ENGINEERING (ENGR)

ENGR 100. Engineering Student Success. 0 Hours.

Semester course; seminar hours. 0 credits. Enrollment is restricted to new first-year students in the School of Engineering; required for students admitted conditionally. Students will meet for a 90-minute class once per week for five weeks. The course is dedicated to helping students understand the expectations and responsibilities of being a college student. Presentations will center on planning the semester, academic professionalism, study skills and test-taking strategies, financial literacy, health and wellness, time management, and the Honor Code. Seminars will be supplemented throughout the semester with online assignments to reinforce the discussions. Graded as pass/fail.

ENGR 101. Introduction to Engineering. 4 Hours.

Semester course; 3 lecture and 3 laboratory hours. 4 credits. Prerequisites: admission to the School of Engineering or permission of instructor. Introduces basic circuits including resistors, diodes, transistors, digital gates and motors. Simple electromechanical systems are considered including motors, gears and wheels. The laboratory introduces fundamental circuit testing and measurement, and proper laboratory notebook writing; students are required to analyze, build and test a digitally controlled robot.

ENGR 105. Engineering Foundations. 3 Hours.

Semester course; 3 lecture hours. 3 credits. The course is a broad introduction to the field of engineering: the practical use of natural science for the benefit of humanity. The course contains modules covering general engineering topics, biomedical engineering, chemical and life science engineering, electrical and computer engineering and mechanical and nuclear engineering. Students successfully completing the course will have a broad understanding of the foundational principles of the various fields of engineering.

ENGR 111. Innovation Shop Training I. 0.5 Hours.

Semester course; 1 laboratory hour. 0.5 credits. Enrollment restricted to students in the School of Engineering. The course provides training on innovation shop safety, includes a tour of the shop, measuring and layout tools and techniques, use of general manual and powered hand tools. Students will be instructed on the use of a bench-top drill press, deburring and finishing tools, 3D printing, laser engraving and thermoforming equipment. Students need to achieve a minimum score of 76% in the class to attain Level I (Blue) certification. Only certified students have permission to use tools and equipment covered in this training. Graded as Pass/Fail.

ENGR 121. Engineering Fundamentals. 3 Hours.

Semester course; 3 lecture hours. 3 credits. Prerequisite: permission of instructor. Open only to non-engineering majors in Certificate in Product Innovation program. Introduces engineering fundamentals to students from non-engineering disciplines. Particular focus is the engineering problem-solving process as applied to open-ended problems. Students will be introduced to the different types of engineering, examine engineering issues and apply the engineering problem-solving process.

ENGR 125. Practical Artificial Intelligence. 3 Hours.

Semester course; 3 lecture hours. 3 credits. An introduction to the world of artificial intelligence through a nontechnical lens, focusing on its applications in various sectors such as medicine, gaming, business, art, literature and smart engineering systems. Students will learn about AI tools and techniques and engage in hands-on activities to understand how AI is integrated into real-world applications.

ENGR 211. Innovation Shop Training II. 1 Hour.

Semester course; 2 laboratory hours. 1 credit. Prerequisite: ENGR 111. Enrollment restricted to students in the School of Engineering. The course provides training on machine/innovation shop safety, blueprint reading, measuring and layout tools and techniques, and use of general and powered hand tools. Students will be instructed on sawing, sanding, drilling and tapping operations, 3D printing and laser engraving/cutting equipment. Hands-on graded assignment is the part of the course.

ENGR 291. Special Topics in Engineering. 1-5 Hours.

Semester course; variable hours. 1-5 credits. Prerequisite: to be determined by the instructor. Specialized topics in engineering designed to provide a topic not covered by an existing course or program. General engineering or multidisciplinary. May be repeated with different content. Graded as pass/fail or normal letter grading at the option of the instructor. See the Schedule of Classes for specific topics to be offered each semester and prerequisites.

ENGR 296. Part-time Internship Experience. 0 Hours.

Semester course; 0 credit. Students may attempt this course a total of six times. Enrollment restricted to School of Engineering majors. The student works part time in an approved internship and must work a minimum of 90 hours, but less than 300 hours during the semester. The student works to meet learning objectives while gaining practical experience relevant to their major. The student completes assignments to document, assess and reflect on their learning experience. The supervisor and student both complete evaluations of the learning experience. Graded pass/fail.

ENGR 303. Junior Seminar. 3 Hours.

