

# Systems Engineering Courses

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## Courses

### **SE 5341. Systems Engr Fundamentals.**

Introduction to the key concepts, processes, and process activities carried out by systems engineers. Fundamentals of architecting and engineering of large and complex development projects. Software tools are covered with emphasis on architectural analysis and design, functional design alternatives, and key architectural attributes.

**Department:** Systems Engineering

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

### **SE 5342. Systems Engr Management.**

Techniques and tools for systems engineering management. Topics include technical management, organizational environments, and technical team structures, time and cost estimates and cost control, resource allocation and resource management. Students propose project studies under the approval of the professor, to be developed in phases as the course progresses.

**Department:** Systems Engineering

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

### **SE 5343. Systems Requirements Analysis.**

Methodologies, approaches, and techniques associated with requirement analysis and definition; process for defining requirements including feasibility studies, requirements elicitation, formal specification, modeling, validation, verification, and documentation.

**Department:** Systems Engineering

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

### **SE 5344. Sys Intgrtn, Verifctn, & Valdtn.**

Students will learn verification planning, verification methods, and validation methods during the development, launching, and operations of a system; integration tests and integration test data collection analysis and systems requirement validation.

**Department:** Systems Engineering

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

### **SE 5345. Sys Engr Project Practicum.**

Methodologies and processes applied to develop a project from the conceptual phase to prototype definition under the supervision of at least two (2) faculty members from participating departments. Students are encouraged to work on real customer projects. Prerequisite: Departmental approval.

**Department:** Systems Engineering

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**SE 5346. Systems Architecture & Design.**

Conceptual design of systems, considering the arrangements of components and the relations among them, and the holistic attributes of the arrangements. Department of Defense Architectural Framework (DoDAF), Zachman Frameworks, and other frameworks. Top-level strategic design at the beginning of the life-cycle is stressed. Essential elements, decisions, rationales, and behaviors are covered, as well as the necessity for broad engineering knowledge in the creation of architectural representations. Prerequisites: SE 5341 and SE 5342.

**Department:** Systems Engineering

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Prerequisite(s):** (SE 5341 w/C or better ) AND (SE 5342 w/C or better)

**SE 5347. Systems Engr Processes.**

Creation of systems engineering processes over a wide variety of complex systems is covered. Analysis and design of system processes through models, methodologies and tools are taught. ANSI/EIA 632 is reviewed. Process as different from product process started in the middle, efficiency, cycle-shortening, process development, integrated process sensing and control, evolution, and drift correction are covered. Prerequisites: SE 5341 and 5342.

**Department:** Systems Engineering

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Prerequisite(s):** (SE 5341 w/C or better ) AND (SE 5342 w/C or better)

**SE 5348. Systems Modeling & Simulation.**

Systems Modeling Language (SysML) is taught as a systems- oriented customization of the object-oriented software Unified Modeling Language (UML). This course covers model- based descriptions of systems, and executable simulations of systems as made possible by SysML supporting programs, currently Enterprise Architect. Prerequisites: SE 5341 and 5342.

**Department:** Systems Engineering

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Prerequisite(s):** (SE 5341 w/C or better ) AND (SE 5342 w/C or better)

**SE 5358. Industrial Data Analytics.**

This course introduces the concepts, algorithm, techniques, and systems of data mining, including (1) an introduction to data analytics, (2) data preprocessing, (3) mining frequent patterns and correlation, (4) classification, (5) cluster analysis, and (6) learning about the software used in data mining and (7) demonstration of how to apply data analytics techniques using python. Keywords: Data Analytics, Industrial Analytics, Industrial data.

**Department:** Systems Engineering

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Prerequisite(s):** (IE 3373 w/C or better)

**SE 5390. Systems Engr Special Topics.**

Systems Engineering Special Topics (3-0) This course will apply Systems Engineering (SE) Methods, Processes and Tools (MPT) to current challenges in modern end-to-end Systems-of-Systems (SoS) and Complex Systems- of-Systems (CxSoS), including the design of large scale smart energy grids, healthcare delivery systems of systems, service systems enterprises, and environmentally sustainable industries. Prerequisite: Departmental approval.

**Department:** Systems Engineering

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**SE 5391. Individual Studies.**

Individual Studies Research, design, and analysis of advanced Systems Engineering problems, conducted under the direct supervision of a faculty member. Prerequisite: Departmental approval.

**Department:** Systems Engineering

**3 Credit Hours**

**6 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

3 Other Hours

**SE 5398. Thesis I.**

Academic recognition for research, formulation and implementation of new systems engineering processes, methods and tools, as well as for academic dissemination of research through conference presentation and journal publications. Prerequisite: Departmental approval required. Restricted to level of GR.

**Department:** Systems Engineering

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

0 Lecture Hours

3 Other Hours

**SE 5399. Thesis II.**

Academic recognition for research, formulation and implementation of new systems engineering processes, methods and tools, as well as for academic dissemination of research through conference presentation and journal publications. Prerequisite: Departmental approval required. Restricted to level of GR.

**Department:** Systems Engineering

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

0 Lecture Hours

3 Other Hours