

# APPLIED MATHEMATICS BACHELOR OF SCIENCE

## Leading to a Bachelor of Science Degree in Applied Mathematics

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 co-ops. The four-year B.S. in Applied Mathematics in which majors take 8 semesters of classes and complete two marketable applied math co-ops. 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, data science, research, operations research, quality assurance, software engineering, statistics, biomedicine, and informatics.

### Program Educational Objectives

- 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.

### Three Year Program

Total Required Credits: 120

Course	Title	Credits
<b>First Year</b>		
<b>Fall Semester</b>		
MATH1550	FOUNDATIONS OF APPLIED MATHEMATICS	4
MATH1776	CALCULUS 1A	2
MATH1777	CALCULUS 1B	2
COMP1000	COMPUTER SCIENCE I	4
English Sequence		4
Science Elective		4
BIOL1100, BIOL1700, BIOL2200, BIOL3000, CHEM1100, CHEM1600, PHYS1250, PHYS1750, PHYS2000 will satisfy the SCIENCE elective requirement. BIOL2990, CHEM2990, PHYS2990, BIOL3800, CHEM3800 and PHYS3800 require School approval		
<b>Credits</b>		<b>20</b>
<b>Spring Semester</b>		
MATH1876	CALCULUS 2A	2
MATH1877	CALCULUS 2B	2
MATH2300	DISCRETE MATHEMATICS	4
COMP1050	COMPUTER SCIENCE II	4
English Sequence		4
Science Elective		4

Course	Title	Credits
BIOL1100, BIOL1700, BIOL2200, BIOL3000, CHEM1100, CHEM1600, PHYS1250 will satisfy the SCIENCE elective requirement. BIOL2990, CHEM2990, PHYS2990, BIOL3800, CHEM3800 and PHYS3800 require School approval		
<b>Credits</b>		<b>20</b>
<b>Summer Semester</b>		
COOP3000	PRE CO-OP WORK TERM (OPTIONAL)	0
<b>Credits</b>		<b>0</b>
<b>Second Year</b>		
<b>Fall Semester</b>		
MATH2025	MULTIVARIABLE CALCULUS	4
MATH2100	PROBABILITY & STATISTICS FOR ENGINEERS	4
MATH2550	TRANSITION TO ADVANCED MATH	4
MATH3900	NUMERICAL ANALYSIS I	4
HSS Elective*		4
<b>Credits</b>		<b>20</b>
<b>Spring Semester</b>		
MATH2200	ADVANCED STATISTICS	4
MATH2500	DIFFERENTIAL EQUATIONS	4
MATH2860	LINEAR ALGEBRA & MATRIX THEORY	4
MATH3950	NUMERICAL ANALYSIS II	4
NON-TECH Non-Technical Elective		4
<b>Credits</b>		<b>20</b>
<b>Summer Semester</b>		
COOP3500	COOP EDUCATION 1	
<b>Credits</b>		<b>0</b>
<b>Third Year</b>		
<b>Fall Semester</b>		
MATH3700	OPERATIONS RESEARCH	4
MATH4900	PARTIAL DIFFERENTIAL EQUATIONS	4
Technical Elective (p. )		4
Technical Elective (p. )		4
HSS Elective*		4
<b>Credits</b>		<b>20</b>
<b>Spring Semester</b>		
COOP4500	COOP EDUCATION 2	0
<b>Credits</b>		<b>0</b>
<b>Summer Semester</b>		
MATH5000	APPLIED MATHEMATICS FINAL YEAR DESIGN I	4
Technical Elective (p. )		4
Technical Elective (p. )		4
HSS Elective*		4
NON-TECH - Non-Technical Elective		4
<b>Credits</b>		<b>20</b>
<b>Total Credits</b>		<b>120</b>

### Non-coursework Requirement:

In addition to the above coursework requirements, students are required to complete the following non-coursework degree requirements:

- One public lecture
- A poster presentation

### Non-Technical Electives:

A total of 8 semester credit hours comprised of any two 4-credit courses for which the pre-requisite has been met, in the following subjects: ARCH, COMM, CONM, ECON, ENGL, HIST, HUMN, HSSI, INDS, INTD, LITR, MGMT, MANF, PHIL, POLS, PSYC, SOCL, SURV

### ENGL/HSS Note

Students are required to complete:

- At least one course in Humanities: CSAS, HSSI, HIST, HUMN, LITR and PHIL
- At least one course in the Social Sciences: CSAS, HSSI, COMM, ECON, ENVM, POLS, PSYC and SOCL
- The remaining course 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.

