credits) fall

### **ARCH 2222 AXP ARCHITECTURE EXPERIENCE PROGRAM**

Through AXP student learn about the daily realities of architectural practice, acquire comprehensive experience in basic practice areas, explore specialized areas of practice, develop professional judgement, and refine their career goals. The AXP is developed and administered by the National Council of Architectural Registration Boards (NCARB). In most jurisdictions, completion of the AXP is a requirement for initial registration. The AXP identifies the tasks that are essential for competent practice. The program is structured to prepare students to practice architecture independently upon initial registration. (0 credits) fall

Prerequisite: enrollment in the B.S. Arch program.



## **ARCH 2225 PRO PRACTICE PREP**

Through independent learning, this roughly ten-hour course introduces a systematic approach to architectural contract drawing (CDs), architects' drawings to communicate design intent clearly. "Picking up redline" marks - refining CDs reiteratively - is a most common assignment for entry-level staff. Materials in this course provide basic vocabulary and technical logic in the organization of a set of drawings that includes: 1) many scales (from the site plan to the detail drawing) and; 2) many disciplines (the building engineering disciplines - structural and MEP design - as well as other such as landscape architecture). Materials provide two different types of resources: readings and quizzes about the contract drawing set, and drawing a project using the software Revit. (0 credits) spring

## **ARCH 2500 STUDIO 04**

This studio course explores architectural design through a series of problems increasing in scale, complexity and length throughout the semester. (6 credits) summer

Prerequisites: ARCH2000 and ARCH2200

## **ARCH 2600 HISTORY/THEORY 02**

This lecture course surveys world architecture, urbanism and landscapes from 1700 CE to the 1960's. Lectures discuss architecture as a form of cultural expression and in relation to artistic, political, religious, scientific, technological and social developments. (4 credits) summer

## **ARCH 2700 TECHNOLOGY 02**

This lecture and workshop-based course focuses on architectural methods for achieving visual, thermal and acoustical comfort in buildings using climate, form, orientation, materials and structure. (4 credits) summer

Prerequisites: ARCH2200, and sophomore status in B.S.Arch

## **ARCH 2990 INDEPENDENT STUDY ARCHITECTURE**

This course investigates a topic of special interest to faculty and students that is outside regular course offerings. (0 - 6 credits)

Prerequisite: Consent of department head and instructor.

## **ARCH 3000 STUDIO 05**

This studio course explores architectural design through a series of problems increasing in scale, complexity and length throughout the semester. (6 credits) fall

Prerequisites: ARCH2500; sophomore status in B.S.Arch

## **ARCH 3200 TECHNOLOGY 03**

This lecture and workshop-based course focuses on architectural methods for achieving visual, thermal and acoustical comfort in buildings using passive and active systems. Building system technologies are addressed. (4 credits) fall

Prerequisites: ARCH2700 and junior status in B.S.Arch program

## **ARCH 3400 STRUCTURES I**

Students learn how loads are applied and distributed, and how to analyze beams and trusses. Both the method of joints and the method of sections will be used. Basic principles of strength of materials, structural mechanics and structural analysis are presented. (3 credits) fall

Prerequisite: ARCH2000; junior status in B.S.Arch program

## **ARCH 3500 STUDIO 06**

This studio course explores architectural design through a series of problems increasing in scale, complexity and length throughout the semester

Prerequisites: ARCH2200, ARCH2700, ARCH3000, ARCH3200 and ARCH3400; junior status in B.S.Arch program. (6 credits) spring

Corequisite: ARCH3900

## **ARCH 3700 CONCENTRATION STUDIES 01**

This course addresses introductory topics pertinent to the student's chosen concentration: Adaptive Interventions, Emerging Technologies or Urbanism. Contemporary issues in the field are addressed through readings, discussion, analysis, writing and projects. (4 credits) spring

Prerequisite: junior/ senior status in B.S.Arch program.

## **ARCH 3750 CONCENTRATION STUDIES 02**

This course addresses advanced topics pertinent to the student's chosen concentration: Adaptive Interventions, Emerging Technologies or Urbanism. Contemporary issues in the field are addressed through readings, discussion, analysis, writing and projects. (4 credits) fall

Prerequisite: junior/ senior status in B.S.Arch program.

## **ARCH 3800 SPECIAL TOPICS ARCHITECTURE**

Presents topics that are not covered by existing courses and are likely to change from semester to semester. Refer to the Class Schedule for a specific semester for details of offerings for the semester. (4 credits) spring and fall

## **ARCH 3850 SPECIAL TOPICS ARCHITECTURE**

Presents topics that are not covered by existing courses and are likely to change from semester to semester. Refer to the Class Schedule for a specific semester for details of offerings for the semester. (4 credits) spring and fall

## **ARCH 3900 STRUCTURES II**

Students analyze more complex systems and design beams and columns in wood, steel, and concrete. Topics include analysis of continuous beams and rigid frames, loads on structural systems, grids & pattern layout and funicular structures (cables and arches). (3 credits) spring

Prerequisite: ARCH3400

## **ARCH 4000 STUDIO 07 (URBANISM)**

This studio course introduces topics of design in the urban realm. Students engage with complex issues and agendas, and develop proposals in response to the physical, cultural, and social contexts that inform design at the urban scale. Topics pertinent to the Urbanism concentration are addressed. (6 credits) fall

Prerequisites: ARCH3500; junior status in B.S.Arch, and Urbanism concentration status.

## **ARCH 4025 STUDIO 07 (EMERGING TECH)**

This studio course introduces topics of design in the urban realm. Students engage with complex issues and agendas, and develop proposals in response to the physical, cultural, and social contexts that inform design at the urban scale. Topics pertinent to the Emerging Technologies concentration are addressed. (6 credits) fall

Prerequisites: ARCH 3500; junior status in B.S.Arch, and Emerging Technologies concentration status.

## **ARCH 4050 STUDIO 07 (ADAPT INTRVENTIONS)**

This studio course introduces topics of design in the urban realm. Students engage with complex issues and agendas, and develop proposals in response to the physical, cultural, and social contexts that inform design at the urban scale. Topics pertinent to the Adaptive Interventions concentration are addressed. (6 credits) fall

Prerequisites: ARCH 3500; junior status in B.S.Arch, and Adaptive Interventions concentration status.

## **ARCH 5500 STUDIO 08**

This studio course proposes design topics grounded in a research agenda that informs the design process. The range and scale of projects vary; students initiate a single original design project. (6 credits) spring

Prerequisite: ARCH4000 or ARCH4025 or ARCH4050

## **ARCH 7000 GRADUATE FOUNDATION STUDIO 01**

This studio addresses graduate level design topics dedicated to students in the two year Master of Architecture program. (6 credits) fall

Prerequisite: Enrollment in two-year Master of Architecture program. Please refer to the Design Studio Grade Requirement regarding the final grade for this course.

## **ARCH 7250 GRADUATE HISTORY THEORY LECTURE**

This lecture course surveys world architecture, urbanism and landscapes from the ancient world through roughly 1600 CE. Lectures shall discuss architecture as a form of cultural expression and be presented in relation to artistic, political, religious, scientific, technological, and social developments. (4 credits) fall

## **ARCH 7350 2D + 3D MEDIA & PROCESSES**

Requirement for incoming three-year graduate students. The course introduces and applies fundamental manual drawing techniques and logics essential to the development of spatial and critical thinking skill sets and practice as well as digital 2D and 3D translations. (4 credits) fall

## **ARCH 7500 GRADUATE FOUNDATIONS STUDIO 02**

This studio focuses on techniques of visualization and representation (freehand drawing skills and model-making) as they pertain to beginning design. Students continue to develop fundamental design skills through orthographic drawing (plan, section and elevation), perspective drawing, model-making and diagramming. Fundamental digital skills are explored. General concepts of space, form, material and structure are investigated by using techniques in architectural representation and visualization in a series of design problems. (6 credits) spring

Prerequisite: ARCH7000

## **ARCH 7550 GRADUATE HISTORY THEORY SEMINAR**

This seminar builds on core themes and topics introduced in the Graduate History Theory Lecture, surveying world architecture, urbanism and landscapes from roughly 1600 CE to present. Graduate students concentrate on focused research and themes, critical writing and research at the graduate level is emphasized. Required for three-year graduate students. (4 credits) spring

Prerequisite: ARCH7250; for two-year students: previous relevant history theory course work

## **ARCH 7600 TECHNOLOGY 02**

Technology 02 introduces the theory and application of climate, energy use and comfort as determinants of architectural form. Emphasis is on architectural methods for climate adaption using non-mechanical means (climate, shape, orientation, material and structure) for ventilating, cooling, heating and lighting envelope-load dominated buildings. (4 credits) spring

## **ARCH 8000 ADVANCED GRADUATE DESIGN STUDIO 01**

This design course focuses on the development of highly detailed design proposals, integrating knowledge of building materials and systems within the framework of well-articulated and advanced design intentions. (6 credits) fall

Prerequisite: ARCH7000 and ARCH7300

## **ARCH 8250 ADVANCED TECHNOLOGY & MATERIALS**

This lecture and workshop-based course focuses on site and architecture design skills and concepts, in urban and non-urban environments. The course also includes principles of building siting/orientation and an introduction to passive environmental building strategies. Emphasis on materials, formal logics and structural relationships at multiple scales will be investigated. (4 credits) spring

## **ARCH 8300 APPLIED RESEARCH & DESIGN 01**

Focus on advanced studies Research & Design methodologies through a series of explorative projects & presentations. Methodologies & Strategies are explored so as to instill a clear understanding of advanced research at the graduate level. (4 credits) fall

## **ARCH 8500 ADVANCED GRADUATE DESIGN STUDIO 02**

This design course focuses on the development of highly detailed design proposals, integrating knowledge of building materials and systems within the framework of well-articulated and advanced design intentions. (6 credits) spring

Prerequisite: ARCH 8350 and ARCH8400 and ARCH7000

## **ARCH 8650 FABRICATION METHODS**

With a focus on making as a means of applied research, graduate students work with both manual + digital fabrication tools, techniques and fabrication methodologies. Design and Applied Research will range in scale and scope from the making of artifacts to prototyping to one to one scale manufacturing. (4 credits) spring

## **ARCH 8700 APPLIED RESEARCH & DESIGN 02**

Applied Research & Design 02 focuses on visual methodologies through a series of explorative projects & presentations. Visual research methodologies & strategies are introduced through a series of case studies and precedents. Graduate level criteria & expectation are to be met. (4 credits) spring

Prerequisite: ARCH8300

## **ARCH 8750 CONCENTRATION STUDIES**

Concentration Studies offers topics pertinent to Urbanism, Emerging Technologies or Adaptive Interventions with an emphasis on relevant models of research within the selected discipline of the concentration. Contemporary issues in the field are addressed through readings, discussions, analysis, writing and projects. (4 credits) fall or spring

Prerequisite: ARCH7000

## **ARCH 8800 STRUCTURES 02**

Introduction to behavior and analysis of more complex systems and design of beams and columns in wood, steel and concrete. Topics include analysis of continuous beams/rigid frames, loads on structural systems, grids/pattern layout and funicular structures (cables and arches). (3 credits) spring

Prerequisite: ARCH 8400

## **ARCH 9000 STUDIO 09: SPECIAL TOPICS**

This studio addresses design topics relevant to graduate level study. Students integrate the major architectural issues emphasized in the previous studios in a single design project. (6 credits) fall

Prerequisite: M.Arch status. Corequisite: ARCH9200 and ARCH 9300

## **ARCH 9200 THESIS PREP 01**

This course examines the theoretical underpinnings and methodologies pertinent to research in architecture. Students come to understand how researchers conduct architectural research, with the goal of preparing their own thesis agenda. (4 credits)

Prerequisite: MArch status; ARCH9000

## **ARCH 9300 THESIS PREP 02**

Students prepare the groundwork for their thesis project through research and development of an architectural program, site analysis, and design methods that support an original design project in Studio 10: Thesis. (4 credits)

Prerequisite: MArch status; ARCH9000

## **ARCH 9500 STUDIO 10: THESIS**

Students pursue a final thesis design of a project of their own definition, as developed during the fall semester in ARCH9200 Thesis Preparation I and ARCH9300 Thesis Preparation II. (6 credits)

Prerequisite: M.Arch status; ARCH9000, ARCH9200, and ARCH9300

Corequisite: ARCH9700

## **ARCH 9600 PROFESSIONAL PERSPECTIVES**

A comprehensive study of architectural practice, including project management, financial planning, organizational structure, scheduling, marketing, legal issues, and the roles and responsibilities of design professionals. (4 credits)

Prerequisite: M.Arch status

## **ARCH 9700 ADVANCED TOPICS 01**

This course addresses topics relevant to graduate study. Readings, discussion and analytical projects address contemporary issues in the field. (4 credits)

Prerequisites: M.Arch status; ARCH9000, ARCH9200, and ARCH 9300. Corequisite: ARCH9600

## **BIOLOGICAL ENGINEERING**

### **BIOE 2000 FUNDAMENTALS OF BIOLOGICAL ENGINEERING**

This course introduces students to the fundamental concepts of Biological Engineering. Knowledge of thermodynamics and fluid mechanics is critical for students to solve biological engineering problems. Students will learn about energy, entropy and enthalpy in their various forms in a biological setting. Students will also learn basic fluid statics and dynamics. These topics will be applied in assignments, exams and in the laboratory to solve biomedical and biochemical engineering problems. Case studies are presented to allow student to put together their knowledge gained in their topics to solve problems pertaining to human organ systems like heart, lungs and kidneys. (4 credits) fall

Prerequisite: CHEM1100 and ENGR1800

Co-requisite:PHYS1750

### **BIOE 2500 BIOLOGICAL INSTRUMENTATION AND MEASUREMENT**

Methods of using instrumentation for measurements in biological engineering are investigated in this course. Topics include the scientific method, sensors and physical phenomenon, data acquisition, analysis and statistics, and instruments for biological engineering. The laboratory exercises focus on the sensor interface, data acquisition, and development of software algorithms to analyze the data. (4 credits) spring

Prerequisite: ENGR1800, BIOL1100and BIOE2000

Co-requisite: CHEM1600

### **BIOE 2550 MICROFLUIDS**

Introduction to fundamental principles and methods of microfluidics including capillarity, low Reynolds number flows, diffusion, osmosis, electrical fields, flow through porous media, microfabrication and lateral flow assays with an emphasis on global health diagnostic technologies. Fluid dynamics concepts for bulk flows both in physiological systems and in terms of microfluidic tools for exploring transport phenomena of single cells and tissue scale systems will be covered. (4 credits)

Prerequisite: BIOE3025

### **BIOE 3025 BIOMATERIALS & TISSUE ENGINEERING**

The chemical and mechanical properties of materials for biological systems are investigated. Cell culture, scaffolds and constructs for tissue engineering application are explored. (4 credits) summer

Prerequisite: BIOE2000 and CHEM2400

### **BIOE 3500 GENETICS AND TRANSGENICS**

This course builds upon the conceptual and technical approaches learned in BIOL1100 and BIOE2000 in the context of genetics and genetic engineering. Students will apply their knowledge of gene expression to explore the growing field of genetic research and novel genomic therapies. Specifically, the course will focus on the molecular underpinnings of genome modification and methods used for harnessing molecular machinery to combat disease, modify resources and serve as important tools in research. Students will be immersed in current trends in genetic research, which range from applied classical genetics to the controversies surrounding genetic medicine and genomics. (4 credits) fall

Prerequisite: BIOL1100 and BIOE2000

### **BIOE 3550 UNIT OPERATIONS & PROCESS CONT**

This course introduces fundamental design and operation principles of biological engineering systems, including bioreactors, phase transfer, separation and other mass transfer operations. (4 credits) summer

### **BIOE 3650 COMPUTATIONAL BIOLOGY**

Introductions to concepts, techniques and programming skills for computational biology, including simulation and game theory. The system models include central control, multiple actor based, deterministic, stochastic, differential equations, and spatial representation and graphics (at least two dimensional). (4 credits)

Prerequisite: MATH2500 AND BIOE2500

## **BIOE 4000 CELL PHYSIOLOGY AND SIGNALING**

This course focusses on intercellular communication via chemical, electrical and mechanical stimuli. Topics include membrane-bound and intracellular receptor proteins, cellular responses to receptor activation, membrane potentials, sensory receptors and the endocrine and nervous organ systems. (4 credits) spring

Prerequisite: BIOL1100

## **BIOE 4500 BIOTRANSPORT PHENOMENA**

This course explores transport phenomena (momentum, heat, and mass transfer) as related to biological systems. This includes microscale and molecular processes for membrane transport and perfusion, such as diffusion, osmosis, passive and active transport, and electrophysiology. Dynamics of mechanical flow for fluid and heat are introduced for cells, tissues and organ systems. (4 credits) spring

Prerequisite: BIOE2000, BIOE2500 and MATH2500

2018-2019 Academic Catalog: Course Descriptions - Biology

## **BIOLOGY**

### **BIOL 1000 GENERAL BIOLOGY**

Introduces basic principles of biology, including cell structure and function, and metabolism; genetics; reproduction; theories of evolution; classifications of organisms; plant form and function, animal form and function; community ecology and ecosystems dynamics. Emphasis placed on scientific inquiry. (4 credits)

### **BIOL 1050 GENERAL BIOLOGY II**

Introduction to the evolution, biology and classification of vertebrates, including fish, amphibians, reptiles, birds and mammals. A comparative approach will be used to examine the respiratory, circulatory, endocrine, skeletal, nervous reproductive and digestive systems of vertebrates. Emphasis on evolution, speciation, behavior, spatial patterns, migration. Communications, thermal adaptations, communication, coloration and behavior of vertebrates may be emphasized. Lecture and laboratory components are included. (4 credits)

Prerequisite: BIOL1000

### **BIOL 1100 CELL & MOLECULAR BIOLOGY**

This course introduces basic principles of cellular and molecular biology. Topics include: properties of life, organic molecules, general features of cells, membrane structure, synthesis and transport, introduction to energy, enzymes and metabolism, cell respiration, photosynthesis, cell communication, extra cellular matrices, cell junctions, tissues, nucleic acid structure, DNA replication and chromosome structure, gene expression and regulation, mutation, the eukaryotic cell cycle, mitosis and meiosis, viruses and bacteria. (4 credits) fall, spring, summer

### **BIOL 1500 INTRODUCTION TO MEDICAL BIOTECHNOLOGY**

This course introduces students to the central dogma of molecular biology and to insights on how medical biotechnology applications can be used to solve important social and medical problems for the benefit of humankind. Students will learn essential molecular biology techniques commonly used in modern research labs, including preparation of biological reagents, use of expression vectors, selective growth and transformation of bacteria, DNA synthesis and polymerase chain reactions (PCR), subcloning, electrophoresis and the use of bioinformatics databases and algorithms to design and perform successful cloning experiments. (4 credits)

Prerequisite: BIOL1100

### **BIOL 1700 ANATOMY & PHYSIOLOGY I**

This course covers the basic structure and function of the human body as an integrated set of systems. Topics include: functional compartments of the cells and body, tissues, mechanisms of communication, integration and homeostasis, an overview of the endocrine, nervous and sensory systems and the integrative control and mechanisms of body movement. (4 credits) fall, spring

Prerequisite: BIOL1100

## **BIOL 1750 ANATOMY & PHYSIOLOGY II**

This course covers the basic structure and function of the human body as an integrated set of systems. Topics include an overview of the cardiovascular, circulatory, respiratory, excretory and digestive systems and energy balance. (4 credits) fall, spring

Prerequisite: BIOL1700

## **BIOL 2100 MICROBIOLOGY**

This course introduces those concepts that are basic to viruses and prokaryotic and eukaryotic cells. Topics include microbial growth, evolution and classification; descriptions of different prokaryotic, eukaryotic and other lifeforms and how they utilize these principles; the neutral ecology of microorganisms; the human use of microorganisms; and microorganisms function in disease. (4 credits) fall

Prerequisite: BIOL1100

## **BIOL 2200 ADVANCED MOLECULAR BIOLOGY**

This course takes an in depth look at the principles of modern molecular biology. Topics include: Organization of DNA into genomes, gene replication, recombination, repair and cellular responses to DNA damage, RNA transcription, structure, function, processing, and transport, protein translation and transport, cell cycle regulation, developmental regulation and modern application of molecular biology. Labs will provide foundational training for a range of techniques commonly employed in molecular biology and genetics followed by application of methods to complete inquiry-based projects. Prerequisite: BIOL1100

## **BIOL 2990 INDEPENDENT STUDY BIOLOGY**

This course investigates a topic of special interest to faculty and students that is outside existing course offerings. (1-4 credits)

Prerequisite: Consent of department head and instructor

## **BIOL 3000 GENES TO GENOMICS**

This course will explore the vast applications of genetics in biomedical science. Students will survey recently published primary research articles, read selected scientific literature and view relevant biomedical films or attend symposia in the Boston area, which emphasize the importance of genetics in biomedical progress. Topics will include: classical molecular genetics, genetic disease, genetic engineering, epigenetics and the social, moral, and ethical issues surrounding biomedicine. Moreover, students will be able to interact with leaders in the field of biomedicine during a series of guest lectures. The lab section will be used for independent research projects using *Drosophila melanogaster* to allow for application of genetic techniques, promoting an active learning experience. (4 credits) fall, summer

Prerequisite: BIOL1100, BIOL2200 and CHEM2400

## **BIOL 3750 MOLECULAR GENETICS & TRANSGENETICS**

This course will explore the vast applications of genetics in biomedical science. Students will survey recently published primary research articles, read selected scientific literature and view relevant biomedical films or attend symposia in the Boston area, which emphasize the importance of genetics in biomedical process. Topics will include: classical molecular genetics, genetic disease, genetic engineering, epigenetics and the social, moral and ethical issues surrounding biomedicine. Laboratories will be primarily research-driven using *Drosophila melanogaster* as a model organism. (4 credits)

Prerequisite: BIOL1100, BIOL2200 and CHEM2400

## **BIOL 3800 SPECIAL TOPICS IN BIOLOGY**

These courses present topics that are not covered by existing courses and are likely to change from semester to semester. Refer to the semester schedule for the courses offered. (1 - 4 credits)

## **BIOL 4400 SYNTHETIC BIOLOGY**

This course explores the artificial design and engineering of macromolecules, molecular motors, biological systems and living organisms. Computational tools are utilized and developed in the course for synthetic biology. (4 credits) summer

Prerequisite: BIOE2000, BIOE2500 and CHEM2400

## **BIOMEDICAL**

### **BMED 1000 INTRODUCTION TO BIOMED ENGINEERING**

The course introduces the field of biomedical engineering with class activities that expose students to biomedical engineering careers, devices and systems related to medical diagnosis, treatment and rehabilitation. The course will include guest lectures by professional experts such as practicing biomedical engineers, physicians, and healthcare industry representatives. (2 credits)

### **BMED 1599 QUANTITATIVE PHYSIOLOGY FOR ENGINEERS**

Physiology of humans is explored from cells and tissues to organs and systems. Understanding of physiology is sought from the aspects of functional and control systems, and quantitative relationships. Topics include cell structure and function, mechanisms of homeostasis, membrane transport and biopotentials, skeletal muscle and motor control, nervous system, cardiovascular system, respiratory system, integrative physiology, and applications of engineered designs interacting with physiological systems. The course is intended to prepare students who are not in the Biomedical Engineering (BBME) program, and wish to work on interdisciplinary engineering projects involving biomedical applications. (4 credits)

Prerequisite: MATH1750 or MATH1775

Corequisite: PHYS1750

### **BMED 2099 PHYSIOLOGY FOR ENGINEERS I**

Provides the foundations of biochemistry, cell metabolism, reproduction and genetics, microorganisms, cells as organ subsystems, cells' interaction with the environment. Will include laboratory projects and simulations. (4 credits)

Prerequisites: CHEM1100 AND PHYS1250; and MATH1750 OR MATH1775

### **BMED 2500 BIOMEDICAL ELECTRONICS & INSTRUMENTATION**

Introduction to biomedical electronics and instrumentation for clinical applications. Topics will include sensors for measurement of biomedical signals, bioelectric phenomena, nerve and muscle potentials, electrodes and amplifiers, electrocardiography, blood pressure, heart sounds, respiratory pressure, gas concentration, blood-gases, electromyography, electroencephalography, therapeutic and prosthetic devices, electrical safety of medical devices, and advances in medical instrumentation. (4 credits) spring

Corequisite: ELEC2699 and BIOL1750

### **BMED 2990 INDEPENDENT STUDY BIOMEDICAL**

This course investigates a topic of special interest to faculty and students that is outside regular course offerings. (1 – 4 credits)

Prerequisite: Consent of department head and instructor

### **BMED 3099 PHYSIOLOGY FOR ENGINEERS II**

Covers human physiology and anatomy, comparative physiology, the mechanism, types and prevention of diseases, and the environmental effects on human physiology. Will include laboratory projects and simulations. (4 credits)

Prerequisite: BMED2099 Physiology for Engineers I

### **BMED 3100 CLINICAL ENGINEERING PRACTICE**

This course covers the basic models of clinical engineering practices and the role of clinical engineers in health care delivery organizations such as hospitals and clinics. Topics include clinical engineering department operations, managing safety programs, technology assessment, medical equipment planning, acquisition, commissioning, and management, selection of equipment in the design of clinical facilities, safe, effective and ethical use of medical devices in compliance with applicable regulatory standards and a clinical engineering design project. (4 credits)

Prerequisite: BMED2500

Corequisite: MATH2750



## **BMED 3200 MEDICAL DEVICES AND SYSTEMS**

This course covers various types of medical devices and systems. The topics include biosensors, signal processing and analysis, cardiac diagnostic and therapeutic devices involving electrophysiology and hemodynamics, respiratory, renal and neural devices and systems in clinical practice, life support and life saving devices, implants and artificial organs, imaging systems, anesthesia machines, electrosurgical units, clinical laboratory equipment, Q.A., standards, regulatory affairs, FDA approval and medical device design. (4 credits)

Prerequisite: BMED2500

Corequisite: MATH2750

## **BMED 3800 SPECIAL TOPICS BIOMEDICAL ENGINEERING**

Presents topics that are not covered by existing courses and are likely to change from semester to semester. Refer to the Class Schedule for a specific semester for details of offerings for the semester. (1 – 4 credits)

## **BMED 4099 BIOMEDICAL SYSTEMS ENGINEERING**

Covers biomedical modeling, design, applications: instrumentation, clinical experiments, biostatistics, ethics, biomechanics, biomaterials, bio-fluids, bioelectricity, bio-signal and image processing, physiological control systems. Will include laboratory projects and simulations. (4 credits)

Prerequisites: Fifth-year status in BELM; BMED3099

## **BMED 4200 BIOMATERIALS AND TISSUE ENGINEERING**

This course covers the usage of biomaterials in biomedical engineering. Topics include the chemical structures, physical and mechanical properties of biomaterials, biomaterial degradation and processing, surface properties, protein and cell interactions with biomaterials, biomaterials implantation and acute inflammation, wound healing, immune response to biomaterials, biomaterials and thrombosis as well as infection, tumorigenesis and calcification of biomaterials. An overview of biomaterials applications and tissue engineering is provided and a biomaterials design project is required. (3 credits)

Prerequisites: BIOL1100 and CHEM1100 and MECH3599

## **BMED 4300 SIGNALS AND SYSTEMS FOR BIOMEDICAL ENGINEERING**

This course covers bioengineering signals and systems, signal processing, Fourier and Laplace transforms, transfer function, frequency selective filters, real time processing, adaptive filters, time-frequency and time-scale analysis, linear system identification, optimization, fuzzy models, compartment models and control systems. Selected biomedical applications include pulse oximetry, defibrillator output, blood pressure monitoring and closed-loop drug infusion control. (3 credits) spring

Prerequisites: BMED2500 and MATH2750

## **BMED 4400 BIOMECHANICS**

The overall objective of this course is to train students on problem-posing and problem-solving skills and illustrating how the fundamentals of mechanics are applied to biological problems. This course offers insight into the mechanics of hard tissue, musculoskeletal soft tissue, joint articulating surface motion, analysis of gait, mechanics of head and neck, biomechanics of chest and abdomen impact, cardiac biomechanics, heart and valve dynamics, molecular transport and regulation in microcirculation, modeling in cellular biomechanics and introduction to sports biomechanics. (4 credits) spring

Prerequisites: MECH3599 and MATH2750

## **BMED 4450 DESIGN PROSTHETICS AND IMPLANTS**

This course covers the design process of prosthetic devices and implants from concept development to launch from technical perspective to regulatory approvals. The students will learn how to use the engineering principles to develop prosthetic devices and implants for treatment of different disorders. Topics include concept development, design for manufacturing, design optimization and validation, material selection and regulatory approval. (4 credits) summer

Corequisites: BMED 4200 and BMED 4400

## **BMED 4500 ENGINEERING IN BIOMEDICINE**

This course includes lectures by practicing professionals from medical devices research and development, manufacturing, hospitals, and regulatory agencies. It also includes presentations on ongoing biomedical research projects on campus and student co-operative work experiences. The course will also address current trends and emerging challenges in the biomedical engineering field. (1 credit) summer

Prerequisite: Senior status

## **BMED 4550 MEDICAL ROBOTICS AND ASSISTIVE TECHNOLOGIES**

This course covers the design, control and application of medical robotics and assistive technologies. The course includes surgical navigation, image guided interventions, robot assisted surgeries, as well as other medical robotic applications. The course will also cover assisted technologies, identifying the needs of disabled people, and the design and application of assistive devices. (4 credits) summer

Prerequisites: BMED2500, BMED4400

## **BMED 4600 BIostatISTICS**

This course, intended primarily for biomedical engineering students, covers topics including descriptive statistics, probability, sampling, sampling distribution, estimation, linear regression, hypothesis testing, analysis of variance, Baye's theorem, probability distributions, multiple regressions, chi square distribution and other statistical methods to analyze biomedical data. Lab modules complement theoretical coverage and involve software applications and a group design project for medical applications. (4 credits) summer

Prerequisites: BIOL1100 and COMP1000 and MATH2025

## **BMED 4700 BIOMEDICAL ETHICS & REGULATORY AFFAIRS**

This course provides an overview of the ethical and regulatory affairs applied to biomedical engineering. The course covers ethics and Biomedical engineering practice and research, theories and principles of ethics, the code of ethics, ethical considerations in areas including clinical engineering, human enhancement, and implants. This course also covers medical devices and FDA regulatory requirements including medical device design control, review, testing, pre- and post-marketing and compliance. (2 credits)

Prerequisite: BMED4500

## **BMED 4800 MEDICAL INFORMATICS & TELEMEDICINE**

This course will expose the student to the fields of telemedicine and medical informatics. Topics include telemedicine technologies, telemedicine consultations, the importance of internet in telemedicine, mobile technology, healthcare data storage, healthcare data analytics, electronic health records and health information exchange, medical coding, health information privacy and security, and ethics in health informatics. (4 credits)

Prerequisites: COMP1000 and BMED2500

## **BMED 4850 MEDICAL IMAGING & OPTICS**

This course covers principles, operations and applications of diagnostic medical imaging systems including ultrasound, x-rays, computer tomography, and magnetic resonance imaging. The course also covers diagnostic applications of optics in medicine including microscopy, spectroscopy, and endoscopy. (4 credits)

Prerequisite: BMED2500

## **BMED 5000 BIOMEDICAL ENGINEERING SENIOR DESIGN I**

This is a course for seniors that allows them to work in a group or as an individual to further their studies in a project-oriented style. Students in this course will work on their area of focus by taking an interdisciplinary approach to solve a technological problem in the biomedical field. The work done in this course will be performed under the supervision of one or more faculty advisors. Oral and written progress reports are reviewed and iteratively refined throughout the semester. The technical report of the work at the end of the semester is coupled with a formal presentation to the class. This course is followed by BME Senior Design II. (3 credits)

Prerequisites: senior status and completion of one co-op in a medical organization or academic research

## **BMED 5050 ARTIFICIAL INTELLIGENCE AND ANALYTICS IN HEALTHCARE**

The Artificial Intelligence (AI) and Analytics in Healthcare course covers applications of AI theory in disease diagnosis and health data analytics. Topics include Artificial Neural Networks, Fuzzy Logic, Application of AI and Analytics in diagnosis of disease such as cancer, genetic programming for knowledge discovery in chest-pain diagnosis. Lab experiments will include development of AI models and algorithms that solve selected real-world medical and healthcare decision making problems. (4 credits) summer

