

ME 310: Manufacturing Processes

<i>Course description:</i>	Manufacturing processes, material fabrication, and nontraditional processing.
<i>Number of credits:</i>	2. This course is required.
<i>Course Coordinator:</i>	A. Gozen
<i>Prerequisites by course:</i>	MSE 201; certified major in Mechanical Engineering
<i>Prerequisites by topic:</i>	<ol style="list-style-type: none">1. Equilibrium phase diagrams.2. Time-temperature transformation characteristics of plain carbon steels.3. Engineering stress, engineering strain, Hooke's law.4. Structure and properties of polymeric materials.
<i>Postrequisites:</i>	ME 474, ME 475
<i>Textbooks/other required materials:</i>	S. Kalpakjian and S. Schmid. <i>Manufacturing Engineering & Technology</i> . Pearson, 6/e.
<i>Course objectives:</i>	To identify, discuss, and analyze the following manufacturing processes for engineering materials and the associated equipment: <ol style="list-style-type: none">1. Casting.2. Bulk deformation.3. Sheet metal forming.4. Traditional and Nontraditional material removal.5. Joining and fastening.6. Manufacturing of polymers, metal-powders, composites, and ceramics.
<i>Topics covered:</i>	<ol style="list-style-type: none">1. Casting of metals and alloys.2. Rolling, forging, extrusion, and drawing.3. Cutting, bending, and drawing of sheet metal.4. Traditional, shear process machining.5. Nontraditional machining.6. Manufacturing of polymers and reinforced plastics.7. Processing of metal-powders and ceramics.8. Contemporary topics such as rapid manufacturing; nano-manufacturing, automation, computer-integrated manufacturing systems, sustainable manufacturing, manufacturing costs.

- Expected learning outcomes:* Upon successful completion of the course, the students will be able to:
1. Examine the design drawing of a component and describe a feasible sequence of manufacturing processes for production of the component.
 2. Distinguish between different types of casting and differentiate between their output product characteristics.
 3. Describe, in engineering sketch form, the bulk deformation processes of forging, rolling, extrusion, and drawing.
 4. Characterize the major machining operations of turning, milling, and drilling via description of cutting tools used and basic components of the machine tools.
 5. Relate the common mechanisms of cutting tool wear to desirable cutting tool material properties.
 6. State the advantages and physical description of the nontraditional material removal processes of waterjet machining, electric discharge machining, and chemical machining.
 7. Identify specific polymer processing methods based on material and component geometric properties.

Class schedule: Two 50 minute lectures per week, for one semester.

Laboratory schedule: None

Contribution to meeting the professional component: Engineering Topics

Relationship of course to student outcomes:
3 strongly supported; 2 supported; 1 minimally supported

Student Outcomes Pre-Fall 2018
(ABET EC2000)

a	b	c	d	e	f	g	h	i	j	k
3				3						

Student Outcomes Fall 2018 forward
(ABET EC2019)

1	2	3	4	5	6	7
3						

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