

## IE 304 Production and Service Systems Planning and Design Spring 2024-25

Instructor	Lecture	Classroom	Day/Time	Office Hour	Room
Bülent Çatay	Lec1	FENS L045	W 9:40–10:30	by appointment	FENS 1058
	Lec2	FENS L045	F 9:40–11:30		

LA	Recitation	Classroom	Day/Time	Office Hour	Room
Gasya Koç	A	FENS L056	M 16:40–17:30	TBA	FENS L068
Canberk Ersoy	B	FENS L062	M 17:40–18:30	TBA	FENS L068

### Objectives:

This course is intended to introduce the students to the design and operation of manufacturing and service facilities. We will present a conceptual description and classification of modern production environments and address major issues faced during the planning and control of their operation. We will focus on the decomposition of the overall production planning and control problem to a number of subproblems, and the development of quantitative techniques and analytical tools for addressing the arising subproblems. The topics include (but are not limited to) assembly lines, sequencing and scheduling, flexible manufacturing systems, group technology and cellular manufacturing, and facilities planning and design. Although the focus is on manufacturing systems, emphasis will be given to introduce the application of methodologies covered for manufacturing systems to service systems as well.

The students are expected to have a solid background in **formulating linear programming models**. GUROBI solver will be used with Python to model and solve the production planning problems. Although it is not a prerequisite, it is **strongly recommended that you had taken and passed IE 312**.

### Learning Outcomes:

- Studying different production systems and assembly line balancing via modeling and heuristics
- Modeling and solving machine scheduling problems
- Designing manufacturing cells by applying group technology
- Modeling and solving facility layout and location problems

### Recommended Textbooks:

*Modeling and Analysis of Manufacturing Systems*. R.G. Askin and C.R. Standridge, John Wiley, 1993. [TS155.6 .A75 1993]

*Production and Operations Analysis*. S. Nahmias, Irwin/McGraw-Hill, 2013. [TS155 .N34 2013]

*Facilities Design, 5<sup>th</sup> edition*. S. Heragu. CRC Press, 2022. [TS177 .H47 2022] (eBook available online at the Information Center)

### Lecture Attendance Policy:

Attendance will be taken during the lectures and may positively influence your letter grade.

**Grading Policy:**

AvgGrade = 40% Midterm + 40% Final + 20% Quizzes

All grades are out of 100. In order to receive a passing letter grade you are required to get at least an AvgGrade of "40".

**Exams:**

- A midterm exam and a final exam will be given in class.
- The exams will be closed book/notes.
- A single **comprehensive** make-up exam will be offered to those who have missed the midterm or final exam, and have a medical report issued or approved by the SU Health Center.
- The make-up exam will take place after the final exam.
- If you miss both exams, one of your grades will be "0" regardless of your excuse.
- There is no make-up for the make-up exam!

**Quizzes:**

- 5 in-class quizzes will be given during lecture hours.
- The quizzes will be delivered online via SUCourse.
- You are required to be in the classroom during the quiz; otherwise, your grade will be zero. Attendance will be monitored.
- Best 4 out of 5 quizzes will be counted towards the calculation of "AvgGrade".
- There is no make-up for missed quizzes.

**Tentative Course Outline:**

Week	Topic	Reference
1	Introduction	Askin-Ch1
1-2	Assembly Lines	Askin-Ch2, Nahmias Ch9
3-4	Single Machine Scheduling	Askin-Ch4, Nahmias Ch9
5-6	Flow Shop Scheduling	Askin-Ch4, Nahmias Ch9
7-8	Job Shop Scheduling	Askin-Ch4
<b>TBA</b>	<b>MIDTERM</b>	
9-10	Flexible Manufacturing Systems	Askin-Ch5
11-12	Group Technology and Cellular Manufacturing	Askin-Ch6, Heragu-Ch8
13-14	Facility Layout	Askin-Ch7, Heragu-Ch1-4

**Disclaimer:**

The instructor reserves the right, when necessary, to alter the grading policy, change exam dates, and modify the syllabus and course content. Modifications will be announced in class and at the SUCourse+. Students are responsible for the announced changes.

**Academic Integrity:**

Students in this course are expected to honor the academic integrity principles according to the SU rules and procedures. Non-compliance to [academic integrity](#) principles through plagiarism, using or accomplishing another person's work, and/or submitting previously used work will be penalized.