Prerequisites: MATH2750 or Department approval

Corequisites: BMED4300 and BMED4600

## **BMED 5500 BIOMEDICAL SENIOR DESIGN II**

This course is a continuation of BME Senior Design I. Students are expected to continue with their design and development activities from the previous course and focus on design improvements and applications of the product. Supervising faculty and invited industry professionals will review the student's prototypes and make recommendations. Students will submit a report on the designed product and make a presentation to the class, supervisors, invited faculty, alumni and other interested parties. (3 credits)

Prerequisite: BMED5000

## **BUILDING**

### **BLDG 1015 CONSTRUCTION GRAPHICS**

The development and interpretation of civil, architectural, structural, and electrical drawings; freehand sketching of construction details and sections; computer-aided construction drafting. (4 credits)

### **BLDG 1050 CONTRACTS & CODES**

A comprehensive study of construction contracts including conditions of agreement and modifications. Students analyze the Massachusetts State Building Code as it applies to buildings. (4 credits)

Prerequisites: BLDG1015 and BLDG1100; or ARCT1150

### **BLDG 1100 CONSTRUCTION METHODS**

A detailed study of current methods and equipment used in timber, masonry and steel construction. Laboratory exercises emphasize plan reading. (4 credits)

### **BLDG 1500 CONSTRUCTION ESTIMATING**

The fundamentals of construction estimating are covered. Quantity surveys are made for various building components and prices determined for labor and materials, using a current pricing handbook. Standard estimators' forms are prepared. Computer techniques and applications are also examined. (4 credits)

Prerequisites: BLDG1015 and BLDG1100; or BLDG1015 and enrollment in the Professional Certificate in Managing Construction Projects

### **BLDG 1600 HORIZONTAL CONSTRUCTION**

Survey of current methods and equipment used in heavy construction projects including highways, tunnels, bridges, dams, storm drains and sanitary sewers. (4 credits)

Prerequisite: BLDG1100

### **BLDG 1800 CONCRETE CONSTRUCTION METHODS**

An introduction to reinforced concrete buildings with concentration on mix design and complete applications according to the ACI Standard Code, with emphasis on laboratory testing practices of fresh and hardened concrete. (4 credits)

Prerequisites: BLDG1100 and ARCT1000 or BLDG1015

## **BLDG 1900 BASIC BUILDING SERVICES**

Examines the basic building services, including heating, water, plumbing, drainage, ventilation, air-conditioning, vertical transportation, acoustical control, electrical controls, and associated building code requirements. (4 credits)

## **BLDG 2000 STRUCTURAL DESIGN I**

Topics include the principles of mechanics with emphasis on the use of dimensions, weights, forces and angles, centroids, center of gravity, free body diagrams and the laws of equilibrium as applied to trusses. (4 credits)

Prerequisite: MATH1065 and PHYS1005

## **BLDG 2200 BUILDING INFORMATION MODELING**

This course examines the use of Autodesk's REVIT software platform as a complete building design and documentation solution, supporting all phases of design, construction documentation, and construction management required for a building project. Students will create massing and conceptual studies that evolve into building models with schedules, details, renderings, walk-throughs, and other topics via studying real-world building designs. (4 credits)

Prerequisite: ARCT1000 or BLDG1015

## **BLDG 2500 PROJECT ESTIMATING & SCHEDULING**

Students learn and apply the basic principles and current practices employed in estimating project costs including unit costs, overhead and profit. Scheduling tools, such as critical path method and bar charts, are examined as an aid and technique in project planning, budgeting and cost control. (4 credits)

Prerequisites: BLDG1015 or ARCT2150 AND BLDG1100

## **BLDG 2600 TESTING OF MATERIALS**

Testing of Materials focuses on how to properly determine the properties of the most common construction industry materials. These materials include soils, aggregates, asphalt, concrete, steel, wood and masonry. Particular attention is paid to proper laboratory techniques for data acquisition and reporting. (2 credits)

## **BLDG 3000 CONSTRUCTION LAW & GOVERNMENT REGULATIONS**

An introduction to law and contracts to avoid entanglements and disputes, and to develop awareness of legal rights so that construction claims are settled by negotiation, not litigation. In addition, a study of zoning and building code requirements is made. Roles of building departments and boards of standards and appeals, procedures, enforcement, approvals and permits are discussed. (4 credits)

Prerequisite: third year status

## **BLDG 3100 CONSTRUCTION OPERATIONS**

Material handling in heavy construction. The selection and application of heavy construction equipment including equipment productivity and cost. (4 credits)

Prerequisite: BLDG1100

## **BLDG 3200 CONSTRUCTION PROJECT SCHEDULING**

Topic items include project network planning, scheduling, and cost control models. Computer applications to PERT and CPM will be explored and used by the student. (4 credits)

Prerequisites: BLDG1100 and third year status or BLDG1500 and enrollment in the Professional Certificate for Managing Construction Projects

## **BLDG 3400 CONSTRUCTION PROJECT CONTROL**

The study of information management for effective project control. The course will cover gathering of job information and the processing involved in measuring, evaluating and calculating job performance, and reporting the results. Modern-day management information systems, practical accounting techniques, and computer applications will be explored. (4 credits)

Prerequisite: BLDG3200

## **BLDG 3450 CONSTRUCT PROJECT COST ANALYSIS**

This course will also introduce students to modern techniques for analyzing costs for both vertical and horizontal construction. Costs will be compared to baselines established for project control. Students will analyze the variety of factors and different methods that affect construction costs. Primary class emphasis is on the cost analysis process available to project managers. (4 credits)

Prerequisite: BLDG3200

## **BLDG 3500 CONSTRUCTION COST ANALYSIS**

Topics include: practical procedures for building construction estimating of most major trades; analysis of factors and methods affecting construction costs; bid strategies; preparation of preliminary budgets and complete working estimates with quantities and costs of materials, labor and overhead. Computer applications are explored. (4 credits)

Prerequisite: MGMT2500

## **BLDG 3600 CONSTRUCTION MANAGEMENT THEORY**

Construction project management from conception to completion is covered. The course covers feasibility studies, site selection, planning, programming, design coordination, and contracting procedures of actual construction. Emphasis is placed on contractor operations, project administration, job planning, and subcontract coordination. (4 credits)

Prerequisite: third year status; or BLDG1500 and enrollment in the Professional Certificate in Managing Construction Projects

## **BLDG 3700 CONSTR SAFETY & RISK MANAGEMENT**

Topics include the knowledge and skills required to effectively manage safety compliance and risk associated with construction. (4 credits)

Prerequisite: BLDG1100

## **BLDG 4250 FINANCING CONSTRUCTION PROJECT**

An investigation of construction financing during all phases of project development. Topic items include: permanent loans, construction loans, sources of mortgage funds and venture capital, and tax and interest considerations. Emphasis is placed on the role of the banker as a vital member of the construction management team. (4 credits)

Prerequisite: third year status

## **BLDG 5500 SENIOR PROJECT BUILDING CONSTRUCTION MANAGEMENT**

Students have the opportunity to explore and present on a construction management topic of their choice. A final oral presentation is required. (4 credits)

## **CHEMISTRY**

### **CHEM 1000 CHEMISTRY OF THE BUILT ENVIRONMENT**

This course provides a fundamental introduction to chemistry topics with a focus on the built environment. Fundamental principles of chemistry with emphasis on solving problems encountered in business and commerce. Topics include: the atomic model; writing, balancing; and predicting reactions; stoichiometry; the periodic table; properties of acids, bases, and salts; properties of aqueous solutions. (4 credits) fall, spring

Corequisite: MATH1000

### **CHEM 1005 CHEMISTRY A**

This course will introduce the students to basic concepts in chemistry through contemporary applications. Topics will include atomic model and periodic chart, solutions, chemical formulas, balancing chemical reactions, and acids and bases. Laboratory sessions illustrate principles. (4 credits)

Prerequisite: MATH1005

### **CHEM 1100 ENGINEERING CHEMISTRY I**

Introductory chemistry for engineers, covering atomic structure, molecular orbitals and bonding, stoichiometry, intermolecular forces, gas laws, equilibria, acid-base chemistry, reduction/oxidation, electrochemistry, properties of metals, and modern materials. (4 credits) fall, spring, summer

## **CHEM 1600 ENGINEERING CHEMISTRY II**

A second semester in introductory chemistry focusing on chemical thermodynamics, colligative properties, kinetics and catalysis, buffers, solubility, periodic trends, an introduction to materials science, and nuclear chemistry. An emphasis on chemical applications throughout the engineering disciplines will be present in this course. (4 credits)

Prerequisite: CHEM1100

## **CHEM 2000 BASICS OF ORGANIC/BIOCHEMISTRY**

This course is intended to introduce students to key concepts in organic chemistry and biochemistry, and to describe the significant connections between these topics and health, disease and the molecular treatment of disease. Specific topics include saturated and unsaturated hydrocarbons, alcohols, phenols, esters, aldehydes, ketones, carboxylic acids, amines, carbohydrates, lipids, proteins, enzymes, nucleic acids, molecular genetics and metabolism. (4 credits) fall, spring

Prerequisites: BIOL1100 and CHEM1100

## **CHEM 2200 PROTEINS MEDICINE & DISEASE**

A second semester in introductory chemistry focusing on the relevance of protein sequence and structure in health, disease and drug design. Specific topics include introduction to organic molecules, enzyme kinetics and inhibition and protein structure. There will also be an emphasis on correlating protein chemistry aspects to mechanisms of disease, methods of drug discovery, and computational methods used in the drug discovery process. A combination of projects involving wet and computational laboratory methods will be included. (4 credits)

Prerequisite: CHEM1100

## **CHEM 2500 ORGANIC CHEMISTRY I**

This course is an introduction to organic chemistry. It covers basic organic nomenclature and functional groups, stereochemistry, the reactions of alkanes, alkenes, and alkynes, and instrumental analysis of organic molecules. (4 credits)

Prerequisite: CHEM1600

## **CHEM 2990 INDEPENDENT STUDY IN CHEMISTRY**

This course investigates a topic of special interest to faculty and students that is outside existing course offerings. (1 - 4 credits)

Prerequisite: Consent of department head and instructor

## **CHEM 3500 ORGANIC CHEMISTRY II**

This course is a continuation of Organic Chemistry I. It covers alkyl halides and their associated reactions, alcohols and their associated reactions, an introduction to carbonyl chemistry, as well as a continuation of instrumental analysis as applied to these classes of molecules. Conjugated systems and their detections using UV/Vis spectroscopy will be introduced. Polymer chemistry and lipids are also addressed. (4 credits)

Prerequisite: CHEM2500

## **CHEM 3550 BIOCHEMISTRY**

This course starts with structural descriptions of macromolecules, with particular focus on proteins and the structure/function relationships. Enzymes and the principles of catalysis are discussed, followed by a comprehensive survey of the pathways and regulation of metabolism, including glycolysis, the Krebs Cycle, electron transport, as well as lipid, carbohydrate, and protein metabolism. Laboratory exercises supporting the understanding of the lecture topics will be included, with a focus on good laboratory practice. (4 credits) summer  
Prerequisites: CHEM1100, CHEM2000 and CHEM2500.

## **CHEM 3800 SPECIAL TOPICS IN CHEMISTRY**

These courses present topics that are not covered by existing courses and are likely to change from semester to semester. Refer to the semester schedule for the courses offered that semester. (1 - 4 credits)

## **CIVIL ENGINEERING**

### **CIVE 2000 STATICS & MECHANICS MATERIALS I**

Introduces solid mechanics including properties of areas and volumes (centroidal axis, center of gravity and moments of inertia), equilibrium of particles and rigid bodies in two and three dimensions, analysis of internal forces in trusses and frames and shear and moment diagrams for beams. (3 credits) fall

Prerequisites: MATH1750 or MATH1775 and PHYS1250

Corequisite: MATH1850 or MATH1875

### **CIVE 2205 INTRODUCTION TO GEOMATICS**

Various elements of plane surveying, use of a level, total station and global positioning system; topographical surveying and mapping; error adjustment; area and volume computation; curve layout and site development; use of civil engineering computer application programs. (4 credits) fall

### **CIVE 2300 CAD IN CIVIL ENGINEERING**

This course provides the student with an understanding of the role of the engineer on a design team and the importance of standards. It also provides the knowledge and practice of computer-aided design and drafting, and the use of AUTOCAD and CIVIL3D software in civil engineering design. (3 credits) spring

### **CIVE 2400 CIVIL ENGINEERING MATERIALS**

Study of elemental and behavioral properties of steel, aluminum, aggregate, cement, concrete, asphalt, plastics, polymer composites, and wood. Uses in civil engineering and construction engineering applications with consideration to life cycle and longevity are also addressed. (3 credits) spring

Prerequisites: CHEM1100

### **CIVE 2500 STATICS & MECHANICS MATERIALS II**

The study of internal stresses induced by external loads on beams, trusses and axially loaded members of differing materials. Discussion and problems include sectional properties, stress-strain behavior, temperature effects, column buckling and combined stresses. Concepts are illustrated through student participation in laboratory experiments. (4 credits) spring

Prerequisite: CIVE2000

### **CIVE 2990 INDEPENDENT STUDY CIVIL ENGINEERING**

This course investigates a topic of special interest to faculty and students that is outside regular course offerings. (1 – 4 credits)

Prerequisite: Consent of department head and instructor

### **CIVE 3000 FLUID MECHANICS**

Fundamental physical and analytical principles of fluid mechanics through the understanding of the: conservation of mass, conservation of energy, and the conservation of momentum equations. A demonstration of the understanding of these fundamentals by solving problems dealing with: fluid properties, fluid statics, pressure on plane and curved surfaces, buoyancy and floatation, kinematics, systems, control volumes, conservation principles, ideal incompressible flow, impulse-momentum, and flow of a real fluid. (4 credits) fall

Prerequisites: CIVE2000 and MATH1850

### **CIVE 3100 ENVIRONMENTAL ENGINEERING**

This course provides an introduction to environmental engineering concepts with respect to natural and man-made systems of the built environment. Particular emphasis is placed on material and energy balances and principles of thermoics and applied chemistry. (4 credits) fall

Prerequisite: CHEM1100

## **CIVE 3125 ENGINEERING SYSTEMS ANALYSIS**

This course provides an introduction to system optimization and analysis, problem solving and decision making in planning management and design, math modelling of qualitative decision problems, distribution and network models, decision analysis, waiting line models and project scheduling. (3 credits) fall.

Prerequisite: MATH1850

## **CIVE 3150 ADVANCED SURVEYING**

Building upon competencies developed in the Introduction to Geomatics course, students will develop additional competencies in precise leveling, construction layout, static GPS, site detail mapping with RTK, level adjustment, 3D GPS network adjustment. Additional topics covered include measurement error propagation theory, geodesy, map projections, and the US state plane coordinate system. (4 credits) fall

Prerequisite: CONM2205

## **CIVE 3200 STRUCTURAL ANALYSIS**

The study of statically determinate and indeterminate structures including: structure determinate/indeterminate checks, structure stable/unstable checks, truss analysis, moment and shear equations and diagrams for structures, influence lines, maximum shears and moments for movable loads, energy method for deflections, moment distribution method for indeterminate beams and frames, slope deflection method for indeterminate beams and frames and an introduction to the stiffness method of analysis. EPIC course (4 credits) fall

Prerequisite: CIVE2500

## **CIVE 3250 GIS APPLICATIONS IN CIVIL ENGINEERING**

Students will gain an understanding of the basic components, functions of and terminology associated with Geographic Information Systems. Each student will create a typical GIS for civil engineering use. In doing so, they will develop specific competencies in: creating and populating geodatabases; basic data manipulation functions; data editing, and georeferencing Spatial and 3D analysis tools, symbology and general cartographic principles will be utilized by the students in the creation of small scale and large-scale models and maps useful in civil engineering design. (3 credits) summer

Prerequisite: CIVE 2205 or CONM2000

## **CIVE 3300 SOIL MECHANICS**

Study of soil, rock and underground water and their relation to design, construction and operation of civil engineering works. Topics include: origin and composition of rock and soil, site exploration, soil classification, compaction, in-situ stresses, soil compressibility and settlement, shear strength of soil, and groundwater fundamentals, flow, related environmental issues. (4 credits) fall

Prerequisites: CIVE2000 and CIVE2500

## **CIVE 3325 EMBANKMENTS, DAMS, AND SLOPE STABILITY**

In this course, the fundamental concepts and principles of design and construction of embankments, earth dams and unsupported slopes are studied. In addition, different methods of slope stability analysis are covered in this class. A project on unsupported slope stability will be assigned to students as a project. Students are asked to design an unsupported slope and validate their design using common geotechnical engineering software (3 credits) summer

Prerequisite: CIVE3300

## **CIVE 3350 GREEN ENGINEERING**

This course will provide a foundation for topics in green engineering. This course will teach students an innovative design perspective needed for a fundamental conceptual shift from the current paradigms of design towards a more sustainable system, based on efficient and effective use of materials, water and energy. (3 credits)

Prerequisite: CHEM1100



## **CIVE 3375 EARTH RETAINING STRUCTURES**

Design of earth retaining structures, such as retaining walls, MSE (Mechanically Stabilized Earth), and SRW (Segmented Retaining Walls), Soil Nail Walls, excavation support walls, and waterfront bulkheads. Topics include earth pressures, retaining wall designs, tieback and anchorages, slurry walls, sheet pile selection, soil nails for excavation stabilization and use of geo-synthetics. (3 credits) summer  
Co-requisite: CIVE3300

## **CIVE 3400 STRUCTURAL ANALYSIS II**

Study of the use of matrix methods in structural analysis of determinate and indeterminate structures. Using linear algebra, the basics of matrix analysis such as degrees of freedom, coordinate systems, and other features are discussed. The structural elements are developed, such as truss and beam elements, using Virtual Work principles. The Stiffness Matrix and Stiffness Method are developed through Virtual Work. The matrix method is used to solve complex structures which include frames, trusses, elements of varying shapes, elements subjected to non-uniform loading between nodes, the movement of supports, and temperature changes. (3 credits) spring  
Prerequisite: CIVE3200

## **CIVE 3425 DYNAMICS OF STRUCTURES**

Study of the principles of kinetics and kinematics related to the behavior of structures and their components under dynamic loads. In this introductory course, only single degree of freedom systems are addressed. Frequencies and periods of damped and undamped systems are addressed. Harmonic, impulse and arbitrary forces are introduced into the single degree of freedom structures. Also, this course will use the seismic methodologies of the International Building Code. (3 credits) spring  
Prerequisite: CIVE2500

## **CIVE 3450 LEGAL ASPECTS OF BOUNDARY SURVEYING**

This course is an introduction to real estate law and boundary determination principles that are essential to the practices of land surveying. Real estate law, conveyancing terminology, evidence gathering, and research theory will be taught. Key principles of boundary law will be explored such as the relative weight of evidence, sequential and simultaneous conveyances, easements and rights of way, and the public land survey system. (3 credits) spring  
Prerequisite: CIVE2205

## **CIVE 3500 DESIGN STUDIO LAB**

This experiential studio will link several of the civil engineering disciplines in a series of three two-hour studios per week. The studios will be tied together by a common site and features developed by civil engineering faculty. (3 credits)  
Prerequisite: Junior standing

## **CIVE 3700 HIGHWAY ENGINEERING**

Introduction to principles of highway engineering, including the history of transportation engineering, fundamentals of traffic flow and driver characteristics, intersection design and control, capacity and level of service of highways and intersections, geometric design of highways, highway drainage, principles of pavements, design of flexible and rigid pavements, and pavement management. (4 credits) summer  
Prerequisite: CIVE2200

## **CIVE 3800 SPECIAL TOPICS CIVIL ENGINEERING**

Presents topics that are not covered by existing courses and are likely to change from semester to semester. Refer to the Class Schedule for a specific semester for details of offerings for the semester. (1 – 4 credits)

## **CIVE 3900 HYDRAULIC ENGINEERING**

This course applies the principles of fluid mechanics to the design and analysis of hydraulic systems. The course emphasizes open channel flow and other topics of interest to the civil engineer. Topics include hydraulic grade line calculations, pump design, culvert analysis and design, based flood elevation studies using HEC-RAS, non-uniform flow, gutters and inlets, water distribution, and open channel design. EPIC course (4 credits) summer

Prerequisite: CIVE3000

## **CIVE 4000 CIVIL ENGINEERING DESIGN PROJECTS**

This course provides the student with an independent, project-based learning opportunity in a topic within the civil engineering discipline. EPIC course (4 credits) spring

Prerequisite: Senior status

## **CIVE 4050 BOUNDARY SURVEYING**

Building on the principles taught in Legal Aspects of Boundary Surveying, special boundary topics such as water boundaries, unwritten transfers, Torrens Title systems. Land Title Surveys, Survey Reports and writing legal descriptions will be covered along with the roles of statute and case law in the boundary determination process. Students will complete a final project that will involve making boundary decisions involving conflicting evidence. (3 credits) summer

Prerequisite: CIVE3150 and CIVE3350

## **CIVE 4100 WATER RESOURCES AND HYDROLOGY**

An introduction to surface water and groundwater hydrological processes and systems, including storm water management, water supply and contaminant transport and modeling. (3 credits)

Prerequisite: CIVE3000

## **CIVE 4125 CIVIL ENGINEERING & PROJECT MANAGEMENT PRACTICES & PRINCIPLES**

Introduction and development of principles and practices to effectively manage civil projects through all phases, including inception/concept, design, planning, construction commissioning and completion. Emphasis will be placed on Financing, Scheduling, Value Engineering and Evaluation and Project Organization. (4 credits) spring

Prerequisite: Senior status

## **CIVE 4150 LAND USE PLANNING**

An introduction to land use planning and management approaches through the review of the theory and regulations involved in the planning and development of residential / commercial sites, subdivisions, office parks, and industrial parks (3 credits) summer

Prerequisite: CIVE2300

## **CIVE 4175 ESTIMATING, SCHEDULING AND PROJECT CONTROL**

An introduction to the Fundamentals of Construction Management, Construction Estimating, and Construction Scheduling. (3 credits) summer

Prerequisite: CIVE2300

## **CIVE 4200 GEOLOGY FOR CIVIL ENGINEERS**

Study of geological processes, structures and component elements to understand the behavioral effects on civil engineering works and resources, including: types of rocks and their origin, types and transportation of soils, groundwater occurrence and movement, earthquake causes and ramifications, subsurface investigation, and environmental and engineering geology. (3 credits)

## **CIVE 4225 ENVIRONMENTAL UNIT OPERATIONS**

In this course students will learn to characterize, design and evaluate environmental unit operations using mathematical, chemical and engineering concepts. The general operating fundamentals of physical, chemical and biological systems are presented. Special unit operations designed by environmental engineers are also reviewed and evaluated. This elective course is offered for students interested in environmental engineering and is a required course in the Environmental Engineering minor. (3 credits)

Prerequisite: CHEM1100

Corequisite: CIVE3000

## **CIVE 4250 STRUCTURAL STEEL DESIGN**

Introduction to the design of structural steel tension, compression and flexural members including connections. Design for combined loads is also introduced. Both member strength and serviceability requirements are considered. The LRFD philosophy of the latest AISC Steel Construction Manual is employed. (3 credits)

Prerequisite: CIVE3200

## **CIVE 4300 FOUNDATION ENGINEERING**

In this course, the fundamental concepts and principles of shallow and deep foundation design and in-service behavior are studied and applied. Conditions where shallow foundations are not appropriate are reviewed as is selection of appropriate types of deep foundations. Two foundation design projects are included in course work. (3 credits)

Prerequisite: CIVE3300

## **CIVE 4350 REINFORCED CONCRETE DESIGN**

Introduction to the design of reinforced concrete members including beams, columns and one-way slabs. Both member strength and serviceability requirements are considered. The design approach is ultimate strength consistent with the provisions of the latest edition of ACI-318. Relevant connection details associated with the design elements are also addressed. The use of commercial software to verify the student's design will be used to supplement the course. (3 credits)

Prerequisite: CIVE3300

## **CIVE 4375 WATER AND WASTEWATER TREATMENT**

This course provides an introduction to the principles of water and wastewater treatment, including the various treatment options and unit operation design. (3 credits)

## **CIVE 4400 MUNICIPAL PLANNING**

This course covers the regulations and engineering principles involved in the planning and development of residential and commercial sites, office parks, and industrial parks. (3 credits)

Prerequisite: CIVE3900

## **CIVE 4425 TRAFFIC SYSTEMS ANALYSIS**

Subjects include traffic signals and controls, traffic system analysis, microscopic level simulations, VBA coding, level of service analysis. (3 credits) spring

Prerequisite: CIVE3700

## **CIVE 5500 CIVIL ENGINEERING CAPSTONE DESIGN**

This course provides the student with a comprehensive, multidisciplinary, group, project-based civil engineering capstone design opportunity and allows these projects to be performed in an EPIC format. (4 credits) summer

Prerequisite: Senior status

## **CIVE 8000 PROJECT MANAGEMENT PRINCIPLES & PRACTICES**

Introduction and development of principles and practices to effectively manage civil projects through all phases, including inception, design, planning, construction commissioning and completion. Emphasis will be placed on Financing, Scheduling and Evaluation and Project Organization. (3 credits)

## **CIVE 8100 ENGINEERING MODELING & ANALYSIS**

Computational approaches to modeling with applications in construction, structures, transportation, water resources and other civil engineering areas; matrix computations, digital terrain modeling, network applications and algorithms, heuristic optimization. Development of the finite element method with an emphasis on understanding the fundamental principles governing the analysis technique. Applications to two-dimensional solids with particular attention to applications in structural engineering. (3 credits)

Corequisite: CIVE8000 and CIVE8200

## **CIVE 8200 ENVIRONMENTAL SYSTEMS**

Overview of infrastructural development. Sustainable design features for facilities including municipal, transit, industrial, telecommunications, and waste management. Impact of infrastructure development on environmental management including storm water quality and quantity, soil and channel erosion, air quality, sprawl, and waste production, treatment, and storage. (3 credits)

## **CIVE 8250 ENGINEERING ESTIMATING & SCHEDULING**

Estimating subjects include quantity take-off methods, cost estimating, engineering economics and value engineering. Scheduling subjects include construction sequencing, CPM network analysis, activity time analysis, resource scheduling and time-cost trade-off. (3 credits)

Prerequisite: CIVE8000 and CIVE8100 and CIVE8200

## **CIVE 8300 TRAFFIC ANALYSIS & SAFETY**

Subjects include traffic capacity studies, traffic signals and controls, speed studies, intersection analysis, traffic volume studies, sight distance evaluation, pedestrian facilities, multi-modal systems and traffic safety analysis. (3 credits)

Prerequisite: CIVE8000 and CIVE8100 and CIVE8200

## **CIVE 8350 CONSTRUCTION OPERATIONS, METHODS & QUALITY CONTROL**

Fundamentals and applications of engineering aspects of lifting and rigging, crane selection, erection and stability, dewatering and pumping, equipment production, productivity analysis and improvement, and temporary erosion control. (3 credits)

Prerequisite: CIVE8000 and CIVE8100 and CIVE8200

## **CIVE 8400 HIGHWAY DESIGN & TRANSPORTATION PLANNING**

Design of roadway systems, including vertical and horizontal curves, super elevation, vertical and horizontal clearances, acceleration and deceleration, intersection and interchanges, traffic impact and capacity analysis and transportation planning. (3 credits)

## **CIVE 8450 TEMPORARY STRUCTURES**

Fundamentals of engineered structures at a jobsite including construction loads, formwork, falsework and scaffolding, shoring and reshoring, concrete maturation and early strength evaluation, bracing, anchorage, cofferdams and relevant codes and standards. (3 credits)

Prerequisite: CIVE8000 and CIVE8100 and CIVE8200

## **CIVE 8550 SITE PLANNING & DEVELOPMENT**

The course provides a comprehensive review of land development for previously undeveloped and developed land. Engineering topics include land use and zoning requirements, earthworks, grading and land-forming, materials management, utility design and layout, road and parking works, environmental design and site work sequencing. Management topics include project financing, permitting, bidding and contracting. (3 credits)

Prerequisite: CIVE8000 and CIVE8100 and CIVE8200

## **CIVE 8600 ADVANCED STEEL & CONCRETE DESIGN**

The course continues from basic steel and concrete design coursework. The course addresses advanced topics in structural steel and reinforced concrete design following the LRFD, AISC design specification and the ACI 318, Building Code Requirements. Structural steel topics included design of plate girders, composite steel and concrete members, and moment frames. Connection design will include bolted and welded connections using the instantaneous center approach, braced frame connections and moment frame connections. Reinforced concrete topics include the design of two-way slabs, deep beams using non-linear strain distribution and the strut and tie method, slender columns, and pile cap foundations. Seismic design of selected topics for both materials will also be addressed. The use of commercial software to verify student's design will be used to supplement the course. (3 credits)

## **CIVE 8700 BRIDGE DESIGN**

The course addresses the design of highway bridges using the AASHTO LRFD design specifications. Bridge types and the bridge selection process are discussed. The course addresses the design limit states, loads, load combinations, distribution factors and the principle of probabilistic design. The design of both steel (I-shaped and box girders) and concrete (AASHTO Standard I-shapes and bulb tees) are covered. Bridge design for other infrastructure system such as rail and transit will be discussed. The use of commercial software to verify student's design will be used to supplement the course. (3 credits)

Prerequisite: CIVE8000 and CIVE8100 and CIVE8200

## **CIVE 8950 CAPSTONE**

The course provides the student the opportunity to develop and complete an independent project in her/his chosen area of specialty that incorporates knowledge, tools and techniques developed in the program. Students may elect to perform a research-based project in their area of specialty provided on-campus or off-campus resources are available. (3 credits)

Prerequisite: Final semester standing or by permission of the Department Chair

## **COMMUNICATION**

### **COMM 1552 ORAL COMMUNICATIONS**

Students will learn theories/practices of public speaking in various settings. Audience analysis and speech development will be considered. Students will participate in preparing/performing of a variety of oral presentations. (3 credits) CPCE only

### **COMM 3100 PROFESSIONAL COMMUNICATION**

This course focuses on the development of professional-level written and oral communication skills. Students will learn how to conduct a meeting, do an effective oral presentation, write technical descriptions, instructions and reports, and effectively present information to their clients. Standard business formats (memo, letter, etc.) will also be reviewed. (3 credits)

Prerequisites: ENGL1050 and ENGL1550

### **COMM 3800 SPECIAL TOPICS IN COMMUNICATIONS**

These courses present topics that are not covered by existing courses and are likely to change from semester to semester. Refer to the Class Schedule for a specific semester for the courses offered that semester. (1 - 4 credits)

Prerequisite: completion of an ENGL sequence

### **COMM 4102 INTRODUCTION TO MASS COMMUNICATION**

This course serves as an overview to the mass media and the process of mass communication including its historical aspects, as well as the relevance of the mass media messages that our students will face today and tomorrow. (4 credits)

Prerequisite: completion of an ENGL sequence

## **COMM 4112 SOCIAL PERSPECTIVES JOURNALISM**

This course directs students in developing a perspective for the basics of the news process: gathering, reporting and disseminating news. The role of the journalist in American society and the changing role of news and society will be discussed. The changing role of news and the newspaper is also discussed and analyzed, particularly as they pertain to an increasing population of society that access, read and interpret the news via on-line newspapers, logs, streaming and archived podcasts, and via the Internet and websites. (4 credits)  
Prerequisite: completion of an ENGL sequence

## **COMM 4122 ORAL COMMUNICATIONS**

This course will introduce the student to the basics of public speaking and communications. Students will be involved in speech preparation, development and delivery. This course also provides students with assistance in developing and using appropriate visual aids. Topics pertaining to audience analysis, speech anxiety, research, performance and wording will also be addressed. Individual and team presentations will be required. (4 credits)  
Prerequisite: completion of an ENGL sequence

## **COMM 4125 INTRODUCTION TO RADIO BROADCASTING**

This communications course will introduce students to the language and concepts of radio and internet broadcasting. Students will be introduced to and involved in broadcast (radio & Internet) topics and activities including a communication overview of radio broadcast history, station organization and operations, past and present technologies, format development and terminology using lectures, class speakers, projects, films, quizzes, exams and group exercises. It is expected that students will also use the WIRE studio for production and/or broadcast assignments and projects. EPIC course (4 credits)  
Prerequisite: completion of an ENGL sequence

## **COMM 4262 PUBLIC RELATIONS WRITING**

Students will be exposed to and examine the issues and role of the public relations practitioner and media messages. They will also learn public relations writing/communication style which will be utilized to prepare press releases, public service announcements and other related materials. (4 credits)  
Prerequisite: completion of an ENGL sequence