A minimum of 20 credits total, including English, humanities, and social science credit, is required to complete the humanities and social sciences graduation requirement.

Math Placement (<https://catalog.wit.edu/academic-policies-procedures/ug/math-placement/>) may alter the course schedule above.

### Technical Electives:

A total of 16 semester credit hours of technical electives must be taken as a part of the program. One of the four technical electives must be either MATH4875 REAL ANALYSIS I, MATH4575 COMPLEX VARIABLES, or MATH4400 INTRODUCTION TO ABSTRACT ALGEBRA. Students may choose, after consultation with their primary advisor, among the electives offered each semester. Technical elective courses include biological, financial, and physical science applications through courses offered by the Applied Mathematics Academic Unit including:

Course	Title	Credits
MATH1950	FINANCIAL MATHEMATICS	4
MATH2250	TIME SERIES	4
MATH2425	CRYPTOLOGY	4
MATH3150	STOCHASTIC PROCESSES	4
MATH3200	DIFFERENTIAL GEOMETRY	4
MATH3225	FUNCTIONAL ANALYSIS	4
MATH3250	HAZARD & CATASTROPHE MODELING	4
MATH3500	CALCULUS IV	4
MATH4050	MACHINE LEARNING	4
MATH4100	INDUSTRIAL PROBLEMS IN APPLIED MATHEMATICS	4
MATH4400	INTRODUCTION TO ABSTRACT ALGEBRA	4
MATH4475	ACTUARIAL MATHEMATICS	4
MATH4575	COMPLEX VARIABLES	4
MATH4875	REAL ANALYSIS I	4
MATH4975	REAL ANALYSIS II	4
MGMT2750	INTEGRATIVE FINANCIAL ACCOUNTING (requires School approval)	4

Course	Title	Credits
Any 2000-Level courses in BIOE,BIOL, BMED,CHEM,CIVE,COMPELEC,ELMC,ENGR,ENVM,MECH,PHYS,SCIN will also count as Technical Electives* Prerequisites must be met and School approval is required.		

## Four Year Program

Total Required Credits: 120

Course	Title	Credits
<b>First Year</b>		
<b>Fall Semester</b>		
MATH1550	FOUNDATIONS OF APPLIED MATHEMATICS	4
MATH1776	CALCULUS 1A	2
MATH1777	CALCULUS 1B	2
English Sequence		4
Science Elective		4
BIOL1100,BIOL1700, BIOL2200, BIOL3000, CHEM1100,CHEM1600, PHYS1250 will satisfy the SCIENCE elective requirement. BIOL2990, CHEM2990, PHYS2990, BIOL3800, CHEM3800 and PHYS3800 require School approval		
<b>Credits</b>		<b>16</b>

<b>Spring Semester</b>		
MATH1876	CALCULUS 2A	2
MATH1877	CALCULUS 2B	2
MATH2300	DISCRETE MATHEMATICS	4
English Sequence		4
Science Elective		4
BIOL1100,BIOL1700, BIOL2200, BIOL3000, CHEM1100,CHEM1600 PHYS1250 will satisfy the SCIENCE elective requirement. BIOL2990, CHEM2990, PHYS2990, BIOL3800, CHEM3800 and PHYS3800 require School approval		
<b>Credits</b>		<b>16</b>

<b>Second Year</b>		
<b>Fall Semester</b>		
MATH2025	MULTIVARIABLE CALCULUS	4
MATH2550	TRANSITION TO ADVANCED MATH	4
COMP1000	COMPUTER SCIENCE I	4
HSS Elective*		4
<b>Credits</b>		<b>16</b>

<b>Spring Semester</b>		
MATH2500	DIFFERENTIAL EQUATIONS	4
MATH2860	LINEAR ALGEBRA & MATRIX THEORY	4
COMP1050	COMPUTER SCIENCE II	4
NON-TECH Non-Technical Elective		4
<b>Credits</b>		<b>16</b>

<b>Summer Semester</b>		
COOP3000	PRE CO-OP WORK TERM (OPTIONAL)	1
<b>Credits</b>		<b>1</b>

