Model-Based Systems Engineering (MBSE) Foundations and Applications to the Production Enterprise

Online educational modules offered by Purdue University

Designed for individuals with a wide variety of backgrounds and job responsibilities who...

- Need to perform efficiently in a model-based digital enterprise, especially in a production engineering context
- Are interested in understanding the value, functions, and applications of MBSE rather than receiving in-depth instruction on a specific software package

Designed to be flexible to meet the learner's needs. Characteristics of the program include...

- Option to take entire set of seven modules or choose individual modules that best suit the learner's needs (short descriptions of the modules on the back of this page)
- Engaging instruction including short video presentations, case studies, individual quizzes, team projects, and opportunities to interact with and receive feedback from the instructor
- Each module requires about 10 hours of active participation over three weeks (20 hours over 4 weeks for the capstone module)
- Documentation of successful completion of a module, with either a certificate or continuing education units from Purdue University, for each learner who earns a total score of 80% or more on the assignments

Designed by a Purdue University team of faculty and staff from multiple disciplines with...

- Extensive input from MBSE experts from manufacturing corporations in various sectors, professional organizations, and government agencies
- Funding from the National Science Foundation's Education and Human Resources Directorate through their Production Engineering and Research Program

For more information, visit:

https://purdue.biz/3tCTP9G

Overview of All Modules

Introduction to Systems Engineering (SE) and Model-Based Systems Engineering (MBSE) for Production Systems

- Introduces fundamental concepts in SE and MBSE through videos, case studies, written materials, guided discussions, and team projects

Engineering a System with SysML

- For learners who want to prepare to work in an environment where MBSE is used
- Get an overview of systems modeling with SysML, foundations of modeling preparation and organization, systems engineering using SysML, options for presenting results, and an introduction to MBSE tools that can be used for managing the life cycle of a system

SysML Implementation and Applications

- For learners who will be directly involved in developing models used in MBSE
- Get hands-on experience building SysML models according to the principles learned in the previous module
- Learn to use an MBSE tool demonstrating the ability to form and use models for system requirements analysis, physical, functional, and allocated architecture, system integration and verification, model validation, and documentation

Quantitative Methods Supporting MBSE

- Develop or refresh analytical skills for data analysis
- Learn to interpret simulation results and make effective design and business decisions
- Learn statistical foundations such as distributions and probability, hypothesis testing, and confidence intervals
- Covers applications and decision-making, including simulation and Monte Carlo

Production Engineering and MBSE

- Get an overview of production engineering processes, systems, and key performance indicators
- Learn how modeling and simulation in are used production engineering along with their benefits
- Explore examples of the use of simulations in both a manufacturing process and a production system
- Learn to identify manufacturing characteristics that should be considered in creating SysML diagrams and understand how SysML diagrams provide information on manufacturing domain models and vice versa

Digital Engineering and the Model-based Enterprise

- Learn the importance of integrating and connecting MBSE to the Digital Enterprise to enable collaboration and how MBSE data and models flow and are shared throughout the different stages of the product lifecycle
- Understand the state of MBSE tools and technology with respect to the digital enterprise infrastructure, the digital thread, MBSE and PLM integration, traceability and change management

MBSE Capstone Project

- Apply the ideas and concepts learned in prior modules to a real-world problem and demonstrate the business value of the project using quantitative methods
- Identify stakeholders, write a set of requirements, and develop a top-level architecture for a particular system