## **COMM 4300 MEDIA ETHICS**

Claims of the democratizing power of media are ubiquitous: the media (and in particular the internet) have been credited with the rebirth of democracy. Simultaneously, the relaxation of media ownership rules in the U.S., the degradation of journalism and newspapers, the increased pressures for profitability over high quality content pose questions about whether media's impact has been entirely positive. These competing perspectives force us to ask, specifically: is the media creating a thriving democracy or failing "idocracy"? The goal of this course will be to consider the ethical obligations of the media in a democratic society and whether the media have met these obligations. (4 credits)  
Prerequisite: completion of an ENGL sequence

## **COMM 4325 VIDEO PRODUCTION**

This course allows students to explore the technical, creative, and expressive elements of the time-based medium of video. Students will become fluent in basic video and sound production, editing techniques, and formal elements of moving imagery. Because the main goal of this course is to gain skills in creative expression using this visual medium, a majority of class time will be spent on learning and applying techniques, working on in-class on projects, and engaging in regular critique of students' work. (4 credits)  
Prerequisite: completion of an ENGL sequence

## **COMM 4382 SOCIETY AND VISUAL MEDIA**

This course looks at current media practices and their impact on communication, culture, and society. Image making and manipulation, video, audio, interactivity, and connectivity will be demonstrated and analyzed. The class focuses on effectively communicating content and ideas through digital media formats. (4 credits)  
Prerequisite: completion of an ENGL sequence  
2018-2019 Academic Catalog: Course Descriptions - Computer Science

## COMPUTER SCIENCE

### COMP 1000 COMPUTER SCIENCE I

An introductory course covering the fundamental concepts and skills of programming in a high-level language. Emphasis is placed on problem solving, algorithm development, program design and structure, code documentation and style, and testing and debugging. Topics include hardware and software systems, data types and variables, device/file input and output, flow control and functions, use of basic data structures, as well as principles and applications of object-oriented programming. (4 credits) fall, spring

### COMP 1050 COMPUTER SCIENCE II

This course is an advanced introduction to computer science. It focuses on object-oriented programming. Topics include abstraction and encapsulation, classes and methods, objects and references, overloading, inheritance, polymorphism, interfaces, console/file input/output, dynamic data structures, generics, and GUI applications. (4 credits) fall, spring

Prerequisite: COMP1000 or ELEC3150

### COMP 1070 COMPUTER SCIENCE I

An introductory course in computerized problem solving using a structured programming language, such as C++ or Java. Topics include functions, selection structure, loops, data types, and arrays. (4 credits) fall, spring

Corequisite: MATH1750 or MATH1775

### COMP 1071 COMPUTER SCIENCE II

A continuation of COMP1070, Computer Science I. Topics include strings, structs, arrays, and linked lists, as well as text and binary files, recursion and dynamic allocation. (4 credits) fall, spring

Prerequisite: COMP1070

### COMP 1099 COMPUTER SCIENCE I WITH C

This course is an introduction to problem-solving and program design using the C language. Student understanding is enhanced by solving practical engineering and technical problems. Topics include: formatted and character I/O, selection and iteration control statements, logical operations for Boolean expressions, pointers and arrays, functions and bitwise operators. (4 credits)

Prerequisite: MATH1005 or

Corequisite: MATH1000

### COMP 1100 INTRODUCTION TO NETWORKS

This course provides an introduction to networking and computing systems including operating systems, technical aspects of the Internet and internetworking. (4 credits) fall, spring

### COMP 1150 ROUTING AND SWITCHING

This course introduces the students to routing, packet forwarding, and switching technologies. Both static routing and dynamic routing protocols are covered as well as basic switching concepts. Students will learn how to configure industry standard networking equipment. (4 credits) fall, spring

Prerequisite: COMP1100 or COMP1170 or COMP2100

### COMP 1170 INTRODUCTION TO NETWORKS AND SYSTEMS

This course provides an introduction to networking and computing systems including operating systems, technical aspects of the Internet and internetworking. (4 credits) fall, spring

### COMP 1171 ROUTING AND SWITCHING

This course introduces students to routing, packet forwarding, and switching technologies. Included are static and dynamic routing protocols, basic switching concepts, design implementation, and configuration. (4 credits) spring

Prerequisite: COMP1170

## **COMP 1200 COMPUTER ORGANIZATION**

This course covers binary number and codes, logic elements, combinational and sequential logic, architectural design of a computer using these elements, and introduces concepts such as process and memory management. (4 credits) fall, spring

Prerequisite: COMP1000 or COMP1070

Corequisite: MATH2300

## **COMP 2000 DATA STRUCTURES**

This course is an introduction to the analysis and implementation of data structures. Topics include bags, sets, lists, queues, trees, maps, recursion, sorting and searching. (4 credits) fall, spring

Prerequisite: COMP1050 and MATH2300

## **COMP 2070 OBJECT ORIENTED PROGRAMMING IN JAVA**

This course is an introduction to object oriented programming and design. Topics include: abstraction and encapsulation, classes and objects, overloading operators and friend functions, inheritance, templates, iostream, fstream, dynamic allocation, pointer arrays, polymorphism, stacks, linked lists, and recursion. (4 credits) fall, spring

Prerequisite: COMP1071

## **COMP 2071 DATA STRUCTURES**

This course is an introduction to data structures using inheritance and template classes. Topics include: queues, sorted linked lists, binary search trees, B+ trees, balanced, trees, timing of sort and search algorithms, hash searching and indexed files, directed graphs and Dijkstra's weighted path algorithm, acyclic graphs, topological sorting, and critical path analysis. (4 credits) fall, spring, summer

Prerequisite: COMP 2070

## **COMP 2100 NETWORK PROGRAMMING**

This course provides an overview of how modern systems communicate over the Internet. An emphasis is placed on application programming interfaces common to all forms of network programming. Students will gain practical experience with several operating systems and network protocols relevant to computing. (4 credits) fall, spring

Prerequisite: COMP1050

## **COMP 2150 NETWORK ADMINISTRATION**

Modern enterprise and business systems rely on a stable network and server infrastructure to function. This includes many network protocols and services that are required in any network operations environment. Students in this course will configure and manage these critical services in their own virtualized environment following best practices and standards from the operations community. (4 credits) spring

Prerequisite: COMP1150

## **COMP 2160 WIRELESS NETWORKS**

This course will give introduction to the state of the art wireless and mobile networks. This course will cover the fundamental principles, architectures, and standards of modern wireless communication systems, including their applications and uses. (4 credits) spring

Prerequisite: COMP1100 or COMP2100

## **COMP 2270 COMPUTER ARCHITECTURE**

This course covers binary number and codes, logic elements, combinational and sequential logic, and architectural design of a computer using these elements. (4 credits) fall, spring

Prerequisite: COMP1071

## **COMP 2350 ALGORITHMS**

This course introduces algorithmic design and analysis: students assess the complexity of algorithms in terms of time and space requirements for large input sizes. Topics include searching, sorting, pattern matching, hashing and encryption. (4 credits) fall, spring

Prerequisite: COMP1050 and MATH2300



## **COMP 2471 UNIX SYSTEM ADMINISTRATION**

Covers basic skills needed to administer a Unix system including file organization, backup, recovery, account maintenance, network design, administration, device control, security, and system monitoring. (4 credits) spring

Prerequisite: COMP1170

## **COMP 2499 SYSTEMS ANALYSIS & BUSINESS APPLICATIONS**

This course covers the principle analysis, design and implementation methodologies, and tools to develop business applications using the system development life cycle (SDLC). Students will gain experience in the analysis, design, and development of business applications via a series of case studies. (4 credits)

## **COMP 2500 SECURITY PRINCIPLES**

The course introduces computer and network security concepts and techniques. Theoretical concepts of security are examined as well as implementing system and network security. (4 credits) fall

Prerequisites: COMP1100 or COMP2100

## **COMP 2650 DATABASES**

Concepts and methods for the design, creation, querying, and management of relational database management systems. Covers modeling the conceptual and logical organization of databases, including the entity-relationship model; the relational data model and SQL; as well as functional dependencies and normal forms. Students will further strengthen their database skills by developing a substantial project with a team. (4 credits) fall, spring

Prerequisite: COMP1050; MATH2300 or MATH2800

## **COMP 2670 DATABASE MANAGEMENT SYSTEMS**

An introduction to the use of database management systems. Covers hierarchical networks and relational systems and techniques for designing, creating, accessing and maintaining data bases. (4 credits) fall, spring.

## **COMP 2990 INDEPENDENT STUDY BCOS BSCN**

This course investigates a topic of special interest to faculty and students that is outside regular course offerings. (1-4 credits)

Prerequisite: Consent of department chair and instructor

## **COMP 3070 ASSEMBLY LANGUAGE**

An introduction to assembly language, including data representation, data storage, arithmetic, control flow, stacks and procedures, integer and character I/O, and encryption. (4 credits)

Prerequisite: COMP2070

## **COMP 3071 INTRODUCTION TO PROGRAMMING LANGUAGES**

An introduction to Programming Language Concepts including context-free grammars, parse trees, syntax diagrams, symbol tables, data types, control structure, and language translators. (4 credits) summer

Prerequisite: COMP2070

## **COMP 3100 SYSTEM ADMINISTRATION**

System administration is the practice of installing, configuring, and maintaining a computing system. This course provides students an overview of these and related concepts as well as the skills required to become an entry level system administrator. In particular, topics covered include file systems, process control, access control, account management, software management, and scripting. (4 credits) fall

Prerequisite: COMP1000; COMP1100 or COMP2100

## **COMP 3170 NETWORK ADMINISTRATION**

Prepares the student for managing a network and servers. It covers planning, installation and configuration, as well as monitoring, troubleshooting and optimizing. (4 credits) spring

Prerequisite: COMP1170

## **COMP 3171 802.11 WIRELESS NETWORKS**

This course covers the fundamental principles, architectures and standards of modern wireless communication systems, including their applications and uses. The topics of radio communications, spread spectrum, OFDM, CDMA, antenna, security, vulnerabilities, and network planning and deployment issues will be discussed. (4 credits)

Prerequisite: COMP1170

## **COMP 3200 ASSEMBLY LANGUAGE**

An advanced course in assembly language, including data representation, data storage, arithmetic, control flow, stacks and procedures, integer and character I/O, encryption, and applications to embedded computing. (4 credits)

Prerequisite: COMP1200, COMP2000 and COMP2350

## **COMP 3350 PROGRAMMING LANGUAGES**

An introduction to programming language concepts, including language evaluation criteria, context free grammars, parse trees, syntax diagrams, symbol tables, data types, control structure, and language translators. (4 credits) summer

Prerequisite: COMP2000 and COMP2350

## **COMP 3370 ALGORITHM DESIGN & ANALYSIS**

Students analyze the complexity of computer algorithms in terms of time and space requirements for large input sizes. Includes searching, sorting, pattern matching, hashing and encryption. (4 credits) summer

Prerequisite: COMP2070

## **COMP 3400 OPERATING SYSTEMS**

In this comprehensive course, we will study the basic facilities provided by the Operating System. Students will cover the functions of operating systems, including process management (processes, threads, context switch, concurrency control, synchronization, scheduling, deadlocks, etc.), primary memory management, virtual memory management, file systems, resource allocation, and information protection. (4 credits) fall

Prerequisite: COMP2000 and COMP2350

## **COMP 3450 PARALLEL AND DISTRIBUTED COMPUTING**

This course covers topics related to parallel and distributed computing, including parallel and distributed architectures and systems, parallel and distributed programming paradigms, parallel algorithms, and applications of parallel and distributed computing. (4 credits) summer

Prerequisite: COMP2000, COMP2350 and COMP2100

## **COMP 3470 ADVANCED SYSTEM ADMINISTRATION**

A course covering advanced systems and network administration including scripting, multi-OS environments, remote booting and installations, monitoring, and other related topics. (4 credits)

Prerequisite: COMP1170

## **COMP 3475 OPERATING SYSTEMS**

Covers the functions and organization of operating systems including: process management, input/output systems, memory management, resource allocation, data management, and information protection. (4 credits) summer

Prerequisites: COMP2071 and COMP2270

## **COMP 3499 OPERATING SYSTEMS FOR ENGINEERS**

This course covers the functions and organization of operating systems, including process management, input/output systems, memory management, resource allocation, data management, and information protection. (4 credits) spring

Prerequisite: COMP1099 or ELEC2850

## **COMP 3500 NETWORK SECURITY**

This course covers all aspects of securing and protecting a local area network from threats and vulnerabilities. Students will configure, test, and validate standard network services and devices at all layers of the network. (4 credits) fall

Prerequisite: COMP2150 and COMP2500

## **COMP 3570 INTRODUCTION TO COMPUTER NETWORK SECURITY**

The course introduces computer and network security concepts and techniques. Theoretical concepts of security are examined as well as implementing system and network security. (4 credits) summer

## **COMP 3571 CRYPTOGRAPHY & NETWORK SECURITY**

This course covers the basic issues and principles of cryptography, system and network security. This course covers: (a) mathematical background principles of number theory, prime numbers and modular arithmetic; (b) system and network security protocols, techniques and architectures. The primary focus of the course is asymmetric encryption, key management, hash functions, digital signatures, and certificates. (4 credits)

Prerequisite: COMP2070

## **COMP 3572 SECURE INFORMATION TECHNOLOGY MANAGEMENT**

Examines how to run an IT organization. Includes study of organizational and staffing issues, satisfying user needs, planning and budgeting, system maintenance, system security, physical security, and upgrades. (4 credits) fall

Prerequisite: COMP2070

## **COMP 3660 MOBILE APP DEVELOPMENT**

This course is an introduction to mobile application development. It focuses on the creation of software systems for mobile devices. Topics include: platform introduction, environment setup, version control system, system prototyping, project structure and resources, application lifecycle, UI components, system services, sensors, security and permissions, data storage, testing and debugging, and application deployment. (4 credits)

Prerequisite: COMP1050

## **COMP 3670 WORLD WIDE WEB APPLICATION DEVELOPMENT**

In-depth project-oriented work in WWW development including page organization, frames, interactive databases, graphics, security, client and server-side scripting to create robust, effective web sites. (4 credits) spring

Prerequisite: COMP2070

## **COMP 3671 DATABASE APPLICATIONS**

This course covers the design and implementation of databases for several data base applications using a database management system. (4 credits)

Prerequisite: COMP2070

## **COMP 3672 INTRODUCTION TO BIOINFORMATICS**

This course introduces software tools used in biology for gene sequencing, pattern matching, etc. Tools may include database, data mining, statistical analysis, algorithms and visualization. (4 credits)

Prerequisite: COMP2070

## **COMP 3750 INTRODUCTION TO BIOSTATISTICS**

This course covers practical applications of descriptive and inferential statistics with an emphasis on principles and methods of summarizing biological data using statistical software package. (4 credits) summer  
Prerequisites: COMP1000 and MATH2100

## **COMP 3800 SPECIAL TOPICS BCOS BSCN**

Presents topics that are not covered by existing courses and are likely to change from semester to semester. Refer to the Class Schedule for a specific semester for details of offerings for the semester. (4 credits)

## **COMP 3999 INFORMATION SYSTEMS PROJECT MANAGEMENT**

This course provides students with a detailed understanding in the implementation of the Systems Development Life Cycle (SDLC) and the methodologies to manage information systems projects. (4 credits) fall.

## **COMP 4050 MACHINE LEARNING**

Introduction to the field of machine learning. This course focuses on algorithms to help identify patterns in data and predict or generalize rules from these patterns. Topics include supervised learning (parametric/non-parametric algorithms, kernels, support vector machines), model selection, and applications (such as speech and handwriting recognition, medical imaging, and drug discovery). Students who have basic programming skills and who have taken a course in probability are encouraged to take this course. (4 credits) Prerequisite: MATH2100 and COMP1000

## **COMP 4150 ADVANCED SYSTEM ADMINISTRATION**

Advanced System Administration is a follow-on course to System Administration that dives deeper into system and network environments found in modern enterprises. Students will build fully functional virtual networks, configure shared storage, deploy network account systems, utilize configuration management tools, monitor system health, and set up a variety of standard applications. Scripting is used throughout the course to solve problems and automate common tasks. (4 credits)  
Prerequisite: COMP3100

## **COMP 4450 SYSTEMS PROGRAMMING**

Systems programming involves writing software that is intended to interact with the Operating System rather than with the user directly. This course covers UNIX/Linux systems programming including system calls, file I/O, memory management, processes, threading, and other related topics. Students will rewrite fundamental parts of the UNIX/Linux user space. (4 credits)  
Prerequisite: COMP3400

## **COMP 4460 COMPILERS**

This course covers the principles and techniques used in the design of compilers. Compilers are the programs that translate code written in higher level languages into executable code. Topics include lexical and semantic analysis, transition, code generation and optimization. (4 credits)  
Prerequisite: COMP3350

## **COMP 4499 INTRODUCTION TO OPERATING SYSTEMS**

Covers the functions of operating systems, including process management, primary memory management, virtual memory management, and file systems. (3 credits) spring  
Prerequisite: COMP2070 or ELEC3000

## **COMP 4650 WEB DEVELOPMENT**

In-depth project-oriented work in modern web development including page organization, interactive databases, responsive design, security, and client and server side scripting. Students will create robust, effective, and secure web applications. (4 credits) spring  
Prerequisite: COMP2650

## **COMP 4672 BIOINFORMATICS ALGORITHMS**

Proven computer science approaches such as divide and conquer and dynamic programming are applied to algorithmic problems faced by biologists particularly in the area of genetics. (4 credits)

Prerequisites: COMP1070 or COMP1099 or COMP2070; and MATH1750 or MATH1775 or MATH2850 or MATH2860

## **COMP 4700 ARTIFICIAL INTELLIGENCE**

This course introduces the philosophical foundations of the underlying techniques involved with the design and implementation of intelligent computer systems. Topics include problem-solving via search, knowledge representation, reasoning in deterministic and stochastic tasks, as well as learning. (4 credits)

Prerequisites: COMP2000, COMP2350, MATH2100 and MATH2860

## **COMP 4871 SEMINAR IN COMPUTER NETWORKING**

This course examines current topics (determined by the instructor) in computer and network information systems. Students will make presentations and write a term paper. (4 credits) summer

Prerequisite: Senior status

## **COMP 4950 PROJECT MANAGEMENT**

This course provides students with a detailed understanding of the Systems Development Life Cycle (SDLC) and the methodologies to manage computing, networking, and security projects. (4 credits) spring

Prerequisite: COMP2650

## **COMP 4960 SOFTWARE ENGINEERING**

This course presents a formal approach to state-of-the-art techniques in software design and development. Students work in teams on an externally collaborative software projects. (4 credits) spring

Prerequisite: COMP2000, COMP2350 and COMP2650

## **COMP 5500 SENIOR PROJECT**

This course provides the opportunity for students to participate in design and implementation of solutions to large project in a team-based environment. Projects will in general be interdisciplinary in nature. Students will be required to provide written documentation and give oral presentations about their projects. The projects will be chosen in conjunction with the instructor for the course. (4 credits) summer

Prerequisite: COMP4950 or COMP4960

## **COMP 5501 SENIOR PROJECT COMPUTER SCIENCE**

This course provides the opportunity for students to participate in design and implementation of solutions to large problems with small groups of people. Problems will be chosen in consultation with and after the approval of the curriculum department head. (4 credits) summer

Prerequisite: Senior status

## **COMP 5502 SENIOR PROJECT COMPUTER NETWORKING**

Students build individual projects in computer and network information systems. This is a capstone course. Students demonstrate the design, implementation and documentation of their projects. (4 credits) summer

Prerequisite: Senior status

## **COMP 7000 FOUNDATIONS OF COMPUTER SCIENCE**

This course recaps foundational material covered in typical undergraduate degrees. Topics covered may include computer science theory, computability and complexity, computer organization and architecture, operating systems, and data communications. (3 credits) fall

## **COMP 7050 PROGRAMMING PARADIGMS & SYSTEMS**

This course looks at the four main programming paradigms: imperative, functional, logic, and object-oriented. The paradigms are compared and students gain experience with each of them. The second half of the course looks at systems and the various techniques needed. These include parallel and distributed systems, real-time systems, and embedded systems. (3 credits) fall

Prerequisite: COMP7000

## **COMP 7100 MANAGING SOFTWARE DEVELOPMENT**

This course addresses the breadth of managing software development and is designed to help technically trained software engineers to acquire the knowledge and skills necessary to lead a project team, understand the relationship of software development to overall project engineering, estimate time and costs, and understand the software process. The nature of software development is sufficiently unique to require specialized management techniques, especially in the areas of estimating and scheduling. (3 credits) spring

Prerequisite: COMP7050

## **COMP 7150 DATA SCIENCE & WEB SERVICES**

Data Science and Web Services are provided through a service-oriented architecture (SOA) applied to data sourced from the internet. Web data services enable maximal mashup, reuse, and sharing of structured data (such as relational tables), semi-structured information (such as XML documents), and unstructured information (such as RSS feeds, content from web applications). Applications that can serve as a consumer or provider of web data services include mobile computing, web portals, enterprise portals, online business software, social media, and social networks. (3 credits) spring

Prerequisite: COMP7050

## **COMP 7200 MOBILE APPLICATION DEVELOPMENT**

Mobile application development focuses on the creation of software systems targeting low-power handheld devices such as cell phones. This course examines the client-server model, considers various hardware configurations (e.g., screen size, hardware specifications) and user interface design. Security of mobile applications will be examined as devices such as smartphones become increasingly ubiquitous and owners store ever increasing amounts of personal information on them. (3 credits) summer

Prerequisite: COMP7050

## **COMP 7250 ENTERPRISE COMPUTING**

Enterprise computing refers to business oriented information technology that is critical to an organization's success. This course considers mainframe computing and compares it to distributed and cloud-based computing. It examines the architecture, operating system, application programming environment, networking, security and management of mainframe systems. (3 credits) summer

Prerequisite: COMP7050

## **COMP 7300 COMPUTER SECURITY**

Computer Security, also known as cybersecurity, is information security as applied to computers and mobile computational devices such as smartphones, as well as computer networks. The course examines the processes and mechanisms by which computer-based equipment, information and services are protected from unauthorized or unintended access, changes, or distribution, how threats are assessed and attacks are handled, and how analysis is undertaken to determine what information was lost or compromise as an attack took place. (3 credits) fall

Prerequisite: COMP7050

## **COMP 7400 BIG DATA**

Big Data is an all-encompassing term for any collection of data that is so large and complex that it becomes difficult to process using traditional data processing applications. The challenges include analysis, capture, classification, search, sharing, storage, transfer, visualization and privacy violations. Big Data is of interest to science, government, and the private sector as more and more data is collected daily. This course examines techniques to capture, manage, and manipulate large data sets. (3 credits)

Prerequisite: COMP7050

## **COMP 7425 DATA MINING**

Data mining is the analysis step in knowledge discovery in databases. It is an interdisciplinary field involving the computational process of discovering patterns in large data sets, and involves methods at the intersection of artificial intelligence, machine learning, statistics, and database systems. The overall goal of data mining is to extract information from large data sets and transform it into an understandable structure for future use. Topics examined in this course include the raw analysis step, addresses database and data management aspects, data preprocessing, model and inference considerations, metrics to determine how “interesting:” a result is, complexity considerations, post processing of discovered structures, visualization, and online updating. (3 credits)

Prerequisite: COMP7050

## **COMP 7450 SOFTWARE ENGINEERING**

Software Engineering is the study and application of engineering to the design, development and maintenance of software. Topics covered include requirements engineering, software design, software construction, software testing, software maintenance, software configuration management, software engineering management, software engineering process, software engineering tools and methods and software quality management. (3 credits)

Prerequisite: COMP7050

## **COMP 7500 CAPSTONE**

The capstone experience brings together the material learned earlier in the Master’s programs. Students are guided by a faculty member to build a software system that integrates the knowledge they have learned and the skills developed throughout the program. Where possible, projects will be developed in collaboration with industry partners. (3 credits) spring

Prerequisite: COMP7050

## **CONSTRUCTION MANAGEMENT**

### **CONM 1000 INTRODUCTION TO CM/FM/RE DEVELOPMENT**

This course provides an introduction to construction management and facilities management. The course will explore the process of real estate development as it pertains to the built environment. The course will analyze the cultural context of construction, emphasizing its centrality in the evolution and expansion of the built environment. Industry trends, ethical considerations, delivery systems, technologies and recent “mega” projects including green construction and sustainability will be discussed. (3 credits) fall

### **CONM 1200 BUILDING CONSTRUCTION**

Survey of current materials and methods used in building construction, including building foundations; timber, concrete and steel framing systems; masonry construction; interior and exterior finishes. (4 credits) fall

### **CONM 1500 CONSTRUCTION GRAPHICS**

The development and interpretation of civil, architectural, structural, and electrical drawings; freehand sketching of construction details and sections; computer aided construction drafting. (3 credits) spring

### **CONM 1600 HEAVY CONSTRUCTION EQUIPMENT**

Study of current methods and equipment used in heavy construction projects, including highways, tunnels, bridges, dams, storm drains, and sanitary sewers. (3 credits) spring

Prerequisites: MATH1000

### **CONM 2000 CONSTRUCTION SURVEYING**

Instruction is given in the theory and techniques of horizontal and vertical measurements. Laboratory exercises will focus on the application of these techniques as they relate to the building industry including construction layout and grades. (4 credits) fall

Prerequisites: CONM1500 and MATH1500

## **CONM 2100 STATICS & STRENGTH MATERIALS**

This course covers the fundamental concepts of structural static; forces, moments, equilibrium, support conditions, and free body diagrams; and the fundamentals of strength of materials: properties, stress, strain, shear, bending, and torsion. (4 credits) fall

Prerequisites: MATH1500 and PHYS1000

## **CONM 2200 ESTIMATING**

Topics include the basic manual and computer-aided skills for estimating a variety of projects and developing takeoffs for all trades. (4 credits) fall

Prerequisites: CONM1200 and COMN1500

## **CONM 2500 BUILDING SYSTEMS**

Building Systems is an introduction to the design, construction and start-up of building systems including mechanical, electrical and life safety systems. In particular, it covers the elements of these systems as they relate to the realm of the construction manager. The course provides basic design concepts and code requirements for a variety of systems, including: plumbing, heating, ventilation and air conditioning, fire protection, electrical distribution, lighting, low voltage, and building management control (BMS). It also provides information on systems testing and start-up. (4 credits) spring

## **CONM 2600 WOOD/STEEL ANALYSIS & DESIGN**

This course covers the properties of wood and steel products used in construction. The basic design principles for timber and steel structures are covered including connections, beams, columns, trusses, and frames. (3 credits) fall

Prerequisite: CONM2100

## **CONM 2990 INDEPENDENT STUDY CONSTRUCTION MANAGEMENT**

This course investigates a topic of special interest to faculty and students that is outside regular course offerings. (1 - 4 credits) fall, spring, summer

Prerequisite: Consent of department head and instructor.

## **CONM 3000 MATERIALS TESTING & QUALITY CONTROL**

Aggregate, concrete, asphalt, wood, and masonry are tested using ASTM procedures to establish design criteria, inspection and quality control programs. (4 credits) fall

Prerequisite: CHEM1000 or CHEM1050

## **CONM 3100 CONSTRUCTION PROJECT MANAGEMENT**

Covers feasibility studies, site selection, planning, programming, risk allocation, client relationships, project reporting, design coordination, and contracting procedures. (4 credits) fall

Prerequisite: Junior status in BSCM program.

## **CONM 3201 CONSTRUCTION PROJECT SCHEDULING**

Topics for this course include project network planning, scheduling and cost control models. Computer applications to Gantt Charts and CPM will be explored by the student. (4 credits) fall

Prerequisite: Junior status

## **CONM 3500 ADVANCED ESTIMATING & BID ANALYSIS**

Detailed cost estimates including quantity takeoffs, labor/material pricing, overhead/profit. Also, included are the preparation of preliminary budgets; factors affecting construction cost, bid strategies and computer applications are explored. (4 credits) summer

Prerequisite: CONM2200

## **CONM 3600 CONCRETE ANALYSIS & DESIGN**

This course covers topics related to the analysis and design of reinforced concrete structures including beams, columns, slabs, footings and retaining walls. (4 credits) summer

Prerequisite: CONM2100



## **CONM 3800 SPECIAL TOPICS CONSTRUCTION MANAGEMENT**

Presents topics that are not covered by existing courses and are likely to change from semester to semester. Refer to the Class Schedule for a specific semester for details of offerings for the semester. (1 - 4 credits) summer

## **CONM 4000 CONSTRUCTION PROJECT CONTROL**

Examines the activities involved in the effective management of single and multiple construction projects including basic control theory, the preparation of control models, the collection of actual production data, and the corresponding computation of project performance. (3 credits) summer

Prerequisites: CONM3200 or CONM3201; and CONM3500

## **CONM 4100 CONSTRUCTION BUSINESS & FINANCE**

Topics include construction financing during all phases of project development involving permanent loans, construction loans, sources of mortgage funds and venture capital, and tax and interest considerations. (4 credits) spring

Prerequisites: MGMT2700 and CONM3100, Senior standing

## **CONM 4200 CONSTRUCTION SAFETY & RISK MANAGEMENT**

Topics include the knowledge and skills required to effectively manage safety compliance and risks associated with construction. This course satisfies the OSHA 30-hour training requirement for graduation. (3 credits) spring

Prerequisites: CONM1200 and CONM1600

## **CONM 4600 CONSTRUCTION LAW AND GOVERNMENT REGULATIONS**

A study of construction contracts and the contractual relationships commonly established between owner, designer, builder and construction manager. (3 credits) summer

Prerequisite: CONM3100

## **CONM 4650 BUSINESS CONSTRUCTION LAW AND GOVERNMENT REGULATIONS**

This course introduces business law and relationships, construction contracts and the contractual relationships commonly established between owner/real estate developer, designer, builder and construction manager. (3 credits) summer

Prerequisite: Senior Status

## **CONM 5500 SENIOR PROJECT CONSTRUCTION MANAGEMENT**

Students have the opportunity to explore a subject in construction management of their own choice and to present it. A final oral presentation is required. (4 credits) summer

Prerequisite: Completion of preceding 7 semesters of BSCM program and Senior status.

