SYSTEMS ENGINEERING

Courses

SYE 521. Introduction to Operations Research. 3 Hours
This course covers methods, principles and fundamentals of deterministic and stochastic operations research. Emphasis is on the formulation and solution of mathematical models in decision making environments, the search for optimal solutions to these decisions, and the explicit treatment of uncertainty through the use of probabilistic modeling and statistical analysis. Models include linear and non linear programs, inventory and production models, decision analysis, forecasting. and queuing. Required background in probability theory.

SYE 550. Requirements Engineering. 3 Hours
This course will provide an understanding of the essential concepts, practices, and applications of requirements engineering used to elicit and model requirements for systems. Topics include requirements definitions, classifications, and types, requirements engineering roles, and activities, requirements change management, requirements elicitation techniques, requirements documentation, SysML requirements, requirements modeling and tools, requirements for risk management, traceability, and testing, and requirements frameworks and methods. Prerequisites: ENM 505 (with a minimum grade of a B).

SYE 551. Systems Architecture and Model-Based Systems Engineering. 3 Hours
This course will provide an understanding of the essential concepts, practices, and applications of System Architecture, and how Systems Engineering models can be used to design and deploy a system. The students will be able to apply systems architecture and Model-Based Systems Engineering (MBSE) to model the different types of systems, including: product, service, enterprise and system-of-systems. Prerequisites: ENM 505.

SYE 552. System Verification, Validation and Testing. 3 Hours
This course investigates systems engineering integration, testing, and evaluation methodologies, emphasizing verification, validation, & testing (VVT) practices including development system VVT activities, post-development system VVT activities, non-testing system VVT methods, non-testing system VVT methods, modeling quality, cost, time, and risk, obtaining quality data, and optimizing VVT strategy. Prerequisites: ENM 505 (with a minimum grade of a B).

SYE 553. Risk Analysis. 3 Hours
This course rigorously examines the foundations of engineering risk analysis. Topics include risk analysis methods, risk modeling, trade space analysis, system definition, system structure, failure probability assessment, failure consequence, failure valuation, risk treatment, risk control, risk communication, and risk data. Prerequisites: ENM 500 (with a minimum grade of B).

SYE 571. Data Analytics for Systems Engineers. 3 Hours
Data analytics help to enhance productivity through the application of quantitative and qualitative techniques to extract and categorize data to identify and analyze data patterns. Data analytics demand an integrated set of skills such as statistics, machine learning, and mathematics. This course will introduce students to some of the tools and basic principles of data analytics. Among the techniques, tools, and concepts that students will be introduced to are data collection, analysis of exploratory data, descriptive modeling, predictive modeling, evaluation, and effective communication of analytical outcomes. Prerequisites: ENM 500.

SYE 572. System Simulation. 3 Hours
This course is an introduction to stochastic discrete event simulation of complex systems and human performance. Topics covered include model creation, 2D and 3D animation, the process of generating random numbers and random variables, the analysis of input data, the computer modeling of real systems, validation and variation, and the analysis of simulation output. Emphasis is on modeling real-world systems using modern software. Prerequisites: ENM 500 or equivalent.

SYE 595. Special Topics in Systems Engineering. 3 Hours
To explore a systems engineering competency at an advanced level. Prerequisites: Enrolled in the Master of Science in Systems Engineering (MSSE) Program, Consent of the Instructor and Consent of the Systems Engineering Program Director.

SYE 599. Thesis. 1-6 Hours
Thesis in Systems Engineering.