

ME EN 5182/6182 – Design of Production and Service Systems

Section 001: In Person | Section 030: Distance Education

Department of Mechanical Engineering
The University of Utah | First Half Summer 2023

Prerequisites:
5182: one semester of probability or statistics
(ME EN 2550, CS 3130, ECE 3530, CH EN 2550, MATH 3070)
6182: graduate standing

This course covers the design processes for production and service systems with an emphasis on economic justification. Topics covered include logistics and supply chain design, capacity planning, flow lines, paced assembly lines, facility layout, and material handling. Through spreadsheet models and simulations, students quantitatively identify and suggest improvements to production and service systems.

COURSE CONTACTS

Instructor:

Pedro Huebner

pedro.huebner@utah.edu

Office: 1346 MEK

Office Hours: *on demand,*
by appointment.



Department Liaison:

Todd Easton, Program Director

todd.easton@utah.edu

WEBSITE

<https://mech.utah.edu>

LEARNING OUTCOMES

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

- Identify, formulate, and solve system design problems characterized by uncertain demand and limited resources.
- Analyze the performance of a variety of distinct production and service systems and use that information as tools to support decision-making processes.
- Understand the sources and inherent effects of variability on the performance of production and service systems and ways to mitigate its associated and undesired impacts.
- Identify the characteristics and cost structures of different types of logistic networks and modes of transportation.
- Develop spreadsheets models and simulations to improve decision making.

COURSE STRUCTURE

The course is structured in the form of daily meetings (Mon-Thu) 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 through 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 30 minutes to be completed. They will usually be administered at the end of lectures, so plan your attendance accordingly.

Section 030 students have the added flexibility to follow the course remotely and asynchronously. It is recommended that each lecture be watched no longer than 48 hours after being posted online. Due dates for all activities are kept up to date on Canvas and future versions of this syllabus/schedule. Special cases regarding different due dates for remote students will be communicated in class and via Canvas announcements.

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 sheet of notes 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 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 when project grades are assigned.

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 to class, 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 TEXTS

No specific textbook is required to follow the course as materials will come from a diversity of sources and comprehensive lecture notes will be posted online. Additional materials and relevant references will be shared throughout the semester. The following textbooks have supported the development this course and may provide more additional information regarding several topics of interest:

- WJ Hopp, ML Spearman. Factory Physics (3rd edition). Waveland Press, 2011. ISBN-13: 978-1577667391.
- Russel RS, Taylor BW. Operations and Supply Chain Mgmt (10th edition) Wiley, 2019. ISBN-13: 978-1119577645
- Heragu SS. Facilities Design (5th edition). Taylor & Francis, 2022. ISBN-13: 9781032258058.
- Francis RL, White, JA. Facility Layout and Location (3rd edition). Prentice Hall, 1992. ISBN-13: 978-0132992312.

GRADING

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

This course follows the letter grading scale 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 sent 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. Students at the graduate level will have additional requirements to be observed when completing the research project.

LATE ASSIGNMENTS AND MAKEUP WORK

The grade for an assignment submitted up to one day (24 hours) following the original deadline will have a 50% grade deduction 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>.

Additionally, academic misconduct policies specific to the Department of Mechanical Engineering will also apply. These policies are available at <https://www.mech.utah.edu/academics/me-academic-misconduct-policy>. By continuing your enrollment in this course, you acknowledge to be familiar with these policies and commit to abide by them.

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.

COURSE DELIVERY

ME EN 5182/6182-001 will be delivered in person. Section 030 will be delivered via asynchronous, on-demand recordings. The instructor will deliver in-person lectures every Mon, Tue, Wed, and Thu from 12:00 PM to 1:40 PM, and every lecture will be recorded and posted online within 24 hours.

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

See pages 5 and 6.

LECTURE CALENDAR | Mon, Tue, Wed, and Thu | 12:00 PM to 1:40 PM | WBB 207 and Online

Week	Lecture	Date	Topic
1	1	05/15	Course Introduction (<i>online recording, no meeting</i>)
	2	05/16	Capacity Planning (1)
	3	05/17	Capacity Planning (2)
	4	05/18	Capacity Planning (3)
2	-	05/22	Capacity Planning (Practicum and Quiz #1, <i>no meeting</i>)
	5	05/23	Facility Layout (1) (<i>online recording only, no meeting</i>)
	6	05/24	Facility Layout (2)
	7	05/25	Facility Layout (3)
3	-	05/29	Memorial Day Holiday (no class)
	-	05/30	Facility Layout (Practicum, Q&A, and Quiz #2)
	-	05/31	Exam #1 (12:00 PM to 1:40 PM)
	8	06/01	Assembly Systems (1)
4	9	06/05	Assembly Systems (2)
	10	06/06	Assembly Systems (3)
	-	06/07	Assembly Systems (Practicum, Q&A, and Quiz #3)
	11	06/08	Facility Location (1)
5	12	06/12	Facility Location (2)
	-	06/13	Facility Location (Practicum, Q&A, and Quiz #4)
	13	06/14	Logistics and Freight Transport (1)
	14	06/15	Logistics and Freight Transport (2)
6	-	06/19	Juneteenth Holiday (no class)
	-	06/20	Logistics and Freight Transport (Practicum, Q&A, and Quiz #5)
	-	06/21	Review/Project Day (<i>Q/A only; no activities planned</i>)
	-	06/22	Exam #2 (12:00 PM to 1:40 PM)

HOMEWORK DUE DATES

HW	Due	Topic
1	05/24	Capacity Planning
2	06/02	Facility Layout
3	06/12	Assembly Systems
4	06/16	Facility Location
5	06/22	Logistics and Freight Transport

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	05/22	Capacity Planning
2	05/30	Facility Layout
3	06/07	Assembly Systems
4	06/13	Facility Location
5	06/20	Logistics and Freight Transport

Quizzes will be administered following an open Q&A session

PROJECT DATES

Date	Event
06/01	Assignment and Formation of Groups
06/22	Final Report
06/23	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.*