



SYSTEMS ENGINEERING ARCHITECTURE AND DESIGN

Course Information:

Course: SYSM 6301 / MECH 6337 (*Traditional Format*)

Term: Fall 2016

Classroom Building: JSOM

Section: 001 / 001

Classroom Number: 2.901

Class Meeting Times: Fridays from 4:00pm – 6:45pm

Professor Contact Information:

Professor: Alix Minden, P.E., PMP

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Office Location: ECSS 3.209

Office Hours: **CURRENTLY TBD. HOURS WILL BE UPDATED IN NEXT REVISION**
(planned to be posted by early to mid-August.)

Course Pre-requisites, Co-requisites, and Other Restrictions:

Pre- & Co-requisites: None.

Other Restrictions: Problem-solving, analytical, and advanced mathematics skills.

Course Description:

SYSM 6301 (CS 6301 / MECH 6337) Systems Engineering, Architecture and Design (3 credit hours) Architecture and design of large-scale and decentralized systems from technical and management perspectives. Systems architectures, requirements analysis, design tradeoffs, and reliability, through case studies and mathematical techniques. International standardization bodies, engineering frameworks, processes, notations, and tool support from both theoretical and practical perspectives. (3-0) Y

Course Structure:

The course's "face time" will be conducted as a mix of lectures, group and seminar-style discussions, in-class projects, and group presentations. There will be weekly assigned readings and/or webinars. The content will be assigned from two required textbooks, the INCOSE Systems Engineering Handbook, INCOSE's website, and potentially other case studies. Deliverables will include pre- & post- course knowledge assessments, various homework assignments, quizzes (mini-exams), a group term project, and an



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individual term paper. As appropriate, guest presenters may be invited to present their unique perspectives.

Learning Objectives:

Upon successful completion of this course, students will:

- Understand the established concepts and best practices in systems architecture and design, including model driven architecture and design.
- Understand the history of system architecture and design as a discipline.
- Understand the need for systems architecture and design for large-scale decentralized systems.
- Understand the stakeholders involved in systems architecture and design (roles, skills, responsibilities).
- Understand the role of product models in systems architecture and design; how to represent, analyze, and use the models.
- Understand the role of business process models in systems architecture and design; how to represent, analyze, tailor, and use the models.
- Understand the impact of quality-of-service attributes in systems architecture and design, including reliability and security capabilities.

Topics the Course Will Cover:

- Introduction to Systems Engineering
- Systems Engineering Fundamentals (Core SysE Methods and Skills)
- Systems Engineering Analysis Techniques & Tools
- Systems Engineering Metrics
- Systems Engineering frameworks and processes
- Related international standards (engineering, management, education)
- Brief introduction to Requirements Engineering and Risk Management
- Application of SysE Fundamentals to System Architecture
- System Architecture Modeling Overview
- Verification Notations and Approaches
- Application of SysE Fundamentals to System Design

Required Textbook and Materials:

1. Wasson, Charles S. *Systems Engineering Analysis, Design, and Development*. Hoboken: John Wiley & Sons, Inc., 2015. (ISBN: 9781118442265)
2. Maier, Mark W. *The Art of Systems Architecting*. Boca Raton: CRC Press, 2009. (ISBN: 9781420079135)
3. Walden, David D., Garry J. Roedler, Kevin J. Forsberg, R. Douglas Hamelin, and Thomas M. Shortell. *International Council on Systems Engineering (INCOSE)*



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Systems Engineering Handbook. Version 4, July 2015. (ISBN: 9781118999400)

4. **NOTE:** Textbook #1 and the required textbook chapters of #2 will be available for free in electronic form for UT-Dallas students, via the UTD McDermott electronic Library.
5. **NOTE:** The electronic version of “textbook” #3 is available to students for free, as INCOSE “CAB” Members, via INCOSE’s website.
6. Others to be identified later, and posted to eLearning (Blackboard).

Required Software (NO SOFTWARE TO BUY!):

1. Microsoft Office
2. Microsoft Visio (available free via a Premium account of Dreamspark)
3. **NOTE:** Your premium “Dreamspark” account will not be available until census day for the semester.