## **CONM 7000 EXECUTIVE MANAGEMENT FOR CONSTRUCTION MANAGEMENT**

This course covers the management of a design and construction office and dealing with challenges of change, culture, diversity, portfolio management, project management, strategic management and other elements that influence the management process. This course also covers leadership, authority and decision making, and ethics concepts as systems-thinking ways of winning desired cooperation from associates, customers and the construction project participants. The use of case studies and analysis to develop a deeper understanding of executive management in a construction organization is emphasized. (3 credits) fall

Corequisite: TCRM7000

## **CONM 7050 RESEARCH METHODOLOGY IN CONSTRUCTION MANAGEMENT**

This course will guide each student in the understanding and development of research, research tools, proposal writing, and research reports. Emphasis is placed on research planning and design. Topics to be covered range from the Review of Literature through qualitative and quantitative research methodologies. Special attention will be devoted to defining research problems in construction science or construction management and the development of research papers. Upon completion of this course, students will be able to: Demonstrate an understanding of the scientific approach to a research project; Demonstrate knowledge of the variety research tools used in scientific research; Examine “real world” construction science or management problems and develop research methodologies to define and understand them; Demonstrate knowledge of the available quantitative research methodologies; Demonstrate an understanding of how to write a research proposal; Specify the assumptions and limitations implicit in using these techniques, and explain the effect they have on the validity of the results obtained. (3 credits) spring

## **CONM 7100 MODERN CONSTRUCTION DELIVERY METHODS**

This course will expose students to current Architecture-Engineering-Construction (AEC) industry practices that are used to finance and manage the design and construction of capital facilities. It will investigate as well as differentiate recent trends in project contracting, organization, and production management. (3 credits) summer

## **CONM 7150 CONSTRUCTION MANAGEMENT ADVANCED PROJECT CONTROLS**

This course prepares students for the essential construction project controls topics necessary for an effective project manager. The course will be a presentation of several key aspects of construction projects such as construction contracts, cost estimation, planning and scheduling, equipment costs and productivity, construction control and monitoring, and risk management. (3 credits) spring

## **CONM 7200 CONSTRUCTION LAW**

This course will provide a focused study of the key legal concepts and considerations encountered in the construction industry. The course shall include the student and analysis of: industry standard construction contract forms and documents, contractual relationships on a construction project, risk allocation among the parties to a construction project, the procurement and contract formation issues arising on construction projects (public v. private considerations), claims and changes (for time and compensation), and alternative dispute resolution. (3 credits) fall

## **CONM 7250 CONFLICT RESOLUTION AND NEGOTIATION FOR CONSTRUCTION MANAGEMENT**

The course reviews the theoretical basis and practical application of traditional and evolving methods of negotiation and dispute avoidance, mitigation and resolution within the construction industry. The class will cover key strategies, styles, and tactics involved in negotiating typical construction industry transactions, as well as alternative project delivery methods and partnering. The class will also address the negotiation of construction disputes and the resolution of disputes using third parties. Traditional litigation and all forms of alternative dispute resolution will be examined. (3 credits) spring

## **CONM 7300 REAL ESTATE FOR CONSTRUCTION MANAGEMENT**

Introduce elements, players and processes associated with real estate development. Emphasis placed on understanding the real estate development process from the perspective of each of the major players. Topics to be covered include the developer’s role, the relationship between owner/developer, architect and contractor, legal issues, and the perspective of lenders and investor partners. (3 credits) fall

## **CONM 7400 ADVANCED PROJECT CONTROLS**

This course covers the construction project controls necessary to be an effective project manager. Several key aspects of construction projects, such as construction contracts, cost estimation, planning and scheduling, equipment costs and productivity, construction control and monitoring, and risk management are discussed. (3 credits) spring

## **CONM 7500 INTERNATIONAL CONSTRUCTION**

A detailed introduction to the key elements of the international construction markets is covered, with emphasis on strategic elements having the most effect on project scopes, schedules and budgets. (3 credits) spring

## **CONM 8000: CAPSTONE PROJECT IN CONSTRUCTION MANAGEMENT**

This course will guide each student in the development of an individual research topic. It integrates applied classroom and current industry practice and knowledge through observation and interpretation of realistic construction management issues. (3 credits) spring

## **CONM 8900 MASTER OF SCIENCE IN CONSTRUCTION MANAGEMENT THESIS**

The MS in Construction Management offers an optional thesis for students who are considering doctoral-level study in the field. (3 credits)

Prerequisite: CONM7050

## **CONSTRUCTION MANAGEMENT WITH FACILITY MANAGEMENT CONCENTRATION**

### **CMFM 2300 SPACE PLANNING**

Students follow the process of design, problem solving, and building construction management as it relates to the use of interior space. Students will develop comprehensive projects involving issues pertaining to space planning, regulatory codes, building systems, material use and construction methods as related to Facilities Management. (4 credits) summer

Prerequisites: CONM1500

### **CMFM 2400 PROPERTY MANAGEMENT**

This course will focus on how to develop programs for future space needs, determine how much space is required, and how to find new space and negotiate leases with owners and brokers. The interface with property managers plays a crucial role in this process. Students will visit sites in order to select the correct location in which to house all or part of an organization. (3 credits) spring

### **CMFM 3200 PROJECT MANAGEMENT FOR FACILITY MANAGERS**

Students study methods, concepts and procedures of FM project management. Topics include team development, scheduling, budgeting/estimating, contract administration, purchasing, relocations, and move management. (4 credits) spring

Corequisite: CMFM2000 or FMGT2000

### **CMFM 3300 BUILDING OPERATIONS**

Students examine how facilities, building operations, and maintenance organizations are managed. Topics covered include scheduling, equipment evaluation, training and long range planning. Students will explore how the interdependent mechanical systems in a facility work together and how all the elements of an efficient facility work in tandem for maximum effective value to the organization. (3 credits) fall

### **CMFM 4100 FACILITY ASSESSMENT & FORECAST**

This course emphasizes the strategic role required of the facilities manager in providing information for corporate managers and executives for facility forecasting. Topics include corporate real estate, attorney and developer interface, operating budgets and capital expenditures, and build performance assessment. (4 credits) fall

Prerequisite: CMFM3400 or FMGT3400

## **CMFM 4200 ENERGY & SUSTAINABILITY**

Students examine how facilities, building operations, and maintenance organizations are managed to understand energy creation, delivery and consumption. Topics include sources, forms, and methods used to assess and manage energy use in buildings. This course also provides a solid understanding of the fundamental concepts in sustainable practices. Students will apply concepts needed to successfully organize, monitor, communicate and develop a good sustainability program. (3 credits) summer

Prerequisite: CMFM2000 or FMGT2000

## **CMFM 4600 PRINCIPLES REAL ESTATE FOR FACILITY MANAGERS**

This course is designed to enable the student to understand the functioning of the competitive corporate real estate market. It covers real estate concepts pertinent to facilities management. (3 credits) summer

Prerequisite: CMFM4100 or FMGT4100

## **CMFM 5500 CAPSTONE PROJECT**

Students will select their own project with the approval of the faculty for development through the semester. Students are encouraged to select an area of investigation that is a specialization within CMFM that most interests them. Project will be supported by written original investigation and submitted periodically during development for review by the faculty. (4 credits) summer

Prerequisite: All CMFM concentration and CONM required courses, except CMFM 4600, must be successfully completed prior to enrollment in this course

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## **CONSTRUCTION MANAGEMENT WITH COMMERCIAL REAL ESTATE CONCENTRATION**

### **CMRE 1500 PRINCIPLES OF COMMERCIAL REAL ESTATE**

This course provides an introduction to the areas of real estate markets, finance, valuation, urban economics and investments as related to construction. (3 credits) spring

### **CMRE 2000 REAL ESTATE INVESTMENT**

This course provides an introduction to real estate with a focus on investment and financing issues. Topics include, project evaluation, financing strategies, investment decision making, and real estate capital markets. (3 credits) fall

### **CMRE 3000 REAL PROPERTY ANALYSIS**

This course examines the development process for real property. Topics include project inception, site identification and property acquisition, development feasibility, entitlements process, risk assessment, asset valuation, debt and equity financing, design/construction and project management. (3 credits) fall

Prerequisite: CMRE2000

### **CMRE 4000 REAL PROPERTY SECURITIZATION**

This course introduces the analysis of mortgages, mortgaged backed securities and other structured financing. Other topics include, fundamentals of interest rate determination, yield curves and borrowing, and lending decision criteria. (3 credits) spring

## **COOPERATIVE EDUCATION**

### **COOP 2500 CO-OP INSTITUTE**

This interactive seven (7) week, non-credit seminar provides students the tools and framework needed to develop skills to successfully search for, accept, and complete a cooperative educational experience. Topics include but are not limited to Title VII of the Civil Rights Act of 1964, illegal workplace harassment. (0 credit) fall, spring.

### **COOP 3000 OPTIONAL COOP WORK TERM**

Cooperative education (co-op) aims to provide practical experience while applying classroom learning at a work site; to enhance professional skills; to experience personal growth. Co-op is a full-time work experience in a position related to your major. This course may not be used in lieu of COOP3500 nor COOP4500 as a graduation requirement.

Prerequisite: Successful completion of freshman and sophomore program requirements; 2.0 or higher cumulative GPA

### **COOP 3500 COOP EDUCATION 1**

Cooperative education (co-op) aims to provide practical experience while applying classroom learning at a work site; to enhance professional skills; to experience personal growth. Co-op is a full-time work experience in a position related to your major. Enrollment in this course maintains full-time student status.

Prerequisite: Junior Status; 2.0 or higher cumulative GPA

### **COOP 4500 COOP EDUCATION 2**

Cooperative education (co-op) aims to provide practical experience while applying classroom learning at a work site; to enhance professional skills; to experience personal growth. Co-op is a full-time work experience in a position related to your major. Enrollment in this course maintains full-time student status.

Prerequisite: COOP3500; Senior Status; 2.0 or higher cumulative GPA

### **COOP 5000 ADDITIONAL COOP WORK SEMESTER**

Cooperative education (co-op) aims to provide practical experience while applying classroom learning at a work site; to enhance professional skills; to experience personal growth. Co-op is a full-time work experience in a position related to your major. Enrollment in this course maintains full-time student status.

Prerequisite: COOP3500 and COOP4500; permission of the Director of CO-OPS + CAREERS, 2.0 or higher cumulative GPA

## **DESIGN**

### **DSGN 1000 VISUALIZATION 1 / DRAWING I**

Visualization 1/Drawing 1 is an interdisciplinary course between the Industrial Design and Interior Design departments. Students create finished illustrations through observation, sketching and refining. Skills in hand-eye coordination, correct tool selection and use, and an application of linear perspective are developed to accurately and expressively record subjects from life, design and built environment. An emphasis on verbalizing work utilizing design nomenclature is stressed. (3 credits)

### **DSGN 1010 DRAWING & THINKING FOR PRODUCT DEVELOPMENT**

Primarily geared towards non-design majors, this course is focused on developing freehand drawing skills, the creative visual processing of ideas, and fundamental presentation techniques typical of the design practice and product development methodology. Course is open to all majors and levels of students. (3 credits)

### **DSGN 1100 DESIGN MAGIC**

This course is a jam-packed experience that introduces the first-year design student to the magic world of design creativity, the infinite possibilities in design, who's doing it and what they're doing, and how one gets creative magic. (2 credits)

## **DSGN 1200 COLOR & COMPOSITION**

This course investigates the properties and relationships of color, color systems and color interactions. Students relate theory to design through studio projects and explore its psychological and physiological effects on the environment. (4 credits)

## **DSGN 2990 INDEPENDENT STUDY DESIGN**

This course investigates a topic of special interest to faculty and students that is outside regular course offerings. (1 - 4 credits)

Prerequisite: Consent of department head and instructor.

## **DSGN 3500 STUDY ABROAD EPIC STUDIO**

The Study Abroad EPIC Interior/Industrial Design studio explores human scale and interaction in the interior built environment. Projects require solutions that simultaneously resolve theoretical, aesthetic and technical concerns, including the use of sustainable design methodologies. (6 credits)

Prerequisites: INDS3000 and INTD3000

## **DSGN 3800 SPECIAL TOPICS DESIGN**

Presents topics that are not covered by existing courses and are likely to change from semester to semester. Refer to the Class Schedule for a specific semester for details of offerings for the semester. (1 - 4 credits)

## **ECONOMICS**

### **ECON 1102 ECONOMICS I**

This course is designed to enable the student to understand the functioning of the competitive market. The analysis of the production of goods and services and the method of allocation and distribution is emphasized. (3 credits)

Prerequisite: ENGL1050

### **ECON 1300 MONEY AND BANKING**

The course deals with the creation and uses of money and the role of banks. Fiscal and monetary policy, the role of the Federal Reserve, and both foreign and domestic banking policy will be studied. (3 credits)

Prerequisites: ENGL1050 and ENGL2050

### **ECON 3200 INTERNATIONAL ECONOMICS**

This course is a survey of the development of international trade theory and policy. Topics include: The organization and regulation of international trade, GATT, international economic integration, NAFTA, balance of payments and exchange rate determinations. (3 credits)

Prerequisite: ENGL1050 and ENGL2050

### **ECON 3800 SPECIAL TOPICS IN ECONOMICS**

Presents topics in economics that are not covered by existing courses and are likely to change from semester to semester. Refer to the Class Schedule for a specific semester for details of offerings for the semester. (4 credits)

Prerequisite: completion of an ENGL sequence

### **ECON 4102 PRINCIPLES OF ECONOMICS**

This course covers the core theories and concepts of microeconomics and macroeconomics, with emphasis on how individuals, organizations, and public officials allocate scarce resources, and the impact of their policy choices on the growth and development of the economy. (4 credits) fall, spring, summer

Prerequisite: completion of an ENGL sequence

## **ECON 4152 MACROECONOMICS**

An introduction to the functioning of market economics. National income determination, and the role of labor and capital in the determination of economic aggregates. Public and economic policy associated with unemployment and inflation, and fiscal and monetary policy. (4 credits) fall, spring, summer

Prerequisite: completion of an ENGL sequence

## **ECON 4154 MICROECONOMICS**

This course involves a study of the choices made by individuals and organizations in the allocation of scarce resources with emphasis on consumer demand and profit maximization of firms, the behavior of firms under conditions of competition, monopoly-monopoly and imperfect competition, and public policy issues related to the same. (4 credits) fall, spring, summer

Prerequisite: completion of an ENGL sequence

## **ECON 4200 TECHNOLOGY & ECONOMIC DEVELOPMENT**

This course focuses on the current challenges of the developing world and the technological advances which are improving lives and empowering the poor in terms of access to health care, clean water, nutritious food, sanitation, and communication technology. We will also consider the theoretical and historical relationship between technology and economic growth and development. By working with both interdisciplinary and external partners, students will develop their own proposals for new technologies designed to meet the needs of underdeveloped communities around the world. (4 credits)

Prerequisite: completion of an ENGL sequence

## **ECON 4362 THE GLOBAL ECONOMY**

This course will examine the global economic shifts which have precipitated regional and global economic integration and interdependence among the world's economies. Topics include the role of international organizations, global corporations, and international flows of finance, information, technology and trade in shaping the scope, depth, and pace of economic growth and development in the international community. (4 credits)

Prerequisite: completion of an ENGL sequence

## **ELECTRICAL**

### **ELEC 1000 INTRODUCTION TO ENGINEERING AND TECHNOLOGY**

This initial course introduces technology concepts and engineering drawing. Students will learn about basic systems, get an overview of their major, and become acquainted with the skill sets they will need to be successful in their field. (4 credits)

Prerequisite: Enrollment in BCOT or BEET program.

### **ELEC 1030 ELEX & ELECTRONICS**

Basic principles of electric circuit analysis are discussed. Voltage, current, and power relationships in AC and DC circuits are emphasized. Principles and applications of diodes, transistors, and control devices are discussed. Basic digital circuitry is also included. Laboratory work augments the theory. (4 credits)

Prerequisite: MATH1065 or MATH1500

### **ELEC 1100 CIRCUIT THEORY I**

The concepts of current, voltage, power, energy, and resistance are studied. Topics include DC and AC sources, capacitance, inductance, and magnetism. Resistive circuits are analyzed using Ohm's and Kirchhoff's Laws and computer-aided circuit analysis using SPICE is included. (4 credits)

Corequisite: MATH1000 or MATH1035

## **ELEC 1500 CIRCUIT THEORY II**

The concepts of impedance and admittance in sinusoidal circuits are examined. Circuits are solved using superposition, Thevenin, Norton, nodal, and mesh analysis. Resonant circuits and transformer theory are also studied. Laboratory work and computer-aided analysis techniques are designed to correlate with theory. (4 credits)

Prerequisite: ELEC1100

Corequisite: MATH1500

## **ELEC 1600 ELECTRONIC DESIGN I**

This course introduces the student to the fundamental principles involved in the electronic design process. Topics include problem identification and definition, mechanisms of technological problem-solving, design alternatives, and project planning and implementation. The influence of cost, material resources, performance criteria, and relevant safety issues will be discussed. All students will be expected to complete an electronic design project. (3 credits)

Prerequisite: MATH1000

## **ELEC 2000 SEMICONDUCTOR DEVICES**

A variety of semiconductor devices are introduced. Emphasis is placed on diodes, BJT, oscillators and FET. A variety of applications including triacs, SCRs, opt isolators, and other devices are also included. (4 credits)

Prerequisite: ELEC1500

Corequisite: MATH1700

## **ELEC 2100 LOGIC CIRCUITS**

This course introduces the Boolean algebra, combination logic circuits, counters, registers, ALUs, encoders, decoders and multiplexer. Circuit simulation software is used in laboratory work. (4 credits)

Prerequisite: ELEC1100

## **ELEC 2199 LINEAR INTEGRATED CIRCUITS**

The emphasis of this course is on basic linear operational amplifier circuits such as comparators, amplifiers, wave-shaping circuits and active filters. Also considered are linear integrated circuit modules such as voltage references and instrumentation amplifiers. These circuits are tested and analyzed in the laboratory. (4 credits)

Prerequisite: ELEC2099

## **ELEC 2200 DIGITAL SYSTEMS**

This course covers both the hardware and the software of a microprocessor-based system. The first part of this course introduces different number systems, Boolean algebra, truth table, simplification methods of Boolean expression, combination and sequential circuits. The second part of the course introduces microprocessor and microcontroller, memories, input/output interfacing, and assembly language programming. (4 credits)

Prerequisite: COMP1299

## **ELEC 2250 NETWORK THEORY I**

The fundamental concepts of current, voltage, and power are studied along with the properties of passive circuit elements as well as network theorems. Transient analysis R-L, R-C, and R-L-C circuits and initial conditions are studied. Laboratory experiments parallel classroom theory and include circuit simulation. (4 credits)

Prerequisite: MATH1850 or MATH1875

Corequisite: MATH2500



## **ELEC 2275 DIGITAL LOGIC**

This course introduces digital logic and circuits. Topics include continuous and discrete number representations, binary arithmetic, combinational logic (Boolean algebra, truth tables, Karnaugh maps, encoders, decoders, multiplexer), sequential logic (flip-flops, timing diagrams, counters, registers, state machines, memory), integrated circuit issues (operating characteristics, logic voltage levels, propagation delay, fan-out), power dissipation) and programmable logic devices. Digital circuits are implemented and tested utilizing both schematic diagram representation and hardware description language (HDL). (4 credits)  
Corequisite: ELEC2250

## **ELEC 2299 ELECTRIC CIRCUIT ANALYSIS & DESIGN**

Basic electric circuit theory is covered, including direct current (DC), transient, and alternating current (AC) steady state analysis. Specific topics include the concepts of current, voltage, resistance, capacitance, inductance, impedance, power, energy, power factor, Ohm's Law, series and parallel circuits, Kirchhoff's Laws, nodal analysis, mesh analysis, Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem, Phasor diagrams, and introduction to the Laplace Transform in circuit analysis. Laboratory work and computer-aided analysis techniques are designed to correlate with circuit analysis theory and design. (4 credits)  
Corequisite: MATH1850 and PHYS1750

## **ELEC 2399 ANALOG & DIGITAL ELECTRONICS**

In this course a variety of semiconductor devices and analog and digital integrated circuits are introduced. Topics on analog electronics include diodes and transistors (FETs and BJTs) with discussion of applications, operational amplifiers (inverting, non-inverting and difference amplifiers, integrators and differentiators), filters, oscillators and signal generators. Digital electronics topics include digital logic, number conversions, Boolean Algebra, Karnaugh maps, logic gates, flip-flops, and programmable logic devices, encoders and decoders, counters and registers, and analog to digital converters. Applications to medical instrumentation are discussed. (4 credits)  
Prerequisite: ELEC 2299; Biomedical Engineering students only

## **ELEC 2499 LOGIC CIRCUITS**

This course introduces binary and hexadecimal numbers, Boolean algebra, truth tables, Karnaugh maps, and combination logic using basic gates. Flip-flops, counters, registers, ALU's, encoders, and decoders are also presented. Circuit simulation software is used in both classroom and laboratory work. (4 credits) Prerequisite: ELEC1100

## **ELEC 2500 ELECTRONICS I**

The concepts of design, analysis, simulation, implementation and evaluation of electronic circuits and systems are covered. Topics include signals and amplifiers, frequency response, feedback, operational amplifier circuits, active filters, and oscillators. (4 credits)  
Prerequisites: ELEC2750 and MATH2500  
Corequisite: ELEC3350

## **ELEC 2599 INTRODUCTION TO MICROPROCESSORS**

This course introduces microprocessors and microcomputer systems. Related hardware and software issues will be covered. It will also cover memory systems, input/output devices, and interfacing mechanisms. (4 credits)  
Prerequisite: ELEC2499

## **ELEC 2600 DIGITAL APPLICATIONS**

This course covers the analysis and modeling of high-speed digital systems. It examines the use of programmable CMOS integrated circuits. The student will learn to implement both combination and sequential logic circuits in addition finite state machines. (4 credits)  
Prerequisite: ELEC1500 and ELEC2100  
Corequisite: MATH1850

## **ELEC 2699 INTEGRATED ELECTRONICS**

This integrated electronics course covers basic analog and digital electronic circuits and devices. The topics include diodes, MOSFETs, FETs, BJTs, operational amplifiers, inverting, non-inverting, integrating, and differentiating op-amps, bioinstrumentation amplifiers, filters, oscillators and signal generators, digital logic, Boolean algebra, Karnaugh maps, logic gates, flip-flops, programmable logic devices, encoders, decoders, counters, registers and A to D converters. Lab experiments will include basic analog and digital devices, practical biomedical applications, and a design project. (3 credits)

Prerequisite: ELEC2299

## **ELEC 2700 INTEGRATED CIRCUITS WITH APPLICATIONS**

Integrated circuit applications of operational amplifiers and linear integrated circuits are introduced. Topics include the use of linear and non-linear IC's in open and closed loop (feedback) configurations. (4 credits)

Prerequisite: ELEC2000

Corequisite: MATH1800

## **ELEC 2750 NETWORK THEORY II**

In this continuation of Network Theory I, the concept of complex impedance and admittance is included. Circuits are analyzed using network theorems. Magnetic circuits, transformer concepts and AC power are studied in addition to three-phase balanced circuits. The Laplace Transform analysis and its application to circuit analysis are also studied. (4 credits)

Prerequisites: ELEC2250 and MATH2500

## **ELEC 2799 CIRCUIT THEORY AND APPLICATION**

Introduction to electrical and electronic circuits, with emphasis on building a foundation for applications involving mechanical systems. Voltage, current and power will be analyzed in DC and AC circuits having components that include resistors, capacitors, inductors, diodes or operational amplifiers. Some of the laboratory exercises will involve applications having sensors of mechanical phenomenon, signal conditioning, data acquisition and basic signal processing on a computer running suitable software. Some of the homework and laboratory exercises will involve building and testing circuits using circuit simulation software. (3 credits)

Prerequisites: MATH1750 and PHYS1750

## **ELEC 2850 MICROCONTROLLERS USING C PROG**

Students learn to develop both computer programs and microcontroller systems. Based on the C language, fundamental programming concepts are explored, including types, operators (Boolean, binary, numeric), expressions, control flow, functions, pointers, arrays, structures and input/output mechanisms. Microcontroller concepts are explored, including hardware architecture, programming model, timers, interrupts, data acquisition, signal output and serial communication. Peripheral circuits for microcontrollers are developed for signal conditioning of sensor input and for controlling of actuators. (4 credits)

Prerequisite: ELEC2275

## **ELEC 2950 EMBEDDED COMPUTER SYSTEMS**

Students will design embedded data acquisition systems to monitor and record data from a variety of electromechanical systems. This course includes the study and use of sensors for measurement of physical parameters, signal conditioning for input interfacing, semiconductor devices for output control. Both hardware and software designs are implemented to solve a variety of engineering applications. (3 credits)

Prerequisite: ELEC2275 or ELEC2200

## **ELEC 2990 INDEPENDENT STUDY ELECTRONICS**

This course investigates a topic of special interest to faculty and students that is outside regular course offerings. (1 – 4 credits)

## **ELEC 3000 OBJECT ORIENTED PROGRAMMING ELECTONICS**

This course is an introduction to object oriented programming topics useful for electronics. Topics include I/O file streams and data files, introduction to classes, class functions, and conversions. (4 credits)

Prerequisite: COMP1299

## **ELEC 3100 DATA COMMUNICATIONS**

This course introduces the concepts of digital transmission, metallic cable and fiber t transmission media, transmission lines, public telephone network and data communications. (4 credits)

Prerequisite: ELEC2100

## **ELEC 3150 OBJECT ORIENTED PROGRAMMING FOR ENGINEERES**

This course introduces students to a set of tools and methods that enables engineers to build reliable, user-friendly, maintainable, well documented, reusable software systems. This course teaches these fundamental ideas through the object-oriented approach to programming using C++ and Java. (4 credits)

Prerequisite: ENGR1800

## **ELEC 3200 ADVANCED DIGITAL CIRCUIT DESIGN**

Students learn the approach to designing complex digital systems described using schematic entry or hardware description languages. Circuits are synthesized, simulated and tested on programmable logic hardware circuits. (4 credits)

Prerequisite: ELEC2275

## **ELEC 3225 APPLIED PROGRAMMING CONCEPTS**

This course will introduce engineers to applied programming concepts and large-scale programming projects. Topics include design patterns, data structures, database management, advanced user's interfaces, algorithm design, and version control and regression testing. The course will focus on hands-on programming, with both small and large projects. (3 credits) summer

Prerequisites: ELEC3150 or instructor permission.

## **ELEC 3250 ANALOG CIRCUIT DESIGN**

This course covers the concepts of design, analysis, simulation, implementation and evaluation of analog electronic circuits and systems. Topics include semiconductor physics, BJT, MOS, and FET devices and linear integrated circuits. (4 credits)

Prerequisite: ELEC2750

## **ELEC 3300 ELECTRIC MACHINES & TRANSFORMERS**

This course concentrates on single-phase and three-phase systems, magnetic systems, transformers, electromechanical conversion principles, three-phase and single-phase induction motors, synchronous motors and generators, DC generators and motors, and stepper motors as applied to electric power and control systems. Laboratory work parallels classroom theory. (4 credits)

Prerequisite: ELEC1500

## **ELEC 3350 SOLID STATE DEVICES**

The primary goal of this course is to provide students with the essential background on semiconductor materials and devices including a basic understanding of crystal structure, energy bands, charge carriers and junctions. (3 credits)

Prerequisites: ELEC3250 and MATH2025

## **ELEC 3450 MICROCONTROLLERS & EMBEDDED COMMUNICATION**

This course will introduce the students to microcontroller principles, both hardware and software. Students will write assembly language programs using programming techniques and use sensor signal conditioning for interfacing and software design. (4 credits)

Prerequisite: ELEC2100

## **ELEC 3500 ELECTRONICS II**

This course, the second in a two-course sequence, covers the concepts of design, analysis, simulation, implementation and evaluation of electronic circuits and systems. Topics include diodes, MOSFETs, BJTs, building blocks of integrated circuit amplifiers, differential and multi-stage amplifiers, and output stages and power amplifiers. (4 credits)  
Prerequisites: ELEC2500 and ELEC3350

## **ELEC 3550 COMPUTER NETWORKS FOR ENGINEERS**

This course focuses on the Internet and a modern treatment of computer networking. Topics include network services, application, transport and network layers, local area networks, wireless and mobile networks, multimedia networking and network security. (4 credits)

Prerequisite: ELEC3150

Corequisite: ELEC3725

## **ELEC 3575 COMPUTER COMMUNICATION & NETWORK**

This course covers local (LAN), metropolitan (MAN) and wide area (WAN) networks, topologies and transmission media, network interface and management, congestion/flow/error control, routing and addressing. Laboratory exercises include simulation and installation of small network. (4 credits)

Prerequisite: ELEC3100

## **ELEC 3600 SIGNALS AND SYSTEMS**

This course introduces students to signals and systems and to linear algebra. Topics include: matrix operations, determinants, vector spaces, linear transformations, orthogonality, eigenvalues, signal operations, classifications of signals and systems, continuous-time LTI system analysis (impulse response, convolution, Laplace transform and its applications), continuous-time signal analysis (Fourier series, Fourier transform and its applications). (4 credits)

Prerequisites: MATH2025 and MATH2500

## **ELEC 3625 COMPUTER ORGANIZATION & ARCHITECTURE**

This course introduces engineering students with the design of computer systems and component; processor design, instruction set design, and addressing; control structures and microprogramming; memory management, caches and memory hierarchies; interrupts and I/O structures. (4 credits)

Prerequisite: ELEC3200

Corequisite: ELEC3550

## **ELEC 3675 LINEAR NETWORK ANALYSIS**

This course introduces first and second order differential equations, initial condition problems, Laplace Transforms with partial fraction expansion, pole/zero analysis, and Fourier Transforms. Associated laboratory experiments parallel the theory and help demonstrate the practical usefulness of the topics as they apply to electronic and computer engineering technology problems. (4 credits)

Prerequisite: MATH2000

## **ELEC 3725 COMPUTER ARCHITECTURE**

This course introduces engineering students with the design of computer systems and components; processor design, instruction set design, and addressing; control structures and microprogramming; memory management, caches, and memory hierarchy; interrupts and I/O structures. (3 credits)

Prerequisite: ELEC2275

Corequisite: ELEC3550

## **ELEC 3750 COMPUTER SYSTEMS ARCHITECTURE**

This course examines the operation of a computer system including microprocessor, I/O, mass storage, monitors, and memory. Introduces machine language and compilers as applied to current and state-of-the-art systems. Interfacing with stepper motors and sensors are also introduced. (4 credits)

Prerequisite: ELEC2100

## **ELEC 3775 DISCRETE SIGNALS & SYSTEMS**

Discrete signals and systems are identified and studied. The use of difference equations, convolution techniques, and z-transforms are included. The need for anti-aliasing filters, sample-and-hold circuitry as well as limitations of ADCs are emphasized. Laboratory exercises address practical solutions to problems. (4 credits)

Prerequisite: Junior status

Corequisite: ELEC3675

## **ELEC 3800 SPECIAL TOPICS ELECTRONICS**

Presents topics that are not covered by existing courses and are likely to change from semester to semester. Refer to the Class Schedule for a specific semester for details of offerings for the semester. (1 – 4 credits)

## **ELEC 3900 INTRODUCTION TO NANOTECHNOLOGY**

The ongoing impact of nanotechnology on the current state of science and engineering will be explored here. Various deposition techniques and applications are also studied. (3 credits)

## **ELEC 3920 ENGINEERING SIGNALS & SYSTEMS**

Continuous and discrete-time signals and systems will be studied. Time domain analysis of linear systems will include convolution (discrete and continuous), time-invariance, causality, and stability of systems. Time domain analysis of signals using the Fourier series and Fourier integral will be covered as well as frequency domain analysis of signals using the Fourier transform. Laplace transform analysis of linear systems including pole-zero plots and z-transform analysis of discrete systems will be studied. Laboratory exercises will use computer software to strengthen important course concepts. (4 credits)

Prerequisites: ELEC2750 and MATH2500

## **ELEC 3950 ADVANCED SENSORS & INTERFACING SYSTEMS**

Topics include linear and nonlinear sensors, high-performance instrumentation amplifiers for signal conditioning, temperature sensors, analog computational units with application of linear regression techniques, and design of multiplier circuits. Modern sensors and interfacing with microcontrollers are introduced. (4 credits)

Prerequisite: ELEC2700

## **ELEC 4000 DIGITAL SIGNAL PROCESSING**

This course presents the basic digital signal processing (DSP) principles used in the design and analysis of sampled signals. Topics include but are not limited to design of finite impulse response (FIR) filters and infinite impulse response (IIR) filters. The Fast Fourier Transform (FFT) is studied in order to compute the Discrete Fourier Transform (DFT). Laboratory experiments emphasize hardware and software solutions to practical problems. (4 credits)

Prerequisites: ELEC3775

## **ELEC 4025 HARDWARE SECURITY**

This course will introduce students to the hardware and related software aspects of modern computing devices. Students will learn about confidentiality, data integrity, availability, general methods of data/information protection, and study existing exploitations, in order to design more security systems/devices. Students will also study the ethics of hacking and security. (3 credits) summer

Prerequisites: ELEC2850 or instructor permission

## **ELEC 4050 MOTORS AND CONTROLS**

This course reviews the topic of magnetic, DC, AC (single and 3-phase) and special motors are considered. Applications of different types of motors will be discussed. Electromechanical control equipment as well as the solid-state control equipment will be covered. The course will use the knowledge learned in previous courses in the curriculum to build a working model for a particular application. (4 credits)

Prerequisites: ELEC3250 and MATH2025

## **ELEC 4075 ENGINEERING OPERATING SYSTEMS**

Students will learn the fundamentals of operating systems concepts and architectures for various platforms such as personal computers, mobile, networked and real-time embedded systems. Coverage shall include operating systems architecture, concepts and methods for managing processes and threads, main memory, file systems, I/O management and real-time systems. Detailed examples are taken from several operating systems, emphasizing the techniques used in UNIX variants. Concepts and techniques will be demonstrated using lab experiments using UNIX-like system such as Linux or QNX. (4 credits) spring  
Prerequisite: ELEC3150

## **ELEC 4100 ELECTROMAGNETICS**

Static electric and magnetic fields are studied in this course. Maxwell's equations are presented and time-varying fields are introduced. Laboratory applications include transmission of electromagnetic waves in air and on transmission lines. (4 credits)  
Prerequisite: MATH2000

## **ELEC 4200 DIGITAL CONTROL & SYSTEMS**

This course will use velocity and position feedback to control servos. PID and other types of systems will be analyzed through software packages employing BODE, Nyquist and Root locus techniques. (4 credits)  
Prerequisite: ELEC3675  
Corequisite: ELEC4225

## **ELEC 4225 INTRODUCTION TO DIGITAL SIGNAL PROCESS**

This course introduces sampling, aliasing, ADCs and z-transforms. DSP applications including digital filtering (both FIR and IIR) are analyzed and designed. Fast Fourier Transform (FFT) is studied in order to compute the Discrete Fourier Transform (DFT). Laboratory experiments emphasize hardware and software solutions to practical problems. (4 credits)  
Prerequisites: ELEC3450 and ELEC3675

