ENGINEERING (ENGR)

ENGR 5101 Engineering Research Seminar I
1 Semester Credit Hour
The course focuses on developing professional research skills typically not provided in formal coursework such as methods for research, literature review, presenting scientific research, research ethics.

ENGR 5102 Engineering Research Seminar II
1 Semester Credit Hour
Continuation of topics from ENGR 5101. Students get experience in presenting research to peer audiences. Peer-review process, professional society engagement.
Prerequisite: ENGR 5101.

ENGR 5302 Numerical Methods for Engineers
3 Semester Credit Hours (3 Lecture Hours)
This course introduces students to algorithms and methods that are commonly needed in scientific computing. The mathematical construction of these methods is emphasized as much as their algorithmic aspects. This class will enable graduate students obtain the knowledge and competence in the design of mathematical models that can properly help develop their research objectives and experimentation through mathematical modeling and simulation. Topics cover mathematical preliminaries, computer arithmetic, solution of nonlinear equations, solving systems of linear equations, selected topics in numerical linear algebra, approximating functions, numerical differentiation and integration, numerical solution of ordinary differential equations, numerical solution of partial differential equations, and linear programming and related topics. This course work is enabled by the utilization of MATLAB as the main tool to compute the students work.

ENGR 5305 Experimental Methods and Design in Engineering
3 Semester Credit Hours (3 Lecture Hours)
Experimental methods in engineering. Includes measurement techniques, instrumentation, data acquisition, signal processing, and linear and digital electronics; uncertainty analysis. Design and analysis of experiments.

ENGR 5311 Thesis Research
3 Semester Credit Hours
This course is for MS in Engineering students choosing the thesis option. This course is only credit/no credit. Student will be given a grade of In-Progress until the thesis is successfully completed.

ENGR 5312 Thesis
3 Semester Credit Hours
This course is for MS in Engineering students choosing the thesis option. A student should register for this course in the semester in which the student plans to present and defend the MS thesis.
Prerequisite: ENGR 5311.

ENGR 5313 Capstone Project
3 Semester Credit Hours (3 Lecture Hours)
This course is for MS in Engineering students choosing the non-thesis option. Culminating research or design project under supervision of faculty member. Should be taken in last semester of residence in the MS in Engineering (non-thesis option) program. Final report and presentation required. Permission of instructor.

ENGR 5351 Internet of Things (IoT): Devices and Communication
3 Semester Credit Hours (3 Lecture Hours)
This course covers concepts for Internet of Things (IoT), and related devices, sensors, and communication protocols. Graduate students will utilize the IoT kits for hands-on in-class lab assignments. Building on these hands-on experiences, students will develop skills to create specific tools and programs that integrate hardware, software, and the cloud in the context of IoT. Final project will involve solving a realistic problem using IoT devices, sensors, and communication protocols. The final project is an individual assignment. Graduate Standing.

ENGR 5352 Artificial Intelligence (AI) in Engineering and Science Applications
3 Semester Credit Hours (3 Lecture Hours)
This course will introduce the student to AI, ML and Deep Learning topics. In addition, the students will investigate different AI applications in engineering and sciences. The course entails general concepts of AI as well as AI models, selecting an AI model for an application. Some theory will be covered. Transfer learning and reinforcement learning in deep convolutional neural networks will be discussed. Ethics in AI and limitations of AI will also be discussed. The course culminates in an individual graduate-level class project that involves use of AI tools for machine learning/deep learning for data classification/regression analysis or other applications selected by student and approved by instructor. Students will get hands on experience with programming in MATLAB, Python or other AI tools of their choice. Engineering graduate standing.

ENGR 5390 Special Topics
3 Semester Credit Hours (3 Lecture Hours)
Study of advanced topics in engineering. May be repeated. Topics vary by semester and offering.

ENGR 5396 Directed Independent Study
3 Semester Credit Hours
One-on-one study of advanced topics in engineering directed by individual faculty member. May be repeated for credit once. Topics vary by faculty member. Requires a formal proposal of study to be completed in advance of registration which must be approved by the supervising faculty member, department chair, and associate dean of the College of Engineering.

ENGR 5401 Engineering Mathematics and Analysis
4 Semester Credit Hours (4 Lecture Hours)
Analytic methods in ordinary differential equations, complex-variable theory, the Laplace transform and its inversion. Initial-value problems and boundary-value problems; eigenvalues, eigenvectors, and eigenfunctions.