Semester course; 3 lecture hours. 3 credits. Prerequisite: permission of instructor. This course provides students an opportunity to explore business and leadership topics. Topics include the fundamentals of product design and new product development, manufacturing and quality systems, finances and financial reports, ethics in the workplace, intellectual property, teamwork, leadership and communications. Students will be assigned selected readings, written compositions and oral presentations. This course prepares the student to participate in the Engineering Laboratory/Manufacturing Internship.

ENGR 311. Innovation Shop Training III. 1 Hour.

Semester course; 2 laboratory hours. 1 credit. Prerequisite: ENGR 211. Enrollment is restricted to students with Level II (Red) certification. The Level III (Green) course provides basic training on set-up and operation of manual milling machines and the lathe. The course covers cutting tool, speed and feed calculation. Students must develop a technological process and machine metal parts per assigned drawings on vertical mill and lathe. They will also use other techniques and equipment that were covered in previous levels. Students need to achieve a minimum score of 76 % in the class to attain Level III (Green) certification. Only certified students have permission to use tools and equipment covered in this training.

ENGR 395. Professional Development. 1 Hour.

Semester course; 1 lecture and 1 workshop hour. 1 credit. Enrollment is restricted to majors in the School of Engineering. Professional development course to help prepare students to find a job and succeed in a professional environment, and specifically to work as an intern or in a cooperative education position. Topics covered include career paths; job searches; resume and cover letter writing; preparing for the interview; personal assessment of interests, values and strengths; networking; professional and ethical behavior on the job; overview of legal issues related to hiring, such as nondisclosure agreements and noncompete clauses; overview of personal finance management at the first job; workplace safety; and expectations and requirements for internships and cooperative education positions.

ENGR 396. Internship Experience. 0 Hours.

Semester course; 0 credit. Students may attempt this course a total of three times. Enrollment restricted to School of Engineering majors. The student works in an approved internship and must work a minimum of 300 hours during the semester. The student works to meet learning objectives while gaining practical experience relevant to their major. The student completes assignments to document, assess and reflect on their learning experience. The supervisor and student both complete evaluations of the learning experience. Graded pass/fail.

ENGR 398. Cooperative Education Experience. 0 Hours.

Semester course; 0 credits. Students may attempt this course a total of four times. Prerequisite: ENGR 395. Restricted to School of Engineering majors in good academic standing. The student works full-time in an approved cooperative education position. The student works to meet specific learning objectives while gaining practical experience relevant to their major. The student completes assignments to document, assess and reflect on their learning experience. The supervisor/mentor and student both complete midterm and final evaluations of the learning experience. Graded pass/fail.

ENGR 399. Cooperative Education Experience II. 3 Hours.

Semester course; 3 credits. Prerequisite: ENGR 398. Restricted to School of Engineering majors in good academic standing. A student that has completed at least one work term in a full-time approved cooperative education position completes an additional full-time work term. The student works to meet specific learning objectives while gaining practical experience relevant to their major. The student completes assignments to document, assess and reflect on their learning experience. The supervisor/mentor and student both complete midterm and final evaluations of the learning experience.

ENGR 402. Senior Design Studio (Seminar). 1 Hour.

Continuous courses; 1 lecture hour. 1-1 credit. Prerequisites: senior standing and participation in a senior design (capstone) project; completion of ENGR 402 to enroll in ENGR 403. This weekly seminar presents and discusses topics relevant to senior-level engineering students in support of the capstone project and upcoming graduation. A single course coordinator manages and administers the course and schedules the various faculty lectures and guest speakers. Topics include, but are not limited to, the following: proposal writing, project planning and management, scheduling resources and budgeting for technical projects, patents and intellectual property, quality systems (six sigma, ISO standards, statistical process control), entrepreneurship, creativity and innovation and professional registration.

ENGR 403. Senior Design Studio (Seminar). 1 Hour.

Continuous courses; 1 lecture hour. 1-1 credit. Prerequisites: senior standing and participation in a senior design (capstone) project; completion of ENGR 402 to enroll in ENGR 403. This weekly seminar presents and discusses topics relevant to senior-level engineering students in support of the capstone project and upcoming graduation. A single course coordinator manages and administers the course and schedules the various faculty lectures and guest speakers. Topics include, but are not limited to, the following: proposal writing, project planning and management, scheduling resources and budgeting for technical projects, patents and intellectual property, quality systems (six sigma, ISO standards, statistical process control), entrepreneurship, creativity and innovation and professional registration.

