College of Engineering

The College of Engineering offers the following graduate programs:

- Master of Civil Engineering
- Master of Science in Advanced Manufacturing and Enterprise Engineering
- Master of Science in Advanced Materials Engineering
- Master of Science in Biomedical Engineering
- Master of Science in Civil Engineering
- Master of Science in Computer Engineering
- Master of Science in Electrical Engineering
- Master of Science in Mechanical Engineering
- Doctor of Philosophy in Biomedical Engineering
- Doctor of Philosophy in Electrical Engineering
- Doctor of Philosophy in Environmental Science and Engineering
- Doctor of Philosophy in Mechanical Engineering

These programs offer opportunities for advanced study and research designed to prepare students for leadership roles in engineering careers with industry, government, educational institutions, and research organizations. For master’s degree programs, a thesis option is recommended for students who are planning a career in research or who contemplate pursuing a doctorate in one of the engineering disciplines. A nonthesis option is also available for students who desire a practical industrial applications-oriented degree.

The Department of Biomedical Engineering offers a matrix of academic tracks based on segments of biomedical engineering and/or areas of clinical emphasis. Specifically, the program has emphases in the following areas: biomaterials, biomechanics, and bioimaging. The biological areas covered are orthopedics/dental tissues, cardiovascular systems, and neural systems. The Department of Civil and Environmental Engineering includes programs of study in structures, environmental engineering—transportation, water resources, hydrology, geotechnical engineering, solid mechanics, and materials. The Department of Electrical and Computer Engineering includes programs of study in Computer Engineering, Systems and Control, Digital Signal Processing, Communications, and Electronic Materials and Devices. The Department of Mechanical Engineering includes programs of study in thermal and fluid systems, mechanical systems and design, mechanics and materials, and manufacturing engineering and systems.

All College of Engineering departments offer Master’s programs from their own discipline and research emphases: Department of Biomedical Engineering offers M.S. in Biomedical Engineering, Department of Civil Engineering offers M.S. in Civil Engineering and Master of Civil Engineering, Department of Electrical and Computer Engineering offers M.S. in Electrical Engineering and M.S. in Computer Engineering, and Department of Mechanical Engineering offers M.S. in Mechanical Engineering and M.S. in Advanced Manufacturing and Enterprise Engineering. In addition, the College of Engineering offers an interdisciplinary Master of Science degree in Advanced Materials Engineering that features state-of-the-art technical knowledge and multidisciplinary courses with focus in two concentration areas:

1. Multifunctional Electronic, Dielectric, Photonic and Magnetic Materials; and

The M.S. in Advanced Materials Engineering degree program is administered by the Department of Electrical and Computer Engineering.

A Doctor of Philosophy degree in Biomedical Engineering will train students in the fundamental sciences and engineering related to medicine. Areas of focus include biomechanics, biomaterials, bioimaging, and the following systems: musculoskeletal/dental, cardiovascular, and neurological.

A Doctor of Philosophy degree in Electrical Engineering offers an in-depth and integrated study focused in one of the following areas: Computer Engineering, Systems and Control, Digital Signal Processing, Communications, and Electronic Materials and Devices.

A Doctor of Philosophy degree in Environmental Science and Engineering offers research emphases in Water Resources, Environmental Quality, Environmental Remediation, Pollution Control, Conservation Ecology, Spatial Analysis, Remote Sensing, and Natural Hazards.

A Doctor of Philosophy degree in Mechanical Engineering offers an in-depth and integrated research focus on three concentration areas: Thermal and Fluid Systems, Design and Manufacturing Systems, and Mechanics and Materials.

A limited number of assistantships and fellowships are available to qualified students. Financial assistance is awarded on a competitive basis.

Engineering (EGR) Courses

EGR 5023. Numerical Techniques in Engineering Analysis. (3-0) 3 Credit Hours.
Prerequisite: Graduate standing in engineering or consent of instructor. Advanced methods of applied mathematics, including numerical linear algebra, initial value problems, stability, convergence, partial differential equations, and optimization.

EGR 5213. Topics in Systems Modeling. (3-0) 3 Credit Hours.

EGR 5233. Advanced Quality Control. (3-0) 3 Credit Hours.
Prerequisite: Graduate standing in engineering or consent of instructor. Methods and techniques for process control, process and gage capabilities, inspection plans, American National Standard, and recent advanced techniques. Tour of manufacturing industry. Case studies in process control, outgoing quality, and costs. A project, assigned by a manufacturing company, is required, along with a final presentation of the project.

EGR 5703. Advanced Scientific Visualization. (3-0) 3 Credit Hours.
Prerequisite: Graduate standing in engineering or consent of instructor. Topics include 3D image display and generation techniques, visual thinking process, interaction with visualization, efficiency of visualization on sparse grid, haptic rendering and control, and immersive 3D programming.
EGR 5713. High Performance Computing. (3-0) 3 Credit Hours.
Prerequisite: Graduate standing in engineering or consent of instructor.
Topics include scientific computing in UNIX/LINUX environment,
instruction on several import UNIX applications, various parallelization
styles of computing, and application programming interfaces (APIs) in
scientific applications.

EGR 6013. Advanced Engineering Mathematics I. (3-0) 3 Credit
Hours.
Prerequisites: EGR 2323 and EGR 3323, or equivalent courses.
Advanced methods of applied mathematics, including vector differential
calculus, linear algebra, functional space and their applications to
engineering problems. (Same as BME 6033. Credit cannot be earned for
both EGR 6013 and BME 6033.) (Formerly titled “Analytical Techniques
in Engineering Analysis”).

EGR 6023. Advanced Engineering Mathematics II. (3-0) 3 Credit
Hours.
Prerequisites: EGR 2323 and EGR 3323, or equivalent courses.
Advanced methods of applied mathematics. Topics may include solution
methods of partial differential equations, complex analysis, optimization
theory, other topics in engineering mathematics and their applications to
engineering problems. May be repeated for credit as topics vary.