

ME EN 5960/6960 – Fundamentals of Systems Engineering

Section 006: In Person and Live Stream

Department of Mechanical Engineering
The University of Utah | Fall 2021

Prereqs: Graduate standing
or dept. approval

In Fundamentals of Systems Engineering, students are introduced to the science of systems engineering, especially the methods and disciplines used to define, develop, and deploy small to complex and large-scale systems. The course takes advantage of integrated examples, analysis and discussion of case studies, projects, and team exercises that enable a thorough understanding of the larger context wherein requirements for a system are realized and then translated into an operational concept.

COURSE CONTACTS

Instructor:

Pedro Huebner

pedro.huebner@utah.edu

Office: 2465 MEK

OH: Tuesdays | 2:30 - 3:30 PM
Thursdays

Teaching Assistant:

TBD



Department Liaison:

TBD

WEBSITE

<https://mech.utah.edu>

LEARNING OUTCOMES

At the end of the course, students should be able to:

- Understand and define the science of systems engineering, the stages of a system life cycle, and the interrelationships between systems engineering and other fields.
- Demonstrate familiarity with the tools and disciplines of systems engineering and their respective goals within the system life cycle.
- Identify and describe the four process groups that support systems engineering.
- Examine the requirements of a system and their relevance in the early stages of systems development.
- Implement functional analysis, decomposition, and requirement allocation tools and their relevance in the later stages of systems development.
- Demonstrate familiarity with technical management processes and how they are used to establish and execute plans at any stage of the system life cycle.

COURSE STRUCTURE

The course is structured in the form of semiweekly meetings that may include lectures, demonstrations, discussion sessions, in-class assignments, review sessions, Q&As, quizzes, exams, etc. Attendance is encouraged for all course meetings. Students will be informed well in advance if an in-class activity has an impact on grade. Some lectures may be mostly dedicated to the modelling of problems using information technology software. For that reason, students are welcome to bring their own laptops to follow lectures.

Homework assignments must be submitted individually, but collaborative work is encouraged. In other words, students are free to work together when formulating problems and coming up with creative solutions but are required to submit their own work and not that of their colleagues. All assignments will require the submission of electronic materials via Canvas. Please pay attention to specific instructions for each assignment provided during class and/or published online. Quizzes will be taken during class time and should take around 20 minutes to be completed. They will usually be administered at the end of lectures, so plan your attendance accordingly.

One midterm exam and one final exam will contain a variety of multiple choice, essay, and engineering-type questions. Exams are closed book and notes, but one double-sided letter-sized "cheat sheet" is allowed, unless otherwise specified. Exams are typically designed to be completed within a 1-hour interval, but the full lecture time will be made available. You can use a calculator (scientific encouraged) to solve the exams. The use of smartphones or other communication devices is prohibited.

A group research project is designed to allow students to display creativity and demonstrate that they have mastered the concepts illustrated in the course. All team members are expected to contribute equally to the completion of the project report. A peer evaluation will be conducted at the end of the course where students will be rated by their teammates based on their individual contributions. The outcome of the peer evaluation will be taken into consideration for the grade portion related to the project.

GENERAL POLICIES

All students and instructional staff are expected to follow proper classroom behavior and treat others with civility and respect. If anyone's actions or behavior become disruptive, the instructor reserves the right to invite them to leave for the remainder of that day.

The use of computers and other communication devices during class is allowed for taking notes, referring to an electronic version of the textbook, and/or using calculation software. Cell phones must be silenced. Voice calls, texting, and social media are prohibited unless in case of emergencies or when explicitly authorized by the instructor. Snacks, coffee, and other refreshments can be consumed if permitted by the building code. Liquids must be kept in leak- and spill-proof containers, and food must not produce strong smell. Please properly dispose of all waste and help keep our learning environment clean.

REFERENCE TEXT

This course will adopt a handbook prepared by the International Council on Systems Engineering (INCOSE) as its primary reference text. Students have access to an electronic copy of the book at no additional cost using the J. Willard Marriott Library's website. While on campus or logged in for off campus access, use the search tool to find the reference below and download individual chapters or view the entire book using Adobe Digital Editions. Additional materials and other relevant references will be shared throughout the semester at no cost to students.

- o INCOSE. INCOSE Systems Engineering Handbook: A Guide for System Life Cycle Processes and Activities (4th edition). John Wiley & Sons, 2015. Print ISBN: 9781118999400, eBook ISBN: 9781118999417.

GRADING

	Weight	Notes
Homework	25%	5 assignments
Quizzes	15%	5 quizzes
Research Project	10%	1 written report
Midterm Exam	20%	cheat sheet allowed
Final Exam	30%	cheat sheet allowed

This course follows the letter grading scheme below:			
95 ≤ A ≤ 100 90 ≤ A- < 95	87 ≤ B+ < 90 83 ≤ B < 87 80 ≤ B- < 83	77 ≤ C+ < 80 73 ≤ C < 77 70 ≤ C- < 73	67 ≤ D+ < 70 63 ≤ D < 67 60 ≤ D- < 63 0 ≤ E < 60
The option to curve the overall grade distribution is at the sole discretion of the instructor and will never be in disadvantage of any student.			