ENGR 410. Review of Internship. 1 Hour.

Semester course; 1 credit. Prerequisites: chemical, electrical and computer, or mechanical engineering major and experience to satisfy the engineering internship requirements. Students complete oral presentations and written reports summarizing the internship experience.

ENGR 411. Fundamentals of Engineering Exam Preparation. 1 Hour.

Semester course; 1 lecture hour. 1 credit. Prerequisite: senior or graduate standing, or permission of instructor. This course prepares students for taking the fundamentals of Engineering Exam. Passing the FE Exam is the first step to getting a Professional Engineering license. This course is not intended to teach the various subject matters, but to review the subject areas and help students prepare as well as possible for the examination.

ENGR 490. Engineering Seminar. 1-3 Hours.

Semester course; variable hours. 1-3 credits. May be repeated with different content. Prerequisite: permission of the instructor. A series of specialized topics in engineering that are of general interest but not covered by an existing course or program. Lectures will be presented in seminar format by speakers from business, industry, government and academia. Subjects will be multidisciplinary in nature. Graded as pass/fail or normal letter grading at the option of the instructor.

ENGR 491. Special Topics in Engineering. 1-5 Hours.

Semester course; variable hours. 1-5 credits. Prerequisite: determined by the instructor. Specialized topics in engineering designed to provide a topic not covered by an existing course or program. General engineering or multidisciplinary. May be repeated with different content. Graded as pass/fail or normal letter grading at the option of the instructor. See the Schedule of Classes for specific topics to be offered each semester and prerequisites.

ENGR 492. Independent Study in Engineering. 1-5 Hours.

Semester course; variable hours. 1-5 credits. May be repeated with different content. Prerequisite: permission of the instructor. Students must submit a written proposal to be approved by the supervising instructor prior to registration. Investigation of specialized engineering problems that are multidisciplinary or of general interest through literature search, mathematical analysis, computer simulation and/or laboratory experimentation. Written and oral progress reports as well as a final report and presentation are required. Graded as pass/fail or normal letter grading at the option of the instructor.

ENGR 494. Intern or Co-op for Credit. 3 Hours.

Semester course; 45 field experience hours (delivered online, faceto-face or hybrid). 3 credits. May be repeated for a maximum of six credits. Prerequisite: ENGR 396 or ENGR 398. Enrollment is restricted to College of Engineering majors to provide academic credit for approved experiential/work-based learning (i.e. internship, co-op, summer research) and requires the approval of the department (see academic advisor.) This course is to be taken following the completion of a minimum of 300 worked hours of approved internship, research or co-op experience relevant to the student's major, and documents that a student has fulfilled all internship requirements, including a final assessment of learning by the employer and a final self-evaluation. This course includes reflection on learning and exploration of future career paths. Graded as pass/fail.

ENGR 496. Internship Review. 0 Hours.

Semester course; 0 credits. Prerequisite: ENGR 296 or ENGR 396. Restricted to School of Engineering majors. This course is to be taken following the completion of a minimum of 300 hours of approved internship experience relevant to the student's major and documents that a student has fulfilled all internship requirements, including a final evaluation by the employer, a final self-evaluation, a final report describing the experience and a final oral presentation about the experience. Graded pass/fail.

ENGR 497. Vertically Integrated Projects. 2 Hours.

Semester course; 3 or 6 laboratory hours. 0, 1 or 2 credits. May be repeated for a maximum total of eight credits. Enrollment requires permission of the project faculty adviser. This course provides undergraduate students the opportunity to participate in multiyear, multidisciplinary projects under the guidance of faculty and graduate students in their areas of expertise. As they address research and development issues, students learn and practice many different professional skills, make substantial technical contributions to the project, and experience many different roles on a large, multidisciplinary design/discovery team. Students must earn a minimum of four credits in this course with a minimum grade of C in order for these credits to be eligible to count toward a technical or departmental elective. More restrictive requirements may be imposed by individual departments. Note: When the limit allowed by the specific department is reached, students can continue to be engaged through the zero-credit option.

ENGR 498. Review of Cooperative Education Experience. 0 Hours.

Semester course; 0 credits. Prerequisite: ENGR 398. Restricted to School of Engineering majors. This course is completed following the final work term of a cooperative education experience and is required to obtain transcript notation to document that a student has fulfilled all the requirements of the school's cooperative education program. The requirements include a final evaluation by the employer, a final self-evaluation, a final report describing the experience and a final oral presentation about the experience.