## **ELEC 4300 ENGINEERING COMMUNICATION SYSTEMS**

This course serves as an introductory course in analog and digital communication systems. Topics covered include amplitude, frequency, pulse and pulse-code modulation and signal-to-noise ratios for various modulation schemes and sampling, quantization and coding. The laboratory would augment the course materials. (4 credits)  
Prerequisite: MATH3100

## **ELEC 4350 FEEDBACK CONTROL SYSTEMS**

Analysis and design of linear control systems will be accomplished using Root locus, Bode and Nyquist techniques. The laboratory experiments will include servo trainers and employing 4 software packages. Digital systems will be introduced as well as state variables. PID controllers will be covered. (4 credits)  
Prerequisites: ELEC3675 and ELEC3775

## **ELEC 4400 ENGINEERING DIGITAL SIGNAL PROCESSING**

This course presents the theory and practice of digital signal processing. Topics include review of discrete-time signals, systems and the Z-transform; sampling and quantization; Fourier transforms (DTFT, DFT and FFT) with applications to fast convolution; design techniques for FIR and IIR digital filters; realization structures for digital filters and finite precision effects; fundamentals of multi-rate signal processing and filterbanks; and DSP applications. (4 credits)  
Prerequisites: ELEC3600 and MATH2300

## **ELEC 4425 ADVANCED PROGRAMMABLE LOGIC**

The objective of this course is to build a RISC processor core. The emphasis will be on implementing MSI circuits using VHDL language. Students utilize top-down methodology to design complex logic circuits using programmable logic abstractions. They synthesize hierarchical architecture structures in building a processor core. (3 credits)

Prerequisites: ELEC2100 and ELEC3750

## **ELEC 4450 DIGITAL COMMUNICATION SYSTEMS**

This course studies sampling, coding, decoding, pulse code modulation, digital multiplexing, digital carrier systems, frequency shift keying, data compression, as well as bandwidth considerations. Laboratory work parallels classroom theory. (4 credits)

Prerequisite: ELEC3775 or ELEC4425

## **ELEC 4475 FEEDBACK AND CONTROL**

The definition of an analog feedback control system will be the introduction of the course. The course proceeds with the time-domain and frequency-domain analysis of closed loop feedback control systems. The relationship between the time-domain and frequency-domain is discussed. The stability methods are explained. The course provides an introduction to the state-space method and an introduction to discrete control systems. (4 credits)

Prerequisites: MATH2500

Corequisite: ELEC4050

## **ELEC 4500 ELECTRONICS DESIGN PROJECT I**

The first of a two-course sequence, this course concentrates on the selection of an appropriate engineering project for design, the development of time and financial budgets, and milestone graphs. The majority of work is spent in the laboratory researching, designing, prototyping, debugging, and acquiring data on the students' individual designs. Engineering notebook is required. (3 credits)

Prerequisites: ELEC3450 ELEC3950; senior status

## **ELEC 4725 ADVANCED COMPUTER ARCHITECTURE**

We will discuss various concepts behind the designs of current microprocessors. In particular, the topics that will be covered in the course are but not limited to: performance simulators and evaluation, static and dynamic scheduling, instruction-level parallelism, advanced pipelining, speculative execution, memory hierarchy and organization, multi-processing (3 credits) spring

Prerequisite: ELEC3725

## **ELEC 5000 SENIOR DESIGN PROJECT I**

This course is for BCOT senior students to pursue project-oriented work. Students may work in their curriculum or become involved in an interdisciplinary problem. Course requirements include oral and written progress reports throughout the semester plus a final technical report documenting the semester's work. (4 credits)

Prerequisite: Senior status

## **ELEC 5500 SENIOR DESIGN PROJECT II**

The second of a two-course sequence, Senior Design Project II focuses on implementing the design developed in Senior Design Project I. Emphasis is placed on both oral and written presentation skills as well as packaging and fabrication of an "engineering prototype". (3 credits)

Prerequisites: ELEC4500

## ELECTROMECHANICAL

### ELMC 1000 ENGINEERING GRAPHICS

Basic concepts of CAD, design, and sketching are explored. Drafting exercises include orthographic projection, 2- and 3-dimensional elements, multiviews, dimensioning, sections, tolerance, and assemblies. CAD is used in drafting exercises for electrical and mechanical design. (4 credits)

Corequisite: MATH1000 or MATH1005

### ELMC 2080 INTRO TO ROBOTIC SYSTEMS

This course introduces the fundamental principles of robotic systems. Students study both the hardware and software needed to design, build, program, and test a mobile robot. Topics include power sources, motors, sensors, actuators, and process controls. Laboratory work complements classroom discussion. (3 credits)

Prerequisite: MATH1500 or MATH1750 or MATH1775

### ELMC 2990 INDEPENDENT STUDY ELECTROMECH

This course investigates a topic of special interest to faculty and students that is outside regular course offerings. (1 – 4 credits)

Prerequisite: Consent of department head and instructor

### ELMC 3000 ELECTROMECHANICAL DESIGN

Students work in teams to design and construct an interdisciplinary project. Teams, with clearly defined individual responsibilities, are required. During the course of the semester, each team undertakes the necessary activities to bring about a successful design project that is well understood, documented, and presented in both oral and written form. Emphasis is placed on research, innovation, project management, decision-making, prototyping, design for manufacturing, design for testability, environmental and ethical issues in design, depth and breadth of analysis, quality of hardware, documentation, and communications. (3 credits)

Prerequisites: Junior status; ENGR1500 and MECH2500 and ELEC2200 and ELEC3250

### ELMC 3250 ELECTROMAGNETIC FIELD THEORY

This course introduces static electric and magnetic fields. Time-varying fields are studied using Maxwell's equations. Application of energy transfer in space and in communication transmission lines are analyzed. (3 credits)

Prerequisite: MATH2025

### ELMC 3800 SPECIAL TOPICS ELECTROMECHANIC

Presents topics that are not covered by existing courses and are likely to change from semester to semester. Refer to the Class Schedule for a specific semester for details of offerings for the semester. (1 – 4 credits)

### ELMC 4000 ADVANCED MATHEMATICAL MODELING

Problems in heat transfer, fluid mechanics, vibration systems, and wave propagation will be modeled using partial differential equations. Solution techniques will involve the study of orthogonal expansions in Fourier series, Sturm-Liouville theory, and the method of separation of variables. Additional problems in heat conduction will be presented and solved using Bessel functions and cylindrical coordinates. Computer software for both modeling and problem solving will be employed. (3 credits)

Prerequisite: MATH2500

### ELMC 5000 SENIOR DESIGN I

This course is only for electromechanical students with senior status and the required Prerequisite courses. Students will work in the electrical and mechanical fields alone and in small project groups to study, analyze, design, and sometimes build and test concepts in a field of their choosing. The study will be performed under the direction of one or more faculty advisors. Projects from industry will be encouraged to increase the interaction and cooperation with local engineering firms. Course requirements include regular, oral, and written progress reports throughout the semester. The final technical report will detail the plans and schedule for the following Senior Design II course. (4 credits)

Prerequisites: ELEC4475 and MECH4400 and MECH4425



## **ELMC 5005 ELECTROMECHANICAL SYSTEMS I**

This course analyzes the dynamic behavior of mechanical, fluid and thermal systems using modeling and simulation techniques. Steady state and transient conditions will be examined in both free and forced modes. Various simulation software packages are used in the laboratory to analyze electromechanical systems. (4 credits)  
Prerequisites: ELEC4475 and MATH2860 and MECH3850

## **ELMC 5500 SENIOR DESIGN II**

This course is a continuation of Senior Design I. The students continue with their design and analysis with emphasis on improvements and applications. Other faculty and local engineers will review the student work and make recommendations. (4 credits)  
Prerequisites: MATH2100 and ELMC5000 and ELMC5505

## **ELMC 5505 ELECTROMECHANICAL SYSTEMS II**

This course is a continuation of Electromechanical Systems I. Analysis of multi-degree of freedom systems will be studied. Dynamic responses of first and second order systems to harmonic excitation are analyzed. State space analysis will be used to solve sets of nth-order coupled differential equations. Sensors to detect displacement, velocity, and acceleration as well as digital signal processing techniques to acquire data, provide filtering, and perform system analysis will be employed. The laboratory projects will reinforce the theory and demonstrate the rigor of the analytical techniques. Laboratory exercises will stress the comparison of theoretical and simulated results. (4 credits)  
Prerequisite: ELMC5005

## **ENGINEERING**

### **ENGR 1000 INTRODUCTION TO ENGINEERING**

This course develops the skills needed during the student's study of engineering. Topics include task/time management, effective use of notes, engineering research, oral and written communications, problem-solving techniques, ethics and professional responsibility and Institute resources. In the laboratory, students work in teams to complete a variety of engineering tasks. (3 credits) fall

### **ENGR 1500 INTRODUCTION TO ENGINEERING DESIGN**

This course is an externally collaborative project based interdisciplinary design course, introducing students to the fundamentals of engineering design and professional practices. Students learn about the design cycle and the necessary steps to work on a successful design as a member of a team. Topics include problem identification, brainstorming, project planning, and design alternatives. Cost, safety and environmental issues are considered as well as ethical and professional responsibilities. (3 credits) spring  
Prerequisite: Enrollment in an engineering program

### **ENGR 1600 FUNDAMENTALS OF CAD & CAM**

Basic concepts of engineering graphics, design and sketching and computer programming, research methodologies, manufacturing fundamentals, along with basic measurements and presentation of experiment results. (1 credit) fall, spring

### **ENGR 1800 INTRODUCTION TO MATLAB**

MATLAB is a powerful programming language used throughout many engineering industries. This course provides an introduction to the fundamentals of computer programming and the use of MATLAB. The student will be introduced to the 'Procedural Programming' paradigm and will learn the proper use of the logical building blocks common to all modern computing languages and how to create specific programs using the MATLAB syntax. After this introductory course the student is encouraged to continue to use and develop their MATLAB programming skills by utilizing MATLAB for their other courses. (1 credit) fall, spring

## **ENGR 2990 INDEPENDENT STUDY IN ENGINEERING**

This course investigates a topic of special interest to faculty and students that is outside regular course offerings. (1 – 4 credits)

Prerequisite: Consent of department head and instructor

## **ENGR 3500 ENGINEERING JUNIOR DESIGN**

This engineering design course is for junior level engineering and computer science students who will formulate a topic and develop a design for an innovative device or system. Students are encouraged to follow an interdisciplinary approach. (4 credits)

Prerequisite: Junior status in an engineering or computer science program

## **ENGR 3800 SPECIAL TOPICS IN ENGINEERING**

Presents topics that are not covered by existing courses and are likely to change from semester to semester. Refer to the Class Schedule for a specific semester for details of offerings for the semester. (1 – 4 credits)

## **ENGR 5000 ENGINEERING SENIOR DESIGN I**

In this first capstone course, engineering students will apply knowledge and skills learned in their undergraduate engineering curriculum toward a proposed project approved by the faculty advisor to study, analyze, design, build and test concepts in a field of their choosing. Elements of the design process are considered as well as real-world constraints, such as economic and societal factors, marketability, ergonomics, safety, aesthetics and ethics. (4 credits)

Prerequisite: senior standing;

Corequisite: MGMT3200

## **ENGR 5500 ENGINEERING SENIOR DESIGN II**

In this second capstone course, students will continue to work on their project. The final prototype will be presented by engineering students to meet initial specifications. (4 credits)

Prerequisite: ENGR5000

## **ENGLISH**

### **ENGL 0700 ENGLISH AS A SECOND LANGUAGE I (COMPOSITION)**

This course takes students from paragraph writing and revising through an introduction to rhetorical models. The focus is on sentence writing, including topic sentences, grammar review, idiomatic expression, and usage. (4 credits) fall, spring

Prerequisite: 0700 placement

### **ENGL 0800 ENGLISH AS A SECOND LANGUAGE II (LITERATURE & COMPOSITION)**

This course is a continuation of ENGL0700. Students will read literature as the basis of continuing development of English comprehension skills and write expository essays. The course will also introduce students to the research process and implementing MLA style documentation. (4 credits) fall, spring

Prerequisite: 0700 placement and ENGL0700; OR 0800 placement

### **ENGL 0850 ESL LEARNING CIRCLE**

This English language skills course is designed to provide additional support to non-native speakers based on their final grade in ENGL080. It will continue building on learned rhetorical modes while focusing on sentence and paragraph structure. Students will analyze content and grammar errors to improve fluency. (1 credit) fall, spring, summer

Prerequisite: ENGL0800; Required for ENGL0800 grade of C- or lower.

## **ENGL 0900 ENGLISH LANGUAGE SKILLS**

This course promotes foundational English language skills and writing practice, through which students may upgrade their readiness for college-level study through intensive reading, writing, speaking and listening practice. (4 credits) fall

Prerequisite: 0900 placement

## **ENGL 1050 ENGLISH COMPOSITION (CPCE)**

A short review of English basics is provided. Emphasis is on writing coherent paragraphs and short essays, basic rhetorical strategies and techniques of rewriting and editing. (3 credits)

Prerequisite: 4 units of high school English.

## **ENGL 1100 ENGLISH I**

An introduction to college-level academic writing and research. Instruction focuses on critical reading and analysis, composing and revising strategies, writing for varied rhetorical purposes, critical thinking, information literacy, and writing from sources. (4 credits) fall, spring, summer

Prerequisite: 1100 placement; OR 0900 placement and ENGL0900; OR 0800 placement and ENGL0800; OR 0700 placement and ENGL0700 and ENGL0800 with a grade of C or higher; OR 0700 placement and ENGL0700 and ENGL0800 with a grade of C- or lower and ENGL0850

## **ENGL 2050 LITERATURE AND COMPOSITION**

This course introduces students to the study of literature and literary themes in the genres of short story, poetry, drama, and novel. While the emphasis is on critical reading and thinking, the course also encourages the continued development of effective writing skills through frequent writing assignments. (3 credits)

Prerequisite: ENGL1050

## **ENGL 2200 ENGLISH II**

A sequel to English I (ENGL1100) in which students will continue to develop their writing and research skills and will study for Western cultural movements the Enlightenment, Romanticism, Modernism, and Postmodernism which will provide them with the cultural and historical framework necessary for beginning their humanities and social science electives. Students will explore these movements through the critical reading of a range of texts, including fiction, poetry, drama, philosophy, political theory, cultural history and theory, aesthetic criticism and theory, and the personal essay. (4 credits) fall, spring, summer

Prerequisite: ENGL1100; OR 0900 placement and ENGL0900 and ENGL1100; OR 0800 placement and ENGL0800 and ENGL1100

## **FACILITIES MANAGEMENT (CPCE)**

### **CPFM 2000 INTRODUCTION TO FACILITY MANAGEMENT**

This course examines the scope of the professional facilities manager's responsibilities. The Facility Manager's role in relation to an organization's strategic plan is stressed. Provides a solid understanding of the fundamental concepts in Facilities Management and why a broad understanding of the responsibilities of the profession is valuable to facility managers and all professionals. Students will apply concepts needed to successfully organize, monitor, communicate and develop a good Facilities Management program. Guest speakers, case studies and field trips will be used to help further illustrate Facilities Management topics. (3 credits)

### **CPFM 2300 SPACE PLANNING**

Students follow the process of design, problem solving, and building construction management as it relates to the use of interior space. Students will develop comprehensive projects involving issues pertaining to space planning, regulatory codes, building systems, material use and construction methods. Team research projects will facilitate the ability to work cooperatively. (3 credits)

## **CPFM 3200 PROJECT MANAGEMENT FOR FACILITY MANAGERS**

Students study methods, concepts and procedures of FM project management. Topics include team development, scheduling, budgeting/estimating, contract administration, purchasing, relocations, and move management. (3 credits)

Prerequisites: Junior status or enrollment in the Professional Certificate in Facilities Management

## **CPFM 3300 BUILDING OPERATIONS**

Students examine how facilities, building operations, and maintenance organizations are managed. Topics covered include scheduling, equipment evaluation, training and long range planning. Students will explore how the interdependent mechanical systems in a facility work together and how all the elements of an efficient facility work in tandem for maximum effective value to the organization. (3 credits) fall

## **CPFM 4100 FACILITY ASSESSEMENT AND FORECASTING**

This course emphasizes the strategic role required of the facilities manager in providing information for corporate managers and executives for facility forecasting. Topics include corporate real estate, attorney and developer interface, operating budgets and capital expenditures, and building performance assessment. (3 credits)

Prerequisites: Enrollment in Professional Certificate in Facilities Management

## **CPFM 4200 ENERGY AND SUSTAINABILITY**

Students examine how facilities, building operations, and maintenance organizations are managed to understand energy creation, delivery and consumption. Topics include sources, forms, and methods used to assess and manage energy use in buildings. This course also provides a solid understanding of the fundamental concepts in sustainable practices. Students will apply concepts needed to successfully organize, monitor, communicate and develop a good sustainability program. (3 credits)

Prerequisites: Enrollment in the Professional Certificate in Facilities Management

## **CPFM 4600 PRINCIPLES OF REAL ESTATE AND PROJECT MANAGEMENT**

Students study real estate concepts pertinent to facility management. Topic include real estate financial management, site selection, RE master planning, leasing, purchase vs. lease, property management and highest and best use analysis. (3 credits)

Prerequisites: CPM4100

## **CPFM 5500 CAPSTONE PROJECT**

Students will select their own project with the approval of the faculty for development through the semester. Students are encouraged to select an area of investigation that is a specialization within CPM that most interests them. Project will be supported by written original investigation and submitted periodically during development for review by the faculty. (4 credits) summer

2018-2019 Academic Catalog: Course Descriptions - First Year Seminar

## **FIRST YEAR SEMINAR**

### **FYS 1000 FIRST YEAR SEMINAR**

First Year Seminar introduces new students to the personal and academic skills and strategies necessary to successfully transition into Wentworth. Using a variety of pedagogical approaches to create an interactive learning-centered classroom, instructors both teach academic skills and serve as a first-year advisor to provide support for common developmental issues. Students develop the skills necessary to achieve academic goals and social integration at Wentworth. (0 credits) fall

## **HISTORY**

### **HIST 1051 MODERN WORLD CIVILIZATIONS (CPCE)**

An introduction to the concepts of culture and history. A variety of cultures are examined. Institutions and ideas are studied from around 1500 to the present day. (3 credits)

Prerequisite: ENGL1050

### **HIST 1053 MODERN WORLD HISTORY (CPCE)**

This course deals with the revolutions: technological, political, cultural, intellectual and social that have shaped the modern world. A research project is required. (3 credits)

Prerequisite: ENGL1050 and ENGL1550.

### **HIST 1101 U.S. HISTORY TO 1877 (CPCE)**

United States history from the colonial period through Reconstruction. Emphasis on the interpretation of American institutions and ideas. (3 credits)

Prerequisite: ENGL1050

### **HIST 1151 MODERN U.S. HISTORY (CPCE)**

United States history from Reconstruction to the present. Emphasis on the interpretation of American institutions and ideas. (3 credits)

Prerequisite: ENGL1050

### **HIST 2990 INDEPENDENT STUDY IN HISTORY**

This course investigates a topic of special interest to faculty and students that is outside existing course offerings. (1 – 4 credits)

Prerequisite: completion of an ENGL sequence

### **HIST 3800 SPECIAL TOPICS IN HISTORY**

Special topics in history to be determined by the faculty assigned. These courses present topics that are not covered by existing courses and are likely to change from semester to semester. Refer to the semester schedule for the courses offered that semester. Contact the faculty assigned for more information about the course topic. (4 credits)

Prerequisite: completion of an ENGL sequence

### **HIST 4100 ANCIENT WORLD CIVILIZATIONS**

This course surveys the cultures and histories of major world civilizations from the origins of humankind until the 15th century C.E. with a concentration on European and Asian Civilizations. (4 credits) offered at the discretion of the department

Prerequisite: completion of an ENGL sequence

### **HIST 4123 US HISTORY TO 1877**

United States history from the colonial period to Reconstruction. Emphasis on the interpretation of American political, social, economic, cultural and religious institutions and the history of ideas. A research project is required. (4 credits)

Prerequisite: completion of an ENGL sequence

### **HIST 4133 MODERN WORLD CIVILIZATIONS**

An introduction to the concepts of culture and history. A variety of cultures across the continents are studied. The development of political, social, cultural and religious institutions is examined. The time period is circa 1500 to the present. A research project is required. (4 credits)

Prerequisite: completion of an ENGL sequence

## **HIST 4171 TECHNOLOGY & SOCIETY**

This course is a study of the relationship between technology and society from prehistoric times to the present day. Various topics are covered with emphasis given to the relationship of science, engineering, and technology. The social and cultural impact of technology throughout human history is a central aspect of the course. (3 credits)  
Prerequisite: ENGL1050 and ENGL2050

## **HIST 4175 MODERN AMERICAN HISTORY**

The study of American civilization from the War Between the States to the turn of the 21st century. Emphasis will be placed on the cultural, economic, and political interactions of the melting pot experiences that led the United States to world power status. International states of affairs will also be studied. (4 credits)  
Prerequisite: completion of an ENGL sequence

## **HIST 4177 US HISTORY FROM RECONSTRUCTION**

This course deals with American culture and institutions. Emphasis is placed on issues of national policy and the technological, political, intellectual and social changes that have created a modern nation. A research project is required. (3 credits)  
Prerequisite: ENGL1050 and ENGL2050

## **HIST 4191 HISTORY OF TECHNOLOGY**

An examination of the history of technology and its relationship to social and historical change. A special emphasis will be placed upon the transitions from one technological age to another. (4 credits) offered at the discretion of the department  
Prerequisite: completion of an ENGL sequence

## **HIST 4200 PICTURES, MEDIA & US POLITICS**

This history course examines relationships between images and politics from the American Revolution to the present. The course focuses on the developments in image technology and U.S. politics. In doing so, students will trace the rise of a national visual culture and modern political campaigns. Students will read history scholarship and analyze pictures from periods we study. The class will visit image collections throughout Boston to engage with historical prints, photographs and other visual materials. (4 credits)  
Prerequisite: completion of an ENGL sequence

## **HIST 4223 BOSTON HISTORY**

This course surveys Boston history, spanning the colonial era to our contemporary environment. The course will emphasize themes of urban development, immigration, politics and segregation by race and class. Students will contribute to digital projects analyzing the city's past while also preserving it for the public. (4 credits) fall.  
Prerequisite: completion of an ENGL sequence

## **HIST 4251 THE CIVIL WAR**

The course deals with the central American event of the nineteenth century. The years before the war, the war itself, Reconstruction, and the meaning of the war today are among the topics studied. (4 credits)  
Prerequisite: completion of an ENGL sequence

## **HIST 4271 HISTORY OF WORLD WAR II**

Students will be exposed to the events that precipitated the conflict and to the major battles and personalities of the war. The political results of the war and the start of the Cold War will also be examined. (4 credits)  
Prerequisite: ENGL1050 and ENGL2050

## **HIST 4300 AMERICAN URBAN HISTORY**

This history course examines American city life from the Revolutionary War to the present. The course focuses on the way culture and politics evolved within the context of a changing urban landscape. In addition to reading historical scholarship students will analyze primary sources such as historical images, newspapers and films. We will also visit local museums and cultural institutions to learn about the history of Boston. (4 credits)  
Prerequisite: completion of an ENGL sequence

## **HIST 4451 HISTORY OF GENDER & SEXUALITY IN THE U.S.**

In this course students will examine the history of sexuality and gender in the United States through reading of historical, theoretical and scientific texts. The course will examine topics including feminism, identity, politics, race, and masculinity. Students will examine the way in which popular and historical perspectives on gender and sexuality are reflected in contemporary film and literature. (4 credits)

Prerequisite: completion of an ENGL sequence

## **HUMANITIES**

### **HUMN 1051 INTRODUCTION TO ART AND ARCHITECTURE**

Art and Architecture reflect culture and technology, and represent significant career possibilities. Through readings, guest lectures, and field trips, students will explore outstanding examples in Boston, make critical reports, and develop skills for success in Architectural Technology at Wentworth. (3 credits) Prerequisites:

ENGL1050

### **HUMN 1071 ART OF THE NATURAL GARDEN**

A garden is a mix of culture and cultivation, a place of pleasure and reflection, society and solitude. This course will examine the elements and components of the natural garden in all its expressions as both fine art and a refining involvement with the natural environment. Historical references and contemporary practice will be used to give an integrated view of context and theory. (3 credits)

Prerequisites: ENGL1050 and ENGL2050

### **HUMN 2990 INDEPENDENT STUDY IN HUMANITIES**

This course investigates a topic of special interest to faculty and students that is outside existing course offerings. (1 – 4 credits)

Prerequisite: completion of an ENGL sequence

### **HUMN 3100 ROMAN CULTURE AND TECHNOLOGY**

An introduction to how the Romans developed technological, institutional, and cultural solutions to meet the social and political demands of their empire, and to how Roman architectural, informational, engineering, and social accomplishments continue to be manipulated and reinterpreted because of their foundational influence on American culture. (4 credits)

Prerequisites: completion of an ENGL sequence

### **HUMN 3800 SPECIAL TOPICS IN HUMANITIES**

Special topics in humanities to be determined by the faculty assigned. These courses present topics that are not covered by existing courses and are likely to change from semester to semester. Refer to the semester schedule for the courses offered that semester. Contact the faculty assigned for more information about the course topic. (1 – 4 credits)

Prerequisite: completion of an ENGL sequence

### **HUMN 4011 AMERICAN CINEMA AND CULTURE (CPCE)**

This course deals with the historical development of American film and the film industry. Particular attention is given to the relationship between films and American culture. (3 credits)

Prerequisite: ENGL1050 and ENGL2050

### **HUMN 4051 MEDIA CULTURE & COMMUNICATIONS**

This course serves as an introduction to the theory and practice of Media, Culture and Communication Studies. Students will explore and critically examine, from a humanities perspective, our technologically mediated culture as it impacts society, and they will consider their own social, cultural, ethical, legal and philosophical roles and responsibilities as media content producers and consumers. Students will explore a variety of digital tools and techniques for analyzing texts, assessing problems, and communicating results. Prerequisite: completion of an ENGL sequence

Prerequisite: completion of an English sequence.

### **HUMN 4221 AMERICAN CINEMA AND AMERICAN CULTURE**

This course will examine selected critical American films as reflections of and products of American culture. The impact of certain particularly American themes on these films will be explored, both in an historical and artistic context. (4 credits)

Prerequisite: completion of an ENGL sequence

## **HUMN 4053 MCCS STUDIO**

The increasing importance assumed by digital technologies in contemporary culture has given rise to new forms of critical and creative thinking, new ways to assess and organize humanistic knowledge, and new forms of communication. In this course, students interpret the cultural and social impact of the new information age, and create and apply new technologies to answer cultural, social, ethical and historical questions, both traditionally-conceived and those enabled by even changing technologies. Students will work in small groups and apply various tools and strategies used by tech-savvy humanists to interpret history and culture within a collaborative, studio-based environment.

Prerequisite: completion of an English sequence.

## **HUMN 4225 TELEVISION STUDIES**

This course examines television from a cultural, historical, technological, commercial, and critical perspective, especially as the medium has developed from broadcasting to narrowcasting. The primary outcome of this course is for students to progress from a consumer to a critical interaction with television. (4 credits)

Prerequisite: completion of an ENGL sequence

## **HUMN 4230 STANDUP COMEDY IN AMERICA**

In this course students will study the development of standup comedy in the twentieth-century America, specifically examining the intersections between standup performance and race, ethnicity, sex, class, and gender, among other subjects. Throughout the course students will study historical backdrops against which standup comedy was written and performed and analyze the influence of the standup tradition on American discourse and identity. (4 credits) fall Prerequisite: completion of an ENGL sequence

## **HUMN 4231 FILM & LITERATURE: ART OF ADAPTATION**

This course focuses on the subjects of film and literature in general and the concept of adaptation in particular. Students will explore a variety of literary genres (short story, novel, creative non-fiction) as well as various modes of literary/film criticism. (4 credits)

Prerequisite: completion of an ENGL sequence

## **HUMN 4233 DECONSTRUCTING THE 20TH CENT**

In the second half of the 20th century, something shifted in the American culture. This shift marked the post-WWII progression from modernity to postmodernity, which was widely reflected by changes in society, culture, and art. This course offers an accessible survey of the cultural, critical, technological, economic, and aesthetic foundations of postmodernism. We will particularly examine the postmodern challenge to traditional ideas of progress, authority, authenticity, knowledge, power, and language with its playful mixing of forms and high and low culture. We will progress through the course with a central question that asks if a positive pragmatic potential can be detected within the postmodern sensibility. (4 credits)

Prerequisite: completion of an ENGL sequence

## **HUMN 4235 TECHNICAL THEATER**

The course explores the relationship between the written text and design. Design, decoration, light, sound, and color are elements that affect performance. Several plays and their technical challenges are studied. (4 credits) Prerequisite: completion of an ENGL sequence

## **HUMN 4241 GRAPHIC NOVEL TO FILM**

The graphic novel has blossomed as an art form. In addition, it has proven to be a fruitful source for cinema. This course will examine the graphic novel as an art form and as inspiration for film. What is the graphic novel? How does one “read” a graphic novel “critically?” When does it successfully translate to film and why? What does this teach us about film and about the graphic novel’s visual content? These questions will guide us as we study several significant graphic novels and their film versions. (4 credits)

Prerequisite: completion of an ENGL sequence

## **HUMN 4243 CONTEMPORARY ART & THEORY**

This course examines some of the major theoretical positions and developments informing contemporary (post-WWII) art. The aim of the course is to develop an understanding of contemporary visual culture in relation to social history and human experience, and a basic understanding of aesthetic theory, philosophy and criticism and its importance to

contemporary art practices. (4 credits)

Prerequisite: completion of an ENGL sequence



## **HUMN 4245 TRANSCENDENTAL VISIONS**

This course examines American Transcendentalism, the literary movement that emerged over the nineteenth-century in protest to the intellectual, cultural, and national status quo. We will examine the canonical authors of the period, including Emerson, Thoreau, Whitman, Hawthorne, Melville, and Poe, to establish the period's continuities. Additionally, we will examine writers like Blackhawk, Margaret Fuller, Frederick Douglas, Harriet Wilson, and Rebecca Harding Davis to tease out its contradictions. Along the way, we will interact with modern day culture to consider how this early American narrative tradition holds contextual meaning as well as contemporary resonance. (4 credits)

Prerequisite: completion of an ENGL sequence

## **HUMN 4255 EXPLORATIONS WESTERN THOUGHT**

This course examines major trends in the Western critical tradition, including humanism, rationalism, modernism, and postmodernism while also progressing the student from a consumer to a critical consumption of cultural narratives. (4 credits)

Prerequisite: completion of an ENGL sequence

## **HUMN 4263 ART & SOCIETY IN INDUSTRIAL AGE**

This course will primarily explore 19th century art in Europe with a look at the United States, from the perspective of their evolving modernity. The significance of the Industrial Revolution and the ensuing political upheavals of both continents will be closely studied through the visual imagery of artistic production. Further, the impact of emerging art theory will be analyzed by reading primary sources in the way of the artists' personal manifestoes alongside contemporary critiques of the day. (4 credits)

Prerequisite: completion of an ENGL sequence

## **HUMN 4265 THE AMERICAN DREAM**

An examination of that which is unique in the American experience as expressed in literature. This course will provide the student with a profile of the American character as portrayed in the national literature. The focus will be upon political, religious, and economic roots which illuminate the past and make the present more comprehensible. (4 credits)

Prerequisite: completion of an ENGL sequence

## **HUMN 4275 MYTH AMERICA: COLONY CULTURE WAR**

This course is a survey of American art from the pre-colonial period to the present. American art production will be evaluated for both its aesthetic value and as a historical document. (4 credits)

Prerequisite: completion of an ENGL sequence

## **HUMN 4325 FROZEN! THE CLIMATE CRISIS OF 1816**

This course engages with climate science and sustainability by looking back to the largest volcanic explosion in recorded history, the eruption of Mt. Tambora in April of 1815. The course examines the ensuing worldwide climate disaster from many perspectives: literature, history, art, music, mathematics, chemistry, physics and architecture. By connecting that crisis of global cooling with our own crisis of planetary warming, students come to understand that climate is not just a data set; climate is also a discourse with a cultural history that can be revealed through humanistic inquiry. (4 credits) spring

