SYSTEMS ENGINEERING ARCHITECTURE AND DESIGN

Course Information:

Course: SYSM 6301
Term: Spring 2015
Section: 001 (Traditional Format)
Classroom Building: ECSN
Classroom Number: 2.110
Class Meeting Times: Fridays from 4:00pm – 6:45pm

Professor Contact Information:

Professor: Alix Minden, P.E., PMP
Primary Email: Alix.Minden@UTDallas.edu
Secondary Email: Alix.Minden@LCMI.com
Phone: (469) 278-5264
Skype: AMinden
Office Location: ECSN 3.924
Office Hours: Wednesdays ~5:00-6:45pm, Thursdays ~5:00-6:30pm, Fridays ~2:00-3:45pm, or By Appointment

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 traditional lectures, group and seminar-style discussions, in-class projects, and group project presentations. There will be assigned readings for each session. The readings will be assigned from chapters of various books, journal articles, and case studies. Deliverables will include pre- & post-course assessments, homework assignments, quizzes (mini-exams), a group term project, and an individual term paper. Where appropriate, guest presenters from industry and academia with extensive backgrounds in systems engineering architecture

and design may be invited to present their unique perspectives on current technical and management issues.

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.

Required Textbook and Materials:

Core Journal Articles:

1. MIT, The Influence of Architecture in Engineering Systems, http://esd.mit.edu/symposium/pdfs/monograph/architecture-b.pdf

Core Books / Textbooks / Handbooks:

1. To be identified during the course term.

***Note**: These are all freely available as a UT-Dallas student. Plus, I will post them to eLearning (Blackboard).*

Required Software:

1. Microsoft Office
2. Microsoft Visio (available free via a Premium account of Dreamspark)

Highly Recommended Course Materials:

1. International Council on Systems Engineering (INCOSE) Systems Engineering Handbook, INCOSE-TP-2003-002-03.2.2, Version 3.2.2, October 2011. http://www.incose.org/ProductsPubs/incosestore.aspx

Great Reference Materials:

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. Maier, Mark W. *The Art of Systems Architecting*. Boca Raton: CRC Press, 2009. (ISBN: 9781420079135)
4. Montgomery, Douglas C., and George C. Runger. *Applied Statistics and Probability for Engineers*. Hoboken: John Wiley and Sons, 2007. (ISBN: 9780471745891)
5. Stair, Ralph M. *Quantitative Analysis for Management.* Englewood Cliffs: Prentice-Hall, Inc., 1999. (ISBN 0-13-021538-4)
6. Standards and Frameworks:
    a. ISO/IEC 15288:2008 "Systems and Software Engineering – Systems Life Cycle Processes".
    b. DOD 5000.2-R, version from December 8, 2008.
    c. For DoDAF version 1.0:
        i. **http://nas-architecture.faa.gov/nas/Reference/nasearef/files/DoDAF_v1_0_vol_2.pdf**
    d. For DoDAF version 1.5, Volume 1:
        i. http://jitc.fhu.disa.mil/jitc_dri/pdfs/dodaf_v1v1.pdf
    e. For DoDAF version 1.5, Volume 2:
        i. http://www.defenselink.mil/cio-nii/docs/DoDAF_Volume_II.pdf
    f. For MoDAF:
        i. http://www.modaf.org.uk/
    g. ISO9000 / AS9100.
    h. ISO 10303-233:2012.

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
- Application of SysE Fundamentals to System Architecture
- System Architecture Modeling
- Verification Modeling Notations (informal, semi-formal, formal)
- Application of SysE Fundamentals to System Design

Grading Policy:

Item	Maximum % Earned
Homework	15.0%
Class Participation	10.0%
Pre-Course Survey	2.5%
Post-Course Survey	2.5%
Group Project	30.0%
Individual Term Paper	15.0%
Quizzes (6 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 in class.

NOTE: All assignments shall be submitted via **eLearning**. Email or hardcopy submission will not be accepted.

Course & Instructor Policies:

- Students are expected to attend all classes and participate. Student participation contributes to the overall learning experience.
- Late delivery of assignments are not accepted, unless receiving prior professor approval.
- Unless specifically discussed during class, no extra credit is planned or available.
- Course quizzes (mini-exams) are not available for "make-up". However, the two lowest scores will be "dropped."
- 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.

UT Dallas Syllabus Policies and Procedures:

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

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