SCHOOL OF ENGINEERING

The BS in Engineering with specialization in mechatronics is a flexible, broad degree that prepares graduates to work in many industries. Mechatronics combines mechanical and electrical engineering with computers to create devices that make our lives better. Electrical and mechanical systems, controlled by computers, are at the core of a wide range of processes and products. Robots, the Mars Rover, a heart-lung machine, a computer controlled telescope, and a nano-scale microscope are all examples of mechatronics.

The BSIE is a 4-year program that can be completed at CSU Pueblo. As defined by the Institute of Industrial Engineers, "industrial engineering is concerned with the design, improvement and installation of integrated systems of people, materials, information, equipment, and energy. It draws upon specialized knowledge and skill in the mathematical and physical sciences, together with the principles and methods of engineering analysis and design, to specify, predict and evaluate the results to be obtained from such integrated systems." Industrial engineering is a major branch of engineering with applications in manufacturing, service, governmental, and non-profit organizations. Industrial engineers are productivity and quality specialists who deal with the human aspects of work in addition to the advanced technologies of computer software and production related hardware.

A student can receive the BSE and BSIE degree simultaneously by taking 30 additional credit hours over one degree alone, including a second senior design project.

For more information on the MS degree with a major in Industrial and Systems Engineering, the MS degree with a major in Engineering, and the Railroad Engineering Certificate, see the *Graduate Studies* section of this catalog.

In the Pre-Engineering program, students seeking to major in some area of engineering other than industrial engineering or engineering with a mechatronics specialization (for example, civil, electrical, or mechanical engineering) can complete at least 60 credits that will transfer to other engineering schools.

The minors in Engineering and Industrial Engineering are not available to majors in the department.

The Department of Engineering has found that transfer students are very successful in our programs and we welcome transfer students. About half our graduates began their degrees at other institutions.

Engineering (MS) and Industrial & Systems Engineering (MS)

The Department of Engineering offers two distinct MS degrees: the MS in Engineering (MSE) and the MS in Industrial and Systems Engineering (MSISE).

The MSE program provides advanced education in engineering, currently in two concentration areas: mechatronics and railroad engineering. Mechatronics combines mechanical and electrical engineering with computers to create devices that make our lives better. Electrical and mechanical systems, controlled by computers, are at the core of a wide range of processes and products. Robots, the Mars Rover, a heart-lung machine, a computer controlled telescope, and a nano-scale microscope are all examples of mechatronics. Railroad engineering combines civil, mechanical, electrical, and industrial engineering in solving engineering problems for the railroad industry.

Industrial and systems engineering deals with the design and analysis of complex, human/machine systems. Industrial and systems engineers use a "big picture" or systems-oriented viewpoint to serve as management and operations analysts, focusing on the people, materials, equipment and procedures needed for the most efficient and effective systems performance. Industrial and systems engineers analyze and evaluate systems against specified performance criteria, including efficiency, quality and safety, before new systems are created or old ones are modified. Industrial and systems engineering techniques can be applied in manufacturing and service industries, health care systems, governmental agencies and non-profit organizations.

Regular admission to the MSE or MSISE program requires an undergraduate GPA of at least 3.0 on a 4.0 scale and completion of the GRE test.

Additional Program of Study Requirements for the MSE & MSISE Programs

For a student to be awarded the MSE or MSISE degree, the student's program of study must also satisfy the following requirements. Additionally, the program of study must be approved by the MSE/MSISE Program Director.

- At least 21 credit hours must be in graduate level engineering courses.
- No more than 9 credit hours of graduate coursework may be accepted as transfer credit from another institution.
- Any course taken as a prerequisite to engineering graduate study at CSU Pueblo may not be counted towards graduation and must be taken for credit (i.e., not audited).

Advising

Each term, a student must meet with his or her advisor and be advised before the student can register for classes. Students are generally advised by the MSE/MSISE Program Director, unless the student is working on a thesis. Students working on a thesis are typically advised by their thesis advisors. A candidate for the MSE or MSISE degree must work with the advisor to design a program of study. The program of study must be approved by the advisor and department. This process is formalized by submitting a graduation planning sheet to the MSE/MSISE Program Director before the semester prior to graduation.

