ENGINEERING, GENERAL

EEE 5354L Semiconductor Device Fabrication Laboratory 3 Credits
Grading Scheme: Letter Grade
This course will be offering hands-on experience in semiconductor material characterization and device fabrication techniques.

EEE 5776 Applied Machine Learning 3 Credits
Grading Scheme: Letter Grade
Major machine learning concepts with a focus on application. Topics include classification, regression, unsupervised learning, maximum likelihood, Bayesian, and deep learning models.
Prerequisite: Math for Intelligent Systems, Programming for ADE, and Applied Data Science.

EEE 6778 Applied Machine Learning II 3 Credits
Grading Scheme: Letter Grade
Advanced topics in applied machine learning with an applied focus. Topics include graphical models, unsupervised learning, model selection, as well as variational auto-encoder, generative adversarial network, and recursive deep learning architectures.
Prerequisite: EEE 5776 Applied Machine Learning.

EGN 5010L NRF Training Lab 1 Credit
Grading Scheme: Letter Grade
This course will be teaching Nanoscale Research Facility (NRF) cleanroom users the fundamental and practical aspects of various micro/nanofabrication processes via combination of classroom lectures and hands-on labs. Students will also recieve training on one or more NRF tools.

EGN 5215 Machine Learning Applications in Civil Engineering 3 Credits
Grading Scheme: Letter Grade
Students will leverage state-of-the-art techniques and tools in machine learning to solve Civil Engineering problems. Fundamentals of data analytics and machine learning techniques will be applied to real-world tasks in Civil Engineering. Students will gain essential knowledge and programming skills (using R) in data preprocessing, feature selection, model comparison, hyperparameter tuning and machine-learning interpretation. Case studies and applications are included for hands-on experience.
Prerequisite: Undergraduate level courses in probability and statistics.

EGN 5216 Machine Learning for Artificial Intelligence Systems 3 Credits
Grading Scheme: Letter Grade
This course aims to provide a framework to develop real-world machine learning systems that are deployed, reliable, and scalable. The focus of this course is to introduce basic modules of machine learning systems, namely, data management, data engineering, approaches to model selection, training, scaling, monitoring, and deploying to Machine Learning systems.
Prerequisite: (MAC 2313 OR EQUIVALENT) AND (MAS 4105 OR MAS 3114 OR EQUIVALENT) AND (STA 4321 OR STA 3032 OR EQUIVALENT) and familiarity with at least one programming language (Python preferred).

EGN 5442 Programming for Applied Data Science 3 Credits
Grading Scheme: Letter Grade
Concepts used to skillfully apply and create new Data Science algorithms using a high-level language such as Python or R.
Prerequisite: Previous experience with computer programming strongly encouraged.

EGN 6446 Mathematical Foundations for Applied Data Science 3 Credits
Grading Scheme: Letter Grade
Understand and apply machine learning statistical models including functions of random variables, Monte Carlo, convergence, estimation, and hypothesis testing. Understand and apply optimization algorithms including constrained and unconstrained, first and second order, stochastic and gradient descent, and nonconvex.
Prerequisite: COT 5615.

EGN 6640 Entrepreneurship for Engineers 3 Credits
Grading Scheme: Letter Grade
Introduction to entrepreneurship, idea generating and feasibility analysis, and business planning. Lectures, case studies, student-led discussions, team business plans, and investor presentations.

EGN 6642 Engineering Innovation 3 Credits
Grading Scheme: Letter Grade
Concepts of innovative thinking and innovation practices. Using lectures, case studies, team exercises, and guest speakers, the course teaches life skills in innovative thought and action that students can use in careers ranging from starting companies to executing RD projects in large companies.

EGN 6913 Engineering Graduate Research 0-3 Credits, Max 12 Credits
Grading Scheme: S/U
Course will provide the student with supervised research in a laboratory setting.

EGN 6933 Special Topics 1-3 Credits, Max 12 Credits
Grading Scheme: Letter Grade
Special Topics in Engineering, not specific to a major.

EGN 6937 Engineering Fellowship Preparation 0-1 Credits
Grading Scheme: Letter Grade
Engineering Fellowship Preparation will instill in students an understanding of the fellowship and grant process.

EGS 6012 Research Methods in Engineering Education 3 Credits
Grading Scheme: Letter Grade
Introduce basic principles and practices of quantitative, qualitative, and mixed method research methods used in engineering education research.

EGS 6020 Research Design in Engineering Education 3 Credits
Grading Scheme: Letter Grade
Fundamentals of research design in engineering education research. How to select a research approach that aligns with a research question, principles of research design, management of data, and ethics of human subject research.

EGS 6039 Engineering Leadership 3 Credits
Grading Scheme: Letter Grade
Concepts, theory and practice of engineering leadership; effective written and oral communications and presentations; engineering leadership characteristics, individual differences and self-awareness; developing and building teams; managing change, conflicts, and crises; and understanding real-world ethics and core values.

