SysEng 6542 Model-Based Systems Engineering

Course Syllabus – Spring 2020

Instructor: Dr. Quoc Do
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Department: Engineering Management and Systems Engineering
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Class: Video Communications Center - **vccmedia.mst.edu**
Monday, 4:00 – 6:30 PM CST

Office hours: Virtual Office – Zoom (by appointment only)

Required Textbook: *A Practical Guide to SysML: The Systems Modeling Language* by Friedenthal, Moore, and Steiner.

Canvas Course homepage

https://mst.instructure.com/courses/44897

Overview and Expected Learning Outcomes

The international systems engineering community recognized Model-Based Systems Engineering (MBSE) is the future of systems engineering practice because it introduces new capabilities that provide valuable benefits for complex projects. MBSE provides a structured means to define, design, implement, integrate, sustain and manage numerous interdependencies throughout the Lifecycle of complex systems.

It addresses the limitations inherent in describing complex systems across the Lifecycle using documents by providing an information-centric model (often referred to as 'source of truth') to support systems engineering activities such as user needs analysis, system specification, architectural design, risk analysis, trade-studies, and verification and validation.

Therefore, many of the international top companies in defense and commercial sectors are exploring the opportunities and challenges of MBSE. In this course, you will:

- Learn the differences between MBSE and traditional systems engineering, and benefits of MBSE in contrast to document-based systems engineering practice;
- Understand the basic elements of an MBSE Methodology: Process, method, language and tool;
- Gain an understanding and selection of MBSE practices across the system Lifecycle;

- Gain comprehensive understanding of the Systems Engineering modelling language (SysML) and its application in operational, functional and physical system modelling; and
- Understand model integration, translate models and bring together distributed models and resources.

Exams
There will be two exams for this class, each worth 100 Points. The material covered in the exams will be based on the lectures, classroom discussion, and assignments. Exams will be made available using Canvas and Examity at the beginning of the class period in which they are to be taken. More information will be provided by the instructor to assist students to register with Examity.

Projects
Two papers are required for this class. The first is a summary of a current research and development topic in the area of model based systems engineering (technical paper review), and the second will be documentation of the Final project. More details will be provided on due dates and deliverables in an accompanying project document.

Grading
The majority of grade for this class involves the development and presentation of a system model for the final project. There will also be the two exams and the review and presentation of a paper in the field of distributed systems engineering accompanied by a short (about 5 to 10 minutes) presentation on the contents of that paper.

The point breakdown is as follows:

- Exams (20% each) 40%
- Technical Paper Review 10%
- Final Project* 40%
- Participation/Teamwork* 10%

Late work will not be accepted unless arrangements have been made prior to the due date. Exceptions will be made only for emergencies. *Note that a significant portion of both your final project grade and the overall grade are determined by your participation, teamwork, and professionalism. Details on final project and technical paper review will be provided separately.

Academic Dishonesty
Page 30 of the MST Student Academic Regulations handbook describes the student standard of conduct relative to the System's Collected Rules and Regulations section 200.010, and offers descriptions of academic dishonesty. It is available on-line at http://registrar.mst.edu/academicregs/index.html and http://ugs.mst.edu/.

Special Needs
If you have a documented disability and anticipate needing accommodations in this course, you are strongly encouraged to meet with your instructor early in the semester. You will need to request that the Disability/Services staff send a letter to the instructor

verifying your disability and specifying the accommodation you will need before the instructor can arrange your accommodation. Disability Support Services is located in 203 Norwood Hall. Their phone number is 341-6655 and their email is dss@mst.edu.

Spring 2020 Course Schedule

Week	Topic	Assessment
1 – Jan 27th	Course Introduction MBSE Fundamentals	
2	MBSE Methodology Final project scope and selection	
3	SysML Language and Architecture	
4	SysML Models and Blocks Parametrics and Flows	
5	Technical paper presentations	Technical Review Paper
6	Modeling requirements and allocations	Final Project Proposal
7	Building SysML models - Examples with Commercial Software	
8	Customizing SyML for Specific Domain Open Book Exam 1	Exam 1 via ProctorU
9	Model integration and translating models Bringing together distributed models and resources	
10	Transitioning SysML into systems development environments and organizations	Interim Project Presentation
11	AP-233, Ontological Approaches, and other MBSE techniques	
12	Unified Profile for DADAF and MODAF (UPDM)	
3	Future directions of MBSE Project Presentations	
14	Project Presentations	Final Project Presentation
15	Final Week – Open Book Final Exam	Exam 2 via ProctorU