

ME 481 COURSE PROFILE**DEGREE PROGRAM:** Mechanical Engineering

COURSE NUMBER: ME 481	COURSE TITLE: Manufacturing Processes
REQUIRED COURSE OR ELECTIVE COURSE: Elective	TERMS OFFERED: Fall, Spring
TEXTBOOK / REQUIRED MATERIAL: Manufacturing Processes for Engineering Materials, by Serope Kalpakjian and Steven Schmidt, Prentice Hall, 5th Edition	PRE / CO-REQUISITES: MECHENG 382. I,(3 credits)
COGNIZANT FACULTY: D. Cooper	COURSE TOPICS: <ol style="list-style-type: none"> 1. Manufacturing systems 2. Overview of manufacturing processes used in industry 3. Machining processes 4. Deformation processes 5. Welding processes 6. Assembly processes 7. surface treatment processes with a focus on heat treating 8. Solidification processes with a focus on metal casting 9. Reconfigurable manufacturing, additive manufacturing, polymer processing, powder metallurgy
BULLETIN DESCRIPTION: Modeling and quantitative analysis of manufacturing processes used in industry to manufacture mechanical systems: machining, deformation, welding, assembly, surface treatment, and solidification. Process costs and limits; influence of processes on the final mechanical properties of the product. Reconfigurable manufacturing. Three recitations. Undergraduate credit only.	
COURSE STRUCTURE/SCHEDULE: Lecture; 2 per week at 3 hours	

<p>COURSE OBJECTIVES: for each course objective, links to the Program Outcomes are identified in brackets.</p>	<ol style="list-style-type: none"> 1. To teach the process-level dependence of manufacturing systems through tolerances [1, 2, 6] 2. To expose the students to a variety of manufacturing processes including their typical use and capabilities [1] 3. To teach the important effects that manufacturing processes may have on the material properties of the processed part with a focus on the most common processes [1] 4. To teach the thermal and mechanical aspects, such as force, stress, strain, and temperature, of the most common processes [1] 5. To provide a technical understanding of common processes to aid in appropriate process selection for the material and required tolerances [1, 2] 6. To provide a technical understanding of common processes to aid in appropriate material selection for a predetermined process [1]
<p>COURSE OUTCOMES: for each course outcome, links to the Course Objectives are identified in brackets.</p>	<ol style="list-style-type: none"> 1. Document system, measurement and tolerance issues driven by process selection [1] 2. Given a part to be manufactured, identify candidate processes that are capable of creating the parts features [2] 3. Weigh tradeoffs between similar processes based on general pros and cons in terms of heuristic guidelines [2] 4. Compute force components of interest that are associated with processes that are performed by mechanical means [4] 5. Compute stresses and strains, both in-process and residual, for mechanical, thermal and thermo-mechanical processes [3, 4] 6. Compute temperatures and cooling trends in thermal processes [3, 4] 7. Evaluate process selections for a predetermined material [3, 4, 5] 8. Evaluate process selections for prescribed tolerances [2, 4, 5] 9. Evaluate material selections for a predetermined process [3, 4, 6]
<p>ASSESSMENT TOOLS: for each assessment tool, links to the course outcomes are identified</p>	<ol style="list-style-type: none"> 1. Weekly problem sets 2. One in-class midterm exam 3. One two-hour in-class final exam

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LAST UPDATED: 05/11/2023 – K. Oldham