SysEng 6542
Model Based Systems Engineering

Course Introduction

Dr Quoc Do

Class Times

Class: Video Communications Center
vccmedia.mst.edu
Monday, 4:00 – 6:30 PM CST
Email: itms@mst.edu
573-341-4526

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

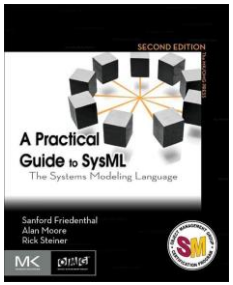
Canvas Course homepage
https://mst.instructure.com/courses/44897

Instructor Contact: Dr. Quoc Do
doq@mst.edu

VCC support: Ardith McComb
mccomba@mst.edu
573-341-6998 or

Textbook

- *A Practical Guide to SysML: The Systems Modeling Language by* Sandford Friedenthal, Alan Moore, and Riock Steiner.



Other References

- *SysML for Systems Engineering* by Jon Holt, Simon Perry, 2008.
- *Systems Engineering with SysML/UML: Modeling, Analysis, Design by* Tim Weilkiens, Morgan Kaufmann, 2006.
- INCOSE Systems Engineering Handbook, Version 4.

Class Outline

- 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 SysML Systems Engineering modelling language and its application in operational, functional and physical system modelling;
- Understand model integration, translate models and bring together distributed models and resources.

See Syllabus—Posted on Canvas

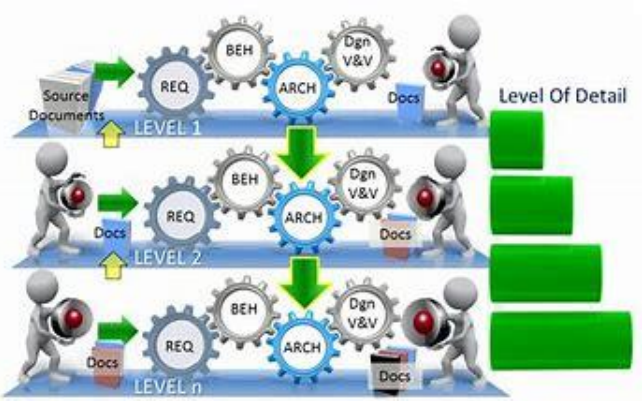
Grading

- Technical Review Paper/Presentation 10%
- Two Open-Book Exams 40%
- Final Project* 40%
- Participation/Teamwork* 10%

* Student peer-assessments are significant portion of the grade

Exams

- Two exams through the course of the semester via ProctorU.
- Must be completed within 2.0 hours.
- It is recommended to notify the instructor of when you plan to take the exam.



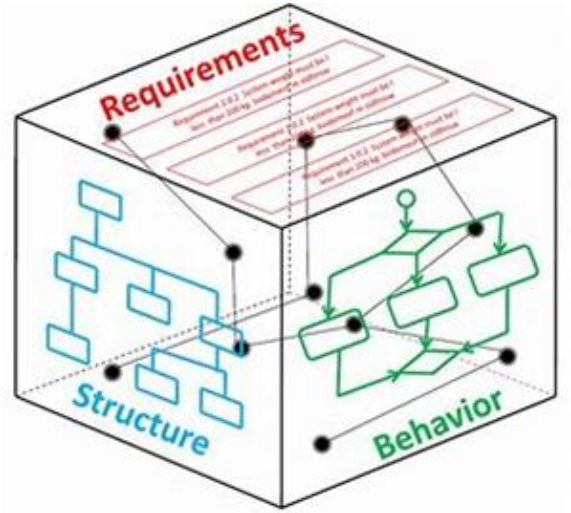
Model-Based Systems Engineering Process

Technical Review Paper

- Select a topic in the area of Model Based Systems Engineering
- Individual assignment
- Short in-class presentation (5 minutes)
  - Summary of the topic
  - Key paper's findings
  - Information Sources
  - Your view and conclusion
  - 5 page limit
- Sources
  - Company databases (i.e. Boeing)
  - INCOSE Publication
    - Symposia papers
    - MBSE Initiative's Wiki
  - Any systems engineering journals and publications
- Paper selection requires instructor approval
  - Send an email 2-3 papers on a selected topic (title, author, source) to instructor for approval.

