

ENGR - Engineering

Courses numbered 100 to 299 = *lower-division*; 300 to 499 = *upper-division*; 500 to 799 = *undergraduate/graduate*.

ENGR 101. Introduction to Engineering (3).

Assists engineering students in exploring engineering careers and opportunities. Provides information on academic and life skills essential to becoming a successful engineering student. Promotes connections to specific engineering majors and provides activities to assist and reinforce the decision to major in engineering.

ENGR 102B. Entrepreneurship and Innovation Applied Project (1).

Continues the team's big idea venture from FYAP 102A. Students experience the process of product development and turn their proof-of-concept prototype into a full working prototype that solves a customer's challenge and that could potentially be commercialized. Students deliver their product pitch at the Koch Innovation Challenge elevator pitch competition. Prerequisite(s): FYAP 102A.

ENGR 102C. Service Learning Applied Project (1).

Design, build, test and deliver the team's service-learning project from FYAP 102A. Students experience the process of product development and turn their proof-of-concept into a full working prototype that addresses the needs of their client or sponsor group. *Course includes service-learning content.* Prerequisite(s): FYAP 102A.

ENGR 150. Special Topics (1-4).

An umbrella course created to explore a variety of subtopics differentiated by letter (e.g., 150A, 150B). Not all subtopics are offered each semester – see the course schedule for availability. Students enroll in the lettered courses with specific topics in the titles rather than in this root course.

ENGR 150A. Generative AI for Real-World Problem Solving: An Interdisciplinary Approach to Design (3).

Cross-listed as BSAN 150A. In this course, students from various disciplines come together to explore the practical applications of generative AI to develop solutions for messy real-world problems. Course emphasis focuses on understanding how to use applications and pinpoint potential use-cases, while providing a high-level overview of the theoretical underpinnings. Students learn to critically analyze and anticipate the impact of generative AI tools on the future of education and the workforce, as well as delve into the ethical, intellectual and legal dilemmas with societal implications. Interdisciplinary student teams work on a term project to foster a deeper understanding of generative AI platforms, encouraging innovative thinking to develop solutions to real problems. To ensure that students are able to identify and approach new problems using generative tools, the course provides a high-level overview of machine learning through practical programming exercises designed for students without a programming background.

ENGR 202. Service Learning in Engineering (1).

Intentional and thought-provoking application of classroom learning to active and engaging engineering work by participating in a group project that meets identified community needs. Course is project based, with a report and reflections. Project is identified by the student and could be mentoring or leading a team of students in an engineering service effort. *Course includes service-learning content.*

ENGR 205. Applied Innovation and Design (3).

Uses hands-on projects and in-lab training to guide students through the design thinking process in order to develop innovative and creative problem-solving skills. Teams compete in a design competition by entering a project that addresses a specific, student-identified need

in the community, third world country or society at large. Students demonstrate skills and knowledge gained throughout the course by working in a collaborative team, building a working prototype of their design, assessing economic and societal impact, and communicating with local industry professionals. Students learn project management tools, team working tools, how to perform market research and develop videos, and prototype development. ENGR 205 is designed for juniors, seniors and transfer students who are ineligible for First-Year Seminar courses. This alternative course satisfies the FYAP 102A/B and APEN 201 requirements for juniors, seniors and transfer students to the engineering technology degree. Students who have taken FYAP 102A/B or APEN 201 cannot receive credit for ENGR 205.

ENGR 220. Applied Analog and Digital Electronics (3).

Provides a fundamental understanding of electronics and programming through content and active learning. Introduces basic electronic components and principles, sensors, actuators and electronic diagnostic tools. Builds confidence and creativity by designing, constructing and debugging circuits as well as programming a micro-controller to perform desired tasks. Introduces students to semiconductors and integrated circuits such as op-amps, combinational logic circuits and flip-flops. Students learn methods to interact with the physical world. At the end of the course, students should be comfortable developing simple electronic prototypes for future projects. Prerequisite(s): MATH 111 .

ENGR 250AA. 3DEXPERIENCE Sheetmetal (0.75-2).

Covers how to create sheet metal parts utilizing the sheet metal tools, which allow a student to fold and unfold parts utilizing appropriate parameters. Students see the difference between creating these parts using sheet metal tools and creating them using part design tools and how to work between them. Prerequisite(s): ENGR 250PP.

ENGR 250EE. 3DEXPERIENCE Composites (1.5).

