Engineering (ENGR)

Courses

ENGR 005 Introduction to Engineering Practice 0,2 Credits
First year practical engineering experience; introduction to concepts, methods and principles of engineering practice. Problem solving, design, project planning, communication, teamwork, ethics and professionalism; innovative solution development and implementation. Introduction to various engineering disciplines and degree programs. Mandatory for first year RCEAS students.

ENGR 010 Applied Engineering Computer Methods 0,3 Credits
Introduction to programming, with a focus on engineering tasks and problem analysis across engineering disciplines. Use of computational tools to solve engineering problems. Introductory concepts of visual and computational data analysis and use of AI. Interfacing sensors and actuators to a microcontroller board and programming various static and mobile devices.
Attribute/Distribution: ND

ENGR 050 Directed Study 1-3 Credits
Engineering project work either as an individual or team member. Projects directed by faculty within the Rossin College of Engineering and Applied Science with possible interaction from outside consultants, community and industry leaders. Written report required. RCEAS permission required.
Repeat Status: Course may be repeated.

ENGR 051 Independent Study 1-3 Credits
A study of one or more areas of engineering, either as an individual or team member. Written report required. RCEAS permission required. Pass/Fail grading only.
Repeat Status: Course may be repeated.

ENGR 075 Women in Technology and Innovation 1 Credit
This class explores the transformative role of women in driving prosperity and progress through technology and innovation. It highlights women building impactful companies and paving the way for female entrepreneurship and gender equality. The class also addresses challenges women in tech face, including sexism, gender discrimination, and impostor syndrome. Over 7 weekly sessions, guest lectures from female tech leaders will offer insights and share their experiences as a guidepost for success.

ENGR 089 Introduction to Design Thinking for Innovation 3 Credits
Design Thinking is a proven process for identifying problems and creating solutions to address them. Key tools and terminology of Design Thinking and related processes that encourage creativity as a way to innovate will be explored. The emphasis is on learning by doing and focuses on practicing the 5 steps in Design thinking: Empathize, Define, Ideate, Prototype, Test that can be applied to virtually any area where new solutions are needed.

ENGR 130 Engineering Communications 1 Credit
Experience and theory in oral and written communications preparing students for their first Co-Op work assignments. Required of all Engineering Co-Op students.
Prerequisites: ENGR 200 or ENGR 198
Can be taken Concurrently: ENGR 200, ENGR 198

ENGR 160 Engineering Internship 1-3 Credits
Offers students who have attained at least Junior standing an opportunity to complement coursework with a work experience. Preapproval is required before beginning the internship experience, and detailed rules can be obtained from the Associate Dean of Undergraduate Education for the College of Engineering. Report required. P/F grading.
Repeat Status: Course may be repeated.

ENGR 162 (THTR 162) da Vinci: Artist & Engineer 4 Credits
Leonardo da Vinci wove art and engineering together seamlessly. His inherent connection to both was at the heart of his practice and this course. This course unites engineering, theatre, art, and design through hands-on design and building experiences together with engineering analysis of da Vinci's structures and inventions. Through this practice, we will discover and appreciate the inherent connection between the engineer and the artist. Together we will explore Leonardo’s inspirational intellectual curiosity, his humanity, and his remarkable technical knowledge.
Prerequisites: MATH 021 or MATH 051
Can be taken Concurrently: MATH 021, MATH 051
Attribute/Distribution: AL, HU, Q, W

ENGR 200 Engineering Work Experience 3 Credits
Supervised work assignment to obtain practical experience. Must have acceptance into the program. P/F grading.
Repeat Status: Course may be repeated.

ENGR 211 (BIOC 211, BIOE 211, MAT 211, ME 211) Capstone Design Project I 3 Credits
Students work on teams, integrating knowledge and skills acquired in their prior course work, to design practical solutions to real-world problems, typically in collaboration with industry, entrepreneurs, faculty, or campus departments. Teams perform in-depth engineering design while considering engineering standards and the project business case. Constraints, including technical, financial, environmental, societal, supply chain, regulatory, and others are considered throughout. Teams produce written reports, oral presentations, and prototypes appropriate for the project.

ENGR 212 (BIOC 212, BIOE 212, MAT 212, ME 212) Capstone Design Project II 2 Credits
Students continue developing their solutions from ME 211 through prototype fabrication and testing, iteration, and failure mode analysis. New information about the project, as well as new knowledge, standards, and constraints, may be identified, considered and integrated into the solution. Teams are expected to produce a final project-specific prototype, an implementation plan appropriate to the project, as well as related business case financial models. Additional deliverables include written reports and presentations.