Final Project

- Develop an MBSE model for the Air-Deployable Amphibious Vehicle (ADAV) using SysML in Cameo Enterprise Architecture and other modeling tools (if required).



- Groups of 4-5 students.
- Deliverables:
  - Project Proposal;
  - Project Interim Presentation;
  - Project Final Presentation; and
  - Project Report and System Model.
- Team work is essential and a peer assessment is required to be submitted by each student on their team members' performance and contribution.

Schedule

Week/class	Topic	Assessment
Wk – Jan 20th	No class	
Wk – Jan 27th	Course Introduction MBSE Fundamentals	
Wk – Feb 3rd	MBSE Methodology Final project scope and selection	
Wk – Feb 10th	SysML Language and Architecture	
Wk – Feb 17th	SysML Models and Blocks Parametrics and Flows	
Wk – Feb 24th	Technical paper presentations	**Technical Review Paper**
Wk – Mar 2nd	Modeling requirements and allocations	**Project Proposal Presentation**
Wk – Mar 9th	Building SysML models - Examples with Commercial Software (US-Daylight saving)	
Wk – Mar 16th	Customizing SyML for Specific Domain Open Book Exam 1	**Mid-Semester Exam via ProctorU**
Wk – Mar 23rd	Mid-semester break	No class
Wk - Mar 30th	Class presentation	**Interim Project Presentation**
Wk – Apr 6th	OOSEM - Building SysML models (Adelaide – Daylight saving)	
Wk – Apr 13th	MBSE Practice Across Defence and Industry	
Wk – Apr 20th	Unified Profile for DADAF and MODAF (UPDM)	
Wk – Apr 27th	MBSE - Systems of Systems Modelling	
Wk – May 5th	Final project presentation and report submission	**Final Project Presentation**
Wk – May 11th	Open Book Final Exam (No Class)	**Final Exam via ProctorU**
Wk – May 18th	Final grades available to students via Joe'SS	

Class – Meet and Greet

- Class Introduction - Each student, please introduce yourself, including but not limited to:
  - Name;
  - Objective;
  - Education;
  - Background and current role; and
  - Work experience (if applicable).

Introduction - Instructor

- **Education:**
  B.Eng, M.Eng, and PhD Electronics Engineering (Robotics) at University of South Australia

- **Professional Experience:**

Future Submarine Program - Department of Defence - Australia
-- Systems Engineering Governance Manager

Frazer-Nash Consultancy
-- Group Leader/Principal Consultant (Systems Engineering)

Department of Transport Victoria, Australia
-- Senior MBSE Sys Engineer – Melbourne Metro Rail Project

Royal Australian Navy
-- Functional Master Set Modelling
-- Future Submarine program

Australian Army
-- Capability modeling of Battlespace Communication System
-- Land Open System Architecture (LOSA)

Defence Systems Innovation Centre (DSIC)
-- Research Scientist

University of South Australia
-- Lecturer/Instructor for Masters of Systems Engineering programs

Introductions - Instructor

- **Professional Services History:**
  - ***Chair,*** *SESA Awards and Mentoring Committee.*
  - ***Immediate Past President*** of the Systems Engineering Society of Australia (SESA), a technical society of Engineers Australia (2016-2017);
  - ***President*** of the Systems Engineering Society of Australia (SESA), a technical society of Engineers Australia (2014-2016);
  - ***Associate Director*** for Technical Review of the International Council of Systems Engineering (INCOSE) (2010-2014);
  - ***Deputy President*** of the Systems Engineering Society of Australia (SESA) (a technical society of Engineers Australia), (2012-2014);
  - ***Co-Chair and Founder*** of the Model-Based Conceptual Design (MBCD) Working Group (2012-now);
  - Editor of the International Journal of Intelligent Defence Support Systems, since 2010;
  - Member of the OMG SysML Revision Task Force, 2012;
  - President of the INCOSE Australian Chapter (2009-2011); and
  - Secretary of the INCOSE Australian Chapter (2008-2009).

Program Completed