

University of Southern California  
Daniel J. Epstein Department of Industrial and Systems Engineering  
ISE 232L: Manufacturing Processes  
Class Number 31603R, Units 3  
Fall 2007  
Course Syllabus

**Course General:**

The course meets Monday & Wednesday & Friday, 1:00~1:50pm.

Lecture sessions: KAP-144

Lab sessions: GER-309

**Course Instructor:**

Dr. Yong Chen, GER-201

Tel: 213-740-7829, Email: yongchen@usc.edu

Office Hours: Wednesday from 2:00 to 3:30pm or by appointment.

**Teaching Assistant:**

Johnny Wang,

Email: shanglow@usc.edu

Office Hours: Friday 2:00 to 4:00pm.

**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, electronic device fabrication, bio-manufacturing and nano-manufacturing. 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 of how everyday products are designed and manufactured.

The course is a combined lecture and laboratory teaching. The lectures will consist of six parts: (1) Manufacturing processes and its relations to product design and material properties, (2) forming processes (casting, forming & injection molding), (3) cutting processes (lathing, milling & CNC), (4) additive processes (SLA, SLS & MEMS), (5) latest manufacturing developments in bio- and nano-areas, and (6) integrated manufacturing systems. Various case studies and related videos will be used in the lectures. The Labs will require students to form teams to design and fabricate a simple product by using provided CAD software 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,” Fifth Edition, Serope Kalpakjian and Steven R. Schmid, Pearson Prentice Hall, 2006.

## Grading Policy:

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

- Problem assignments.....15%
- Quizzes.....15%
- Final exam.....25%
- Lab project.....20%
- Course project .....20%
- Participation.....5%
- Total Score.....100%

Problem Assignments: Students will be given reading assignments and homework assignments from the textbook each week. Each student is also required to write a learning journal. The purpose of journal is to demonstrate that the student has thoughtfully considered the material presented and its value. Homework and journals should be turned in promptly.

Quizzes: A quiz will be given at the end of each lecture segment. A quiz will be given without notification. The syllabus will only indicate the tentative dates that should help a student anticipate the readings necessary for a quiz. No make-up quiz will be given. We will count the 3 best quizzes for final grade.

Final Exam: One final examination will be given at the end of the semester.

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 4 students, who are expected to work together to accomplish tasks.

- (1) In the lab project, each team is expected to design a simple product and generate CAD models. The high quality design will be built using FDM/3D printers;
- (2) In the course project, each team is expected to dissect an everyday product and analyze the manufacturing processes and material of all its components.

Each project team must prepare a presentation to explain their ideas, methods and results to the class. Presentations should 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 evaluation.

Participation: Participation in the class and lab is required and will be taken into account. Bonus points are available for enthusiastic participation in class. If you miss a class, please work with your fellow students to catch up on what you missed. Please turn cell phones and pagers off or put them in vibrate mode before coming to class and lab.

**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.

**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.”

### Course Schedule:

There are two fifty-minute lecture sessions and one fifty-minute laboratory session each week.

<b>Week #</b>	<b>Monday (1:00~1:50pm)</b>	<b>Wednesday (1:00~1:50pm)</b>	<b>Friday (1:00~1:50pm)</b>	<b>Assignments</b>
1	Aug. 27 – Course Introduction	Aug. 29 – Product development and manufacturing Background	Aug. 31 - Lab 1-1	
2	Sept. 3 – Labor Day Recess	Sept. 5 – Lab 1-2	Sept. 7 - Lab 2-1	
3	Sept. 10 – Introduction to CAD & CAE & CG	Sept. 12 – Customized Product Design and Manufacturing	Sept. 14 - Lab 2-2	Lab Project Assigned.
4	Sept. 17 - Material properties (Metal)	Sept. 19 – Lab 3-1	Sept. 21 - Lab 3-2	
5	Sept. 24 – Material properties (Polymer)	Sept. 26 – Product Manufacturing Overview	Sept. 28 - Lab 4-1	
6	Oct. 1 – Quiz 1; Introduction to Forming Processes	Oct. 3 – Lab 4-2	Oct. 5 - Lab 5-1	
7	Oct. 8 – Metal Casting	Oct. 10 – Sheet-metal Forming	Oct. 12 - Lab 5-2	
8	Oct. 15 - Injection Molding	Oct. 17 – Lab 6-1	Oct. 19 - Lab 6-2	Lab Project Due
9	Oct. 22 – Quiz 2; Product Dissemination	Oct. 24 – Lab Project Presentation	Oct. 26 – Lab Project Presentation	Course Project Assigned
10	Oct. 29 - Introduction to machining	Oct. 31 – Lathing	Nov. 2 - Lab 7	
11	Nov. 5 – Milling	Nov. 7 – CNC & CAM	Nov. 9 - Quiz 3; Introduction to Additive processes	
12	Nov. 12 - SLA	Nov. 14 – SLS & FDM	Nov. 16 – 3D Printer & Rapid Tooling	
13	Nov. 19 – MEMS Fabrication	Nov. 21 – Bio-manufacturing	Nov. 23 - Thanksgiving Recess	
14	Nov. 26 - Quiz 4; Nano-manufacturing & Future developments	Nov. 28 – Complex Products & their Manufacturing	Nov. 30 – Manufacturing Systems	
15	Dec. 3 – Wrap-up	Dec. 5 – Course Project Presentation	Dec. 7 – Course Project Presentation	Course Project Due
16	Dec. 10 - Study Day	Dec. 12 - Final Exam		