Prerequisite: completion of an ENGL sequence

## **HUMN 4343 RENAISSANCE TO ROMANTICISM**

An examination of the impact of globalization on a broad range of art communities in an effort to understand how expanded international connections have yielded re-definitions of cultural and national identity. (4 credits)

Prerequisite: completion of an ENGL sequence

## **HUMN 4345 HISTORY OF AMERICAN FOLK MUSIC**

This course covers the history of American folk music from the work songs and spirituals of the 17th and 18th centuries to the folk revival of the 1960s. Numerous musical genres and traditions will be covered including gospel, minstrelsy, blues, ragtime, country, and bluegrass within various social, cultural, and political contexts. Matters of race, class, and gender will be given particular emphasis. (4 credits)

Prerequisite: completion of an ENGL sequence

## **HUMN 4355 BOSTON VOYAGES BY BOOK & FOOT**

This course will explore the history and culture of Boston through its literature, its citizens, its environment, and its civic and political events. It will examine the sites associated with the readings and sites featured in the texts along with the texts themselves. There will be visits to places of interest including but not limited to the Back Bay, the North and West Ends, and some of the city's smaller museums and green spaces. The investigation of these local sites will aid in making connections between Boston and the larger human community. (4 credits) fall, spring, summer

Prerequisite: completion of an ENGL sequence

## **HUMN 4373 SHAKESPEARE ON FILM**

This course will examine several of Shakespeare's plays as literature and then how these plays have been brought to film, both in their historic and artistic contexts. In the course of this examination, the nature of film, the nature of artistic interpretation, the significance of audience response and the significance of authorial intent will be considered. (4 credits)

Prerequisite: completion of an ENGL sequence

## **HUMN 4501 9/11 LITERATURE AND FILM**

An exploration of how fiction and non-documentary film have addressed September 11, with particular emphasis on how works in these genres have portrayed the events of the day, the impact of the day on the United States and the world, and the mindset of the terrorists. (4 credits)

Prerequisite: completion of an ENGL sequence

## **INDUSTRIAL DESIGN**

### **INDS 1000 INDUSTRIAL DESIGN STUDIO 1**

Industrial Design Studio 1 develops a sensitivity and understanding of design principles through a series of three-dimensional projects. The design process emphasizes research, material preparation, iteration and verification of successful design outcomes against focused elements and principles for each project. Accurate craftsmanship and clear use of design nomenclature during critiques is stressed. (4 credits)

Corequisite: DSGN1000 and DSGN1200

### **INDS 1500 INDUSTRIAL DESIGN STUDIO 2**

Building upon the design foundations of Industrial Design Studio 1, Industrial Design Studio 2 advances an understanding of design principles through a thematic series of three-dimensional projects. The design process emphasizes research, material preparation, iteration and verification for each project, working toward a clear and meaningful design intent. Accurate craftsmanship and clear use of design nomenclature during critiques is stressed. This course reinforces nomenclature covered in INDS1000, Industrial Design Studio 1. (4 credits)

Prerequisite: INDS1000

### **INDS 1750 VISUAL COMMUNICATION**

This class continues to develop concept and principles covered in DSGN1200, Color and Composition, through a series of projects. Topics include visual literacy; visual communication and the dominant methods of how visual messages convey meaning. (4 credits)

Prerequisite: DSGN1200

## **INDS 1850 VISUALIZATION 2: ADVANCED PERSPECTIVE**

This course introduces students to perspective drawing and sketching used by industrial designers. One and two-point perspective, line value, lighting, surface value, shade, shadow, and techniques are covered. (3 credits)  
Prerequisite: DSGN1000

## **INDS 2000 INDUSTRIAL DESIGN STUDIO 3**

This studio focuses on design methodology and problem-solving techniques to develop and enhance creativity. Small-scale design problems in packaging, table, and desktop products are used to build individual skill development. (4 credits)  
Prerequisite: INDS1500

## **INDS 2300 3D REALIZATION I**

This introductory course develops basic model-making skills and the safe use of shop tools (hand and machine). Students will begin to construct study models in support of studio courses utilizing various papers, wood, metal, and plastics. (4 credits)  
Corequisite: INDS2000

## **INDS 2350 VISUALIZATION 3: DRAW & THINK**

This course introduces students to advanced freehand drawing and format conventions used by industrial designers to communicate design concepts visually. Professional presentation skills are stressed. (3 credits)  
Prerequisite: INDS1850

## **INDS 2500 INDUSTRIAL DESIGN STUDIO 4**

This design studio challenges the student to integrate previous design lessons in order to tackle more complex design problems. Manufacturing, user interactions, and advanced product aesthetics are covered. (4 credits)  
Prerequisite: INDS2000

## **INDS 2600 CAD 1: SURFACE MODELING**

This introductory/intermediate course develops the students' understanding of three-dimensional CAD utilizing NURBS based surface modeling techniques, and stresses a progression in constructional and visual problem-solving skills. (3 credits)

## **INDS 2800 3D REALIZATION 2**

This course develops students' three-dimensional visualization skills as related to the industrial design profession. Students will also investigate the appropriate use of metals, wood, plastics, specialty materials, and fabrication technologies to assemble study models for studio courses. (4 credits)  
Prerequisite: INDS2300  
Corequisite: INDS2500

## **INDS 2850 VISUALIZATION 4: PRESENTATION & ILLUSTRATION**

This course advances the student's understanding of representing objects in three-dimensional freehand depictions and integrates the computer as a tool for refining and altering those depictions. (3 credits)  
Prerequisite: INDS2350

## **INDS 2990 INDEPENDENT STUDY INDUSTRIAL DESIGN**

This course investigates a topic of special interest to faculty and students that is outside regular course offerings. (1 – 4 credits)  
Prerequisite: Consent of department head and instructor

## **INDS 3000 INDUSTRIAL DESIGN STUDIO 5**

This studio focuses on the comprehensive integration of small-scale design problems with issues of appearance, function, materials, and manufacturing processes. Please refer to the Design Studio Grade Requirement in the Academic Catalog regarding the final grade for this course. (4 credits)  
Prerequisite: INDS2500

## **INDS 3100 CAD 2: SOLID MODELING**

This intermediate course develops the students' understanding of three-dimensional CAD utilizing an industry standard parametric feature based solid modeler. This course stresses both visual and technical problem-solving skills. (3 credits)

Prerequisite: INDS2600

## **INDS 3150 RAPID PROTOTYPING**

Utilizing modeling software and various rapid prototyping (RP) systems, students will create a number of parts, including working mechanisms, and short run tooling. Students will also investigate the advantages and disadvantages of current RP technologies. (4 credits)

## **INDS 3200 HUMAN FACTORS IN DESIGN**

Studies in the relationship of humans with products and equipment are explored. Methodologies, information output, human output, control, environmental conditions, and human factors applications are introduced. (3 credits)

## **INDS 3300 INFORMATION ARCHITECTURE 1**

This studio-based design course develops each student's awareness and understanding of the visual language that designers use to graphically communicate information and meaning visual storytelling. Students investigate the use of typography and image to communicate meaning in singular and sequential representations. (3 credits)

Prerequisite: INDS1750

## **INDS 3500 INDUSTRIAL DESIGN STUDIO 6**

This studio-based design course focuses on various professional design concentrations such as sustainability, biomedical products, and exhibit design. (4 credits)

Prerequisite: INDS3000

## **INDS 3600 MANUFACTURING IN DESIGN**

This course provides a basic knowledge of current manufacturing processes, materials, systems and production strategies commonly used in commercial product development. (3 credits)

## **INDS 3650 ADVANCED RAPID PROTOTYPING**

This course is an exploration of technologies currently available that provide the industrial designer with an advanced level workflow from 3D CAD modeling software through to rapid prototyping and tooling. Both additive and subtractive prototyping methods will be experienced utilizing laser cutting, 3D printing and CNC machining. (3 credits)

Prerequisites: Junior status; INDS2600 and INDS2800

## **INDS 4000 INDUSTRIAL DESIGN STUDIO 7**

This studio-based course focuses various design themes such as consumer electronics, furniture, and footwear design. (4 credits)

Prerequisite: INDS3500

## **INDS 4011 DESIGN PERSPECTIVES: TOPICS IN HISTORY OF INDUSTRIAL DESIGN**

Students take an in-depth look at selected movements, individuals, companies and/or product lines that are significant in the history of industrial design. (4 credits)

Prerequisite: Junior status

## **INDS 4022 INDUSTRIAL DESIGN V: STUDIO**

This studio focuses on social scale design problems such as biomedical, exhibit, and environmental projects. Student solutions that explore primary research are emphasized. Please refer to the Design Studio Grade Requirement regarding the final grade for this course. (4 credits)

Prerequisite: INDS3077

## **INDS 4033 DIRECTED STUDIES RESEARCH**

Students propose an area of study to faculty. Faculty define projects within area of proposed study for students to choose and develop a research document. This document becomes the basis for their Directed Studies design project. (2 credits)

## **INDS 4300 INFORMATION ARCHITECTURE 2**

This studio-based design course builds on the visual concepts introduced in Information Architecture 1. Projects focus on the visual display of qualitative and quantitative information in static and dynamic media. (3 credits)

Prerequisite: INDS3300

## **INDS 4500 BUSINESS IN DESIGN**

This course examines the business of design practice by focusing on client/project management, marketing, professional communication and entrepreneurship. Professional standards and ethics in design are discussed. (3 credits)

## **INDS 4511 PROFESSIONAL PRACTICE**

The course examines business and legal aspects of Industrial Design practice by focusing on financial and project management, marketing, and personnel issues. Professional standards and ethics in design are discussed. (4 credits)

## **INDS 4522 DIRECTED STUDIES STUDIO**

Students develop and complete their design projects based on their previous semester's research document. Individual student professional development is emphasized. Please refer to the Design Studio Grade Requirement on page 68 regarding the final grade for this course. (4 credits)

Prerequisites: INDS4022 and INDS4033

## **INDS 4533 SENIOR SEMINAR**

This seminar investigates the future of design and its impact on the planet, the responsibilities of the designer to society and the profession, and the expectations of graduates upon entering the field of design. (2 credits)

## **INDS 4750 SENIOR SEMINAR**

This class focuses on current design philosophies and professional trends in visual communication. Students debate and discuss the impact of such and speculate on the impact to the profession and the community at large. (3 credits)

## **INDS 5000 RESEARCH: SENIOR STUDIES**

In this course, students propose an area of study to faculty, who then define projects within areas of proposed study for students to choose from and develop a research document. This document becomes the basis for the student's senior design project. (3 credits)

## **INDS 5500 SENIOR STUDIES**

This course is an independent capstone design studio focusing on an individual's ability to process design research, develop compelling design ideas, and manifest those ideas for presentation in a professional manner.

Prerequisite: INDS4000. (4 credits)

## **INTERIOR DESIGN**

### **INTD 1000 INTERIOR STUDIO I**

The elements and principles of design are introduced in this course. Application of these principles and various forms of organization are explored through two and three-dimensional design exercises. (4 credits)

### **INTD 1500 INTERIOR STUDIO II**

The principles and elements of interior design are introduced and explored through a series of studio projects. (4 credits)

Prerequisites: DSGN1200 and INTD1000

### **INTD 1600 HISTORY OF INTERIORS I**

Historical survey of major design periods in interior architecture and furnishings from antiquity to the late 16th century with emphasis on the artistic, cultural, political, social, economic, and technological conditions which affected their development. (3 credits)

### **INTD 1750 DRAWING II**

The basic principles and methods for drawing three-dimensional space are explored using a variety of media. Mechanical, freehand and digital methods for producing orthographic, paraline and perspective drawings are introduced as critical tools for understanding and representing interior design. (3 credits)

### **INTD 2000 INTERIOR STUDIO III**

The design process is explored using several short-duration interior design projects with simple programmatic requirements. (4 credits)

Prerequisites: INTD1750 and INTD1500

### **INTD 2100 MATERIALS**

Interior finish materials and their applications are examined through various aesthetic, code, sustainability and functional selection criteria. (3 credits)

### **INTD 2250 DRAWING III**

Intermediate drawing course exploring the production of interior architectural drawing using digital drawing software. Orthographic and three-dimensional drawing are produced. Emphasis is placed on the production of drawings for studio design explorations and presentations. (4 credits)

Prerequisite: INTD1750

### **INTD 2500 INTERIOR STUDIO IV**

Exploration of the design process is continued using project slightly larger in scale and programmatically more complex. (4 credits)

Prerequisite: INTD2000

### **INTD 2600 HISTORY OF INTERIORS II**

Historical survey of interior architecture and furnishings from the late 16th century to the present with emphasis on the artistic, cultural, political, social, economic, and technological conditions which affected their development. (3 credits)

Prerequisite: INTD1600

### **INTD 2700 BUILDING SYSTEMS I**

An introduction to basic building systems: structural, conveying, fire protection, plumbing and water conservation. (3 credits)

## **INTD 2800 PRESENTATION TECHNIQUES**

Students explore rendering techniques and learn basic graphic design principles for presentations. Projects apply those techniques and principles to the creation of interior design presentation boards and student portfolios. (4 credits)

Corequisite: INTD2500

## **INTD 3000 INTERIOR STUDIO V**

Demonstrating their proficiency with the design process, students develop creative solutions for a residential interior by synthesizing their expanding theoretical, aesthetic and technical knowledge and sustainable design methodologies. (6 credits) fall

Prerequisite: INTD2500

## **INTD 3100 CONSTRUCTION DOCUMENTS**

Construction documents include drawings and specifications that are used to communicate with a constructor and delineate the requirements for transforming an interior design into real space. CAD (computer aided design) and BIM (building information modeling) drawing methods as well as standardized large and small project format specifications will be explored to create drawing suitable for guiding a constructor through the construction process. (4 credits)

Prerequisite: INTD2250

## **INTD 3300 BEHAVIORAL ASPECTS OF DESIGN**

Through lectures and discussions, students examine psychological and social research that assesses the dynamic relationship between human behavior and the physical environment with an emphasis on interior spaces. Special populations may be discussed the elderly, children, and the physically challenged. (3 credits)

Prerequisite: Junior status.

## **INTD 3500 INTERIOR STUDIO VI**

Projects of realistic programmatic complexity for business office space are developed. Project resolution requires solutions that simultaneously resolve theoretical, aesthetic and technical concerns, including the use of sustainable design methodologies. (6 credits)

Prerequisite: INTD3000

## **INTD 3600 LIGHTING**

Interior illumination is studied in-depth from aesthetic, technical and functional points of view. Conceptual design and documentation, lamps, luminaries, color rendition, lighting calculation and daylighting will be presented through lectures, projects and site observation. (3 credits)

## **INTD 3800 INDEPENDENT STUDY INTERIOR DESIGN**

Presents topics that are not covered by existing courses and are likely to change from semester to semester. Refer to the Class Schedule for a specific semester for details of offerings for the semester. (1 – 4 credits)

## **INTD 4000 INTERIOR STUDIO VII**

Projects of advanced programmatic complexity are studied. Project resolution requires competent and comprehensive solutions that explore and synthesize theoretical, aesthetic and technical issues, including the use of sustainable design methodologies. (6 credits)

Prerequisite: INTD3500

## **INTD 4100 BUILDING REGULATIONS**

Building codes and standards applicable to construction and furnishings are introduced. Students will learn to identify various construction classifications and occupancy categories and to cross reference guidelines, tables and charts found in the building codes. (3 credits)

Prerequisites: INTD2700

## **INTD 4600 PROFESSIONAL PRACTICE**

The course examines business and legal aspects of interior design practice by focusing on financial and project management, marketing, and personnel issues. Ethics and career path issues in design are discussed. (4 credits)

## **INTD 5000 SENIOR PROJECT: RESEARCH**

Students begin their senior capstone project by developing a research document that includes: a project statement; problem statement, project program, code requirements, and precedent research; and documentation of a site (building). The major focus is a comprehensive study of “programming”: the systematic collection and documentation of project parameters including both quantitative and qualitative data. (3 credits)

Corequisite: INTD4000

## **INTD 5500 SENIOR PROJECT: DESIGN**

Using their Senior Project: Research document as a guide, students design a comprehensive project of their own selection. This capstone project requires students to demonstrate mastery of the design process and fulfillment of their established learning objectives. (6 credits)

Prerequisites: INTD4000 and INTD5000

## **LITERATURE**

### **LITR 1321 AMERICAN SHORT FICTION**

A study of the American short story. Content is variable. Literature is studied as a reflection of craft, culture, and ideas. Offered for College of Professional and Continuing Education students only. (3 credits)

Prerequisite: ENGL1050 and ENGL2050

### **LITR 1435 LITERATURE 20TH CENTURY**

An exploration of modern and contemporary fiction, in which students will investigate how 20th century authors treat such themes as personal and social conflict, isolation, globalization, hope, and despair. (3 credits)

Prerequisite: ENGL1050 and ENGL2050

### **LITR 1462 FANTASY & SCIENCE FICTION**

This course will examine imaginative literature such as mythology, fantasy, and science fiction, as both a reflection of the world in which it was created and as a reflection on the future of humankind. (3 credits)

Prerequisite: ENGL1050 and ENGL2050

### **LITR 2990 INDEPENDENT STUDY IN LITERATURE**

This course investigates a topic of special interest to faculty and students that is outside existing course offerings. Contact the faculty for more information. (4 credits)

Prerequisite: completion of an ENGL sequence

### **LITR 3800 SPECIAL TOPICS IN LITERATURE**

Special topics in literature to be determined by the faculty assigned. These courses present topics that are not covered by existing courses and are likely to change from semester to semester. Refer to the semester schedule for the courses offered that semester. Contact the faculty assigned for more information about the course topic. (4 credits)

Prerequisite: completion of an ENGL sequence

### **LITR 4301 POETRY WORKSHOP**

Students will study various forms of poetry, and, as a result, be able to write their own poems based on their understanding of poetry as an art form. (4 credits)

Prerequisite: completion of an ENGL sequence



## **LITR 4351 CONTEMPORARY LITERATURE**

Readings in poetry, fiction, and drama of the Post-World War II period. This course examines American literature and cultural history from 1945 to the present. The work of major writers will be studied to gain insights into the life of our times. (4 credits)

Prerequisite: completion of an ENGL sequence

## **LITR 4401 20TH CENTURY LITERATURE**

Through the study of authors such as Remarque, Dostoevsky, Kafka, Sartre, and Hemingway, this course will assess the problems of alienation, isolation, and individual responsibility as they are confronted by modern man in the twentieth century. (4 credits)

Prerequisite: completion of an ENGL sequence

## **LITR 4451 AMERICAN LITERARY CLASSICS**

This course will provide an opportunity for students to explore the works of selected American writers whose vision and artistry have given distinction to American literature. Certain 19th and 20th century authors will be selected by the instructor. (4 credits)

Prerequisite: completion of an ENGL sequence

## **LITR 4461 THE ART OF THE STORY**

What makes a good story? This course answers that question through both study and practice. Students will analyze short stories by prominent authors, become versed in the basic elements of fiction, and write their own short stories. (4 credits)

Prerequisite: completion of an ENGL sequence

## **LITR 4601 SCIENCE FICTION AND FANTASY**

Readings in science fiction and fantasy including myth and legend and classic literature in the 19th and 20th centuries. The social implications of technology in the 20th century science fiction literature will be explored. (4 credits)

Prerequisite: completion of an ENGL sequence

## **LITR 4651 SHORT FICTION**

This course studies the form of the short story in the literature of Great Britain, the United States, and other nations. Content is variable. Stories are studied as a reflection of craft, culture, and ideas. (4 credits)

Prerequisite: completion of an ENGL sequence

## **MANAGEMENT**

### **MGMT 1000 INTRODUCTION TO MANAGEMENT**

This informational seminar focuses on student discovery as related to the management discipline, careers, models and theories, and management research techniques. This seminar also introduces students to the concentrations within the management program. In addition, management concepts as they pertain to the field of facilities planning and management will be included (long range planning and development, business continuity/disaster recovery, developing effective service models etc.) The roles and environments of project management will also be reviewed. (4 credits) fall

Prerequisite: enrollment in BFPM or BSM.

### **MGMT 1010 INTRODUCTION TO PROJECT MANAGEMENT**

This course surveys major areas of project management: design processes, scheduling, financing, production, marketing, and distribution. Organizational structures will also be discussed. (4 credits)

## **MGMT 1025 COMPUTER AND BUSINESS APPLICATIONS**

This course covers the implementation of computer programs for several business areas including marketing and accounting. Students will gain intermediate to advanced level word processing, spreadsheets, database, and presentation skills. Students will also gain skills using Web development, project management, and accounting tools. (4 credits) fall

## **MGMT 1500 DECISION ANALYSIS FOR BUSINESS**

This course introduces the basic concept of data analysis and approaches to the decision-making process. It is designed to provide students with a sound conceptual understanding of the role that management science plays when making decisions. It emphasizes a wide variety of business modeling and application techniques to the solution of business and economic problems. (4 credits) fall, spring

Prerequisite: MATH1000 or MATH1040

## **MGMT 2000 MANAGEMENT INFORMATION SYSTEMS**

This course introduces the student to various concepts and considerations involved in the education, design, implementation and operation of Management Information Systems. This is an integrative course that brings together information, computers, and the systems approach. (4 credits) fall, spring

Prerequisite: MGMT1025

## **MGMT 2060 INTRODUCTION TO TECHNOLOGY PROJECT MANAGEMENT**

This course traces the development of project management as fundamental to completing projects effectively, delineates the leadership tasks that must be accomplished at each step of a project's life, and helps the student develop skills and wisdom in making decisions both by learning the ramifications of certain decisions and by seeing how those decisions are made in an example project. (3 credits) spring

## **MGMT 2065 INTRODUCTION TO ENTREPRENEURSHIP**

This course provides a basic understanding of the entrepreneurial / innovation process in both small and large businesses. Students discuss the critical role that opportunity recognition / creation plays in that process. Case studies and class exercises assist students in identifying their own personal goals as well as their unique skills and competencies related to the entrepreneurial / innovation process. Students will also examine how entrepreneurs, inventors and investors create, find, and differentiate between money-making opportunities and wishful thinking. (3 credits) spring

## **MGMT 2100 MANAGEMENT COMMUNICATIONS**

This course focuses on the development of professional-level written and oral communication skills. Students will learn how to conduct a meeting, do an effective oral presentation, write technical descriptions, instructions and reports, and effectively present information to their clients. Standard business formats (memo, letter, etc.) will also be reviewed. (4 credits) fall

Prerequisite: completion of an ENGL sequence or enrollment in the Professional Certificate in Project Management

## **MGMT 2200 RESEARCH METHODS IN BUSINESS**

This course provides prospective managers with an understanding of the skills necessary to make effective use of formal quantitative and qualitative research and analytical processes. (4 credits) fall

Prerequisite: MGMT1010 or MGMT1500

## **MGMT 2300 ORGANIZATIONAL BEHAVIOR**

This course is aimed at developing understanding of organizational dynamics so that students can develop lasting strategies and actions that build and sustain high performance in individuals, groups, and organizations. The course also examines what people think, feel and do in organizational settings, focusing on individual, group, and organizational processes. Students are introduced to concepts from a vast array of behavioral sciences, including social, clinical and organizational psychology, sociology, and cultural anthropology. (3 credits)

## **MGMT 2500 SYSTEMS ANALYSIS AND DESIGN**

The purpose of this course is to provide the student with an introduction to systems analysis and design. Topics include analyzing the business case, requirements modeling, data and process modeling, and development strategies. Students also learn about output and user interface design, data design, systems architecture and implementation, and systems operation, support and security. (3 credits) spring

## **MGMT 2550 APPLIED PROJECT MANAGEMENT**

Project management is increasingly important in today's world. This course covers the fundamental concepts and applied techniques for cost-effective management of both long-term development programs and short-term projects. Project management principles and methodology are provided with special focus on planning, controlling, and managing projects to successful completion. The topics are divided into two categories: behavioral aspects of a project and the technical components that make up the project. Computer software will be utilized to provide hands-on practical. Mastery of the concepts introduced in this course should give students a significant competitive advantage in the marketplace.

Prerequisite: MGMT1025 (4 credits) spring

## **MGMT 2600 PROJECT RISK MANAGEMENT**

This course offers a new perspective on project risk that centers risk management on building a healthy organizational culture that recognizes risk as the consequence of bad planning. The course will present new insights on building a risk management culture, while focusing on project management selection factors and financial return. (3 credits)

## **MGMT 2700 FINANCIAL ACCOUNTING**

An introduction to the basics of the accounting process. The course covers the basic techniques of analyzing financial transactions, trial balances, and preparation of financial statements. (3 credits) fall, spring, summer

## **MGMT 2750 INTEGRATIVE FINANCIAL ACCOUNTING**

This course is an introduction to accounting concepts for business students. The accounting cycle; cash, accrual, and preparation of the financial statements and other methods of income measurement will be covered. Accounts receivable, methods of depreciation and payroll accounting also will be discussed. (4 credits) fall, spring

## **MGMT 2850 PRINCIPLES OF MARKETING**

Designed to give the student a broad appreciation of the fundamentals of marketing analysis. Discussions of actual case studies are used to study advertising, personal selling, channels of distribution, marketing research, pricing, new product policy, and the marketing mix. (4 credits) fall, spring, summer

Prerequisite: Junior status.

## **MGMT 2990 INDEPENDENT STUDY IN MANAGEMENT**

This course investigates a topic of special interest to faculty and students that is outside existing course offerings. (1 – 4 credits)

Prerequisite: Consent of department head and instructor

## **MGMT 3000 MANAGING & LEADING ORGANIZATIONS**

This course examines the human aspects of management and is concerned with the ways in which the interactions of members of the management hierarchy contribute to the achievement of organizational goals. The course utilizes both case studies and textual material allowing students to apply management approaches to a variety of management situations and environments. (4 credits) fall, spring, summer

Prerequisite: junior status.

## **MGMT 3050 LEADERSHIP & MANAGEMENT**

This course examines the purpose and design of contemporary organizations, and explores the impact of change in the workplace of the 21st century. Students are introduced to the structures, functions and responsibilities of organizations, including the various roles of managers in the process of organizing human, financial, physical and technical resources to achieve organizational goals. Current theories and methods for effective planning and managing change will be considered. Changing aspects of organizational leadership will be an important aspect of this course, with a particular emphasis on developing a global mindset and managing across cultures. (4 credits)

## **MGMT 3060 TECHNOLOGY ACQUISITION**

This course provides a practical project management approach to technology acquisition. The organizational strategic tasks related to technology acquisition and project management are covered. Students will actively participate in a seven-stage project process for technology acquisition, from the initiation phase to the closing operations phase. (3 credits) fall

Prerequisite: MGMT2060 Introduction to Technology Project Management.

## **MGMT 3065 ENTREPRENEURIAL MARKETING**

Entrepreneurial marketing reflects a n a lternative approach to conventional marketing. Marketing is approached as redefining goods and services (and their markets) in ways that produce a competitive advantage through innovative approaches. This course reviews a strategic approach to marketing built around innovation, calculated risk-taking, resource leveraging, strategic flexibility, customer intensity, and the creation of industry change. We will also explore how marketing and entrepreneurship affect one another. Entrepreneurial marketing has been called subversive marketing, disruptive marketing, radical marketing, guerrilla marketing, viral marketing, expeditionary marketing... all constituting an innovative marketing format. These alternative approaches to conventional marketing are brought together in this course as a fundamental shift that redefines the goods and services, as well as the markets themselves, in ways that produce sustainable competitive advantages. This is a strategic type of marketing built around six core elements: innovation, calculated risk-taking, resource leveraging, strategic flexibility, customer intensity, and the creation of industry change. Traditional internal (company) and external (industry / environment) analyses are employed to illustrate the respective impacts on entrepreneurial marketing, as are the traditional stages of enterprise development. The impact of marketing and entrepreneurship on one another is studied as an emerging concept. Managerial challenges confronting marketers in entrepreneurial ventures are discussed. (3 credits) fall

Prerequisite: MGMT2065

## **MGMT 3100 E-COMMERCE**

Technology has long since impacted the way business is conducted. With the integration of the Internet into our daily lives, organizations now market their products and services differently, creating new revenue models that allow consumers to purchase virtually anything without leaving home. This course will explore the recent phenomenon of e-commerce and what this means for the future of business. Technologies making remote shopping possible will be studied. Students will actively engage through case studies, presentations and lively discussions. (4 credits) summer

Prerequisite: Junior Status

## **MGMT 3200 ENGINEERING ECONOMY**

The study of the effect of the time value of money and tax consequence on the analysis of engineering problems. Areas such as equipment and project costs and investment transactions are included. (3 credits) fall

Prerequisite: MATH1000 or MATH1040 or MATH1035 or MATH1750

## **MGMT 3250 MANAGERIAL ACCOUNTING**

The course deals with cost accounting information and its use in managerial decision-making. Budgets, cost behavior, and determination, profit and expense planning, production and materials planning are among topics considered. (4 credits) spring

Prerequisite: MGMT2700 or MGMT2750

## **MGMT 3360 INTERNATIONAL BUSINESS**

The International Business course discusses both the theories and practices of globalization, focusing upon the differences between domestic and international business. Essential managerial issues including but not limited to cultural and societal environment, trade theory, risk, government involvement, entry modes, economic integration, emerging markets, financial institutions, marketing and strategy will be reviewed. Combining lectures, discussions, case studies and examination of scholarly articles, students will develop a strong understanding that prepares them to apply those concepts taught in the classroom. (3 credits)  
Prerequisite: MGMT3000

## **MGMT 3400 ADVANCED PRATICUM**

In this course, students work with intermediate to advanced complex projects. Students can expect to be challenged and actively engaged in their learning. The course will combine external collaboration and interdisciplinary curricula to manage projects that solve real world problems. By working with outside professionals, students/teams will gain a higher-level of complexity employing experiential learning. Students applying for this course will be evaluated by Management faculty and selected for acceptance. (4 credits)  
Prerequisite: Departmental Approval

## **MGMT 3500 FINANCIAL MANAGEMENT**

This course is an introduction to basic financial management. Topics include financial analysis and planning, working capital management, the time value of money, valuation, cost of capital, capital budgeting, dividend policy, different types of securities, short-term and long-term financial decision, and an introduction to international finance and international trade organizations. (4 credits) spring, summer  
Prerequisite: MGMT2700 or MGMT2750

## **MGMT 3560 GROUP PROCESSES & TEAM BUILDING**

The third course in the Technology Project Management concentration provides experiences in applying the theories of group behavior and team building to the analysis of organizational behavior. This is a course on how to create, foster and manage organizations in which people thrive and perform at their best. It assumes that employee and group thriving is the key to project excellence. Students will have the opportunity to share their thoughts, opinions, and experiences with the class, and will also have the benefit of being able to learn from other students. In addition to lecture segments, students will experience the issues that arise when individuals interact in groups. Demonstrations, in-class exercises, and case-based discussions are featured prominently in this course. (4 credits) spring  
Prerequisite: MGMT2060

## **MGMT 3565 TECHNOLOGY ENTREPRENEURSHIP**

This course gives the student a unique understanding of how technology-focused firms are created and provides them with experience commercializing real technologies. Commercialization topics connecting technology and business will be the focus of the class. Topics will include intellectual property, convergence, industry creation, standards, modularity, and strategy. The outcomes will be applied by assessing the commercial potential of real ideas. The final project of student group work will be a business plan or feasibility study for commercializing the new technology. (4 credits) spring  
Prerequisite: MGMT2065

## **MGMT 3600 LABOR RELATIONS**

Current labor law arbitration processes, labor agreements, and the negotiation process are interrelated in actual case studies. Grievance proceedings, wage negotiation, and contract negotiation are treated specifically. (3 credits) summer  
Prerequisite: Senior status

## **MGMT 3625 LABOR RELATIONS**

Current labor law arbitration processes, labor agreements, and the negotiation process are interrelated in actual case studies. Grievance proceedings, wage negotiation, and contract negotiating are treated specifically. (3 credits)  
Prerequisite: Senior status. (CPCE)

## **MGMT 3650 BUSINESS LAW**

This course is designed to give students a basic understanding of the principles of the American legal system. It covers the foundation of the system and treats topics important to business and industry such as: business organizations, contract laws, torts, and commercial transactions. (4 credits) fall, spring, summer  
Prerequisite: Junior status.

## **MGMT 3700 HUMAN RESOURCES & LABOR MANAGEMENT**

This course surveys what managers need to know about human resource management. The course covers staff planning, recruitment/selection, compensation/benefits, performance management and labor relations. (3 credits) summer  
Prerequisite: Junior status.