<b>Third Year</b>		
<b>Fall Semester</b>		
MATH2100	PROBABILITY & STATISTICS FOR ENGINEERS	4

Course	Title	Credits
MATH3900	NUMERICAL ANALYSIS I	4
Technical Elective (p. )		4
NON-TECH Non-Technical Elective		4
<b>Credits</b>		<b>16</b>
<b>Spring Semester</b>		
MATH2200	ADVANCED STATISTICS	4
MATH3950	NUMERICAL ANALYSIS II	4
Technical Elective (p. )		4
HSS Elective*		4
<b>Credits</b>		<b>16</b>
<b>Summer Semester</b>		
COOP3500	COOP EDUCATION 1	
<b>Credits</b>		<b>0</b>
<b>Fourth Year</b>		
<b>Fall Semester</b>		
MATH3700	OPERATIONS RESEARCH	4
MATH4900	PARTIAL DIFFERENTIAL EQUATIONS	4
Technical Elective (p. )		4
<b>Credits</b>		<b>12</b>
<b>Spring Semester</b>		
COOP4500	COOP EDUCATION 2	
<b>Credits</b>		<b>0</b>
<b>Summer Semester</b>		
MATH5000	APPLIED MATHEMATICS FINAL YEAR DESIGN I	4
Technical Elective (p. )		4
HSS Elective*		4
<b>Credits</b>		<b>12</b>
<b>Total Credits</b>		<b>121</b>

### Non-coursework Requirement

In addition to the above coursework requirements, students are required to complete the following non-coursework degree requirements:

- One public lecture
- A poster presentation

### Non-Technical Electives:

A total of 8 semester credit hours comprised of any two 4-credit courses for which the pre-requisite has been met, in the following subjects: ARCH, COMM, CONM, ECON, ENGL, HIST, HUMN, HSSI, INDS, INTD, LITR, MGMT, MANF, PHIL, POLS, PSYC, SOCL, SURV

### ENGL/HSS Note

Students are required to complete:

- At least one course in Humanities: CSAS, HSSI, HIST, HUMN, LITR and PHIL
- At least one course in the Social Sciences: CSAS, HSSI, COMM, ECON, ENVM, POLS, PSYC and SOCL
- The remaining course 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.

A minimum of 20 credits total, including English, humanities, and social science credit, is required to complete the humanities and social sciences graduation requirement.

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### Technical Electives:

A total of 16 semester credit hours of technical electives must be taken as a part of the program. One of the four technical electives must be either MATH4575 COMPLEX VARIABLES, MATH4400 INTRODUCTION TO ABSTRACT ALGEBRA, or MATH4875 REAL ANALYSIS I, Students may choose, after consultation with their primary advisor, among the electives offered each semester. Technical elective courses include biological, financial, and physical science applications through courses offered by the Applied Mathematics Academic Unit including:

Course	Title	Credits
MATH1950	FINANCIAL MATHEMATICS	4
MATH2250	TIME SERIES	4
MATH2425	CRYPTOLOGY	4
MATH3150	STOCHASTIC PROCESSES	4
MATH3100	MEDICAL IMAGING: A MATHEMATICAL APPROACH	4
MATH3200	DIFFERENTIAL GEOMETRY	4
MATH3225	FUNCTIONAL ANALYSIS	4
MATH3250	HAZARD & CATASTROPHE MODELING	4
MATH3500	CALCULUS IV	4
MATH4050	MACHINE LEARNING	4
MATH4100	INDUSTRIAL PROBLEMS IN APPLIED MATHEMATICS	4
MATH4400	INTRODUCTION TO ABSTRACT ALGEBRA	4
MATH4475	ACTUARIAL MATHEMATICS	4
MATH4575	COMPLEX VARIABLES	4
MATH4875	REAL ANALYSIS I	4
MATH4975	REAL ANALYSIS II	4
MATH4950	DYNAMICAL SYSTEMS AND CHAOS	4
MGMT2750	INTEGRATIVE FINANCIAL ACCOUNTING (requires School approval)	4

Any 2000-Level courses in BIOE,BIOL, BMED,CHEM,CIVE,COMPELEC,ELMC,ENGR,ENVM,MECH,PHYS,SCIN will also count as Technical Electives\* Prerequisites must be met and School approval is required.