SIE 454A/554A: The Systems Engineering Process
Fall 2023

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                SIE 454-001
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                SIE 454-010 & 110
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                Homework for all sections & quiz questions

Prerequisite: Advanced standing in the College of Engineering; or
                SIE 250 Introduction to Systems and Industrial Engineering

Course Description
Processes and tools for engineering large-scale, complex systems: resources, architecture, requirements, risk management, concept design, preliminary design, detail design, decision making, tradeoff studies, life-cycle models, requirements decomposition, verification planning, life cycle planning, product maintenance, teamwork, and documentation.

Course Objectives
This course is aimed at developing your capability for systems thinking by introducing classical and advanced systems engineering theory, methods, and tools. Practical examples will be used to demonstrate the concepts. After taking this course, you should be able to:
- Apply systems engineering methodologies & tools to the design of large, complex systems from eliciting customer requirements through disposal

- Apply systems engineering methodologies & tools to a project

- Judge the applicability of any proposed process, strategy, or methodology for systems engineering using fundamental concepts

- Understand system engineers' role and responsibilities within organizations
- Understand the dynamics of teams and their role in successful projects
- Recognize the value and limitations of modeling and simulation
- Be able to utilize the internet to research materials that supplement and expand the systems engineering philosophy and techniques taught in the class

Pandemic Information

The course will be taught with in-class sections being live in accordance with University policies. The lectures will be recorded and available in D2L. This will be the case unless directed otherwise.

Advice

1. Keep up with the reading during the semester
2. Attend class (prior students have consistently made this comment)
3. Participate in the exercises (in class or in the zoom sessions)
4. Take advantage of me and the TA's as resources (especially on the project as you develop your system)
5. Do your project a little at a time and not try to do the assignment in one day when it is due

Required Course Texts (Interactive Learning eBook)

1. *Fundamentals of Systems Engineering: Basics for Practical Application*, B. O'Cain, August 2022 First Edition, Cognella Publishing
   a. eBook required (ie- active learning). Available through interactive learning in the D2L content section. You will have immediate access for the first 2weeks of class. Your bursars account will be charged on the 24th unless you drop the class and go into the app and "opt out"
   b. Hardcopy available as an add on to eBook purchase.

If you have any difficulty ordering or accessing the book use the following contact information to get your issue resolved

Phone: (858) 552-1120

eMail: orders@cognella.com

Included eBook Resources

1. Reading references that supplement the materials taught in class.
2. Video tutorials that further explain the key concepts in the class
3. Student reports as examples of good class project designs
4. Comprehension checks at the end of textbook section
5. Practice quizzes (eBook, not for grade) to reinforce the concepts

Class Exercises

Team exercises will be done in class. Each one allows the student to develop a particular system design artifact given a set of design information. The exercises will also be conducted on-line through an evening Zoom session on the same day as the in-class exercise. This on-line exercise event will be at 7:00 pm MST and will be recorded for those who cannot attend either session. The link and recording will be in D2L.

Quizzes

Practice: There are 15 quizzes in the eBook that are there for your practice. These do not count for a grade in the course (one at the end of each textbook chapter). They will be taken online in the Cognella active learning site. They are scored and the results provided to you as feedback.

For score- There are 6 quizzes in D2L that are graded for the class. The questions come from the textbook reading, as well as the reference reading noted. They are worth 12% of your total grade.

Homework Assignments

There are ten homework assignments. These are individual assignments. Some build on the output from team exercises. The submission must be pdf or word format. They are worth 20% of your total grade.

System Design Project

You are to define a problem and then develop a system design to satisfy it. This may be defining a new system or a replacement for an existing system. These are individual projects and the scope should be approved by me or a TA to ensure you are on the right track before you start deliverable 1. You will be expected to apply the methods taught in the class and submit a final report at the end of the semester that complies with the Rubric provided for the course you are enrolled in. There are 3 deliverables leading up to the final report. They are the "*Problem Statement & System Concept"*, the *"System Functional Design,"* and the *"System Detail Design".* The project deliverables (1, 2, & 3) + the final report make up 68% of your grade.

Due Dates

These are shown in the D2L assignment section. Late submissions will be penalized as follows: not more than a day late 5%; less than1 week 10%; over a week late 25% (unless approved by me before the due date). **Quizzes do not have due dates and therefore no late penalty.** The final report will not be accepted if submitted beyond the due date shown in the D2L assignment folder.

Basis of grade

Element	Weight	Notes
Homework	20%	10 assignments Official due dates are shown in the D2L assignments folder
Quizzes	12%	6 Quizzes Quizzes do not have due dates and therefore no late penalty.

Problem & System Concept	8%	Each deliverable must follow the project rubric for your specific class (454A or 554A). Official due dates are shown in the D2L assignments folder
Functional Design	15%	
Detail Design	15%	
Final Project Report	30%	

Accessibility and Accommodations
Our goal is that learning experiences be as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, please let me know immediately so that we can discuss options. You are also welcome to contact Disability Resources (520-621-3268) to establish reasonable accommodations. For additional information on Disability Resources and reasonable accommodations, please visit http://drc.arizona.edu/.

If you have reasonable accommodations, please plan to meet with me by phone to discuss accommodations and how my course requirements and activities may impact your ability to fully participate.

Inclusive Excellence is a fundamental part of the University of Arizona's strategic plan and culture. As part of this initiative, the institution embraces and practices diversity and inclusiveness. These values are expected, respected and welcomed in this course.

Threatening Behavior Policy
The UA Threatening Behavior by Students Policy prohibits threats of physical harm to any member of the University community, including to one's self. See: http://policy.arizona.edu/education-and-student-affairs/threatening-behavior-students.

Code of Academic Integrity
Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of independent effort unless otherwise instructed. Homework assignments and the Midterm will be evaluated for originality using the "Turn-it-In" tool. Students are expected to adhere to the UA Code of Academic Integrity as described in the UA General Catalog. See: http://deanofstudents.arizona.edu/academic-integrity/students/academic-integrity

The University Libraries have some excellent tips for avoiding plagiarism available at: http://www.library.arizona.edu/help/tutorials/plagiarism/index.html

Selling class notes and/or other course materials to other students or to a third party for resale is not permitted without the instructor's express written consent. Violations to this and other course rules are subject to the Code of Academic Integrity and may result in course sanctions. Additionally, students who use D2L or UA email to sell or buy these copyrighted materials are subject to Code of Conduct Violations for misuse of student email addresses. This conduct may also constitute copyright infringement.

UA Nondiscrimination and Anti-harassment Policy

The University is committed to creating and maintaining an environment free of discrimination, http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy

Our learning environment is a place where everyone is encouraged to express well-formed opinions and their reasons for those opinions. We also want to create a tolerant and open environment where such opinions can be expressed without resorting to bullying or discrimination of others.

Subject to Change Statement
Information contained in the course syllabus, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor