ENGGINEERING (EGR)

EGR 111. Introduction to Engineering Thinking and Practice. (4 h)
Introduction to the study and practice of engineering, systems thinking, design, research, creative and analytical problem solving practices, and engineering for humanity. With laboratory.

EGR 112. Introduction to Engineering Measurement and Analysis. (4 h)
Exploration of tools, processes, and quantitative and qualitative analysis for modern engineering practice. With laboratory.

EGR 113. Integrated Sciences. (4 h)
An integrated basic science course covering topics in the biological, chemical, and physical sciences. With laboratory.

EGR 211. Materials and Mechanics. (4 h)
Fundamentals of materials and mechanics (statics and dynamics) for engineering applications. With laboratory. P-CHM 111/111L, EGR 111, 112, MST 111, PHY 113. P or C-MST 112.

EGR 212. Transport Phenomena. (4 h)
An integrated course in the fundamentals of thermodynamics, fluid mechanics, and heat transfer with emphasis on principles of conservation and transport of mass, energy, and momentum. With laboratory. P-CHM 111/111L, EGR 111, 112, MST 111, 112, PHY 113. P or C-MST 113.

EGR 213. Mechanical Computer Aided Design I. (2 h)
Introduction to Computer Aided Design (CAD) for mechanical assemblies including design planning additive and subtractive manufacturing techniques. P-EGR 111.

EGR 214. Embedded Microcontroller Systems. (2 h)
Examination of the structure of digital electronic systems with specific focus on microcontroller architectures for embedded system applications, as well as interfacing with analog and digital peripherals. With laboratory. P-EGR 111 or EGR 112 and CSC 111.

EGR 280. Projects with Engineering for Non-Majors. (1-4 h)
Specialized and focused learning via experiential projects. May be repeated for credit.

EGR 281. Introductory Projects with Engineering for Majors. (1-4 h)
Specialized and focused learning via experiential projects. Does not count towards engineering technical elective credit. May be repeated for credit.

EGR 301. Special Topics in Engineering. (1-4 h)
Seminar and/or lecture and/or project-based and/or laboratory courses in selected topics. Does not count towards engineering technical elective credit unless a designation of ‘Technical Elective’ is noted. May be repeated if the course title changes.

EGR 311. Control Systems and Instrumentation. (4 h)
Fundamentals of circuits and semiconductor electronics as applied to the analysis and design of engineering instrumentation and control systems. With laboratory. P-EGR 211, 212, and MST 113. P or C-MST 205.

EGR 312. Computational Modeling in Engineering. (4 h)
Fundamentals of computational problem solving tools (programming, systems modeling, numerical methods) for diverse engineering applications, with consideration of the economic and ethical outcomes of decisions that are made using such techniques. With laboratory. P-EGR 211, 212, MST 113, 205. (STA 111 highly encouraged but not required).

EGR 313. Capstone Design I. (1 h)
The first course of the capstone design experience. C-EGR 311, 312.
EGR 327. Microengineering. (2 h)
An overview of microengineering systems and an exploration of how size affects critical scaling law parameters, material properties, fabrication techniques, design and use. With laboratory. P-EGR 211 and 212.

EGR 328. Inverse Problems in Engineering. (2 h)
Fundamental approaches and techniques in solving inverse problems using mathematical, numerical, and statistical formulations. Applications include satellite remote sensing of the earth and environment, medical imaging, image and signal processing, and machine learning. With laboratory. P-EGR 211, MST 113 and 205, and STA 111.

EGR 329. Functional Advanced Materials Characterization. (2 h)
Relationships between atomic structure, microstructure, and observable properties of functional and advanced materials. measurement and modification of material properties. With laboratory. P-EGR 211, MST 113, CHM 111 and 111L.

EGR 330. Infrastructure Systems Design. (2 h)
Explore principles of infrastructure systems through experiential learning and application of concepts to design or redesign a local system with consideration of technical, social, environmental, and economic factors. With laboratory. P-EGR 211 and 212.

EGR 331. Thermal Fluid Systems. (2 h)
Applying fundamentals of fluid mechanics, heat transfer, and thermodynamics across diverse engineering applications in the analysis and design of thermal fluid systems. With laboratory. P-EGR 212 and MST 205.

EGR 332. Structural Engineering I. (2 h)
An introduction to structural engineering systems and materials such as steel, wood, and concrete. Emphasis on understanding the load path within real structures and how that impacts their design. With laboratory. P-EGR 211.

EGR 333. Tissue Engineering. (2 h)
Fundamentals of biomaterials, stem cells, and imaging technologies to analyze novel tissue engineering applications. With laboratory. P-EGR 211, 212, BIO 111 or 114, CHM 111 and 111L or POI.

EGR 334. Mobile Robotics. (2 h)
Introduction to mobile robotics, from hardware (energy, locomotion, sensors) and software (signal processing, control, localization, trajectory planning, high-level control). With laboratory. P-EGR 211, 212 and 311.

EGR 335. Field Programmable Gate Array (FPGA) Design and Implementation. (2 h)
An introduction to field programmable gate array (FPGA) design and implementation. With laboratory. P-EGR 311.

EGR 336. Healthcare Engineering. (2 h)
Beyond biomedical engineering, engineers play a critical role in bettering healthcare systems via big data analytics, next generation technologies, translational science and engineering, precision medicine, and diagnostic AI. With laboratory. P-EGR 312.

EGR 380. Fundamentals of Engineering Exam Prep. (1 h)

EGR 381. Engineering Research. (1-4 h)
Engineering research project conducted under the guidance of a research mentor. Does not count towards engineering technical elective credit unless a designation of 'Technical Elective' is indicated. Upon completion and review of project deliverables, engineering technical elective credit may be granted. May be repeated for credit.