ENGR 591. Special Topics in Engineering. 1-4 Hours.

Semester course; 1-4 credits. Prerequisite: senior or graduate standing in the School of Engineering, or permission of the instructor. Lectures, tutorial studies, library assignments in selected areas of advanced study or specialized laboratory procedures not available in other courses or as part of research training.

ENGR 597. Vertically Integrated Projects. 3 Hours.

Semester course; 6 laboratory hours. 3 credits. Enrollment requires permission of the faculty adviser. This course provides students pursuing a Master of Science without a thesis option the opportunity to engage in research under the guidance of faculty and graduate students in their area of expertise.

ENGR 601. Engineering Project Management. 3 Hours.

Semester course; 3 lecture hours. 3 credits. This course covers the fundamental tools and techniques of managing engineering projects and processes. It is based on the "Project Management Body of Knowledge" guide with a focus on creating value for stakeholders. Students will learn the eight project performance domains and gain relevant skills to develop project objectives, define milestones and deliverables, create project plans and manage project resources, including some coverage of project management software. Through course projects students will hone their communication, teamwork and decision-making skills. They will also learn how to manage project risks and resolve conflicts that may arise during projects.

ENGR 602. Engineering Contracts and Effective Negotiations. 3 Hours.

Semester course; 3 lecture hours. 3 credits. Engineers are often required to provide input toward the development of contracts and other legal documents as part of overall business operations. This course provides fundamental tools that will aid student understanding of operations at the interface of technology and legal considerations. The course will also include additional content in the review of negotiation methods related to contract development and advancement of business objectives.

ENGR 650. Career Readiness for Grad Students. 1 Hour.

Semester course; 1 lecture hour. 1 credit. Enrollment is restricted to College of Engineering graduate students. This course focuses on the skills needed for successful professional development. Topics include professional behavior, career paths, effective job search strategies, developing professional documents, interview preparation, building a professional network, communicating marketable skills to potential employers and career planning.

ENGR 690. Engineering Research Seminar. 1 Hour.

Semester course; 1 credit. May be repeated for a maximum of 2 credits. Presentations and discussion of current problems and developments in engineering by students, staff and visiting lecturers.

ENGR 691. Special Topics in Engineering. 1-4 Hours.

Semester course; 1-4 lecture hours. 1-4 credits. An advanced study of selected topic(s) in engineering. See the Schedule of Classes for specific topics to be offered each semester.

ENGR 692. Independent Study. 1-3 Hours.

Semester course; 1-3 lecture and 1-3 laboratory hours. 1-3 credits. Prerequisites: graduate standing and consent of instructor. The student must identify a faculty member willing to supervise the course and submit a proposal for approval to the appropriate track's graduate committee. Investigation of specialized engineering problems through literature search, mathematical analysis, computer simulation and/or experimentation. Written and oral reports, final report and examination are required.

ENGR 696. Engineering Products and Economic Considerations. 3 Hours.

Semester course; 3 lecture hours (delivered online, face-to-face or hybrid). 3 credits. Enrollment requires permission of instructor. Owing to the recent advancements in technology, engineers have become an integral part of designing the next generation of products. This course will expose students to some of the engineering concepts in product development and economy. These concepts include: the stages of engineering product development – concept design, in silico and in vitro/ in vivo testing; introduction to tools for designing engineering products; financial aspects of materials and supplies used in engineering products; and steps for launching a successful engineering product and available resources.

ENGR 697. Directed Research. 1-15 Hours.

Semester course; variable hours. 1-15 credits. Research directed toward completion of the requirements for M.S. and Ph.D. in Engineering degrees under the direction of engineering faculty and an advisory committee. Graded S/U/F.

ENGR 698. Vertically Integrated Projects. 3 Hours.

Semester course; 6 laboratory hours. 3 credits. Enrollment requires permission of the faculty adviser. This course provides students pursuing a Master of Science without a thesis option the opportunity to engage in advanced research under the guidance of faculty and graduate students in their area of expertise.

ENGR 701. Post-Candidacy Doctoral Research. 9 Hours.

Semester course; 9 research hours. 9 credits. May be repeated for credit. Enrollment is restricted to students who have been admitted to doctoral candidacy in the College of Engineering. Students will participate in supervised discipline-specific research related to their dissertation topic. Students must have approval from their current degree program coordinator to register. This course can be approved as a substitution for any post-candidacy degree requirement. Graded as satisfactory/ unsatisfactory.