## **MGMT 3750 PROJECT EVAL & PERFORMANCE**

This course will explore effective and efficient methods for evaluating project performance. The content deals with measurement of project trends and results through information arising out of the management of the project work breakdown structure. Significant class emphasis is on evaluating project performance measurements applicable to both current project results and future projections to project completion. (3 credits)

## **MGMT 3800 SPECIAL TOPICS IN MANAGEMENT**

Presents topics that are not covered by existing courses and are likely to change from semester to semester. Refer to the Class Schedule for a specific semester for details of offerings for the semester. (1 - 4 credits)  
Prerequisite: Junior status.

## **MGMT 3900 OPERATIONS MANAGEMENT**

A study of planning and control methods for industrial and production processes. Typical topics included: scheduling, updating, time-cost analysis, cost control, resource allocation, and the role of personnel in projects. (4 credits) summer  
Prerequisite: Junior status and MGMT2500

## **MGMT 4000 PROJECT RESEARCH**

This course is a preparation for MGMT5500, Senior Project, by having students investigate an approved study topic and plan a project for completion in Senior Project. (3 credits) spring  
Prerequisite: Senior status. Corequisite: MGMT4250

## **MGMT 4060 TECHNOLOGY PROJECT MANAGEMENT SEMINAR**

Students demonstrate their ability to structure and complete an integrative mini project that identifies and resolves an important technology or technology leadership issues(s). Students report the results of their efforts in written and oral form. (4 credits) spring  
Prerequisite: MGMT2060

## **MGMT 4100 POWER & LEADERSHIP IN ORGANIZATIONS**

This course will provide an overview of approaches to leadership. The relationship between the factors of organization, power, and leadership are considered through provocative analysis. This course will include a combination of lecture, discussion, readings in leadership theory, media, role-play, and self-reflection. (4 credits) spring  
Prerequisite: Junior status.

## **MGMT 4150 MARKETING MANAGEMENT**

Designed to give the student a broad appreciation of the fundamentals of marketing analysis. Discussions of actual case studies are used to study advertising, personal selling, channels of distribution, marketing research, pricing, new product policy, and the marketing mix. (4 credits)  
Prerequisite: Fourth-year status

## **MGMT 4165 CREATING NEW VENTURES**

This course explores the context, and comprehensive process, of new venture creation. Critical issues of new venture strategy and business planning will be addressed through readings, case analyses, guest speakers, a group project and interactive class discussions. We will review the practical skills necessary for evaluating and creating a new venture, evaluating business opportunities, and building and evaluating new product and business opportunities. Creating New Ventures provides the most practical aspects to complement the theoretical approach of the Introduction to Entrepreneurship course. (4 credits) spring  
Prerequisite: MGMT2065

## **MGMT 4250 STRATEGIC MANAGEMENT**

This course presents and explains concepts and theories useful in understanding the strategic process. It provides students with the opportunity to apply concepts, skills, and techniques to real-world corporate problems. (4 credits) spring  
Prerequisite: MGMT1000 and MGMT3000 and MGMT2850  
Corequisite: MGMT3500

## **MGMT 4300 INTEGRATIVE SEMINAR**

Integration occurs when one is able to bring unity and coherence to several, distinct elements. The basic goal of the Integrative Seminar is to provide students with an opportunity, singly and in group discussion, to consider how the various functions and skills of management can work together to advance organizations in achieving strategic goals. This seminar will address important linkages among topics and assignments in management courses and show how their combined use makes for a deeper understanding of management success. (3 credits) spring  
Prerequisite: senior status.

## **MGMT 4400 BUSINESS NEGOTIATION PRINCIPLES**

Executives, managers and employees are in constant states of negotiation for ideas, for resources, for budget and for the best people. Successful negotiations require positioning, preparation, commitment, needs assessment, packaging words persuasively, use of negotiation tactics, and thinking on your feet. It is one of the most demanding skills in a manager's tool kit. This course is designed to give students an understanding of the key elements of successful negotiation, and to help develop and enhance negotiation skills through role-play and practice. (3 credits) spring, summer

## **MGMT 5500 SENIOR PROJECT**

A capstone course. Students undertake a significant project with faculty guidance. A project presentation is required. (4 credits) summer  
Prerequisite: MGMT2600 or MGMT4250

## **MGMT 5505 PROJECT MANAGEMENT CAPSTONE**

Students will examine current professional practice through the case study method. Case studies and lectures will be selected to reflect the students' discipline area. This course focuses on project management concepts, techniques, and practices. Relevant literature and research from related disciplines such as management and communications will be included. Since each project is unique, the particular mix of tools and techniques necessary to effectively and efficiently accomplish objectives will change from project to project. The course deliverable is a significant group report in written and presentation format about a major recognizable project. The development of the assignment is itself designed to require the use and application of project management tools to enhance student understanding. (6 credits)

## **MGMT 5510 CIS SENIOR PROJECT**

A capstone course: Students undertake a significant project with faculty guidance. A project presentation is required. (4 credits)  
Prerequisite: MGMT3000 or MGMT4250

## **MGMT 7000 BUSINESS RELATIONS & HUMAN RESOURCE MANAGEMENT**

Global Business Relations and HR Management covers understanding human resources from an enterprise or project portfolio level and how to manage a diverse workforce where managers and employees may be in different countries. This course will include a review of negotiating in different cultures. (3 credits)

## **MGMT 7025 PROJECT SCHEDULING AND COST PLANNING**

Time and cost, two of the three most important pillars of project management, are examined in this course. Students will study advanced techniques for planning, managing and controlling both schedules and cost. Topics include managing the critical path, resource leveling, scheduling within constraints, cost estimation methods, break-even analysis, and earned value management. A good project manager will be able to manage risk and scope creep and keep the project on a realistic timeline and budget. Students will utilize well-recognized software, while learning to manage time and cost. (3 credits) fall

## **MGMT 7050 BUSINESS FINANCE & INVESTMENT**

This course is designed to develop the financial skills and thought processes necessary to understand and implement financial policy decisions in a global economy and addresses the impact of legal, social, technological and ethical considerations related to the practice of corporate finance. The course stresses effective written and oral communication skills necessary for the design and implementation of financial decisions. (3 credits)

## **MGMT 7100 PROJECT MANAGEMENT APPLICATIONS**

Through individual and group activities, including case studies, students will develop skills in using project management tools and techniques. Focus will be on understanding how to develop requirements, monitor progress, make adjustments and successfully meet the business needs of the project. (3 credits)

## **MGMT 7125 RISK MANAGEMENT**

This course examines the project risk management process from identification through mitigation. Risk management seeks to increase the likelihood of positive events and decrease the impact of negative events. Project Management Body of Knowledge (PMBOK) Guide lists six risk management processes all of which are studied in this course: risk management planning, risk identification, qualitative risk analysis, quantitative risk analysis, risk response planning, and risk monitoring and control. (3 credits) fall.

Prerequisite: MGMT 7025

## **MGMT 7150 BUSINESS OPERATIONS & PROCESS MANAGEMENT**

Business Operations and Process Management focuses on the set of value-added activities that transform inputs into many outputs through effective planning, scheduling, use and control of resources; includes examination of design engineering, industrial engineering management information systems, quality management, production management, inventory management, accounting, and other functions as they affect the organization, including global logistics and sourcing. (3 credits)

## **MGMT 7200 LEADERSHIP**

This course examines the critical roles and functions of leadership with an emphasis on how leaders influence organizational performance and manage change. Topics will include how to set direction, creating a culture of resilience to change, the use of power and influence, and leading and managing in a dynamic environment where the external environmental factors are rapidly changing. (3 credits)

## **MGMT 7225 PROJECT TEAM BUILDING AND LEADERSHIP**

This course examines the importance of processes of project team building and leadership. Building and leading high-performing project teams is essential to project success. Successful projects depend on the effectiveness of the project team and team leader's ability to motivate and manage the members. Project Team Building and Leadership focuses on team formation and development and motivating team members. Topics include assessing the abilities and effectiveness of team members, team building, leadership, motivation, conflict resolution, and effective actions for developing and utilizing teams and team members. (3 credits) spring.



## **MGMT 7250 STRATEGIC FN DECISION MAKING**

This course provides the student with a clear understanding of how accounting data is used to communicate financial information to those outside the business unit and the organization and to upper level management. Students learn to evaluate financial issues and become thoroughly familiar with the concepts and mechanics of the balance sheet, income statement, and statement of cash flows. Course emphasis is on using financial data as an effective tool for decision making. Students learn how to present project proposals, financial data, capital plans capital requests, and strategic plans to upper level management. (3 credits)

## **MGMT 7300 ECONOMICS & INTERNATIONAL BUSINESS**

This course provides a principles-based approach to understanding the scope, nature, opportunities and challenges involved in conducting business in the global economy. In addition to studying the international economic institutions, the course will cover the topics of international trade, international finance, and regional issues in the global economy. (3 credits)

## **MGMT 7325 AGILE PROJECT MANAGEMENT**

This course examines traditional and agile project approaches. When developing a technological solution, many organizations find that the traditional approach to project management is too rigid. In this course, students study the advantages and disadvantages of the traditional and agile project approaches and learn to apply the appropriate project management strategy. Students explore iterative frameworks, such as Scrum, and become well-versed in the process, activities, deliverables, and team roles of agile methodologies. The student will learn and use appropriate software to manage agile and hybrid projects. (3 credits) summer  
Prerequisites: MGMT7025, MGMT7125 and MGMT7225

## **MGMT 7350 MARKETING MANAGEMENT**

From understanding marketing strategy to the fundamentals of the sales and marketing mix (product, price, place of distribution, and promotion), to the tools required for gathering business intelligence, students will learn the key role of technology to marketing in a technical environment. (3 credits)

## **MGMT 7400 EXECUTIVE LEADERSHIP**

This course explores the major elements of organizational dynamics from multiple perspectives, including organizational design, work practices and cultural norms, and the relationship between power and influence. Students will evaluate different approaches to designing and implementing organizational change, as well as the role of leadership in contemporary organizations. (3 credits)

## **MGMT 7425 MANAGING TROUBLED PROJECTS**

This course examines how project managers identify failing projects and the skills to recover. Students learn the symptoms of a troubled project, how to assess projects and how to create recover process. Being proactive with a challenged project is critical to a projects' successful completion. Students explore how to avoid common pitfalls and how to "fail fast" in the project is destined to fail. (3 credits)  
Prerequisites: MGMT7025, MGMT7125, MGMT7225 and MGMT7450

## **MGMT 7450 COMMUNICATIONS STRATEGIES**

Communications Strategies focuses on using oral and written communication skills to advance ideas, agendas, and careers in an organization. Students learn how to "read" their audiences and shape their message accordingly. Students will write executive summaries, full reports, and develop presentations to best communicate their ideas. Through case analysis, written assignments, and personal inventories, students learn to identify and adapt to an organization's overt and covert communication protocols, and to observe the "hidden dimensions" of communication with a culturally and gender diverse workforce. (3 credits)

## **MGMT 7500 QUANTITATIVE METHODS IN FACILITIES MANAGEMENT RESEARCH**

Introduction to the main quantitative and qualitative research methods as applied to facilities management, including tools, proposal writing, and reports. Emphasis is placed upon research planning and design. Topics to be covered include fundamental methodological approaches, the review and evaluation of existing literature and empirical studies through qualitative and quantitative research methodologies, and the design of the student's individual research project. Special attention will be devoted to defining research problems particular to facilities management and the development of the individual research proposal. (3 credits)

## **MGMT 7525 GLOBAL AND VIRTUAL PROJECT MANAGEMENT**

The course examines how project managers ethically communicate and manage project teams that are distributed in a single facility, across the globe, or virtually. Course topics include environmental factors; cross-cultural considerations; methods to support geographically dispersed; distributed, or remote teams; traditional vs. virtual project management; navigating obstacles, building trust and related issues; and best practices for organizing and managing virtual and cross-border project teams. (3 credits)

## **MGMT 7625 MANAGING ENTERPRISE RESOURCE PLANNING (ERP) SYSTEMS**

This course introduces students to Enterprise Resource Planning (ERP), a business management model that integrates information from all aspects of the firm; including Sales Logistics, Production/Material Management, Procurement, and Human Resources. Students to gain an understanding of the importance of the integrated nature of ERP software through case studies and a simulation of SAP, the most popular ERP application. (3 credits)

## **MGMT 7725 PORTFOLIO AND PROGRAM MANAGEMENT**

This course gives students the ability to develop project portfolios that align with the business strategy. In today's increasingly multifaceted business environment, more project managers are being asked to manage multiple complex projects. This ability to manage the project portfolio is what separates projects managers from senior project managers. These portfolios translate an organization's business strategy into a collection of activities that can be managed with desired benefits and results. Managing several related projects in a cohesive, multi-project environment, and provides benefits and synergies that one might not get from managing the projects individually. Students gain an understanding of the critical success factors for portfolios and portfolio management and the key metrics to value the performance of a portfolio. (3 credits)

## **MGMT 7825 PROJECT MANAGEMENT CAPSTONE**

This capstone is the culmination of the MSPM program where students demonstrate their ability to integrate information learned and skills developed throughout the program. Where possible, projects will be developed in collaboration with industry partners. Upon completion of this course, students prove that they have not only the knowledge to lead projects. That have the skills to lead them to a successful completion. (3 credits)  
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## **MANUFACTURING**

### **MANF 1000 MANUFACTURING PROCESSES**

This course is designed to provide a basic understanding of present-day manufacturing processes. Through lectures, demonstrations, and practical applications, the student will be introduced to various manufacturing processes. Topics will include machine tools, welding, casting, sheet metal, and an introduction to numerical control programming. (4 credits)

### **MANF 2000 COMPUTER AIDED MANUFACTURING**

Students will utilize PC based industrial CAM software and Computer Numerical Control machines to produce machine tool programs and parts. (3 credits)  
Prerequisite: MANF1000

## **MANF 3000 MANUFACTURING ENGINEERING**

Topics in lean manufacturing, six-sigma, group technologies, automated systems, visual controls (5s) and production processes and planning will be covered. (3 credits)

Prerequisite: MANF1000 and MANF2000

## **MATHEMATICS**

### **MATH 0900 BASIC ALGEBRA**

Algebraic operations and equations, exponents and radicals, polynomials and factoring, and introduction to the geometry of angles and triangles. (4 credits)

Prerequisite: Placement through the College of Professional and Continuing Education.

### **MATH 1000 COLLEGE MATHEMATICS**

Algebra and trigonometry, including algebraic fractions, systems of linear equations, quadratic equations, literal equations, word problems and their solutions, right triangles, and vectors. Applications will be stressed. (4 credits) fall, spring

### **MATH 1005 COLLEGE MATH A**

Topics in college algebra including exponents, radicals, complex numbers, polynomials, factoring, algebraic fractions, equation solving techniques, an introduction to functions and their graphs, and linear functions. (3 credits)

### **MATH 1020 PLANE & SOLID GEOMETRY**

A survey of elementary Euclidean geometry including lines and angles, measurement and units, properties of triangles, parallelograms, trapezoids, regular polygons, circles, conic sections, spheres, cylinders, pyramids, polyhedra, areas, and volumes. (4 credits) spring

### **MATH 1030 STATISTICS & APPLICATIONS**

This course is designed to introduce students to statistical concepts relating to engineering design, inspection, and quality assurance. Topics covered include probability, normality, sampling, regression, correlation, and confidence intervals in reliability. (4 credits) fall, spring

### **MATH 1035 COLLEGE MATH B**

Topics in college algebra including functions and their graphs, composite and inverse functions, applied functions and variation, quadratic functions, exponential functions, logarithmic functions, systems of equations, and applications. (3 credits)

Prerequisite: MATH1005

### **MATH 1040 APPLIED MATH FOR BUSINESS**

The purpose of this course is to provide students with the basic math skills useful in solving real-life business problems. Linear and quadratic equations will be studied and applied to finance and social sciences. Functions and graphs will be studied and applied to the basic data analysis. Systems of linear equations and linear programming will be applied to maximizing profit. An introduction to probability and statistics and basic financial mathematics are provided. (4 credits) fall

### **MATH 1065 COLLEGE MATH C**

Topics in college algebra and trigonometry including the trigonometric functions, inverse trigonometric functions, trigonometric identities, trigonometric equations, and applications. (3 credits)

Prerequisite: MATH1035

## **MATH 1500 PRECALCULUS**

Topics include: polynomial and rational functions, exponential and logarithmic functions, trigonometric functions, parametric equations, analytic trigonometry, multivariable systems, and applications and modeling. (4 credits) fall, spring, summer

Prerequisite: MATH1000

## **MATH 1550 FOUNDATIONS OF APPLIED MATHEMATICS**

Problems, methods, and recent developments in applied mathematics will be discussed. Topics include, but are not limited to, the following: difference equations, fitting models to data and choosing a best model, probabilistic models, sequential decisions and conditional probability and game theory. Students will gain familiarity with technical word processors such as LaTeX, spreadsheet software and also with high level programming packages such as python, R, and MATLAB. Students will also hear guest speakers describe the role that mathematics plays in their respective careers. (4 credits) fall

## **MATH 1700 CALCULUS I**

Topics include: introduction to limits, definition of the derivative, differentiation of algebraic and transcendental functions, implicit differentiation, applications of the derivative and introduction to integration. (4 credits)

Prerequisite: MATH1065 or MATH1500.

## **MATH 1750 ENGINEERING CALCULUS I**

Limits, continuity, differentiability, the limit definition of the derivative, differentiation, linearization and some integration of algebraic and transcendental functions, implicit differentiation. Intended for engineering majors or advanced technology students. (4 credits) fall, spring, summer

## **MATH 1775 INTEGRATED ENGINEERING CALCULUS I**

Limits (including L'Hopital's Rule), continuity, differentiability, the limit definition of the derivative, differentiation of algebraic and transcendental functions. Integrates symbolic tools, graphical concepts, data and numerical calculations. Students will model engineering and scientific problems in lecture and lab. (4 credits)

## **MATH 1800 CALCULUS II**

Techniques of integration, the fundamental theorem of calculus, area, L'Hopital's Rule, improper integrals, and applications of definite integrals. (4 credits)

Prerequisite: MATH1700

## **MATH 1850 ENGINEERING CALCULUS II**

Define integrals as a limit of Riemann sums, computation of definite and indefinite integrals using the techniques of integration, improper integrals, convergence of sequences and series, and approximating functions and estimating the error using Taylor and Maclaurin series. (4 credits) fall, spring, summer

Prerequisite: MATH1750 or MATH1775

## **MATH 1875 INTEGRATED ENGINEERING CALCULUS II**

Define integrals as a limit of Riemann sums, computation of definite and indefinite integrals using the techniques of integration, improper integrals, convergence of sequences and series, including Taylor series. Integrates symbolic tools, graphical concepts, data and numerical calculations. Students will model engineering and scientific problems in lecture and lab. (4 credits)

Prerequisite: MATH1775

## **MATH 1900 INTRODUCTION TO OPERATIONS RESEARCH**

This course serves as an introduction to the field of operations research (OR). The course will cover basic deterministic (non-probabilistic) methods of operations research (linear programming, network flows, and integer programming) and their applications to resource allocation problems in business and networking. (4 credits) summer

Prerequisite: MATH1500 or MATH2800

## **MATH 1950 FINANCIAL MATHEMATICS**

This course is designed to prepare students for the Society of Actuaries Exam FM (Financial Mathematics). This course will develop knowledge of the fundamental concepts of financial mathematics and how these concepts are applied in the time of value of money, loans, bonds and general cash flows and portfolios. General theories of interest such as annuities, yield rates, and amortization will be covered. Bonds and other securities and additional topics in financial analysis such as determining interest rates and interest rate swaps will be covered. (4 credits)

Prerequisites: MATH1800, MATH1850 or MATH 1875

## **MATH 2000 CALCULUS III**

Three-dimensional Cartesian coordinate system, vectors, lines in three dimensions, planes and other surfaces, partial derivatives, directional derivatives, local extrema, polar coordinates, and multiple integrals in Cartesian and polar coordinates. (4 credits)

Prerequisite: MATH1800

## **MATH 2025 MULTIVARIABLE CALCULUS**

Three-dimensional Cartesian coordinate system, vectors, lines in three dimensions, planes and other surfaces, partial derivatives, directional derivatives, local extrema, polar coordinates, and multiple integrals in Cartesian and polar coordinates, vector fields, line integrals, and Green's Theorem. (4 credits) fall, spring, summer

Prerequisite: MATH1850 or MATH1875

## **MATH 2100 PROBABILITY & STATISTICS FOR ENGINEERS**

Topics studied are basic probability and a variety of probability distributions used in engineering modeling and reliability (expected life of products); linear regression and correlation; and hypothesis testing. (4 credits) fall, spring, summer

Prerequisite: MATH1800 or MATH1850 or MATH1875

## **MATH 2200 ADVANCED STATISTICS**

Topics include: design of experiments, correlation and regression, analysis of variance, t-tests, nonparametric methods, failure, mode, and effects analysis. (4 credits) spring

Prerequisite: MATH2100

## **MATH 2250 TIME SERIES**

This course will provide a basic introduction to time series analysis. Topics include time series regression and exploratory data analysis, ETS, MA, ARMA/ARIMA models, parameters estimate, model diagnostics. Seasonal models, and forecasting. (4 credits) fall.

Prerequisite: MATH 2100

## **MATH 2300 DISCRETE MATHEMATICS**

Topics of this course to be chosen from: elementary logic, sets, permutations and combinations, induction, relations, digraphs, functions, trees, Warshall's Algorithm, and Boolean algebra. (4 credits) fall, spring, summer

Prerequisite: MATH1500 or MATH1065 or MATH1800 or MATH1850 or MATH1700 or MATH1750

## **MATH 2425 CRYPTOLOGY**

This course will introduce the mathematics of historical and modern cryptology. There will be emphasis on both cryptography, the making of codes, and cryptanalysis, the deciphering of coded messages without a key. Topics include, but are not limited to: enumerative combinatorics, probability, statistics, linear algebra, finite groups and number theory. (4 credits) fall.

Prerequisite: MATH2300

## **MATH 2500 DIFFERENTIAL EQUATIONS**

Introduction to the solution of ordinary differential equations (ODEs). Topics will include solving first and higher order ODEs with constant coefficients, simple matrix equations and systems of ODEs, applications, and Euler's and Laplace transform solution methods. (4 credits) fall, spring, summer

Prerequisite: MATH1850 or MATH1875

## **MATH 2550 TRANSITION TO ADVANCED MATHEMATICS**

Students will review elementary logic and earn standard proof techniques: direct proof, proof by contradiction, contraposition, cases and induction. Students will write proofs of statements related to sets, relations, functions. Quantifiers, set operations, equivalent forms of mathematical induction, equivalence relations, partitions, graphs of relations, surjections, injections and cardinality will be discussed. (4 credits) spring

Prerequisite: MATH2300

## **MATH 2650 QUANTITATIVE METHODS**

Set theory and logic, basic matrix notation and manipulation, linear programming, and simplex method are studied. An introduction to probability and statistics is provided. Applications of these concepts are then applied to management problems with a survey of inventory problems, forecasting, and decision-making. (4 credits)

Prerequisites: MATH1065

## **MATH 2750 DIFFERENTIAL EQUATIONS & SYSTEMS MODELING**

Linear systems, matrix algebra, eigenvalues and eigenvectors, solutions of first and second order ordinary differential equations, stability and equilibrium solutions, Laplace transforms, state space models and simulation. (4 credits) fall

Prerequisite: MATH1800 or MATH1850 or MATH1875

## **MATH 2800 FINITE MATHEMATICS**

Set theory and logic, matrix notation and manipulation, linear programming and simplex method are studied. An introduction to probability and statistics is provided. Problem-solving by computer. (4 credits) spring

Prerequisite: MATH1000

## **MATH 2860 LINEAR ALGEBRA & MATRIX THEORY**

Topics include the basic operations of n-tuples and matrices, geometric vectors, equations of lines and planes, systems of linear equations, row reduction of matrices, linear independence, determinants, and an introduction to basis, dimension, eigenvalues, eigenvectors, and vector spaces. (4 credits) fall, spring

Prerequisite: MATH1850

## **MATH 2990 INDEPENDENT STUDY IN APPLIED MATHEMATICS**

This course investigates a topic of special interest to faculty and students that is outside existing course offerings. (1 – 4 credits)

Prerequisite: Consent of department head and instructor.

## **MATH 3150 STOCHASTIC PROCESSES**

This is an introduction to stochastic processes and their application to a large variety of probabilistic problems. The material will be taught without the need to measure theory. Topics include: Markov chains with both finite and infinite state spaces, random walks, transience and recurrence, branching processes, continuous time Markov chains such as the Poisson process and birth-death processes. We will also discuss martingales and Brownian motion. Other topics may be included as time permits and depending on student interest. Computer visualization will be employed, along with simulation. There is a project component to the course as well, and topics will be chosen according to student interest that relates to specific stochastic processes. (4 credits)

Prerequisite: MATH2100

## **MATH 3200 DIFFERENTIAL GEOMETRY**

This course covers basic differential geometry curves and surfaces, with generalization to abstract differentiable manifolds. Topics include arc length, curvature and Frenet frame of space curves, and Gaussian and normal curvature of surfaces. For embedded curves and surfaces as well as for abstract manifolds, geometry is defined in terms of tangent and cotangent spaces, with diffeomorphisms giving rise to mappings between geometries via pullback and pushforward maps. The course includes treatment of the Gauss-Bonnet Theorem and its importance in relating geometric and topological aspects of surfaces. (4 credits)

Prerequisites: MATH2025 and MATH2860.

## **MATH 3225 FUNCTIONAL ANALYSIS**

This course covers analytic properties of normed linear spaces, in particular functional spaces important to the theory of differential equations and probability. Topics include metric spaces and the notion of completeness; normed and Banach spaces; bounded linear operations; dual spaces; inner product spaces and Hilbert spaces. (4 credits) fall

Prerequisite: MATH2500 and MATH2860

## **MATH 3250 HAZARD & CATASTROPHE MODELING**

This course is designed to introduce students to the development of catastrophe models in the context of determining insurance policy premiums. We will discuss model development, parallel computing used to generate a catalogue of data, parameter estimation for models and statistical analysis to test quality assurance. Students will work in small groups to work on either earthquake, flood or wildfire models, and present their progress and final results throughout the semester in a professional manner. (4 credits)

Prerequisite: MATH2850 and MATH2500 or MATH2750; MATH2100 or BMED4600 or COMP3673; and MATH2025

## **MATH 3500 CALCULUS IV**

Topics include the analytic geometry of two- and three-dimensional coordinate systems including polar, cylindrical and spherical coordinates; a review of the fundamental theorem of line integrals and Green's theorem; orientation and parametrization of lines and surfaces; surface integrals; the divergence theorem; Stokes' theorem; the Jacobian; the general substitution rule for integration; constrained optimization and curvature. Other topics may be included as time permits. Computer visualization will be emphasized. (4 credits)

Prerequisite: MATH2025

## **MATH 3700 OPERATIONS RESEARCH**

An introduction to operations research, with topics chosen from linear programming (covering formulation of a number of different types of linear models, the simplex algorithm, duality and sensitivity analysis, the transportation and assignment problems, and integer linear programming). Network models, constrained optimization, modeling and simulation, and game theory are also discussed. (4 credits) fall

Prerequisite: MATH2860

## **MATH 3800 SPECIAL TOPICS IN APPLIED MATHEMATICS**

Presents topics that are not covered by existing courses and are likely to change from semester to semester. Refer to the Class Schedule for a specific semester for details of offerings for the semester. (1 – 4 credits)

## **MATH 3900 NUMERICAL ANALYSIS I**

Analysis of algorithms frequently used in mathematics, the sciences, engineering and industry. Topics include: root-finding, interpolation, numerical differentiation and integration. Numerical experiments will be conducted with C, Matlab, Java, Python or another appropriate high-level language. (4 credits) fall

Prerequisites: MATH1850

## **MATH 3950 NUMERICAL ANALYSIS II**

This course will discuss the theoretical basis of convergence and numerical linear algebra. Topics include: proofs, Cauchy sequences, absolute convergence, orthogonal polynomials, matrix factorization, and error bounds. Numerical experiments will be conducted with C, Matlab, Java, Python or other appropriate high-level language. (4 credits) spring

Prerequisite: MATH3900; Corequisite: MATH2860

## **MATH 4050 MACHINE LEARNING**

Introduction to the field of machine learning. This course focuses on algorithms to help identify patterns in data and predict or generalize rules from these patterns. Topics include supervised learning (parametric/non-parametric algorithms, kernels, support vector machines), model selection, and applications (such as speech and handwriting recognition, medical imaging, and drug discovery). Students who have basic programming skills and who have taken a course in probability are encouraged to take this course. Cross-list with COMP4050 (4 credits)

Prerequisite: COMP1000 or COMP1099 and MATH2100

## **MATH 4100 INDUSTRIAL PROBLEMS IN APPLIED MATHEMATICS**

This is an applied problems course in mathematics. Students will work in small teams to solve problems arising in industry under the guidance of the course professor and an industrial liaison. Every term will be different. (4 credits)

## **MATH 4150 MATHEMATICAL METHODS IN SCIENCE & ENGINEERING**

Students study various mathematical concepts and their application to physical systems. Topics include vector calculus, tensor calculus, applications of transformations, vector spaces, Hilbert spaces and group theory. (4 credits)

Prerequisite: MATH1800 or MATH1850 or MATH1875

Corequisite: MATH2025

## **MATH 4400 INTRODUCTION TO ABSTRACT ALGEBRA**

Topics include groups, subgroups, and factor groups, homomorphisms, rings and fields, and applications that may include symmetry groups, frieze groups, and crystallographic groups and/or introductions to algebraic coding theory. This course is recommended for students intending to go to graduate school for mathematics or a mathematics-related discipline. (4 credits)

Prerequisite: MATH2300

## **MATH 4475 ACTUARIAL MATHEMATICS**

This course is designed to prepare students for the Society of Actuaries' exam P/CAS Exam 1. We will develop knowledge of the fundamental probability tools for quantitatively assessing risk with an emphasis on problems encountered in actuarial science. (4 credits)

Prerequisite: MATH2100 completed with a grade of B or better

## **MATH 4575 COMPLEX VARIABLES**

Complex algebra and functions; analyticity; contour integration, Cauchy's theorem; singularities, power series; residues, evaluation of integrals; multivalued functions, potential theory in two dimensions, conformal mapping. (4 credits)

Prerequisites: MATH2025 and MATH2500

## **MATH 4675 TOPOLOGY**

This course covers some basic notions of point-set topology, such as topological spaces, connectedness and compactness, Heine-Borel Theorem, quotient spaces, topological groups, groups acting on spaces, homotopy equivalences, separation axioms, Euler characteristic and classification of surfaces. (4 credits)

Prerequisite: MATH1850 or MATH1875



### **MATH 4875 REAL ANALYSIS I**

Introduction to real analysis. Topics include introductory proof writing, the real number system, limits, continuity, properties of real-valued functions, differentiation and elementary theory of integration. (4 credits)  
Prerequisite: MATH2025

### **MATH 4900 PARTIAL DIFFERENTIAL EQUATIONS**

An introductory course in partial differential equations which covers the methods of characteristics, separation of variables, Fourier Series, finite differences, Fourier Transforms and Green's Functions. (4 credits) fall  
Prerequisite: MATH2500

### **MATH 4950 DYNAMICAL SYSTEMS AND CHAOS**

Introduction to dynamical systems and chaos with emphasis on applications in science and engineering. Topics include one-dimensional flows (fixed points, stability and bifurcations), two-dimensional flows (phase planes, limit cycles, and bifurcations), and chaos (lorenz equations, maps, fractals and strange attractors). This course counts as a technical elective for applied mathematics majors and minors. (4 credits)  
Prerequisite: MATH2400or MATH2500

### **MATH 4975 REAL ANALYSIS II**

Continued introduction to real analysis. Topics include sequences, series, Fourier series, functions defined by integrals, improper integrals, Riemann-Stieltjes integrals, functions of bounded variation, fixed-point theorems, implicit function theorems, Lagrange multipliers, functions on metric spaces, approximation, Green's Theorem and Stokes' Theorem for real vector fields. (4 credits)  
Prerequisite: MATH4875

### **MATH 5000 APPLIED MATHEMATICS FINAL YEAR DESIGN I**

Student will work alone and in small group projects to study, analyze, design, and sometimes build and test concepts in an applied mathematics subfield of their choosing. The study will be performed under the direction of one or more faculty advisors. Projects from industry be encouraged to increase the interaction and cooperation with firms. Course requirements include regular oral and written progress reports throughout the semester. The final technical report by students may include a plan for the following Applied Mathematics Final Year Design II course. (4 credits) fall  
Prerequisite: Final year standing in BSAM program.