ENGR 300 Apprentice Teaching 1-3 Credits

ENGR 400 Experiential Learning for Engineering Graduate Students 1-3 Credits
Supervised work assignment outside of the university to obtain practical experience in field of study. Requires consent of department chairperson. When on an assignment, the student must register for this course to maintain continuous student status. Limit to at most three credits per registration period. No more than six credits may be applied towards a master’s program and no more than nine credits may be used throughout a student’s entire graduate study at Lehigh.
Repeat Status: Course may be repeated.

ENGR 401 Teaching/Presentation Skills 1 Credit
Development of teaching and presentation skills for scientific professionals. Presentation effectiveness, teaching/presentation methodologies, classroom management, course development/content preparation, lecture/presentation development and lecture/presentation delivery. Individualized undergraduate course specific modules selected by student. Enrollment limited to Rossin Doctoral Fellows.

ENGR 402 Preparing for the Professoriate 1 Credit
Overview of the job search, research program development and service skills for graduate students entering academic careers. Transition from graduate student to faculty responsibilities, the post-doctoral experience, time management, CV/resume preparation, faculty search process, tenure and promotion, research leadership and program development, research proposal preparation and research sponsorship. Enrollment limited to Rossin Doctoral Fellows.

ENGR 420 Introduction to Methodologies in Energy Research 3 Credits
Master's and PhD students will develop the knowledge, skills, and confidence to plan and present independent research proposals. Working through the proposal planning process with progressive assessments and feedback, students will articulate strong research questions, conduct literature reviews, identify research gaps in the literature, draft testable hypotheses, and effectively plan and communicate independent research proposals for diverse audiences. Open to graduate students preparing STEM thesis and research proposals and/or for interdisciplinary graduate students interested in energy research and careers.

ENGR 430 Technical Writing for Engineering and the Sciences 1 Credit
Formal composition and technical writing skills for advanced non-native English writers in Engineering and the Sciences. Instructor and peer review of writing, self-editing strategies, how to incorporate technical vocabulary and formulas, advanced sentence structure, and appropriate citation of research. Field-specific readings, which students must compile, critique, and model in their own writing. Designed for international graduate students who are writing or preparing to write publishable quality articles, theses, or dissertations.

ENGR 440 Intensive Teaching Workshop 0 Credits
Two-day intensive teaching workshop designed to prepare doctoral students for a teaching practicum experience. Various faculty will discuss a range of topics including fundamentals of effective teaching, motivating students, inclusive teaching, principles of teaching under a research perspective, explaining difficult topics, assessing student learning and enhancing learning with instructional technology. Students will be required to prepare and lead micro-teaching sessions. Course requires Dean's office permission and may not be repeated.

ENGR 441 Teaching Practicum 1-3 Credits
Mentored teaching experience focused on the design, organization, pedagogy and assessment of university courses in engineering. Students will work with a faculty member to develop teaching and communication skills and apply best practices in university teaching while receiving feedback. Specific course assignments will be determined by the student's home department and must be approved by the department chair. Course may be repeated for credit.
Repeat Status: Course may be repeated.
Prerequisites: ENGR 440

ENGR 452 (BIOE 452, CHE 452, ME 452) Mathematical Methods In Engineering I 3 Credits
Analytical techniques relevant to the engineering sciences are described. Vector spaces; eigenvalues; eigenvectors. Linear ordinary differential equations; diagonalizable and non-diagonalizable systems. Inhomogeneous linear systems; variation of parameters. Non-linear systems; stability; phase plane. Series solutions of linear ordinary differential equations; special functions. Laplace and Fourier transforms; application to partial differential equations and integral equations. Sturm-Liouville theory. Finite Fourier transforms; planar, cylindrical, and spherical geometries.

ENGR 490 Thesis (Moc) 1 Credit

ENGR 492 (ARTS 492, BUS 492, HLTH 492) Summer Research 1-3 Credits
Summer research experience designated for engineering graduate students at both the master's and doctoral level who are participating in full-time research during the entire summer semester. Students must have a summer research appointment to be eligible to enroll in this course. The course is repeatable, however, credits earned for this course cannot be used to fulfill degree requirements.
Repeat Status: Course may be repeated.

ENGR 499 Dissertation (Moc) 1 Credit
Repeat Status: Course may be repeated.