Covers the design and manufacturing of composite parts. Multiple design methodologies are covered including: manual ply creation, grid method, solid slicing and zone method. Manufacturing definition including computing producibility, splicing, darting, creating flat pattern and creating ply books is also discussed. Prerequisite(s): ENGR 250PP and ENGR 250UU.

ENGR 250KK. 3DEXPERIENCE Electrical (0.75-2).

Encompasses electrical space reservation, electrical design and electrical harness design. Prerequisite(s): ENGR 250PP, ENGR 250RR and ENGR 250UU.

ENGR 250PP. 3DEXPERIENCE Part Design and Sketcher (0.75-2).

Provides an introduction to the 3DEXPERIENCE platform, including searching, creating and editing objects. This course covers the creation of solid parts without complex contours. Students are introduced to the part environment of 3DEXPERIENCE and learn how to work between the Sketcher and Part Design workbenches to create individual parts. Prerequisite(s): computer experience, blueprint reading or equivalent.

ENGR 250RR. 3DEXPERIENCE Assembly Design (0.75-2).

Covers the use of multiple parts to create an assembly. This includes manipulating parts in an assembly, creating engineering connections and analyzing assemblies. It also covers designing within the context of an assembly, including creating and using publications. Prerequisite(s): ENGR 250PP.

ENGR 250SS. 3DEXPERIENCE Drafting (0.75-2).

Covers the creation of engineering drawings. Students are introduced to the drafting environment of 3DEXPERIENCE and learn how to create drawings from parts and products. Prerequisite(s): ENGR 250PP.

ENGR 250TT. 3DEXPERIENCE Prismatic Machining (0.75-2).

This course is the beginning manufacturing course. Covers the machining operations involved in 3-axis milling. Students are introduced to the process environment of 3DEXPERIENCE and learn how to work between the process, part and product environments. Prerequisite(s): ENGR 250PP and ENGR 250RR.

ENGR 250UU. 3DEXPERIENCE Wireframe and Surfaces (0.75-2).

This course is an extension of the part environment and covers the use of wireframe and surface geometry to create complex contours. This course concentrates on the tools available and how to integrate this geometry back into a solid part. Prerequisite(s): ENGR 250PP.

ENGR 250VV. 3DEXPERIENCE Surface Machining (0.75-2).

This course is a continuation in the manufacturing environment. This course covers the more advanced machining operations involved in full 3-axis and multi-axis machining. Students learn how to integrate the manufacturing tools available in Prismatic Machining and Mill-Turn Machining. Prerequisite(s): ENGR 250PP, ENGR 250RR and ENGR 250TT.

ENGR 250WW. 3DEXPERIENCE 3D Tolerancing and Annotation (1.5).

This course is for those interested in model based definition, where the 3D model is the master instead of the draft sheet. This course covers all of the necessary options to properly apply tolerancing and annotations on the 3D part or product. Prerequisite(s): ENGR 250PP.

ENGR 250XX. 3DEXPERIENCE Kinematics (0.75-2).

Covers how to put assemblies into motion. It covers how to produce a kinematic simulation of a mechanism, which shows how a mechanism operates, with analysis. Students learn how to integrate kinematic tools together to produce an overall simulation which can be made into a replay or an external video file. Prerequisite(s): ENGR 250RR.

ENGR 302. Accessible Design (3).

Provides a set of multidisciplinary hands-on learning experiences in designing and creating assistive technologies for community members of all ages with mobility challenges, hearing or vision loss, communication challenges or other disabilities. Students develop a mindset to understand customer needs and are equipped with a skillset needed to source materials and build designs using tools in the laboratory/shop. Guest lectures from across campus — including but not limited to, communications sciences and disorders, early childhood unified, physical therapy or biomedical engineering — present different design perspectives and product design challenges.

ENGR 360. Special Topics (1-4).

An umbrella course created to explore a variety of subtopics differentiated by letter (e.g., 360A, 360B). Not all subtopics are offered each semester – see the course schedule for availability. Students enroll in the lettered courses with specific topics in the titles rather than in this root course. Prerequisite(s): instructor's consent.

ENGR 501. The Engineer as Leader (3).

Develops engineering students for leadership roles soon after graduation. Covers leadership theory, leadership in the context of engineering (both formal and informal) and has several invited speakers. Students complete leadership reflections as well as other assignments. For undergraduate credit only. Prerequisite(s): junior standing.

ENGR 501H. The Engineer as Leader Honors (3).

Develops engineering students for leadership roles soon after graduation. Covers leadership theory, leadership in the context of engineering (both formal and informal) and has several invited speakers. Students complete leadership reflections as well as other

assignments. For undergraduate credit only. Prerequisite(s): junior standing.