SYLLABUS

SAE 542: Advanced Topics in Systems Engineering   **Summer 2017**

Class Session: Monday, 6:00 PM – 9:10 PM PDT, OHE 100C

Class Section: 32312D (DEN/Off-campus) and 32342R (On Campus)

Contact Information:

Instructor: Dr. Phan Phan   Instructor: Mr. Kenneth L. Cureton
Office hours: Upon request   Office hours: Upon request
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If you have any questions and difficulties with understanding course materials, please post any technical or administrative inquiry on our class' weekly discussion board that can benefit all fellow students (and also help us not have to answer the same questions again and again). If your inquiry is of personal nature, please e-mail us. The usual turn-around time for either discussion board or email response is 24 hours. If you don't hear from us within that timeframe, please send us a reminder. Always include both instructors in any email you send.

Course Learning Objectives:

- To introduce the students to advanced topics relevant to systems architecting of complicated and complex systems.
- To introduce the students to mathematical modeling tools and techniques used in systems engineering and management.

Readings and Notes:

- Weekly lecture notes will be posted on the Desire to Learn (http://www.courses.uscden.net)
- Required text to be acquired by students:
  - Friedman, George J. (2005). *Constraint Theory, Multidimensional Mathematical Model Management*. New York, NY: Springer.
- Selected updated chapters from the following text draft to be posted on Desire2Learn:
  - Friedman, George J. and P. Phan (2017). *Constraint Theory, Multidimensional Mathematical Model Management*, 2nd edition. New York, NY: Springer.
- Required text to be downloaded from Desire2Learn by students:
  - Moffat, James. *Complexity Theory and Network Centric Warfare,* The DoD Command & Control Research Program (CCRP) publication (September 2003) ISBN 1-893723-11-9.

Class Grade:

Your grade will be based on two (2) exams. Both exams will be administered online through Desire2Learn, and each exam will account for 1/2 of your final grade. Homework exercises will be assigned but not graded. Their solutions will be subsequently provided to enable your knowledge check.

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Exams:

■ The exams will consist of multiple questions that will test students' knowledge about the advanced systems engineering topics presented in the class. These exams will cover the four (4) lectures and assigned readings prior to the exam. These will be open book, take-home exams over a four-day period. The mid-term exam can be downloaded, completed, and submitted to Desire2Learn anytime between **Friday June 23, 2017 6:00 AM and Monday June 26, 2017 6:00 PM**. The final exam can be downloaded, completed, and submitted to Desire2Learn anytime between **Friday August 4, 2017 6:00 AM and Monday August 7, 2017 6:00 PM**. All times are in Pacific Daylight Savings (PDT) time zone.

■ You *are **not** allowed* to collaborate on the exams. You *are **not** allowed* to copy-and-paste from the readings, publications, any other Internet sources, or the course materials-- all exam answers must be in your own words. The default punishment for unauthorized collaboration, cheating, and plagiarism on the exams is a grade of F for the course.

UNIVERSITY LEVEL ISSUES

■ **Statement for Students with Disabilities**:
Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (or to TA) as early in the semester as possible. DSP is located in GFS 120 and is open 8:30 a.m.–5:00 p.m., Monday through Friday. The phone number for DSP is (213) 740-0776.

■ **Statement on Academic Integrity**:
USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one's own academic work from misuse by others as well as to avoid using another's work as one's own. All students are expected to understand and abide by these principles. *Scampus,* the Student Guidebook, contains the Student Conduct Code in Section 13.00, while the recommended sanctions are located in Appendix A: https://scampus.usc.edu/university-student-conduct-code/. Students will be referred to the Office of Student Judicial Affairs and Community Standards for further review, should there be any suspicion of academic dishonesty. The Review process can be found at: http://www.usc.edu/student-affairs/SJACS/.

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<u>**Schedule of Class Sessions:**</u> The exact schedule is subject to change. Dates of readings may change to align with other schedule adjustments. Changes will be announced.

2017	Lecture Topics	Readings, homework & exams
May 22	1. Course intro & admin, introduction to probability theory, imperfect testing (P2 & Cureton)	HW set #1 assigned
May 29	University Holiday (no class meeting)	Read: Constraint Theory 1st ed, Chapter 1
Jun 5	2. Discrete & continuous probability models, introduction to reliability & maintainability, review HW set #1 answers (P2 – pre-taped)	***Submit student biography*** HW set #2 assigned Read: Constraint Theory 1st ed, Chapter 2
Jun 12	3. Distribution models of failure rate & reliability, Weibull model & life testing, review HW set #2 answers (P2)	HW set #3 assigned Read: Constraint Theory 1st ed, Chapter 3
Jun 19	4: Systems Engineering for Complex Systems: Introduction to Complexity Theory (Cureton), review HW set #3 answers (P2)	Read: Complexity Theory Chapter 1
Jun 23 Jun 26	*Mid-term exam covering Lecture topics 1, 2, 3 and 4*	***Take-home exam -- Friday June 23 at 6:00 AM PDT through Monday June 26 at 6:00 PM PDT***
Jun 26	5: Systems Engineering for Complex Systems: Complexity Theory Applied to Software-Intensive Systems (Cureton)	HW set #4 assigned Read: Complexity Theory Chapter 2
Jul 3	University Holiday (no class meeting)	
Jul 10	6. Resilience Engineering Concepts applied to Complex Systems (Cureton)	Read: Complexity Theory Chapter 4 Read: Constraint Theory 2nd ed, Chapter 4
Jul 17	7. Engineered Resilient Systems – Case Studies of Complex Systems (Cureton)	HW set #4 updated (Lectures #4 - #6) Read: Constraint Theory 2nd ed, Chapter 5
Jul 24	8. Constraint Theory Fundamentals for Complicated & Complex Systems (P2)	HW set #5 assigned Read: Constraint Theory 2nd ed, Chapter 6
Jul 31	9. Constraint Theory Applications in Complicated & Complex Systems, review HW set #4 answers (P2)	Read: Constraint Theory 2nd ed, Chapters 7, 8 and 9 – Not on Exam
Aug 4 Aug 7	*Final exam covering Lecture topics 5, 6, 7, 8, and 9*	***Take-home exam—Friday August 4 at 6:00 AM PDT through Monday August 7 at 6:00 PM PDT***
Aug 7	10. Course Review, Research Frontiers (P2 & Cureton)	None