**Engineering (ENGR)**

The Bachelor of Science Degree in Mechanical Engineering obtained through the Western-CU Boulder Engineering Partnership Program is conferred by the University of Colorado Boulder. Lower-division coursework is completed through Western Colorado University before applying for admission to the University of Colorado Boulder. The entire program is completed on the campus of Western Colorado University.

**The Bachelor of Science Degree in Mechanical Engineering requires:**

- The official transfer of all coursework listed on the plan of study to the University of Colorado Boulder: [https://catalog.western.edu/programs/MECHANICAL-ENGINEERING](https://catalog.western.edu/programs/MECHANICAL-ENGINEERING)
- At least 45 credits earned from the University of Colorado Boulder (residency requirement): [https://catalog.western.edu/programs/MECHANICAL-ENGINEERING](https://catalog.western.edu/programs/MECHANICAL-ENGINEERING)
- A minimum of 128 cumulative credits applied to degree
- Student knowledge and adherence to course prerequisites as listed in the course catalog
- A cumulative and major GPA of at least 2 (from entirely CU Boulder coursework as a student’s Western GPA will not continue in the CU portion of the program): [https://catalog.western.edu/programs/MECHANICAL-ENGINEERING](https://catalog.western.edu/programs/MECHANICAL-ENGINEERING)
- Satisfactory completion of all HEAR requirement deficiencies related to high school coursework
- Successful completion of the Fundamentals of Engineering (FE) Exam

Students can learn more about the Western-CU Partnership Honors Program Certificate [HERE](https://catalog.western.edu/undergraduate/programs/certificates/honors-certificate-partnership/).

**Program Goals**

- An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science and mathematics.
- An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
- An ability to communicate effectively with a range of audiences.
- An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
- An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
- An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

- An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
- Mechanical Engineering, Western - University of Colorado Boulder Partnership [https://catalog.western.edu/undergraduate/programs/mechanical-engineering/](https://catalog.western.edu/undergraduate/programs/mechanical-engineering/)

**Engineering Courses**

**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. Prerequisite or corequisite: MATH 141

**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)**

COMPUTER AIDED DESIGN: Introduces CAD software and relevant concepts, including orthographic projection, sections, engineering drawing, geometric dimensioning and tolerancing, and an introduction to manufacturing methods. Prerequisites: Restricted to Mechanical Engineering majors. FABRICATION: This course is designed to provide students with the application of machine speeds, machine feeds, materials, tooling, tapping, and boring, in the manufacturing processes. Prerequisites: Restricted to Mechanical Engineering majors.

**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, 112, 113 and 114; and PHYS 200 (all require minimum grade of C or higher).

**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; 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: ENGR 131 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 prerequisite 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 251 and PHYS 250; 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 252 and PHYS 250 (all require minimum grade of C or higher)

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 prerequisite 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)