

S1: Introduction to Systems Engineering: 3 credit hours

Course Description:

This course is an introduction to systems engineering (SE) and the principles of systems definition, development, and maintenance. Topics include basic understanding of systems, systems engineering objectives, terminology, and working methodology, the relationships between systems engineering and other disciplines, the basic elements of the product life cycle, the use of modeling, and the influence of programmatic considerations. Emphasis is on developing an understanding of the Systems Engineering (SE) methodology. Teamwork and cooperative effort concepts are highlighted.

Prerequisites: None

Course Objectives: Upon completion of the course, SYS101 students will able to:

- Understand and appreciate Systems and the Systems Approach
- Understand and utilize Systems Thinking
- Understand Engineering, System Engineering, and Systems Engineering Technology
- Understand the process of developing a product, particularly a complex product
- Have a sufficient vocabulary to work with System Engineers, Systems Teams, and Product Teams
- Understand and be able to use key System Engineering methods

Textbook and Course Support Materials:

No textbook required. All materials will be provided by instructor.

Technical Requirements: None

Grading Plan:

Final Exam	30%
Exams	20%
Projects	25%
Homework	15%
Classroom Participation	10%
Total	100%

Grading Scale:

100% - 89.5% = A

89.4% - 79.5% = B

79.4% - 69.5% = C

69.4% - 59.5% = D

Less than 59.4% = F

M1: Systems Modeling I: 3 credit hours

Course Description:

This is the first course in the three-course Systems Modeling sequence. It provides an introduction to the concept of a system and to systems modeling. It focuses on the concepts and tools necessary to generate a systems engineering (SE) model that represents a given system. Model documentation and the team approach to project management and execution are emphasized.

Prerequisites: S1 Introduction to System Engineering

Course Objectives: Upon completion of the course, SYS231 students will able to:

- Interpret a SysML model built using the basic feature set of SysML
- Build a system engineering model using the basic feature set in SysML and the CAMEO tool
- Utilize the CAMEO modeling tool to modify an existing SysML model of a given system developed using the basic feature set of SysML

Textbook and Course Support Materials:

A Practical Guide to SysML, The Systems Modeling Language, 3/e, Friedenthal
ISBN: 978-0-1 2-800202-5, Publisher: Morgan Kaufmann

Technical Requirements:

You are required to have access to a computer (Windows Operating Systems (OS) that can be used to open, modify and save files using the CAMEO modeling software and the ability to download and install programs on Windows OS.

Additional Resources:

SysML Distilled, A Brief Guide to The Systems Modeling Language, 1/e, Delligatti
Systems Engineering with SysML/UML, Modeling, Analysis, Design; Tim Weilkiens

Grading Plan:

Homework	35%
Project	35%
Quizzes	10%
Classroom Participation	10%
Notebook Use	10%
Total	100%

Grading Scale:

100% - 90% = A

89% - 80% = B

79% - 70% = C

69% - 60% = D

Less than 60% = F

M2: Systems Modeling II: 3 credit hours

Course Description:

This is the second course in the three-course Systems Modeling sequence. It provides an increase in knowledge of the concepts of a system and systems modeling. It focuses on the more advanced concepts and tools necessary to generate a systems engineering (SE) model that represents a given system. Model documentation and the team approach to project management and execution are emphasized.

Prerequisites: S1: Introduction to Systems Engineering, M1: Systems Modeling I

Course Objectives: Upon completion of the course, M2 students will be able to:

- Interpret a SysML model built using the extended feature set of SysML
- Build a system engineering model using the extended feature set in SysML and the CAMEO tool
- Utilize the CAMEO modeling tool to modify an existing SysML model of a given system developed using the extended feature set of SysML

Textbook and Course Support Materials:

A Practical Guide to SysML, The Systems Modeling Language, 3/e, Friedenthal

ISBN: 978-0-12-800202-5, Publisher: Morgan Kaufmann

SysML Distilled, A Brief Guide to The Systems Modeling Language, 1/e, Delligatti

ISBN: 978-0-321-92786-6, Publisher: Addison-Wesley

Technical Requirements:

You are required to have access to a computer (Windows Operating Systems (OS) that can be used to open, modify and save files using the CAMEO modeling software and the ability to download and install programs on Windows OS.