Regrade and grade correction requests must be made directly to the course instructor no later than one week after the grade or work in question has been returned. Please monitor your grades posted in Canvas continuously as it holds the course's official gradebook.

LATE ASSIGNMENTS AND MAKEUP WORK

The grade for an assignment submitted up to one day following the original deadline will have a 50% penalty applied to it. Assignments submitted more than one day after the original deadline will not be accepted or graded. Legitimate excuses must be supported with appropriate documentation. Makeup work, when authorized by the instructor, will be discussed on a case-by-case basis.

ATTENDANCE

Attending every lecture is highly recommended and encouraged. A low attendance record may be detrimental to your success in the course. Absences to exams and other graded in-class activities can be excused if reasonably justified and supported by appropriate documentation. It is at the discretion of the instructor to accept excuses, which will be

analyzed on a case-by-case basis in accordance to The U's policies on instruction and evaluation, available at: <https://regulations.utah.edu/academics/6-100.php>.

ACCOMMODATIONS FOR DISABILITIES

The University of Utah seeks to provide equal access to its programs, services, and activities for people with disabilities. If you will need accommodations in this class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Union Building, (801) 581-5020. CDS will work with you and the instructor to make arrangements for accommodations. All written information in this course can be made available in an alternative format with prior notification to the Center for Disability Services.

In addition to the standard process above, please inform the instructor if you have any other issues that may prevent you from fully demonstrating your abilities so that accommodations can be made to ensure your full participation in the course and safeguard your educational opportunities at The U.

NON-DISCRIMINATION POLICY

The University of Utah guarantees equality of opportunity in education and strives to provide an academic environment that is free from any form of discrimination. Therefore, discrimination or harassment of any person based on race, color, religion, creed, gender, national origin, age, disability, veteran status, sexual orientation, or gender identity is a violation of state and federal laws and/or The U's policies and will not be tolerated. Retaliation against any person who complains about discrimination is also prohibited. Be advised that all students, faculty, and staff are required to report instances of sexual harassment, sexual assault, or discrimination to the appropriate offices within the university. Information regarding non-discrimination policies and reporting guidelines can be found at <https://oeo.utah.edu>.

Addressing Sexual Misconduct: Title IX makes it clear that violence and harassment based on sex and gender (which includes sexual orientation and gender identity/expression) is a civil rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a disability, veteran's status or genetic information. If you or someone you know has been harassed or assaulted, you are encouraged to report it to the Title IX Coordinator in the Office of Equal Opportunity and Affirmative Action, 135 Park Building, 801-581-8365, or the Office of the Dean of Students, 270 Union Building, (801) 581-7066. For support and confidential consultation, contact the Center for Student Wellness, 426 SSB, (801) 581-7776. To report to the police, contact the Department of Public Safety, (801) 585-2677(COPS).

Pregnancy/Childbirth: Should you need modifications or adjustments to your course requirements because of pregnancy- or childbirth-related matters, please contact your instructor as soon as possible to discuss an accommodation plan. Congratulations and enjoy the many sleepless nights to come!

Religious Observance: Students may excuse absences that result from religious observances and may reschedule tests and required coursework that fall on religious holidays, without penalty.

LGBTQ+ Individuals: The course instructor advocates in favor of equality for all individuals, regardless of their perceived or actual sexual orientation, gender identity, or gender expression. Please inform your instructor if you have a specific pronoun or chosen/preferred name that you would like to be addressed by.

ACADEMIC INTEGRITY AND STUDENT CONDUCT

Students are required to comply with all university-level policies on academic integrity as published in the Code of Student Rights and Responsibilities. All cases of academic misconduct will be reported to the Office of the Dean of Students. Please review your rights and responsibilities available at <https://regulations.utah.edu/academics/6-400.php>.

Integrity Pledge: Your signature on any test or assignment indicates *"On my honor, I affirm that I have neither given nor received inappropriate aid in the completion of this exercise."*

UNIVERSITY SAFETY

The University of Utah values the safety of all campus community members. To report suspicious activity or to request a courtesy escort, call campus police at 801-585-COPS (801-585-2677). You will receive important emergency alerts and

safety messages regarding campus safety via text message. For more information regarding safety and to view available training resources, including helpful videos, visit <https://safeu.utah.edu>.

Please review The U's Emergency Response Guide available at <https://alert.utah.edu/emergency-response-guide> and be familiar with the official procedures in the events of earthquakes, utility failures, fires, medical assistance in case of injury or illness, environmental quality concerns, active shooters and acts of violence, bomb threats, severe weather, bio/chem/RAD spills, secure in place and shelter in place orders, and evacuation orders.

