ENGINEERING (ENGR)

ENGR 130. Introduction to Engineering Computing. (3 Credits)
This course is an introduction to programming with a focus on applications in mechanical engineering. This course introduces the fundamentals of programming logic through MATLAB and Arduino, which will be used as software tools in future ME courses in the curriculum. Students in this course will create hands-on programming projects using MATLAB and microcontrollers to learn programming skills, such as control flow, I/O, functions, files, strings, vector/array manipulation, other data structures, and basic algorithms that use them. Computational thinking, testing, and debugging practices will be emphasized. This is an active learning class, which means we intend for most classroom sessions to include activities with MATLAB or Python and/or microcontrollers.

ENGR 131. Introduction to Engineering Design. (3 Credits)
An interactive course to introduce students to the elements of engineering design. Learning objectives include a hands-on design experience, building teamwork and communication skills, understanding engineering methodology and engineering ethics The goal for the semester is an open-ended design problem that students must solve as part of a team effort. This provides the practice that students need to become more skilled in the process of technical design as it is practiced in the workplace. Intro to design aims to build students' confidence in applying fundamental problem-solving concepts in order to solve complex, open-ended problems. Restricted to students who specified one or more of these Programs of Study or Program Foci: CU Boulder Partnership Program- Mechanical Engineering; or instructor permission. All WCU students are encouraged to register. Please request instructor permission via Workday.

ENGR 161. COMPUTER-AIDED DESIGN. (3 Credits)
Introduces CAD software and relevant concepts, including orthographic projection, sections, engineering drawing, geometric dimensioning and tolerancing, and an introduction to manufacturing methods. Prerequisite: MATH 151 or instructor permission.

ENGR 162. Fabrication. (1 Credit)
This course is designed to provide students with the application of machine speeds, machine feeds, materials, tooling, tapping, and boring, in the manufacturing processes. Prerequisite: Restricted to Mechanical Engineering majors. Co-requisite: ENGR 161. Or instructor permission.

ENGR 197. Special Topics. (1-6 Credits)
Special Topics

ENGR 201. Biomaterials. (3 Credits)
Introduces the science and engineering of biomaterials, with an emphasis on biomechanical aspects. Addresses the design, fabrication, testing, applications and performance of synthetic and natural materials that are used in a wide variety of biomedical prosthetics, implants and devices. In addition to attending lectures, students will conduct a laboratory experiment and a case study. Prerequisites: CHEM 121 or CHEM 111 and 112; (all require minimum grade of C- or higher). Or instructor permission.

ENGR 210. Biomedical Engineering Principles and Methods. (3 Credits)
An introduction to the fundamental principles and mathematical methods of biomedical engineering. Core conservation equations are applied to mass, energy, charge, and momentum transfer in biomedical systems. Additional topics may cover a breadth of exposure in diagnostics and analytical techniques, statistical analysis of biomedical data, bioinformatics, bioinstrumentation. Prerequisites: MATH 151; CHEM 121 or CHEM 111 and 112; PHYS 190 and 185; BIOL 150 (all require minimum grade of C- or higher). Or instructor permission.

ENGR 224. Materials Science. (3 Credits)
Provides an overview of the structure, properties and processing of metallic, polymeric and ceramic materials. Specific topics include perfect and imperfect solids, phase equilibria, transformation kinetics, mechanical behavior and material degradation. Approach incorporates both materials science and materials engineering components. Prerequisites: CHEM 121 or CHEM 111 and CHEM 112; and PHYS 190 & PHYS 185 (all require minimum grade of C- or higher). Or instructor permission.

ENGR 251. Dynamics. (3 Credits)
An investigation of the kinematics and kinetics of particles and ridged bodies as well as modes of vibration and time response. Topics covered include coordinate systems, work-energy relations, momentum, relative motion, and vibration. Prerequisite: PHYS 250 (requires minimum grade of C- or higher); or instructor permission.

ENGR 265. Engineering as a Profession. (1 Credit)
An introduction to the profession of mechanical engineering. Specific topics addressed through the semester include career opportunities in mechanical engineering, internship search skills, resume writing skills, expectations for professional behavior in the classroom and in industry, and current events/ethics topics relevant to the field. The class format may include additional evening/weekend activities. Prerequisite: Sophomore standing or instructor permission.

ENGR 292. Independent Study. (1-6 Credits)

ENGR 297. Special Topics. (1-6 Credits)
Provides an overview of the structure, properties and processing of metallic, polymeric and ceramic materials. Specific topics include perfect and imperfect solids, phase equilibria, transformation kinetics, mechanical behavior and material degradation. Approach incorporates both materials science and materials engineering components. Prerequisites: Requires prereq course of CHEM 121 or CHEM 111, 112, 113 and 114, and PHYS 200 (min grade C).

ENGR 299. Internship. (1-6 Credits)

ENGR 335. Fluid Mechanics. (3 Credits)
Examines the fundamentals of fluid flow with application to engineering problems. Topics covered include fluid statics and kinematics, Bernoulli equations, laminar and turbulent viscous boundary layers, laminar and turbulent pipe flow, and conservation equations for mass, momentum, and energy. Prerequisites: MATH 252 and PHYS 250 (all require minimum grade of C- or higher); or instructor permission.

ENGR 363. Mechanics of Solids. (3 Credits)
Covers shear force and bending moment, torsion, stresses in beams, deflection of beams, matrix analysis of frame structures, analysis of stress and strain in 2-D and 3-D (field equations, transformations), energy methods, stress concentrations and columns. Prerequisites: MATH 251 and PHYS 250 (all require minimum grade of C- or higher). Or instructor permission.

ENGR 392. Independent Study. (1-6 Credits)

ENGR 397. Independent Study. (1-6 Credits)
FLUID MECHANICS:Examines fundamentals of fluid flow with application
to engineering problems. Topics covered include fluid statics and
kinematics, Bernoulli equations, laminar and turbulent viscous boundary
layers, laminar and turbulent pipe flow, and conservation equations
for mass, momentum and energy. Prerequisites: Requires prereq of
PHYS 250 or ENGR 250; MATH 358; PHYS 201. All require C or higher.

ENGR 399. Internship. (1-6 Credits)

ENGR 492. Independent Study. (1-6 Credits)

ENGR 499. Internship. (1-6 Credits)