Admission Requirements

A successful applicant will have a quantitatively based baccalaureate degree from a regionally accredited college or university. Students with non-quantitatively based baccalaureate degrees may be admitted conditionally, but additional prerequisites may be required. Admission to the MSE program or MSISE program requires prior admission to graduate study at CSU Pueblo. Regulations governing graduate studies are contained in the *Graduate Policies and Procedures Guide* available from the Office of Admissions.

Prerequisite Requirements for Admission

Prior to being admitted to regular status, a student is required to demonstrate preparation for graduate study in the chosen concentration (for the MSE) or in industrial and systems engineering (for the MSISE). This is done either by completing prerequisite background courses at CSU Pueblo, by documenting satisfactory completion of equivalent

coursework elsewhere, or by demonstrating equivalent work and/or life experience.

Students who do not possess a satisfactory prerequisite background may be admitted conditionally but be required to complete prerequisites. A plan for completing prerequisite requirements in a timely fashion is developed by the student and advisor and must be approved by the MSE/MSISE Program Director.

Graduate Assistantships

Full-time student admitted to the program with regular status are eligible to apply for merit-based, competitive graduate assistantships. Graduate assistants receive financial support from the department in the form of a stipend and/or remission of tuition and fees for one year (two semesters). A graduate assistant who is supported at a funding level equivalent to full-time tuition and fees is required to choose the Thesis Option.

An assistantship is renewable for a second academic year provided the student remains in good academic standing and makes satisfactory progress towards completion of the MSE or MSISE. An award made to a student who does not perform adequately in his or her duties may be rescinded after the first semester of the award period. In extreme circumstances, an award may be rescinded before the end of a semester.

An application for assistantship consists of a résumé and letter of interest addressed to the department chair. For the following academic year, the deadline for application for an assistantship beginning in the Fall semester is April 1. Subject to availability of funds, assistantships may be granted to begin in the Spring semester.

Academic Programs

Undergraduate Programs

- Civil Engineering, Bachelor of Science in Civil Engineering (https://catalog.csupueblo.edu/college-of-science-technology-engineering-and-mathematics/engineering/bsce-civil-engineering/)
- Engineering, Bachelor of Science in Engineering: Mechatronics Specialization (https://catalog.csupueblo.edu/college-of-science-technology-engineering-and-mathematics/engineering/bse-mechatronics-specialization/)
- Industrial Engineering, Bachelor of Science in Industrial Engineering (https://catalog.csupueblo.edu/college-of-science-technology-engineering-and-mathematics/engineering/bs-industrial-engineering/)
- Pre-Engineering Program (https://catalog.csupueblo.edu/college-of-science-technology-engineering-and-mathematics/engineering/pre-engineering-program/)

Minors

- Civil Engineering, Minor
- Engineering, Minor (https://catalog.csupueblo.edu/college-of-science-technology-engineering-and-mathematics/engineering/engineering-minor/)
- Industrial Engineering, Minor (https://catalog.csupueblo.edu/college-of-science-technology-engineering-and-mathematics/engineering/industrial-engineering-minor/)
- Sustainability, Minor (https://catalog.csupueblo.edu/college-of-science-technology-engineering-and-mathematics/engineering/sustainability-minor/)

3+2 Programs

- Engineering 3+2 Program, Bachelor of Science/Master of Science (https://catalog.csupueblo.edu/college-of-science-technology-engineering-and-mathematics/engineering/engineering-3-2-plan-bs-ms/)

Graduate Programs

- Industrial & Systems Engineering, Master of Science (https://catalog.csupueblo.edu/college-of-science-technology-engineering-and-mathematics/engineering/industrial-systems-engineering-ms/)
- Mechatronics Engineering, Master of Science (https://catalog.csupueblo.edu/college-of-science-technology-engineering-and-mathematics/engineering/mechatronics-engineering-ms/)

Certificates

- Lean Green Belt, Certificate (https://catalog.csupueblo.edu/college-of-science-technology-engineering-and-mathematics/engineering/lean-green-belt-certificate/)
- Railroad Engineering, Graduate Certificate (https://catalog.csupueblo.edu/college-of-science-technology-engineering-and-mathematics/engineering/railroad-engineering-graduate-certificate/)
- Six Sigma Green Belt, Certificate (https://catalog.csupueblo.edu/college-of-science-technology-engineering-and-mathematics/engineering/six-sigma-green-belt-certificate/)
- Sustainability, Certificate (https://catalog.csupueblo.edu/college-of-science-technology-engineering-and-mathematics/engineering/sustainability-certificate/)