Great Reference Materials:

Textbooks and Handbooks:

1. Dickerson, Charles, and Dimitri N. Mavris. *Architecture and Principles of Systems Engineering*. Boca Raton: CRC Press, 2009. (ISBN: 9781420072532)
2. Kossiakoff, Alexander, and William Sweet. *Systems Engineering Principles and Practice*. Hoboken: John Wiley and Sons, 2003. (ISBN: 0-471-23443-5)
3. Montgomery, Douglas C., and George C. Runger. *Applied Statistics and Probability for Engineers*. Hoboken: John Wiley and Sons, 2007. (ISBN: 9780471745891)
4. Stair, Ralph M. *Quantitative Analysis for Management*. Englewood Cliffs: Prentice-Hall, Inc., 1999. (ISBN 0-13-021538-4)

Standards and Frameworks:

1. ISO/IEC 15288:2008 “Systems and Software Engineering – Systems Life Cycle Processes”.
2. ISO9000 / AS9100.

Grading Policy:

This grading policy might be slightly modified in the “final” version for the semester (planned to be posted by early to mid-August.)

Item	Weighting
“Homework” - Reflective Assignments	6.0%
“Homework” - Knowledge Application Assignments (3 to 5)	9.0%
Class Participation	10.0%
Pre- & Post- Course Knowledge Assessments (50% each)	5.0%
Group Project	30.0%



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Individual Term Paper	15.0%
Quizzes (5 to 10)*	25.0%
Total:	100%

NOTE: Assignment due dates will be identified within eLearning (Blackboard), but **typically by 7pm CT two days before the next class**. The quizzes will be **random** throughout the semester. The term paper and group project due dates will be identified during class and also in eLearning.

Grading Policy (Continued):

NOTE: Course quizzes (mini-exams) are NOT available for “make-up”. However, the **two** lowest scores will be “dropped,” with the possibility of a third depending on the total number of quizzes for the semester.

NOTE: All assignments, including the quizzes shall be submitted via **eLearning**. Email or hardcopy submission will not be accepted (unless otherwise approved by professor.)

Course & Instructor Policies:

- Students are expected to attend all classes and participate. Student participation contributes to the overall learning experience.
- Assignment late deliveries are not accepted, unless receiving prior professor approval.
- Unless specifically discussed during class, no extra credit is planned or available.
- Professor reserves the right to modify syllabus, as needed. If changed, notification will be provided to students via eLearning syllabus link, eLearning Announcements, and during the following class period.
- ***This syllabus will be updated to the “final” version for the semester before the semester officially begins (planned to be posted by early to mid-August). The really important part was to ensure you know which books and software is required.***

UT Dallas’ Policy on Sharing Confidential Information:

Per UTD Administration direction, the following policy is explicitly included in the syllabus.

“Students considering sharing personal information in email, in person, or within assignments or exams should be aware that faculty members and teaching/research assistants are required by UT Dallas policy to report information about sexual misconduct to the UT Dallas Title IX Coordinator. Per university policy, faculty have



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been informed that they must identify the student to the UT Dallas Title IX Coordinator. Students who wish to have confidential discussions of incidents related to sexual harassment or sexual misconduct should contact the Student Counseling Center (972-883-2527 or after hours 972-UTD-TALK or 972-883-8255), the Women's Center (972-883-8255), a health care provider in the Student Health Center (972-883-2747), the clergyperson (or other legally recognized religious advisor) of their choice, or an off-campus resource (i.e., rape crisis center, doctor, psychologist). Students who are sexually assaulted, harassed, or victims of sexual misconduct, domestic violence, or stalking, are encouraged to directly report these incidents to the UT Dallas Police Department at 972-883-2222 or to the Title IX Coordinator at 972-883-2218. Additional information and resources may be found at <http://www.utdallas.edu/oiec/title-ix/resources>.”

[Additional] UT Dallas Syllabus Policies and Procedures:

The information contained in the following link constitutes the University's additional policies and procedures segment of the course syllabus.

Please go to <http://provost.utdallas.edu/syllabus-policies/> for these policies.