

University of Southern California  
Daniel J. Epstein Department of Industrial and Systems Engineering  
ISE 232L: Manufacturing Processes  
Class Number 31603R, Units 3  
Spring 2013  
Course Syllabus

**Course General:**

Lecture:

Monday & Wednesday 3:30 - 4:20 pm.

Room: KAP-163

Lab session:

Friday 3:30 - 4:20 pm.

Room: GER-309

**Course Instructor:**

Mahdi Yoozbashizadeh, PhD

Email: yoozbash@usc.edu

Office Hours: Monday & Wednesday (2:00 ~ 3:00pm) or by appointment.

**Teaching Assistant:**

Xuan Song and Yongqiang Li, PhD candidates

Email: xuansong@usc.edu and yongqial@usc.edu

Office Hours: Friday 1:30-3:30 pm at GER 309

**Course Description:**

This course aims to provide students with an understanding and appreciation of the breadth and depth of the field of manufacturing and the strong interrelationships between manufacturing processes, product design and material properties. It will introduce some traditional manufacturing processes such as casting, forming, lathing, milling, polymer injection molding, and emerging manufacturing processes such as layer manufacturing and metal powder processing. It will also discuss modern digital technologies used in manufacturing such as computer-aided design and engineering, computer-numerical control, and computer integrated manufacturing. Group projects are designed to prepare the students to gain understanding on how everyday products are designed and manufactured.

The course is a combined lecture and laboratory teaching. The lectures will consist of six parts: (1) Fundamentals of materials and their manufacturing properties, (2) metallic part fabrication; (3) plastic part fabrication; (4) digital product design; (5) prototyping and additive processes; (6) Computer aided manufacturing fundamentals;. Various case studies and related videos will be used in the lectures. The Labs will require students to form teams to design and prototype an innovative device by using provided CAD software systems and 3D printers.

**Prerequisites:**

An introductory course on material science (e.g. MASC 110L) or chemistry (CHEM 105aL or CHEM 115aL).

## **Textbook**

“Manufacturing Engineering and Technology,” Sixth Edition, Serope Kalpakjian and Steven R. Schmid, Pearson Prentice Hall, 2009.

## **Grading Policy:**

The grading for the class will be determined using the following weights:

• Problem assignments.....	20%
• Quizzes.....	20%
• Final exam.....	20%
• Lab project .....	25%
• Course project .....	10%
• Participation.....	5%
Total Score.....	100%

Problem Assignments: Students will be given reading assignments and homework assignments (including labs) from the textbook. Homework assignments should be turned in promptly. They should demonstrate that the student has thoughtfully considered the material presented and its value. Half of the points will be deducted for late submissions.

Quizzes: Three quizzes (two class quiz and one lab quiz) will be given throughout the semester.

Final Exam: One final examination will be given at the end of the semester based on the university’s final exam schedule.

Lab & Course Projects: The objective of the class projects is to help the students to gain hands-on experience and to use learned materials to solve real world problems. Each project team will have 3 students, who are expected to work together to accomplish the given tasks.

(1) In the course project, each team is expected to dissect an everyday product and analyze the manufacturing processes and material of its components (several sample projects will be uploaded for more clarification).

(2) In the lab project, each team is expected to develop an innovative product or improve an existing product related to the course project. A functional prototype and its CAD models need to be built and demonstrated at the end of the project.

Each project team must prepare a presentation for the course project to explain their ideas, methods and results to the class. Presentations will take about 10 minutes per team and the presenters should be prepared to answer questions on the topic. The presentation and a project report will be used in the evaluation of team-based grades.

Participation: Participation in the classes and labs is required and will be taken into account.

Bonus points are available for enthusiastic participation in class. If you will miss a class, please let me know in advance and work with your fellow students to catch up on what you miss.

Week#	Monday (3:30-4:20 pm)	Wednesday (3:30-4:20 pm)	Friday (3:30-4:20 pm)	Due dates
1 1/15-17	Course introduction	Manufacturing background and team practice	Lab1	Forming teams
2 1/22-24	Product design and manufacturing	Mechanical and physical properties of material	Lab2	
3 1/29-31	Mechanical and physical properties of material	Heat treatment of metal alloys	Lab3	
4 2/5-7	Engineering material comparison (Metal)	Engineering material (Polymer)	Lab4	
5 2/12-14	Engineering material (ceramic)	Metal casting	Lab5	
6 2/19-21	Quiz#1	Metal casting	Lab6	
7 2/26-28	Plastic forming and shaping (Plastic injection molding)	Metal rolling and extrusion	Lab project idea presentation (5min./team)	Lab project and course project idea
8 3/5-7	Metal forging	Sheet metal forming	Lab6 Lab quiz	
9 3/12-14	Spring break	Spring break		
10 3/19-21	Machining process	Machining process	Undergraduate fabrication lab	Course project report due
11 3/26-28	Quiz#2	Powder metallurgy	Lab8	
12 4/2-4	CAD/CIM CNC	CAD/CIM CNC	Lab project team work	
13 4/9-11	Rapid prototyping	Rapid prototyping		
14 4/16-18	Semiconductor fabrication	Course summary and review	Lab project team work	
15 4/23-25	Lab project presentation	Lab project presentation	Demonstration of final prototypes	Lab project due
16	Study week			
17	Friday, May 10 from 2-4pm at KAP-163			

**Academic integrity:**

“The Department of Industrial and Systems Engineering adheres to the University’s policies and procedures governing academic integrity as described in SCampus. Students are expected to be

aware of and to observe the academic integrity standards described in SCampus, and to expect those standards to be enforced in this course.” Check out the helpful “Trojan Integrity: A Guide to Avoiding Plagiarism” and other publications of the USC Office of Student Judicial Affairs (<http://www.usc.edu/student-affairs/SJACS/nonacademicreview.html>).

**Disability Accommodation:**

“Any Student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (or to TA) as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m. - 5:00 p.m., Monday through Friday. The phone number for DSP is (213) 740-0776.”

**Policy on Religious Holidays:**

University policy grants students excused absences from class for observance of religious holy days.

Students should contact instructor IN ADVANCE to request such an excused absence. Students are advised to scan the syllabi at the beginning of the semester to detect potential conflicts with their religious observances. Please note that this applies only to the sort of holy day that necessitates absence from class and/or whose religious requirements clearly conflict with aspects of academic performance. Please refer to the Holy Days Calendar (<http://orl.usc.edu/religiouslife/holydays/>).