### **MATH 5500 APPLIED MATHEMATICS FINAL YEAR DESIGN II**

This course is a continuation of Applied Math Final Year Design I. Students will continue with their design and analysis (or with new designs and analysis) with emphasis on improvements and applications. Other faculty and local industry professionals will review the student work and make recommendations. (4 credits) summer

## **MECHANICAL ENGINEERING**

### **MECH 2000 ENGINEERING STATICS**

The vector approach of the equilibrium of particle and rigid bodies is presented. Trusses, frames, shear and bending moment diagrams, centroids and moments of inertia are studied. (4 credits)  
Prerequisites: MATH1850 or MATH1875; and PHYS1250

### **MECH 2250 ENGINEERING THERMODYNAMICS I**

Thermodynamics properties, work and heat interaction are defined. The First and Second laws of thermodynamics are introduced. Conservation of mass and energy and the entropy and the exergy balance relations are applied in analyzing thermodynamic systems. Alternative energy sources and fuel cells are discussed. Psychrometric applications in the air conditioning processes are covered. Laboratory experiences reinforce the classroom theory. (4 credits)  
Prerequisites: MATH1850 or MATH1875; and PHYS1750

## **MECH 2300 ENGINEERING GRAPHICS**

This course offers entering students the fundamental skills and knowledge that is utilized during their study of mechanical engineering. Topics covered will include Institute resources, successful collegiate level study skills, and oral and written communication, design and research methodologies, as well as ethics and professional organizations. Student teams will perform introductory laboratory exercises to gain hands-on experience in the field of basic Aerospace Engineering. (3 credits)

Prerequisite: ENGR1600

## **MECH 2500 MECHANICS OF MATERIALS**

The concepts of stress and strain and their relation are introduced. Axially loaded members, temperature effect, torsion, bending, combined loading and stress transformations are studied. Stability and buckling of columns are discussed. Laboratory experiences reinforce classroom theory. (4 credits)

Prerequisite: MECH2000

## **MECH 2600 MECHANICAL DESIGN & ANALYSIS**

This 3-D Computer Aided Design course provides experience in mechanical engineering design and analysis. Assembly component interface tolerance analysis to ensure manufacturability of designs and basic finite element analysis of parts and assemblies are conducted. (3 credits)

Prerequisites: MECH2000 and MECH2250 and MECH2500 and ENGR1800

## **MECH 2750 ENGINEERING THERMODYNAMICS II**

Studies vapor power systems including the Rankine cycle and its modifications for use with both fossil and nuclear fuels, vapor compression refrigeration systems, and all-gas cycles including the Brayton cycle and its modifications; the Otto cycle; the Diesel cycle; and supercharging and turbo-charging. Introduces the concepts of exergy and second law efficiency. Studies non-reacting mixtures with applications to air/water/vapor mixtures for air conditioning systems and cooling towers. Discusses the elements of optimum power plant design. Laboratory experiences enforce the classroom theory. (4 credits)

Prerequisite: MECH2250

## **MECH 2990 INDEPENDENT STUDY**

This course investigates a topic of special interest to faculty and students that is outside regular course offerings. (1 – 4 credits)

## **MECH 3000 DESIGN OF MACHINE ELEMENTS**

This course covers the basic concepts and principles in the design and analysis of machine components. The analysis in design is based on the traditional stress analysis from mechanics of materials and also on the finite element formulation based on theory of elasticity. Plane stress, three-dimensional stress and strain, combined stresses, failure criteria and reliability, fatigue, are considered in the analysis of machine elements: rolling bearings, spur gears, flexible elements, and shafts. (4 credits)

Prerequisite: MECH2500

## **MECH 3050 FUNDAMENTALS OF HVAC SYSTEMS**

Moist air properties and air conditioning processes will be covered through theory, Psychometrics chart and Laboratory experiment. Building maximum heat loss (heating load in winter) and heat gain (cooling load in summer) calculations will be discussed along with different heating and cooling systems and subsystems such as hot air, hydronic, vapor compression, absorption Refrigeration Cycles. Degree-day and bin methods to estimate building energy consumption will be covered. (4 credits) summer

Prerequisite: MECH2250

## **MECH 3100 ENGINEERING FLUID MECHANICS**

Mechanics of fluids with emphasis on control volume analysis are studied. The continuity, energy and momentum principles are applied to real fluids. Additional emphasis is on electromechanical systems and laboratory exercises. (4 credits)

Prerequisite: MATH2025 and MECH2250

## **MECH 3200 NUMERICAL SIMULATION AND CFD**

This is an advanced new undergraduate and graduate course that explores the fundamentals of different engineering problems with different simulation techniques and CFD. The course will present several important topics such as modeling techniques and CFD. The topics will cover different techniques to solve multidisciplinary engineering problems. The basic knowledge will be applied to typical problems in aerospace and different engineering applications. (4 credits)

Prerequisites: MECH3100 and MECH2300

## **MECH 3350 GAS DYNAMICS**

This course is an introductory course to the subject of applied Gas Dynamics where the effect of compressibility on fluid flow is introduced. It starts with some basic notions of fluid flow and thermodynamics followed by one dimensional compressible flow. Normal and oblique shock waves. Construction and design of aircraft gas turbine engine. Simulation and CFD analysis of compressible flow and convergent-divergent nozzles. (4 credits)

Prerequisite: MECH2250 and MECH3100

## **MECH 3400 RELIABILITY-BASED MECHANICAL DESIGN**

Techniques for the quantification of uncertainty and risk inherent in mechanical components and systems; and the implementation of reliability-based design in mechanical components and systems. (4 credits) summer

Prerequisite: MECH3000

## **MECH 3599 ENGINEERING MECHANICS**

This course covers static equilibrium and dynamic motion. Major components of this course are force vectors, equilibrium of a particle, resultant and internal forces, centroids, center of gravity, stress and strain, torsion, moments of inertia, shearing, deflection, kinematics of a particle, kinetics of a particle, force, acceleration, work and energy, impulse and momentum. The course includes labs that correspond to the lecture material. (4 credits)

Prerequisites: MATH2025 and PHYS1750

## **MECH 3600 MATERIALS SCIENCE**

This is an introductory course into the structure and properties of materials. Subjects include the processing of materials, crystal structure, miller indices, composition, alloying, electrical properties, phase diagram, corrosion, diffusion, heat treating, inspection, and testing of materials utilized in the electromechanical field. The lab-oratory activities will reinforce the classroom theory. (4 credits)

Prerequisite: Junior status and MECH2500

## **MECH 3650 AERODYNAMICS**

This course is an introductory course to the subject of Aerodynamics. Fundamentals physical quantities and the source of all aerodynamics forces, continuity, momentum and energy equations. Measurement of airspeed: incompressible flow, subsonic compressible flow, supersonic flow. Introduction to viscous flow, laminar and turbulent boundaries, transition, flow separation. Airfoils, wings and other aerodynamic shapes. Elements of airplane performance, equations of motion, thrust, power and maximum velocity. Principles of stability and control (static and dynamic stability, control), moments on the airplane, absolute angle of attack. Astronautics: differential, Lagrange's and orbit equations. (4 credits)

Prerequisite: MECH3350

## **MECH 3800 SPECIAL TOPICS MECHANICAL ENGINEERING**

Presents topics that are not covered by existing courses and are likely to change from semester to semester. Refer to the Class Schedule for a specific semester for details of offerings for the semester. (1 - 4 credits)

## **MECH 3850 ENGINEERING DYNAMICS**

This course covers the kinematics and kinetics of particles and rigid bodies. Kinetic problems are analyzed by utilizing the second law of Newton, work and energy and impulse momentum methods. Dynamics simulation software is used to reinforce the theory. (4 credits)

Prerequisite: MECH2000 and MATH2500

### **MECH 3900 ENGINEERING HEAT TRANSFER**

Conduction, convection, and thermal radiation heat transfer mechanism are described. Steady-state and transient conduction problems are discussed. Convective heat transfer mechanisms and various correlations to evaluate the heat transfer coefficient are discussed. Heat exchanger analysis and thermal radiation heat transfer between surfaces are presented. Laboratory experiences enforce the classroom theory. (4 credits)

Prerequisites: MECH2250 and MECH3100 and MATH2500

### **MECH 4000 MECHANICAL VIBRATION**

General theory of free, damping and forced vibrations with one and two degrees of freedom; vibration suppression and isolation; natural frequencies and mode shapes in continuous mechanical systems through analytical method and numerical simulation. (3 credits)

Prerequisites: MATH2500 and MECH2500 and MECH3850

### **MECH 4200 SIMULATION BASED DESIGN**

This 3-D computer aided design course provides experience in mechanical engineering simulation and design verification analysis. Finite Element Analysis of parts and assemblies are conducted. (4 credits)

Prerequisites: MECH3000 and MECH3100 and MECH3900

### **MECH 4400 ENGINEERING THERMAL DESIGN**

Studies vapor power systems including the Rankine cycle and its modifications for use with both fossil and nuclear fuels, vapor compression refrigeration systems, and all-gas cycles including the Brayton cycle and its modifications; the Otto cycle; the Diesel cycle; and supercharging and turbo-charging. Introduces the concepts of exergy and second law efficiency. Studies non-reacting mixtures with applications to air/water/vapor mixtures for air conditioning systems and cooling towers. Discusses the elements of optimum power plant design. Laboratory experiences enforce the classroom theory. (3 credits)

Prerequisite: MECH2250 and MECH3100 and MECH3900

### **MECH 4425 ADVANCED MECHANICS OF MATERIALS**

Stress analysis, the development of strain, stress concentrations, failure theories and fatigue are studied. Shafts, gears, and other elements are also considered. Laboratory problems and appropriate projects are assigned. (4 credits)

Prerequisites: MECH2500 and COMP1299 and MATH2025 and MATH3100

### **MECH 5000 MECHANICAL CAPSTONE ANALYSIS**

This capstone research-based course is for senior-level mechanical engineering students who will formulate a topic and initiate their capstone project for an innovative technological device or system. Students are encouraged to take an interdisciplinary approach to their design project with research directed by one or more faculty advisors. (3 credits)

Prerequisite: Senior status.

### **MECH 5500 MECHANICAL CAPSTONE PROJECT**

This capstone project course is for senior-level mechanical engineering students who will formulate a topic and develop a project for an innovative technological device or system. Students are encouraged to take an interdisciplinary approach to their design project, and the work will be performed under the direction of one or more faculty advisors. Course requirements include oral and written progress reports throughout the semester plus a final comprehensive technical report.

Prerequisites: Senior status and MECH4200

## PHILOSOPHY

### PHIL 2990 INDEPENDENT STUDY IN PHILOSOPHY

This course investigates a topic of special interest to faculty and students that is outside existing course offerings. (4 credits)

Prerequisite: completion of an ENGL sequence

### PHIL 3800 SPECIAL TOPICS IN PHILOSOPHY

These courses present topics that are not covered by existing courses and are likely to change from semester to semester. Refer to the semester schedule for the courses offered that semester. Contact the faculty assigned for more information about the course topic. (4 credits)

Prerequisite: completion of an ENGL sequence

### PHIL 4401 ENGINEERING ETHICS

This course examines several ethical systems and employs case a case study approach to apply these systems to the scenarios that engineers may encounter. A major focus of this course is examining possible future technological developments and their impact on humanity. (4 credits) fall

Prerequisite: completion of an ENGL sequence

### PHIL 4301 PHILOSOPHY AND RELIGION

An introductory course in the concepts and processes of philosophical and religious thought and experience. In this course students, will be able to examine the classical and contemporary traditions and issues in philosophy and religion, the nature of existential reality, and the process of ethical decision-making. (4 credits)

Prerequisite: completion of an ENGL sequence

### PHIL 4501 ETHICS

The study of the rules and standards of right conduct in regard to the self, industry, and society. Historical perspectives and contemporary case studies are utilized. (4 credits) fall, spring, summer

Prerequisite: completion of an ENGL sequence

### PHIL 4525 VIRTUAL ETHICS

This course will explore the impact of information technology on the individual and society. IT will address questions regarding freedom, privacy, justice and human flourishing in an information age. Topics including the ethics of technology design, social media, networked environments and virtual realities, gaming, robotics. And artificial intelligence will shed light on the new ethical question that challenge our evolving symbiotic relationship with technology. We will conduct our study of “virtual ethics: through primary and secondary readings, including scholarly articles and literature as well as narrative films. (4 credits)

Prerequisite: completion of an ENGL sequence

## PHYSICS

### PHYS 1000 COLLEGE PHYSICS I

General introduction to mechanics. Topics include kinematics, vectors, Newton’s Laws, equilibrium, work and energy, momentum, and circular motion. (4 credits) fall, spring, summer

Prerequisite: MATH1000

### PHYS 1005 PHYSICS A

General introduction to mechanics, including Newton’s Laws, equilibrium, work, energy and momentum. The laboratory work will support the concepts studied in class. (4 credits) fall, spring, summer

Prerequisite: MATH1005

## **PHYS 1010 CONCEPTUAL PHYSICS**

A survey of physics and its applications to modern life. Mechanics, sound, heat, electricity, light, and structure of matter are examined. Understanding of concepts, rather than detailed calculations, is emphasized through lecture and laboratory. (4 credits) fall, spring

## **PHYS 1035 PHYSICS B**

General introduction to mechanical and thermal properties of matter, sound, light, and electricity. The laboratory work will support the concepts studied in class. (4 credits) fall, spring

Prerequisites: PHYS1005

## **PHYS 1250 ENGINEERING PHYSICS I**

A calculus-based course emphasizing the principles and applications of mechanics. Topics include: Newton's Laws, equilibrium; work, energy, power; momentum, circular motion. (4 credits) fall, spring, summer

Corequisite: MATH1750 or MATH1775

## **PHYS 1500 COLLEGE PHYSICS II**

Physical properties of solids and fluids, heat, sound, light, electric, and magnetic forces. (4 credits)

Prerequisites: MATH1500 and PHYS1000

## **PHYS 1750 ENGINEERING PHYSICS II**

Topics include: physical properties of solids and fluids, atomic structure, heat, sound, wave motion, electricity and magnetism. (4 credits) fall, spring, summer

Prerequisite: MATH1750 or MATH1775; AND PHYS1250

Corequisite: MATH1850

## **PHYS 2000 INTRODUCTION TO ASTRONOMY**

This course gives the student a tour of the universe from our own Sun and Solar System to the very edge of space and time itself. Topics will include: our 8 planets, our Sun and structure of stars, nuclear fusion as a stellar energy source; the Milky Way; galaxies and galaxy evolution; large scale structure; and the fate of the universe. We will finish up with an extended discussion of extrasolar planets and the possibility of other life in the universe. No prior knowledge of astronomy is required. (4 credits)

## **PHYS 2500 MODERN PHYSICS**

This course takes a student on a journey of the physics after 1905. Emphasis is placed on the shortcoming of classical physics at the turn of the century leading to the discoveries of the modern era. The special theory of relativity, and the foundations of quantum mechanics serve as the cornerstone for the course. Extensions of these topics will include the modern view of the atom, nuclear physics, wave particle duality of light and mass, space time structure and GPS implementation of relativity. (4 credits) fall, spring, summer

Prerequisite: MATH1700 or MATH1750 or MATH1775; AND PHYS1250.

## **PHYS 2990 INDEPENDENT STUDY IN PHYSICS**

This course investigates a topic of special interest to faculty and students that is outside existing course offerings. (1 – 4 credits)

Prerequisite: Consent of the department head and instructor

## **PHYS 3000 COMPUTATIONAL PHYSICS**

Numerical and computational methods and techniques applied to a variety of physics topics. Use of computers to numerically solve problems and graphically illustrate solutions involving differential equations. Integration, matrices and root finding. (4 credits) fall.

Prerequisites: PHYS1750, MATH1850

## **PHYS 3800 SPECIAL TOPICS IN PHYSICS**

These courses present topics that are not covered by existing courses and are likely to change from semester to semester. Refer to the semester schedule for the courses offered that semester. Contact the faculty assigned for more information about the course topic. (1 – 4 credits)

## **POLITICAL SCIENCE**

### **POLS 1201 POLITICAL SCIENCE**

Study of the use of power in society. The course introduces the student to the nature of political systems at the local, state, national, and international levels. (3 credits)

Prerequisite: ENGL1050

### **POLS 1350 AMERICAN GOVERNMENT (CPCE)**

This course covers the concept of citizenship in the community and the nation. Basic political concepts, governing philosophies, and contemporary governmental structures as they pertain to public policy development are studied. (3 credits)

Prerequisite: ENGL1050 and ENGL2050

### **POLS 2990 INDEPENDENT STUDY IN POLITICAL SCIENCE**

This course investigates a topic of special interest to faculty and students that is outside existing course offerings. (4 credits)

Prerequisite: completion of an ENGL sequence

### **POLS 3800 SPECIAL TOPICS IN POLITICAL SCIENCE**

These courses present topics that are not covered by existing courses and are likely to change from semester to semester. Refer to the semester schedule for the courses offered that semester. Contact the faculty assigned for more information about the course topic. (4 credits)

Prerequisite: completion of an ENGL sequence

### **POLS 4102 AMERICAN GOVERNMENT**

This course provides students with an overview of American democracy. Basic political concepts, governing philosophies, and contemporary governmental structures as they pertain to public policy development are studied. In addition to addressing the important role of institutions, politics and the role of non-state actors will be a central component of class discussion. Most importantly, this course seeks to empower students as citizens in a democratic society, and develops the concept of citizenship in the community and the nations. (4 credits)

Prerequisite: completion of an ENGL sequence

### **POLS 4300 RACE, CLASS & GENDER POLITICS**

This course provides perspectives on identity politics, the complex interaction between the categories of race, class, gender and ethnicity. We will examine the role that race, class, gender and ethnicity play in our politics on a personal, local and national level. In addition to historical and current readings, we will also discuss a foundation on which to conduct analysis of the intersections among issues of race, class and gender. (4 credits)

Prerequisite: completion of an ENGL sequence

### **POLS 4350 SCIENCE & TECHNOLOGY POLICY**

This course introduces students to science and technology policy generally, and in particular, it considers the concepts, actors, processes and challenges involved with promoting innovation while regulating new technologies. How do we ensure the protection of public health and safety without dampening innovation? What is the role of government in all of this? What should it be? What are the current scientific questions that are challenging policymakers? (4 credits)

Prerequisite: completion of an ENGL sequence

## **POLS 4402 INTERNATIONAL POLITICS**

A course designed to analyze how nation states interact in the contemporary world. Basic concepts such as sovereignty, national interest and diplomacy will be studied and assessed in relation to the conduct of foreign policy. Case studies will be used to examine and understand the process of modern decision-making and the intelligence and diplomacy upon which it is based. A basic knowledge of modern history or government is recommended. (4 credits)

Prerequisite: Completion of an ENGL sequence

## **POLS 4450 INTERNATIONAL RELATIONS & SCIENCE FICTION**

Students will come away from this course with an understanding of the international political system and the ability to apply a general conceptual framework and theoretical tools to interpret, analyze and evaluate issues and events in international politics. The twist is that we will be using science fiction notably the idea of a zombie apocalypse, but also other films and pop culture references to illustrate important concepts. (4 credits)

Prerequisite: completion of an ENGL sequence

## **POLS 4452 THIRD WORLD STUDIES**

A course by which a student may enlarge his or her knowledge and understanding about the history and traditions of sub-Asia, Africa and Latin America. The purpose of this course is to prepare students for employment in multi-national corporations with overseas divisions and for technical assistance projects in emerging nations. (4 credits)

Prerequisite: completion of an ENGL sequence

## **POLS 4475 INTERNATIONAL SECURITY**

This course introduces students to the concepts and theories of international security as well as the ongoing threats worldwide. We consider the policies and politics of international security and how states engage with each other through both war and diplomacy. The course will address traditional threats (including terrorism and weapons of mass destruction), but also new threats to human security (such as international environmental and health threats). Throughout the course, special attention will be given to the ways in which technology plays a role both in creating and mitigating these threats. (4 credits) summer

Prerequisite: completion of an ENGL sequence

## **POLS 4502 MEDIA & POLITICS**

This course considers the critical role played by the media in democratic political systems. Students will explore the ways in which the media portrays government processes and officials and shape agendas and public opinion. Sources of bias, regulation, and censorship, as well as the role of new medial and political satire are also explored. (4 credits)

Prerequisite: completion of an ENGL sequence

## **PRIOR LEARNING ASSESSMENT (CPCE)**

### **CPLA 1000 PRIOR LEARNING ASSESSMENT PREPARATION**

Students analyze their life and work experience to discover the college-level learning that they have acquired since completing high school. Student write essays detailing how the learning was acquired and equivalent to the learning objectives and outcomes of related Wentworth courses.

Students must present evidence of the learning described in the essays. This evidence must include letters of support from witnesses to the learning described and may include other forms of documentation. To complete the course, students must present to the instructor the required material in a carefully prepared e-portfolio within the WIT LMS system.

Upon completion, a student may elect to have that portfolio submitted to the Portfolio Review Committee for assessment. Students may earn a maximum of 45 PLA credits. (assessment fee must be paid prior to committee review and published deadline).



## PSYCHOLOGY

### PSYC 2990 INDEPENDENT STUDY IN PSYCHOLOGY

This course investigates a topic of special interest to faculty and students that is outside existing course offerings. (1 – 4 credits)

Prerequisite: completion of an ENGL sequence

### PSYC 3750 PSYCHOLOGY OF ADULTHOOD

This course presents an overview of the theoretical and practical aspects of adult psychological development and aging. Topics covered are: relationships, careers, midlife, retirement and death. (3 credits)

Prerequisite: ENGL1050 and ENGL2050

### PSYC 3800 SPECIAL TOPICS IN PSYCHOLOGY

These courses present topics that are not covered by existing courses and are likely to change from semester to semester. Refer to the semester schedule for the courses offered that semester. Contact the faculty assigned for more information about the course topic. (1 – 4 credits)

Prerequisite: completion of an ENGL sequence

### PSYC 4100 INTRODUCTION TO PSYCHOLOGY

An introduction to psychology, with an emphasis on the role it plays in our everyday lives. Topics include human development, the biological basis of our behavior, the nature of intelligence and consciousness, psychological disorders, and how we behave in social situations. (4 credits)

Prerequisite: completion of an ENGL sequence

### PSYC 4160 SPORTS PSYCHOLOGY

A psychological perspective on sports, emphasizing the experience of those who have broken barriers, or who seek to. After a general introduction to the field of sports psychology, students will read case studies, autobiographical and biographical accounts, and scholarly research related to issues of gender, race/ethnicity, and disabilities. Topics will illustrate common psychological concepts, such as stereotype threat and identity formation. (4 credits)

Prerequisite: completion of an ENGL sequence

### PSYC 4202 ABNORMAL PSYCHOLOGY

The systematic study of a variety of psychological disorders and troublesome problems of behavior. Attention will be given to the recognition of various symptoms and behaviors, several treatment methods, and preventive mental health measures for affected person and families. (4 credits)

Prerequisite: completion of an ENGL sequence

### PSYC 4250 PSYCHOLOGY AND PSEUDOSCIENCE

A pseudoscience is a false science, not supported by what is generally called “a scientific method.” The discipline of psychology has long struggled with the association with pseudoscience, yielding many rich historical and contemporary cases for analysis. This course will explore the relationship between psychology and pseudoscience, including the complex role of that the media has played in confusing and promoting the two. (4 credits)

Prerequisite: completion of an ENGL sequence

### PSYC 4302 SOCIAL PSYCHOLOGY

This course goes beyond an introductory course in psychology or sociology to examine the nature of social interaction in depth. The biological and cultural roots of interaction; the structure and dynamics of groups and organizations; social exchange and competence; social space and distance; evaluation of self and others; verbal and non-verbal communication; and similar topics are considered. (4 credits)

Prerequisite: completion of an ENGL sequence

## **PSYCH 4350 PSYCHOLOGY OF PLACE**

What role does place play in the establishment of our identity? How do the spaces we create and inhabit tether us to ourselves, or perhaps something greater than ourselves? Social scientists are not only interested in the relationships we form, but also with the way our natural and designed surroundings influence our thoughts, feelings and behaviors. In this course, we will explore such topics, including how place affects our sense of wellness. (4 credits)

Prerequisite: completion of an ENGL sequence

## **PSYC 4552 INDUSTRIAL ORGANIZATIONAL PSYCHOLOGY**

By establishing the link between theory and application, this course enables the student to study the psychological principles that emerge in technology and business environments. Topics covered include leadership, communication, organizational culture, motivation, attitude, and stress. (4 credits) fall, spring, summer

Prerequisite: completion of an ENGL sequence

## **SOCIOLOGY**

### **SOCL 1051 SOCIOLOGY (CPCE)**

This course is an introduction to sociology, the systematic study of human groups and social relations. We will analyze the basic structure of society and the issues confronting contemporary life in America. Special emphasis will be placed upon the problems and concerns that bring about change in modern society. (3 credits)

Prerequisite: ENGL1050

### **SOCL 2990 INDEPENDENT STUDY IN SOCIOLOGY**

This course investigates a topic of special interest to faculty and students that is outside existing course offerings. (4 credits)

Prerequisite: completion of an ENGL sequence

### **SOCL 3800 SPECIAL TOPICS IN SOCIOLOGY**

These courses present topics that are not covered by existing courses and are likely to change from semester to semester. Refer to the semester schedule for the courses offered that semester. Contact the faculty assigned for more information about the course topic. (4 credits)

Prerequisite: completion of an ENGL sequence

### **SOCL 4102 SOCIOLOGY**

This course explores sociology, the systematic study of groups and social relations. Sociology investigates the intersection of biography and history by relating the life of the individual to the operation of social institutions; how a person's life interacts with the collective experience of others. We will analyze the basic structure of society and the issues confronting contemporary life in America. Special emphasis will be placed upon forces and problems that bring about cultural change in American society today. In addition, we shall broaden our perspectives to include issues of globalization. (4 credits)

Prerequisite: completion of an ENGL sequence

### **SOCL 4202 SOCIAL MOVEMENTS**

This course will focus on group behavior which occurs outside established institutions. It considers behavior which occurs in spontaneous and structured situations. The main theme of the course is to study social movements aimed at transforming society. (4 credits)

Prerequisite: completion of an ENGL sequence

### **SOCL 4212 ART & TECHNOLOGY**

This course explores the disappearing line between nature and technology. Themes and topics explored include: art history with an emphasis on Modernism and contemporary art; the literature of Hawthorne and Zizek; relationship between nature, culture and science; cyborgs, plastic surgery, and immortality; the importance and effects of ideas and inventions on society. (4 credits)

Prerequisite: completion of an ENGL sequence

## **SOCL 4332 SOCIAL PROBLEMS**

What is a social problem? How does a particular social phenomenon become defined as a social problem? These are the types of questions that this course will begin to answer. This course will provide an analysis of some of the most significant social problems in the United States, and other nations, including: poverty, homelessness, racism, segregation, health, and environmental destruction. We will examine the social and structural factors associated with the creation of these and other problems as well as ways to address and overcome them. We will pay particular attention to how issues become defined as social problems, who gets to define them, and the implications that these problems have for society and its members. Using a sociological perspective, we will delve deeper into these issues to gain a better understanding of their causes and possible solutions and how people experience and make sense of these issues. By the end of the course, you should come away with a better understanding of what constitutes a social problem and possible ways of addressing and solving them. (4 credits)  
Prerequisite: completion of an ENGL sequence

## **SOCL 4432 MARRIAGE AND FAMILY**

This course explores marriage and families from a sociological perspective. The goal of Sociology, as a social science, is to better understand social institutions through the use of empirical research. In this course we will examine current and historical patterns in family formation, theoretical perspectives on family processes, how social policy shapes and influences family life, and the role of family in contemporary American society. Using readings, films, and class discussions, we will explore a myriad of issues related to family life including: gender, parenting, adoption, divorce, family diversity, family violence, and more. Finally, we will examine the social construction of family and explore how cultural contexts and social forces help shape our ideas and beliefs about what family should be and how individual agents work to reshape families. (4 credits)  
Prerequisite: completion of an ENGL sequence

2018-2019 Academic Catalog: Course Descriptions - Surveying

## **SURVEYING**

### **SURV 1000 CONSTRUCTION SURVEYING**

Instruction is given in the theory and techniques of horizontal and vertical measurements using the tape, transit and level. Laboratory exercises will focus on the application of these techniques as they relate to the building industry, including construction layout and grades. (4 credits)  
Prerequisite: MATH1005

### **SURV 1100 OVERVIEW OF SURVEYING TECHNOLOGY**

This course will introduce the student to the various methods and applications of land surveying to the real estate, construction, and land development industries. Students will also be introduced to the various technologies employed by Professional Land Surveyors in accomplishing their work including differential leveling, electronic distance measurement (EDM), electronic data collection, computer-aided design (CAD), the global positioning system (GPS) and geographical and land information systems (GIS/LIS). (3 credits)  
Prerequisite: ENGL1050 or ENGL1000

### **SURV 1200 SURVEYING MEASUREMENT I**

This course will introduce the student to the fundamental theories and techniques for horizontal and vertical measurements with theodolites, automatic levels and steel tapes. Labs include projects in linear measurements, leveling, traversing and stadia surveys. (4 credits)  
Prerequisite: MATH1065

### **SURV 1500 LEGAL ASPECTS LAND SURVEY I**

This course includes an introduction to the realm of real estate law that is essential to the practice of land surveying and the basics of land surveying research. Real estate law and conveyancing terminology, evidence gathering, and research theory will be taught. Key principles of boundary law will be explored such as the relative weight of evidence, sequential and simultaneous conveyances, easements and rights of way, and the public land survey system. (3 credits)  
Prerequisites: ENGL1050 or ENGL1000; and SURV 1200

## **SURV 2200 SURVEYING MEASUREMENT II**

This course includes traverse calculation, and error analysis, applications of coordinate geometry, horizontal and vertical curve calculations, introduction to geodetic survey principles, basic map projection calculations, and introduction to, and use of, data collection equipment and software. Labs include layout of horizontal and vertical curves, field techniques for boundary layout, data collection and site detail mapping. The final project in this course will involve the detailed surveying and mapping of a section of the campus suitable for use in engineering design, construction or conveyancing. (4 credits)

Prerequisite: SURV1200

## **SURV 2250 MA REGS AFFECTING SURV PROF**

This course will involve the study of those regulations directly affecting the practice of Land Surveying in the Commonwealth of Massachusetts such as the Registration Law, (MGL Chap. 112, Secs. 81D-81T), the Regulations of the Board of Registration of Professional Engineers and of Land Surveyors (250 CMR), the Subdivision Control Law (MGL Chap. 41), the Zoning Act, (MGL Chap 40A) and the Massachusetts Land Court Manual of Instructions. Students will be introduced to other bodies of regulations often encountered in the practice of Land Surveying such as municipal subdivision regulations, The Wetlands Protection Act, The Massachusetts Environmental Protection Act (MEPA). (3 credits)

Prerequisite: ENGL1000 or ENGL1050

## **SURV 2500 LEGAL ASPECTS LAND SURVEY II**

Building on the principles taught in Legal Aspects of Land Surveying I, special boundary topics such as water boundaries, unwritten transfers, and writing legal descriptions will be covered along with the roles of statute and case law in the boundary decision process. Students will complete a final project that will involve the application of legal principles to an actual surveying problem requiring them to make boundary decisions involving conflicting evidence. (3 credits)

Prerequisites: SURV1500 and SURV2200

2018-2019 Academic Catalog: Course Descriptions - Technology Management

## **TECHNOLOGY MANAGEMENT**

### **TMGT 8000 STRATEGIC TECHNOLOGY MANAGEMENT**

The focus of this course will be on managing technology for strategic value. Topics covered will include developing business strategy, gaining competitive advantage, R&D allocations, product and process development, strategic partnerships, and the role of innovation. Developing and managing offshore technology operations directly or through partnerships will be examined. (3 credits)

### **TMGT 8100 MANAGEMENT OF NEW PRODUCT DEVELOPMENT**

This course uses a living laboratory learning environment to provide our students with experience along the entire spectrum of the commercialization process; from ideation, invention, product development, technical and market feasibility analysis, intellectual property acquisition and/or management, to business plan development and the search for capital. Protection of intellectual property across international borders will also be discussed. (3 credits)

### **TMGT 8900 CAPSTONE**

The MSTM program culminates with a capstone course where students are called upon to demonstrate their ability to integrate information learned and skills developed throughout the program. Where possible, projects will be developed in collaboration with industry partners. (3 credits)