EGS 6050 Foundations in Engineering Education 3 Credits
Grading Scheme: Letter Grade
An introduction to fundamental issues, questions, and approaches to engineering education.

EGS 6051 Instructional Design in Engineering Education 3 Credits
Grading Scheme: Letter Grade
Introduces students to the design of instructional interventions in engineering education that are focused on facilitating students' learning. Includes how to align the content, assessment and pedagogy of these interventions guided by the premises of a learning theory.

EGS 6054 Cognition, Learning, and Pedagogy in Engineering Education 3 Credits
Grading Scheme: Letter Grade
Applications of cognitive psychology, educational learning theory, and pedagogy to engineering education. The processes learned will inform research and instructional practice decisions, approaches, and analysis.

EGS 6056 Learning and Teaching in Engineering 1 Credit
Grading Scheme: Letter Grade
Learn and apply evidence-based teaching and assessment techniques. Understand how to create course content based on the student-centered learning approach to teaching. Be introduced to methods to foster an inclusive classroom environment to support diverse learners in your classroom. Develop teaching philosophy based on the principles provided through this course
Prerequisite: Enrolled in a graduate-level engineering program.

EGS 6085 Advanced Engineering Educational Technology 3 Credits
Grading Scheme: Letter Grade
Design principles and application in engineering education towards developing effective tools and methods to enhance the learning experience with respect to student lifelong learning. Theory and practical applications in engineering education based on Learning Sciences and Human-Computer Interaction. Practice of system evaluation through theoretical and empirical data. Includes identifying and discussion of ethical and professional responsibilities with technology in engineering education.

EGS 6101 Divergent Thinking 3 Credits
Grading Scheme: Letter Grade
Focuses on student acquisition of divergent thinking skills to support the engineering design process. It emphasizes the importance of student practices such as observing, questioning, learning and experimenting, and stresses cultivating an openness to new experiences, in order to generate ideas and devise solutions to complex design problems.

EGS 6626 Fundamentals of Engineering Project Management 3 Credits
Grading Scheme: Letter Grade
Provides engineering students with a comprehensive understanding of how to plan, optimize and efficiently manage projects (or tasks) to implement products, services or developments. This includes building the structure, processes, components and linkages with a team for successful project delivery within schedule, budget and quality requirements.

EGS 6628 Advanced Practices in Engineering Project Management 3 Credits
Grading Scheme: Letter Grade
Applied Engineering Project Management expands on foundational project management practices to include complex as well as new project delivery concepts. Topics include project acquisition; negotiation skills; advanced risk planning and management; program management; project.
Prerequisite: EGS 4625/6626, Fundamentals of Engineering Project Management, or equivalent (with permission of the instructor).

EGS 6681 Advanced Engineering Leadership 3 Credits
Grading Scheme: Letter Grade
Designed to further develop the leadership framework and capabilities of graduate engineering students. It involves a case study-based instructional approach that reviews and applies strategic leadership concepts and knowledge critical to the success of engineering-based companies that now operate in a highly-uncertain and volatile business environment.
Prerequisite: EGS 6039 or instructor approval.

EGS 6930 Engineering Education Seminar 1 Credit, Max 6 Credits
Grading Scheme: Letter Grade
Graduate seminar in engineering education. Speakers may include graduate students in the program, faculty from campus, and speakers from other institutions.

EGS 6940 Preparation for Engineering Education Practicum 1 Credit
Grading Scheme: S/U
Practicum experience in engineering education. The research practicum implements a practical work experience in engineering education under pre-approved supervision. The preparation course is used to develop a research-based plan and create the content that will be implemented during the practicum with the student's chosen practicum supervisor.
Prerequisite: EGS 6940

EGS 6949 Research to Practice Experience in Engineering Education 1-3 Credits
Grading Scheme: S/U
Practical work experience in engineering education under pre-approved supervision.
Prerequisite: EGS 6940

EGS 6971 Research for Master's Thesis 1-12 Credits, Max 12 Credits
Grading Scheme: S/U
Students are expected to devote an equivalent of three hours a week of course work in this class for each credit in which they are enrolled. Students should check with their department on the impact of excess surcharges and whether the credits will count toward their degree. Students should carefully discuss with their thesis advisor the time expectations for completion of the requirements of the class.

EGS 7979 Advanced Research 1-12 Credits, Max 36 Credits
Grading Scheme: S/U
Research for doctoral students prior to admission to candidacy. Designed for students with a master's degree in the field of study or for students who have been accepted for a doctoral program. Not appropriate for students who have been admitted to candidacy.

EGS 7980 Research for Doctoral Dissertation 1-12 Credits, Max 36 Credits
Grading Scheme: S/U
Research for doctoral students post-admission to candidacy.

ESI 6900 Principles of Engineering Practice 1-4 Credits, Max 8 Credits
Grading Scheme: Letter Grade
Course work in specialized topics for graduate students.
Prerequisite: consent of instructor.