Additional Resources:

Systems Engineering with SysML/UML, Modeling, Analysis, Design; Tim Weilkiens

Grading Plan:

Homework	55%
Project	30%
Quizzes	5%
Classroom Participation	5%
Notebook Use	5%
Total	100%

Grading Scale:

100% - 90% = A

89% - 80% = B

79% - 70% = C

69% - 60% = D

Less than 60% = F

M3: Systems Modeling III: 3 credit hours

Course Description:

This is the third course in the three-course Systems Modeling sequence. It provides an increase in knowledge of the concepts of a system and systems modeling. It focuses on the more advanced concepts and tools necessary to generate a SysML model that accurately represents a given system. Model documentation and the team approach to project management and execution are emphasized. Methods of determining model scope and planning content will be discussed.

Prerequisites: M2: Systems Modeling II

Course Objectives: Upon completion of the course, M3 students will able to:

- Build or modify increasingly complex system models using the SysML and the CAMEO tool
- Understand the methodologies of determining model features based on the project objectives
- Provide electronic and physical deliverables of model outcomes

Textbook and Course Support Materials:

A Practical Guide to SysML, The Systems Modeling Language, 3/e, Friedenthal

ISBN: 978-0-1 2-800202-5, Publisher: Morgan Kaufmann

SysML Distilled, A Brief Guide to The Systems Modeling Language, 1/e, Delligatti

ISBN: 978-0-321-92786-6, Publisher: Addison-Wesley

Technical Requirements:

You are required to have access to a computer (Windows Operating Systems (OS) that can be used to open, modify and save files using the CAMEO modeling software and the ability to download and install programs on Windows OS.

Additional Resources:

Systems Engineering with SysML/UML, Modeling, Analysis, Design; Tim Weilkiens

Grading Plan:

Homework	55%
Project	30%
Quizzes	5%
Classroom Participation	5%
Notebook Use	5%
Total	100%

Grading Scale:

100% - 90% = A

89% - 80% = B

79% - 70% = C

69% - 60% = D

Less than 60% = F

DE1: MBSE in the Digital Environment: 3 credit hours

Course Description:

This course builds on prior coursework and/or experience in systems modeling and database design and management. It introduces the student to disparate model and data types and how to gather data from multiple sources and transform it for incorporation into systems engineering (SE) models. Relationships between different types of modeling systems with Systems Models are investigated. Emphasis may be placed on modeling programs, data structures, languages, and platforms commonly used in a specific industry.

Prerequisites: M1: Systems Modeling I

Course Objectives: Upon completion of the course, DE1 students will be able to:

- Understand the Digital Engineering environment
- Understand the basics of interfacing SysML to other Digital Engineering models and programs
- Understand a general process for building a Digital Engineering Environment (Ecosystem) within an organization

Textbook and Course Support Materials:

No textbook required. All materials will be provided by instructor.

Technical Requirements:

You are required to have access to a computer (Windows Operating Systems (OS) that can be used to open, modify and save files using the CAMEO modeling software and the ability to download and install programs on Windows OS.

Additional Resources:

None

Grading Plan:

Tests	55%
Homework	35%
Quizzes	5%
Classroom Participation	5%
Total	100%

Grading Scale:

100% - 90% = A

89% - 80% = B

79% - 70% = C

69% - 60% = D

Less than 60% = F

CAP1: SET Capstone Project: 3 credit hours

Course Description:

The Capstone project consists of a real-world project in support of an industrial partner. Working as a team or teams, students will interact with the customer, develop an understanding of the objectives, deliverables, and the proposed or existing system. The students will evaluate available documentation, existing models, and determine a project schedule and work breakdown structure for their effort. Based on discussions with the customer, evaluation of the system, and recognition of the objectives of the project, the students will determine the scope and focus of the model needed. As a team or teams, the students will then design, document, build, test, and utilize a realistic, properly representative, model for that system. The students will also identify maturity paths for that model and opportunities to connect to other digital tools.

Prerequisites: M2: Systems Modeling II

Co-requisite: M3: Systems Modeling III

Course Objectives: Upon completion of the course, CAP1 students will have:

- Practical experience in working with an industrial team on an actual project
- Planned and built a system engineering model using the SysML and the CAMEO tool that is representative of an actual industrial project
- Assembled, modified, and delivered products
- Presented and explained a developed systems model and other deliverables to a customer

Textbook and Course Support Materials:

No textbook required. All materials will be provided by instructor and industrial partner.

Technical Requirements:

You are required to have access to a computer (Windows Operating Systems (OS) that can be used to open, modify and save files using the CAMEO modeling software and the ability to download and install programs on Windows OS.

Grading Plan:

Project deliverables	55%
Project Presentation	20%
Homework	15%
Team Participation	10%
Total	100%

Grading Scale:

100% - 90% = A

89% - 80% = B

79% - 70% = C

69% - 60% = D

Less than 60% = F