

**IE 309
Manufacturing Processes I
Summer 2021**

Lecture Time and Location:

Mon. 08:40-11:30

Thu. 08:40-10:30

Fri. 08:40-10:30

Zoom Link → <https://sabanciuniv.zoom.us/j/7933111536>

Recitation Time and Location

Thu. 17.40-19.30

Fri. 10:40-12:30

Instructor: L. Taner Tunc, Ph.D. **Office:** FENS 1077 **e-mail:** ttunc [at] sabanciuniv.edu

Office hours: TBD

Teaching Assistants/Office Hours (contact your TA for location or appointment):

Esra Yüksel (esrayuksel [at] sabanciuniv.edu)

- TBA

Course Book:

Manufacturing Processes for Engineering Materials by S. Kalpakjian and S.R. Schmid, 5th Edition, Prentice Hall, 2008. (in reserve and available to purchase at the bookstore)

Supplementary References:

- Introduction to Manufacturing Processes by J.A. Schey, McGraw-Hill,
- Manufacturing Processes and Systems by P. Oswald, J. Munoz, John Wiley and Sons.
- Manufacturing Processes and Equipment by J. Tlusty, Prentice Hall, 2000.
- Fundamentals of Modern Manufacturing: Materials, processes, and systems by Groover, M., John Wiley, 1999.
- Materials and Processes in Manufacturing by E. P. DeGarmo, J.T. Black, Ronald A. Kohser, Wiley, 2003.

Catalog Description:

Overview of modern manufacturing technology; introduction to manufacturing processes, inspection methods and quality; materials and their manufacturing characteristics; description of various conventional and nonconventional applications in industry: casting, metal forming, forging, extrusion, rolling, joining and welding, EDM, ECM, laser machining, abrasive flow processes; machining processes: turning, milling, drilling, broaching etc., abrasive machining processes.

Objective of the course:

At the conclusion of this course, you should be able to:

- Explain the relation between manufacturing processes and material properties.
- Explain the need for manufacturing processes.
- Analyze economics of manufacturing processes.
- Describe, select and analyze different manufacturing processes and their equipment.
- Analyze characteristics of different processes in terms of quality, cost, lead time, volume.
- Identify and select manufacturing processes and their parameters for a given industrial part/design.
- Identify various rapid product development methodologies in producing mass-customized prototypes/parts.

- Work effectively in a team to analyze a product to identify and explain production stages and manufacturing processes.

Policies and Procedures:

- **Homepage:** <https://sucourse.sabanciuniv.edu/>. The outline of lecture notes, assignments, projects, and other course material will be posted at the SUCourse site.
- **Exams:** There will be midterm exams (progressive) during the semester. The exam dates are as follows: **Midterm I: Week 3, Midterm II: Week 5, Midterm II: Week 7. Dates and times will be announced soon.** There will be a comprehensive final exam during the final exam week. **The questions in the exams will not be same with the solved example questions.**
- **Assignments:** Homework assignments will be assigned regularly. However they will NOT BE GRADED.
- **There will not be any extra-credit questions or homework assignments other than what is assigned.**
- **Missed Exams:** No excuses for missed exams will be accepted other than certified medical excuses from the campus health center or instructor's approval. **A single comprehensive make-up exam** will be offered after **final exam**.
- **Projects:** There will be a semester-project and groups of three or four will be formed to work on the projects. The details of the project will be provided during the first week.
- **Individual effort:** Any academic dishonesty (i.e. cheating, plagiarism...) shall be resolved according to the University's Academic Integrity Policy. **Any academic dishonesty such as cheating, plagiarism or unauthorized sharing will result in an "F" Grade in the course and/or disciplinary actions.**
- **Team effort:** Teams will periodically be asked to submit individual effort assessment with completed assignments. These assessments will be incorporated into assignment grades. Teams having problem working together should make every effort to resolve them by themselves. If that doesn't work, see the instructor for a help.
- **Objections to grading:** If there is any objection to grading, the student must inform this to the instructor in a written statement no later than **one week after** grades given. The student must clearly explain why he/she deserves the missed-credit(s).
- **Attendance:** Attendance will be collected both during the lectures and recitation hours occasionally when the attendance rate is low. If your final grade is in a "gray area", your attendance, quizzes, returned homework assignments and performance in the class may increase your final letter grade.
- **In-class Discussions:** There will be regular reading assignments from the book chapters to be discussed during the lecture hours.
- **Quizzes:** There will be announced quizzes during the recitation hours, which will be relevant to the topic of the corresponding recitation session.
- **Time conflict override:** **If you are registered to the course by time conflict override, you are the one who is responsible of any inconvenience regarding attendance, any missed lecture content, quiz etc.**

Tentative Grade Distribution for the course is as follows:

Quizzes (1 x 5)	10%
Attendance	
Lecture	5%
Recitation	5%
Midterm Exams	17.5% x 2
Project	15%
Final Exam	30%

Total	100%

Tentative Schedule

Week	Topic	Reading
1.1	Introduction, - Fundamentals of Mechanical Behavior of Materials	Syllabus/Chp 1
1.2	Casting processes and equipment - Fundamentals of Metal Casting	Chp. 10
2.1	Casting processes and equipment - Types of casting - Design considerations	Chp. 11/12
2.2	Bulk deformation processes - Forging and types of forging - Rolling and type of rolling	Chp. 13/14
3.1	Bulk deformation processes - Extrusion - Hot extrusion, cold extrusion - Drawing	Chp. 15
3.2	Sheet Metal forming processes - Shearing, Formability tests	Chp. 16
MIDTERM 1		
4.1	Sheet Metal forming processes - Bending, Deep Drawing,	Chp. 16
4.2	Material Removal processes - Introduction - Turning, Drilling	Chp. 21
5.1	Material Removal processes - Milling, Broaching,	Chp. 23
5.2	Material Removal processes - Tool wear and tool life, tool materials, machining economics Abrasive Processes - Grinding and types of grinding - Lapping, Advanced abrasive processes	Chp. 24/25 Chp. 26
MIDTERM 2		
6.1	Advanced Machining Processes	Chp 27
6.2	Processes for plastics	Chp 19
7.1	Polymer processing, rapid prototyping, metal powders	Chp 20
7.2	Fabrication of microelectronic and micromechanical microelectromechanical devices; nano-manufacturing	Chp 29
MIDTERM 3		