

# SCHOOL OF ENGINEERING

The School of Engineering at Colorado State University Pueblo includes five undergraduate programs (1) civil engineering (BSCE), (2) civil engineering technology (BSCET), (3) construction management (BS), (4) engineering (BSE) with a mechatronics specialization, and (5) industrial engineering (BSIE). The school also offers two graduate programs in engineering at the master's level, five minors and several certificate programs. Undergraduate students who qualify may opt to enroll in one of the 3+2 programs and be able to simultaneously graduate with a BS and an MS in five years.

**Civil Engineering:** This undergraduate civil engineering program leads to the Bachelor of Science in Civil Engineering (BSCE) degree. The degree program prepares graduates for entry level positions in activities associated with the analysis, planning, design, construction, and maintenance of infrastructure systems including buildings, highways, airports, bridges, water supply, flood mitigation systems. Civil engineers are concerned with the impacts that projects have to the public and the environment. This baccalaureate program will expose students to the civil engineering subdisciplines of structural engineering, transportation engineering, hydraulic and hydrologic engineering, construction engineering, and geotechnical engineering.

**Civil Engineering Technology:** The undergraduate engineering technology program leads to a Bachelor of Science in Civil Engineering Technology (BSCET) degree. The BSCET degree program prepares graduates for entry level positions to support civil engineering activities associated with the design, construction, operation and maintenance of structures, highways, water supply and disposal systems, and surface water drainage. This program is accredited by the Engineering Technology Accreditation Commission of ABET, <http://www.abet.org> (<http://www.abet.org/>), under the General Criteria and the Civil Engineering Technology and Similarly Named Programs Program Criteria.

**Construction Management:** The major in Construction Management (CM) leads to the Bachelor of Science (BS) degree in Construction Management. Graduates of the Construction Management program enter the industry as project superintendents, field supervisors, project managers, or owner's representatives for a variety of construction related firms such as general contractors, specialty subcontractors, construction managers, designers, developers, consultants, or owners.

**Engineering (Mechatronics):** The BSE is a 4-year program that can be completed at CSU Pueblo. The program is accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org>, under the General Criteria. 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.

**Industrial Engineering (BSIE):** The BSIE is a 4-year program that can be completed at CSU Pueblo. The program is accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org> (<http://www.abet.org/>), under the General Criteria and the Industrial Engineering and Similarly Named Programs Program Criteria. 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 degrees simultaneously by taking 30 additional credit hours over one degree alone, including a second senior design project. Please see the *Graduate Studies* section of this catalog for information about the MS degree programs in Industrial and Systems Engineering and in Mechatronics Engineering.

In our Pre-Engineering program, students seeking to major in some area of engineering other than industrial engineering, engineering with a mechatronics specialization or civil engineering (for example, electrical or mechanical engineering) can complete at least 60 credits that will transfer to other engineering schools. In the same spirit, the School of Engineering welcomes transfer students and has observed that transfer students are very successful when they join our programs.

Three engineering minors are available with the following restrictions. The BSE minor is not available to BSIE majors, and the BSIE minor is not available to BSE majors. However, the BSCE minor is available to the BSE and BSIE majors.

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

The School of Engineering offers two distinct MS degrees: the MS in Mechatronics Engineering (MSME) and the MS in Industrial and Systems Engineering (MSISE).

The MSME program provides advanced education in mechatronics. 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 MSME or MSISE program requires an undergraduate GPA of at least 3.0 on a 4-point scale and completion of the GRE test.

## Additional Program of Study Requirements for the MSME & MSISE Programs

For a student to be awarded the MSME 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 MSME/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 MSME 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 MSME/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 MSME 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 MSME) 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 MSME/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 MSME 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/industrial-engineering-bs/>)
- Pre-Engineering Program (<https://catalog.csupueblo.edu/college-of-science-technology-engineering-and-mathematics/engineering/pre-engineering-program/>)

### Minors

- Civil Engineering, Minor (<https://catalog.csupueblo.edu/college-of-science-technology-engineering-and-mathematics/engineering-technology-and-construction-management/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-program-bs-ms/>)

### Graduate Programs

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

### Certificates

- Graduate Certificate in Railroad Engineering, Post-Baccalaureate Certificate (<https://catalog.csupueblo.edu/college-of-science->

technology-engineering-and-mathematics/engineering/railroad-engineering-graduate-certificate-post-baccalaureate-certificate/)

- Lean Green Belt, Certificate (<https://catalog.csupueblo.edu/college-of-science-technology-engineering-and-mathematics/engineering/lean-green-belt-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/>)