ENGINEERING (ENGR)

ENGR1000 INTRODUCTION TO ENGINEERING
This course develops the skills needed during the students 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)

ENGR1100 INTRODUCTION TO ENGINEERING EXPERIENCE
This course provides an orientation to the engineering profession, the various engineering disciplines, trends in engineering and introduces the notion of lifelong learning. The course is designed to develop critical thinking, learning, and decision-making skills to enhance success in a chosen field of engineering. This course is delivered through lectures, classroom activities, case studies, informational interviews, individual and group work, and presentations and workshops led by engineering professionals in academia and industry. (2 Credits) Fall

ENGR1201 ENGINEERING LABORATORY-BSBE
This course focuses on developing fundamental technical skills and exposure through a sequence of hands-on laboratories. Students are introduced to laboratory safety concepts, experiments design, measurement procedures and techniques, design synthesis, computer-aided design, algorithmic thinking, simulation, and technical reporting. Through a series of hands-on laboratory experiments, students will develop a working knowledge in using and applying modern engineering tools and techniques required for engineering practice. (2 credits) fall

ENGR1202 ENGINEERING LABORATORY-BBME
This course focuses on developing fundamental technical skills and exposure through a sequence of hands-on laboratories. Students are introduced to laboratory safety concepts, experiments design, measurement procedures and techniques, design synthesis, computer-aided design, algorithmic thinking, simulation, and technical reporting. Through a series of hands-on laboratory experiments, students will develop a working knowledge in using and applying modern engineering tools and techniques required for engineering practice. (2 credits) fall

ENGR1203 ENGINEERING LABORATORY-BSCE
This course focuses on developing fundamental technical skills and exposure through a sequence of hands-on laboratories. Students are introduced to laboratory safety concepts, experiments design, measurement procedures and techniques, design synthesis, computer-aided design, algorithmic thinking, simulation, and technical reporting. Through a series of hands-on laboratory experiments, students will develop a working knowledge in using and applying modern engineering tools and techniques required for engineering practice. (2 credits) fall

ENGR1204 ENGINEERING LABORATORY-BSEE/BSCO
This course focuses on developing fundamental technical skills and exposure through a sequence of hands-on laboratories. Students are introduced to laboratory safety concepts, experiments design, measurement procedures and techniques, design synthesis, computer-aided design, algorithmic thinking, simulation, and technical reporting. Through a series of hands-on laboratory experiments, students will develop a working knowledge in using and applying modern engineering tools and techniques required for engineering practice. (2 credits) fall

ENGR1205 ENGINEERING LABORATORY-BELM
This course focuses on developing fundamental technical skills and exposure through a sequence of hands-on laboratories. Students are introduced to laboratory safety concepts, experiments design, measurement procedures and techniques, design synthesis, computer-aided design, algorithmic thinking, simulation, and technical reporting. Through a series of hands-on laboratory experiments, students will develop a working knowledge in using and applying modern engineering tools and techniques required for engineering practice. (2 credits) fall

ENGR1206 ENGINEERING LABORATORY-BSEN
This course focuses on developing fundamental technical skills and exposure through a sequence of hands-on laboratories. Students are introduced to laboratory safety concepts, experiments design, measurement procedures and techniques, design synthesis, computer-aided design, algorithmic thinking, simulation, and technical reporting. Through a series of hands-on laboratory experiments, students will develop a working knowledge in using and applying modern engineering tools and techniques required for engineering practice. (2 credits) fall

ENGR1207 ENGINEERING LABORATORY-BSME
This course focuses on developing fundamental technical skills and exposure through a sequence of hands-on laboratories. Students are introduced to laboratory safety concepts, experiments design, measurement procedures and techniques, design synthesis, computer-aided design, algorithmic thinking, simulation, and technical reporting. Through a series of hands-on laboratory experiments, students will develop a working knowledge in using and applying modern engineering tools and techniques required for engineering practice. (2 credits) fall

