UCONN
SCHOOL OF ENGINEERING

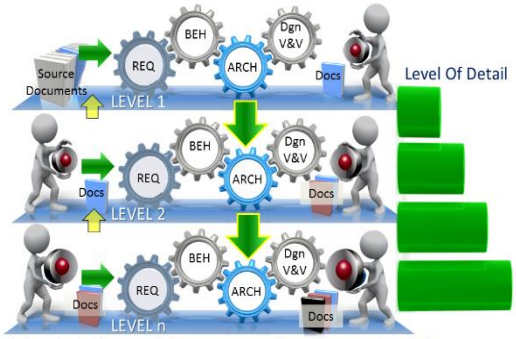
United Technologies Corporation
Institute for Advanced Systems Engineering
UNIVERSITY OF CONNECTICUT

Graduate Courses in Systems Engineering

SE 5001 Model-Based Systems Engineering

What's Exciting About this Course? Applying the knowledge of systems engineering principles, processes, and methods to design cyberphysical systems. Creating architectures, models, and simulations that relate and test all system elements, interfaces, interactions, and performance.

Course Description. This course is designed to provide students with the foundations of model-based systems engineering. Students will develop skills in the areas of fundamental logical, behavioral, physical representations of engineered cyberphysical systems. Topics include software and systems requirements engineering, interface design and modeling, system architecting, system verification and testing, and system simulation. Emphasis is placed on modeling cyberphysical systems using modern MBSE tools. Examples include a water distiller, a residential security system, an automobile, an elevator, and a geospatial library for the demonstration of the theoretical and practical aspects of systems modeling. The course is designed for all graduate students pursuing engineering degrees.



Model-Based Systems Engineering Process

Course Outcomes

- Describe the processes, methods, and practices of model-based systems engineering.
- Apply model-based systems engineering practices and methods to relevant examples.
- Develop and relate requirements, architectures, behavior, specifications, verifications, and tests that represent cyberphysical systems using model-based systems engineering methods.
- Analyze systems using model-based systems engineering approaches to increase performance.
- Simulate the behavior and performance of cyberphysical systems.
- Communicate effectively in teams, via interim and final project progress reports.

Topics: Creating Requirements, Requirements Modeling, Define the System Context and Boundary, Define Interfaces and External Interface Elements, Define the System Behavior, Advanced System Behavior Modeling, Introduction to Simulating Cyberphysical Systems, Allocate the Behavior to Physical Components, Defining Physical Components, Failure Modes and Effect Analysis (FMEA), Verification Requirements and Test Plans, Integrating and Deploying SysML and MBSE into a Systems Development Environment.

Course Objectives and Links to Overall Program Goals

Engineers obtain a strong foundational knowledge of model-based systems engineering principles and practices, which can be leveraged and applied in later courses when analyzing and designing cyberphysical systems. Engineers can model and present the complex relationships between needs, requirements, architecture, and behavior for cyber-physical systems.