

School of Mechanical Engineering and Computer Science
Mech 476/576: Advanced Manufacturing Engineering

Catalog Data:	Mech 476/576 Advanced Manufacturing Engineering; 3 credits Advanced topics in manufacturing processes, including interrelationships between the properties of the material, the manufacturing process and design of components. Credit not granted for both Mech 476 and Mech 576.
Class Schedule:	Three 50-minute lecture sessions per week, for one semester.
Laboratory Schedule:	None
Prerequisites by Course:	Mech 310
Prerequisites by Topic:	<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. 5. Overview of the various manufacturing process. 6. The limitations and some of the critical factors about the processes. 7. Some of the design considerations for the processes to be used. 8. The relationship between the process and the properties of the materials being used. 9. The optimum manufacturing processes and design accordingly. 10. Given a drawing, or part, determine the processes and sequence used for manufacture.
Required Texts:	Kalpakjian, <i>Manufacturing Processes for Engineering Materials</i> , Addison Wesley, 4 th Edition
Course Coordinator:	Dr. Dave (Dae-Wook) Kim
Course Objectives:	<ol style="list-style-type: none"> 1. Understand basic materials properties, behaviors, and failure modes and their relevance to manufacturing processes. 2. Understand metrology and geometric dimensioning and tolerancing and apply them into assembly processes. 3. Understand the mechanics and metallurgical aspects in metal shaping processes including casting, forming, machining, and joining. 4. Describe various manufacturing processes for various engineering materials (P/M, polymers, ceramics, and composites). 5. Survey and describe various rapid prototyping processes. 6. Understand the complex interrelationships between design and manufacturing processes. 7. Exposure lean manufacturing concepts and apply 6-sigma tools to manufacturing processes.
Topics Covered:	<ol style="list-style-type: none"> 1. Introduction to modern manufacturing engineering. 2. Metrology, gage R&R, and GD &T. 3. Mechanics and metallurgical aspects in assembly processes Manufacturing processes for various engineering materials (P/M, polymers, ceramics, and composites)

	<ul style="list-style-type: none"> 4. Basic materials properties, behaviors, and failure modes and their relevance to manufacturing processes 5. Metallurgical aspects and defects in casting processes 6. Mechanics and energy requirements in metal forming processes. 7. Principles of metal cutting and mechanisms of traditional and non-traditional machining. 8. Jigs and fixture design 9. Process improvement and six-sigma. 		
Lab Experiments and Activities:	None		
Course Outcomes:	Students will be able to:		
Assessed for Program Outcomes	<ul style="list-style-type: none"> A-3. Apply scientific (chemistry, physics) and/or engineering principles toward solving manufacturing engineering problems. A-4. Apply statistical methods in analyzing mechanical assembly. C-4. Build prototypes that meet design specifications. H-1. Be aware of the global issues such as outsourcing and/or lean manufacturing that influence engineering decisions. 		
Other	<ul style="list-style-type: none"> A-2. Demonstrate knowledge of fundamental scientific (chemistry, physics) and/or engineering principles in manufacturing processes. I-1. Find, evaluate and use resources to learn new material not taught in class. I-2. List sources for continuing education opportunities in the manufacturing field. K-1. Set-up and/or operate measurement equipment such as calipers, coordinator measuring machine, optical comparator, optical microscope for projects. 		
Required or Elective Course:	Elective		
Contribution to Professional Component:	Engineering Topics		
Relationship of Course to Program:	Meets: Educational Objectives <u>1, 2, 3, 4</u> Program Outcomes <u>A, C, H, I, K</u>		
Prepared by:	Dr. Dave (Dae-Wook) Kim	Date:	October 10, 2008
Approved by CAC:			