ENGR1300 FIRST-YEAR ENGINEERING DESIGN
This interdisciplinary project-based design course engages students to become informed designers. Students will develop the foundation for their future academic and professional careers in an interdisciplinary design environment through this course. Students will apply the engineering design process to develop solutions to open-ended design problems by developing a comprehensive understanding of the problem, constructing a well-thought-out project plan, and establishing the design space defined by constraints and standards. By the conclusion of this course, students will identify, implement, and evaluate an optimal solution using modern engineering tools in an interdisciplinary design environment. (2 Credits) Spring

ENGR1401 APPLIED ENGINEERING ANALYSIS-BSBE
This course provides students with a solid foundation in the analytical tools necessary for engineering practice. Through active and collaborative work, students explore an array of analytical tools as applied to real-world problems. Students develop problem-solving and computational skills in units, dimensions, dimensional homogeneity, vectors, matrix operations, statistical data analysis, algorithmic thinking, programming concepts, and numerical methods. (2 Credits) Spring

ENGR1402 APPLIED ENGINEERING ANALYSIS-BBME
This course provides students with a solid foundation in the analytical tools necessary for engineering practice. Through active and collaborative work, students explore an array of analytical tools as applied to real-world problems. Students develop problem-solving and computational skills in units, dimensions, dimensional homogeneity, vectors, matrix operations, statistical data analysis, algorithmic thinking, programming concepts, and numerical methods. (2 Credits) Spring

ENGR1403 APPLIED ENGINEERING ANALYSIS-BSCE
This course provides students with a solid foundation in the analytical tools necessary for engineering practice. Through active and collaborative work, students explore an array of analytical tools as applied to real-world problems. Students develop problem-solving and computational skills in units, dimensions, dimensional homogeneity, vectors, matrix operations, statistical data analysis, algorithmic thinking, programming concepts, and numerical methods. (2 Credits) Spring

ENGR1404 APPLIED ENGINEERING ANALYSIS-BSEE/BSCO
This course provides students with a solid foundation in the analytical tools necessary for engineering practice. Through active and collaborative work, students explore an array of analytical tools as applied to real-world problems. Students develop problem-solving and computational skills in units, dimensions, dimensional homogeneity, vectors, matrix operations, statistical data analysis, algorithmic thinking, programming concepts, and numerical methods. (2 Credits) Spring

ENGR1405 APPLIED ENGINEERING ANALYSIS-BELM
This course provides students with a solid foundation in the analytical tools necessary for engineering practice. Through active and collaborative work, students explore an array of analytical tools as applied to real-world problems. Students develop problem-solving and computational skills in units, dimensions, dimensional homogeneity, vectors, matrix operations, statistical data analysis, algorithmic thinking, programming concepts, and numerical methods. (2 Credits) Spring

ENGR1406 APPLIED ENGINEERING ANALYSIS-BSEN
This course provides students with a solid foundation in the analytical tools necessary for engineering practice. Through active and collaborative work, students explore an array of analytical tools as applied to real-world problems. Students develop problem-solving and computational skills in units, dimensions, dimensional homogeneity, vectors, matrix operations, statistical data analysis, algorithmic thinking, programming concepts, and numerical methods. (2 Credits) Spring

ENGR1407 APPLIED ENGINEERING ANALYSIS-BSME
This course provides students with a solid foundation in the analytical tools necessary for engineering practice. Through active and collaborative work, students explore an array of analytical tools as applied to real-world problems. Students develop problem-solving and computational skills in units, dimensions, dimensional homogeneity, vectors, matrix operations, statistical data analysis, algorithmic thinking, programming concepts, and numerical methods. (2 Credits) Spring

ENGR1500 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. ***Prerequisite:*** *Enrollment in an engineering program (3 credits) spring*

ENGR1600 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)

ENGR1800 PROGRAMMING WITH MATLAB
This course is universal to all freshman engineering students. 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

