**SIE 454A/554A: The Systems Engineering Process**
Fall 2021


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**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: architecture, requirements, risk management, evaluation criteria, concept exploration, decision making, tradeoff studies, life-cycle models, decomposition, system coupling, test, verification, validation, system modeling, business process re-engineering, sensitivity analysis, teamwork, process maturity and documentation.

**Course Objectives**
This course is aimed at developing your capability of systems thinking by introducing classical and advanced systems engineering theory, methods, and tools. 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 Accommodations**
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.

**Required Course Texts**

1. Fundamentals of Systems Engineering: Basics for Practical Application, BD O'Cain, August 2021 preliminary edition, Cognella Publishing
    a. Available in Ebook
        i. Hardcover available as an add on to Ebook

**Homework assignments**
There are five homework assignments. These are individual assignments even though some of them build on the team class exercises. They must be submitted electronically via the D2L website. The format must be pdf or word. Submissions not more than a week late will be docked 20%. Over a week late will not be graded unless authorized by me in advance. The five homework assignments are worth 20% of your grade.

**Quizzes**
There are 15 quizzes, one at the end of each textbook chapter. They will be taken online with a link provided in the text. Submissions not more than a week late will be docked 20%. Over a week late will not be graded unless authorized by me in advance. They are worth 15% of your 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. You will be expected to apply the methods taught in the class and submit a final report at the end of the semester. The project makes up 65% of your grade. There are 3 deliverables leading up to the final report. They are the problem statement, the "System Concept of Operations" and a "System Detail Design". The scope of your proposed system will be evaluated by me to ensure the scale is appropriate for this class. These are individual projects. Those students also taking ENG 498 are not allowed to use that project to satisfy this course requirement.

**Basis of grade**

| Component | Weight | Notes |
|---|---|---|
| Homework | 15% | 5 assignments<br>Official due dates are shown in the D2L assignments folder |
| Quizzes | 15% | 15 Quizzes.<br>One at the end of each chapter. Official due dates are shown in the D2L assignments folder |

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|---|---|---|
| Problem & System Concept<br>ConOps & Functional Design<br>Detail Design<br>Final Project Report | 5%<br>20%<br>20%<br>25% | Each deliverable must follow the project rubric for your specific class (454A or 554A). Official due dates are shown in the D2L assignments folder |

**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