COVID-19 CAMPUS GUIDELINES

Students are required to self-report if they test positive for COVID-19. To report, please contact: COVID-19 Central @ The U, (801) 213-2874, <https://coronavirus.utah.edu>. Masks and face coverings are no longer required at University of Utah facilities. Exceptions include:

- Masks will continue to be required inside University of Utah Health dedicated clinical facilities. Regulations vary for other facilities.
- Masks will continue to be required on campus buses and shuttles based on a federal public health order.
- All job-related personal protective equipment (PPE) safety requirements will continue to be required consistent with best practices for worker safety.

According to the CDC, wearing a mask remains an effective means of preventing infection for both unvaccinated and vaccinated people. Regardless of what someone chooses (mask or no mask), the university seeks to foster a sense of community and asks everyone on campus to be respectful of individual decisions on mask wearing.

Some students may qualify for accommodations & exemptions from these guidelines through the Americans with Disabilities Act (ADA). Accommodations should be obtained prior to the first day of class. If you believe you meet these criteria, contact: Center for Disability & Access, 801-581-5020, <https://disability.utah.edu>.

COURSE DELIVERY

ME EN 5960/6960-006 will be delivered in a blended (synchronous) format. The instructor will deliver in-person lectures every Monday and Wednesday from 11:50 AM to 1:10 PM, and every lecture will be live streamed at the same time.

Copyright statement: The live streams and recordings are the intellectual property of the instructor and may not be shared or reproduced without their explicit and written consent. In addition, privacy rights of others such as students, guest lecturers, and providers of copyrighted material displayed in the recording may be of concern. Students may not share any course recordings with individuals not enrolled in the class or upload them to any other online environment.

COURSE SCHEDULE AND IMPORTANT DEADLINES

Please refer to pages 5 and 6.

LECTURE CALENDAR | Mondays and Wednesdays from 11:50 AM to 1:10 PM in WEB L112 and Online

Week	Lecture	Date	Topic
1	1	08/23	Course Introduction
	2	08/25	Overview of Systems Engineering (1)
2	3	08/30	Overview of Systems Engineering (2)
	4	09/01	Generic Life Cycle Stages (1)
3	-	09/06	Labor Day
	5	09/08	Generic Life Cycle Stages (2)
4	-	09/13	Lectures 2-5 Practicum and Case Study Discussion
	-	09/15	Lectures 2-5 Q&A and Quiz #1
5	6	09/20	Technical Processes (1)
	7	09/22	Technical Processes (2)
6	8	09/27	Technical Processes (3)
	-	09/29	Lectures 6-8 Practicum and Case Study Discussion
7	-	10/02	Lectures 6-8 Q&A and Quiz #2
	-	10/04	Midterm Exam 2:00 PM to 3:20 PM
8	-	10/11	Fall Break
	-	10/13	Fall Break
9	9	10/18	Technical Management Processes (1)
	10	10/20	Technical Management Processes (2)
10	11	10/25	Agreement and Organizational Project-Enabling Processes
	-	10/27	Lectures 9-11 Practicum and Case Study Discussion
11	-	11/01	Lectures 9-11 Q&A and Quiz #3
	12	11/03	Tailoring Process and Application of Systems Engineering (1)
12	13	11/08	Tailoring Process and Application of Systems Engineering (2)
	14	11/10	Cross-cutting Systems Engineering Methods (1)
13	15	11/15	Cross-cutting Systems Engineering Methods (2)
	-	11/17	Lectures 12-15 Practicum and Case Study Discussion
14	-	11/22	Lectures 12-15 Q&A and Quiz #4
	16	11/24	Specialty Engineering Activities
15	A	11/29	Guest Speaker (planned)
	B	12/01	Guest Speaker (planned)
16	-	12/06	Lectures 16, A-B Practicum and Case Study Discussion
	-	12/08	Lectures 16, A-B Q&A and Quiz #5
17	-	12/14	Final Exam (10:30 AM to 12:30 PM)

HOMEWORK DUE DATES

HW	Due	Topic
1	09/20	Lectures 2-5
2	10/18	Lectures 6-8
3	11/03	Lectures 9-11
4	11/24	Lectures 12-15
5	12/10	Lectures 16, A-B

SCHEDULE AND DUE DATES ARE SUBJECT TO CHANGE
Canvas will always have the most up-to-date version of this schedule.
All changes will be communicated!

All submissions are due at 11:55 PM

QUIZ DATES

Quiz	Date	Topic
1	09/15	Lectures 2-5
2	10/02	Lectures 6-8
3	11/01	Lectures 9-11
4	11/22	Lectures 12-15
5	12/08	Lectures 16, A-B

Quizzes will be administered following an open Q&A session

PROJECT DATES

Date	Event
10/18	Assignment and Formation of Groups
12/10	Final Report
12/12	Peer Evaluations

*Do not hesitate to send any questions you may have to pedro.huebner@utah.edu. I am here to help you succeed! 😊
I also appreciate feedback. Let me know if things are going well for you. We will work together to resolve any issues.*