

Please reference formal communication from the University of Arizona on COVID-19, this is a dynamic situation, as such policies and practices are changing in real time. My commitment to you is to effectively teach the key elements of systems and industrial engineering regardless of your location or availability this semester. Systems engineering is done in practice as teams, across the globe, with varying backgrounds and skillsets. In some respects, your experiences during COVID may better prepare you for the reality of this profession.

The University of Arizona
Systems and Industrial Engineering

Syllabus for
Systems and Industrial Engineering SIE250
Fall, 2021

Instructor: John Ullrich
eMail: ullrich@email.arizona.edu
Course Website: D2L Arizona

Class Time and Dates: M,W,F 1100-1150

- Flex inperson, reference registrar material for ILC room assignment
 - o Courses recorded via ZOOM <https://arizona.zoom.us/j/84093880020>
- Onsite lectures are utilized to facilitate in-class collaboration. In-class exercises are a key component of your grade and can not be substituted for remote work.

Attendance is not a factor in final grades. If you need to miss a class session, notify the instructor in advance. However, all discussion threads and homework are due on time – no exceptions will be made.

Weekly Discussion on D2L:

- Bi-weekly the instructor will post an item on D2L.
- You are responsible to spend thirty minutes reviewing and researching the material (question, short article or commentary, video, or other) and posting a **one-paragraph** response on D2L discussion board for the entire class to see.
- Response due by 11:00 PM every Thursday.
- These are mandatory and will be graded. There will be no exemptions made for missed discussion threads.

Office Hours:

- For 2 hours every week the professor will be available for drop-in office hours, as follows:
 - o 4-5 PM –after class each Friday – same D2L Collaborate link as above
 - o Friday afternoon and evenings by appointment.

Students will be notified in advance should the above hours change due to Instructor's business travel schedule.

Bulletin Description of the Course:

The course serves as an introduction to systems engineering. Students will be introduced to the systems development lifecycle as a methodology; fundamental principles and practices will be discussed and detailed through the entire spectrum of systems engineering, notably: engineering processes, concept development

including problem definition, stakeholder identification, elicitation of stakeholder objectives, definition of system requirements, concept generation, concept selection, system verification, and system validation.

Also within the scope of this course is an introduction to industrial engineering, including the concepts of: design for manufacturing, sales and operations planning, optimization, and an overview of Six Sigma concepts and methodologies, with a focus on solving novel Engineering Management problems using the DMAIC process. Note: This is not a belt certification class.

Course Learning Objectives:

Upon completing the course, students will be able to:

1. Define key elements of a systems engineering lifecycle
2. Apply principles and practices of requirements derivation into functional and physical architecture
3. Apply a working knowledge of interface design
4. Define critical interfaces
5. Define key elements of Six Sigma and Lean and their application
6. Describe and apply the DMAIC phases
7. Apply MATLAB/Simulink tools, such as basic mathematical modeling, and optimization
8. List and apply key Lean concepts, such as Muda (waste reduction), VSM, Value Added/Non-Value Added analysis, and other Lean fundamental concepts

Required Textbook and Other Materials: All available online through the University of Arizona

[Systems Engineering Principles and Practice, 2nd Edition](#)

Kossiakoff, Alexander ; Sweet, William N ; Seymour, Samuel J ; Biemer, Steven M ; 2011

- Principles and Practice provides an educationally sound, entry-level approach to the subject...
- MATLAB (SIMULINK) <https://new.library.arizona.edu/tech/software/matlab-r2019b>
- <https://softwarelicense.arizona.edu/mathworks-matlab>

Average Amount of Out-of-Class or Independent Learning Expected per Week:

Students will spend 3 hours per week in lecture, 1 hour per week in D2L discussion, and 6 hours in two exams given outside class hours. Homework and other out-of-class work is estimated at around twice the classroom time. <https://catalog.arizona.edu/policy/credit-definitions>

Class Schedule and Assignments:

Module	Topic/Activity	Key Items
1	Foundations	Modern Systems Engineering • Characteristics of complex systems • Intro to models (or thinking of systems as models) Definition of a System Model (Wymore) • Systems Engineering Viewpoints –Why are we different Hierarchical models of complex systems • Framework –The building blocks of complex systems Systems Life Cycles
2	Concept Development	Origins of a new system • Validate and understand operational need • Creation of operational requirements Concept Explorations

		•Deriving or creating system concepts from requirements •Alternate Concepts, trades and analysis Selecting the Preferred System •Using modeling and analysis to select
3	Engineering Design	•Concerned with designing all the component parts so that they will fit together as an operating whole that meets the system operational requirements •It is an intensive and highly organized effort, focused on designing components that are reliable, maintainable, and safe under all conditions to which the system is likely to be subjected •Your end goal producible, cost effective and on target
4	Industrial Engineering	• Role of Systems Engineering in the Factory • Engineering for Production Principles • Product Operations Overview
5	Simulink and Modeling	• Mathematical Modeling • Optimization • Machine Learning

Class Organization:

This class will be offered by ZOOM (remotely) as well as in-person meetings dependent on the progression (or regression) of the COVID-19 pandemic currently impacting... humanity (but southern Arizona falls into that category), for both for lectures and demonstrating Simulink. Students are encouraged to use two screens to enable following along as the Instructor provides demonstrations. Also classes will be recorded for future reference.

How Student Performance Will Be Evaluated on Assignments & Other Course Assessments:

1. Bi-Weekly Discussion Board

- A topic will be provided. See each post for specifics, but posts may include a discussion of learnings or insights for that week's homework. Note: Do not give away the answer in the posts, but help and tips are acceptable.
- Evaluation will be based on accuracy of interpretation and clarity, as well as guideline adherence. Avoid verbosity.
- Incomplete or late discussions will receive a zero – there will be no exceptions made.

2. Homework Assignments

- Homework assignments will relate to current lecture or reading material
- Answers will be provided by the Student using the Assessment tool in D2L, and will be automatically graded.
- Homework will be reviewed the following class as time permits, or a can be discussed in the open office hours sessions.
- Homework not completed on time will receive a zero grade. Both homework and discussion threads are due by 11 PM Thursday before the Friday class

Exams:

- There will be a mid-term and a final exam, administered on D2L outside the class meeting time
- Each exam is designed to be completed in 1 hour, with a 3-hour window in which to take it.
- The exam is available for 72 hours after it is posted.

Grading:

A, B, C, D, and E constitute the regular grades used at the University of Arizona. Regular grades are included in the calculation of the grade-point-average (GPA).

A minimum grade of C may be required to register for some courses when a higher level of mastery than a D is necessary for the student's success in the subsequent course. Students should check the requisites (recommended course work) and enrollment requirements (required course work) when planning their class schedules and registering for the next term. Recommended and required course work is noted in the UAccess Class Search and in the Course Catalog.

<https://catalog.arizona.edu/policy/grades-and-grading-system>

- | | |
|-----------------------------|------|
| • Homework (qty 7): | ~20% |
| • Discussion Thread (qty 7) | ~10% |
| • Exam 1 | ~35% |
| • Exam 2 | ~35% |
| • Total | 100% |

Other Policies and Links: <https://catalog.arizona.edu/policies>

- **Student Responsibilities:** Attending regularly scheduled sessions, make-up classes, and other course meetings is a fundamental student responsibility. Attendance at every scheduled session, for the entire session, is expected but ultimately the responsibility of the student.
- **Academic Integrity Code:** Academic dishonesty is defined as cheating of any kind, including misrepresenting one's own work, taking credit for the work of others without crediting them and without appropriate authorization, and fabricating information. All academic work is subject to University policy and may be scrutinized electronically. For more information, see <http://deanofstudents.arizona.edu/policies-and-codes/code-academic-integrity>
- **Student Disability Support Services:** Students needing an accommodation based on the potential impact of a disability should contact Disability Support Services
- **Student Mental Health Services:** UofA offers 24/7 assistance and referral for students needing crisis and emergency mental consultations, confidential assessment, and counseling services
- **Emergencies:** In case of emergency, students will be notified on D2L