ENGR2000 BUILT ENVIRONMENT SUSTAINABILITY
This interdisciplinary course, open to all majors, introduces Sustainability concepts in the context of the built environment examining the various sectors: residential, commercial, industrial, and transportation through the lens of globally utilized sustainability rating systems. The course focuses on the Leadership in Energy and Environmental Design (LEED) certification and the sustainable developments goals of the United Nations to explore strategies to reduce resource consumption and design sustainable structures. The course focuses on key knowledge areas of sustainability theory and practice, life cycle cost analysis, life cycle analysis, value engineering, water efficiency, energy efficiency, indoor environmental quality, materials resources, innovation and regional priority, design resilience, certification of sustainable designs, LEED accredited professional self-certification and post occupancy evaluation of sustainable designs. (4 credits)

ENGR2100 PROGRAMMING FOR ENGINEERS
This comprehensive course is designed to equip engineering students with the essential skills to excel in problem-solving using programming. The course presents fundamental concepts such as input/output operations, arithmetic operations, selection and repetition, arrays, and functions. Advanced topics such as pointers and encapsulation (classes and objects) are also introduced. (4 credits) fall

ENGR3500 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. ***Prerequisite:*** *Junior status in an engineering or computer science program (4 credits)*

ENGR3600 ROBOTICS ENGINEERING I
This course introduces students to the concepts, designs, and applications of robotic systems. Topics include motion planning, navigation, mapping, vision, and pertinent sensors and actuators. Laboratory modules and projects have students develop algorithms for sensing environments and controlling robotic systems, design and develop microprocessor-based autonomous robots utilizing an array of sensors-actuators, and perform vision analysis for object detection and recognition. ***Prerequisites:*** *ELEC2525, or ELEC2227 or ELEC2250 and MECH3175. (4 credits) summer*

ENGR3800 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)

ENGR4000 ROBOTICS ENGINEERING II

In this course, students explore applications of robotics in a wide variety of disciplines, including medicine, industry, and logistics. The topics covered include robot architectures, modes of human-robot interaction (HRI), path planning and navigation, motion tracking and guidance, and haptics, as well as the role of machine learning and artificial intelligence in robotic autonomy. ***Prerequisite:*** *ENGR3600. (4 credits) fall*

ENGR5000 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. ***Prerequisite:*** *senior standing (4 credits) spring*

ENGR5500 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. ***Prerequisite:*** *ENGR5000 (4 credits)*

ENGR7000 MASTER PROJECT

This course provides the framework for students to undertake a project for the non-thesis option of their graduate program. Students will complete an experiential learning endeavor involving self-initiated activity and scholarship. The project will be done under the guidance and evaluation of a project advisor who is a graduate faculty member of the program. The student will investigate a problem related to a field of study in the program, formulate a solution, and design and test module(s) of the solution for feasibility. The student will communicate about their project in both an oral presentation and a written report. (3 credits)

ENGR7100 THESIS I

This course provides the framework for students to initiate and propose a master's thesis. The thesis is a documentation of a project in which engineering principles are applied to address an unresolved challenge related to a field of study in the program. This course guides students through the process of selecting their thesis project, thesis pathway, thesis advisor, and the members of their thesis committee. Students undertake their initial research and development work, and develop a thesis proposal that will include a literature review, an alternatives analysis, a description of proposed designs and testing, and an explanation of how the data resulting from testing will be analyzed. Each student makes an oral presentation and written document of their proposal for feedback and assessment by their thesis committee.(3 credits)

ENGR7101 PROFESSIONAL PERSPECTIVES

This course provides a framework for students to self-select, participate in, provide evidence of participation in, and write reflections for seminar or workshop activities related to being a professional in a field of their program. The overall goal for this course is to increase exposure to professional perspectives and to aspects of professionalism. (1 credit) spring

ENGR7200 THESIS II

This course provides the framework for students to continue and complete the thesis begun in ENGR 7100: Thesis I. With guidance from their thesis committee, students continue their research and development (R&D) work according to their selected thesis pathway, and then document the whole of their project in their thesis. After completing the thesis, students undergo a thesis defense, which consists of an oral presentation and a final meeting with their thesis committee. Based on assessment and feedback by their thesis committee during the final meeting, the student may need to revise their thesis, which may involve more R&D work and analysis. ***Prerequisite:*** *ENGR7100 (3 credits)*