Identification	**Subject**	Manufacturing processes – 6 ECTS credits
	Department	Mechanical Engineering
	Program	Undergraduate
	Term	Spring, 2018
	Instructor	Mirsadegh Seyedzavvar
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	Phone:	
	Classroom/hours	Monday, 11:50-13:20; Friday, 13:40–15:10
	Office hours	Monday, 10–11:30; 17:00–18:30
Prerequisites	Introduction to Mechanical Engineering	
Language	English	
Compulsory/Elective	Compulsory	
Required textbooks and course materials	Manufacturing Processes (2th edition), *H.N. Gupta, R.C. Gupta, Arun Mittal* Manufacturing Engineering and Technology (6th edition) *S. Kalpakjian, S.R. Schmid, H. Musa*	
Course outline	This course will provide the student with an introduction to the concepts and technologies from a designer's viewpoint of the principal manufacturing processes utilized by industry. Discussion subjects include the manufacturing system and its operating principles, casting, forming, material removal, welding, quality control, and advanced manufacturing processes, in a lecture/lab environment. Manufacturing Processes is a required course in the mechanical engineering degree. Manufacturing Processes covers the interaction of design with industrial materials and processes is considered in connection with technical and economic feasibility, trade-offs and automation.	
Course objectives	Manufacturing is concerned with making products. A manufactured product may itself be used to make other products, such as (a) a large press, to shape flat sheet metal into automobile bodies, (b) a drill, for producing holes, (c) industrial sewing machines, for making clothing at high rates, and (d) numerous pieces of machinery, to produce an endless variety of individual items, ranging from thin wire for guitars and electric motors to crankshafts and connecting rods for automotive engines (Fig. I.1). The manufacture of items for specific uses began with the production of various household artifacts, which were typically made of either wood, stone, or metal. The materials first used in making utensils and ornamental objects included gold, copper, and iron, followed by silver, lead, tin, bronze (an alloy of copper and tin), and brass (an alloy of copper and zinc). The processing methods first employed involved mostly casting, because it was relatively easy to perform. Over the centuries, these simple processes gradually began to be developed into more and more complex operations, at increasing rates of production and higher levels of product quality.	
Learning outcomes	Students who successfully complete the course should demonstrate the following outcomes by tests and homework: 1. Know about the basic Physical, Chemical Properties of materials. 2. Recommend cost-effective material options based upon net part shape, expected loading, operating environment, cost constraints, and life expectancy. 3. Know the basic operation of various manufacturing processes. 4. Learn how various products are made using traditional, non-traditional, or Electronics manufacturing processes. 5. Design simple process plans for parts and products. 6. Understand how process conditions are set for optimization of production. 7. Write and execute CNC machining programs to cut parts on a milling machine.	

	8. Learn the use of reverse engineering and prototype building. 9. Learn the basic concept of metrology, measurement methods, tolerances and surface finish.

Teaching methods	**Lecture**		x
	Group discussion		x
	Experiential exercise		x
	Lab		x
	Case analysis		x
	Course paper		x
	Others		---
Evaluation	**Methods**	**Date/deadlines**	**Percentage (%)**
	Midterm Exam		20
	Class Participation		10
	Assignment and quizzes		30
	Project		--
	Final Exam		40
	Total		100

Policy

- **Ethics**
  Copy of other students' work is highly discouraged. All assignments must be handled by the student himself. This is a university policy and violators will be reprimanded accordingly.

- **Preparation for class**
  The structure of this course demands your individual effort outside the classroom for extra practice of many problems within the textbook. After each session, every student needs to put sufficient time to practice and finish the assignments by the predetermined date.

- **Withdrawal (pass/fail)**
  This course strictly follows grading policy of the School of Engineering. Thus, a student is normally expected to achieve a mark of at least 60% to pass. In case of failure, he/she will be required to repeat the course the following term or year.

- **Cheating/plagiarism**
  Cheating or other plagiarism in handling the assignments, Mid-term and Final Examinations will lead to course failure. In this case, the student will automatically get zero (0), without any considerations.

- **Professional behavior guidelines**
  The students shall behave in the way to create favorable academic and professional environment during the class hours. Unauthorized discussions and unethical behavior are strictly discouraged.

Tentative Schedule

Week	Date/Day (tentative)	Topics	Textbook/Assignments
1		The structure, properties, behavior and manufacturing properties of materials	Chap 1, 2, 3
2		Metal alloys: their structure and strengthening by heat treatment	Chap 4
3		Ferrous and nonferrous metals and alloys: production, general properties, and applications;	Chap 5, 6

		Quiz1/ Delivery of assignments	
4		Polymers: structure, general properties, and applications	Chap 7
5		Ceramics, graphite, diamond, and nanomaterials: structure, general properties, and applications	Chap 8
6		Composite materials: structure, general properties, and applications	Chap 9
7		- Fundamentals of metal casting - Metal-casting processes and equipment - Metal casting: design, materials, and economics	Chap 10, 11, 12
8		- Metal-rolling processes and equipment - Metal-forging processes and equipment **Quiz2/Delivery of assignments**	Chap 13, 14
9		- Metal extrusion and drawing processes and equipment - Sheet-metal forming processes and equipment	Chap 15, 16
10		- Powder-metal processing and equipment - Ceramics, glasses, and superconductors: processing and equipment	Chap 17, 18
11		Plastics and composite materials: forming and shaping	Chap 19
12		- Fundamentals of machining - Cutting-tool materials and cutting fluids - Turning and hole making - Milling, broaching, sawing - Filing, and gear Manufacturing - Machining centers, machine-tool structures, and machining economics - Abrasive machining and finishing operations	Chap 21, 22, 23, 24, 25
13		Advanced machining processes	Chap 27
14		Joining processes and equipment - Fusion-welding processes - Solid-state welding processes - Brazing, soldering, adhesive-bonding, and mechanical-fastening processes	Chap 30, 31, 32
15		Surface technology - Surface roughness and measurement; friction, wear, and lubrication - Surface treatments, coatings, and cleaning **Quiz3/ Delivery of assignments**	Chap 33, 34
16		**Final Exam**	