

EK 130 Introduction to Materials Processing/Product Development

Course Description

Capitalism and enterprise are about innovation - creating a dynamic economy that is ultimately dependent on the ability to design, fabricate and produce products. Product development therefore plays an important role in creating new businesses that fuel progress on a global basis. In this course, each student will use sophisticated computer-aided design tools to create 3-D object codes and then design and develop a specific product. The scientific base and fundamental nature of material processes used in this project will be developed in lectures and their pragmatic application will be demonstrated and taught in the laboratory. Based on this knowledge and experience each student will fabricate a prototype of the product they have designed and developed and try and market it (to the class) to appraise its commercialization potential.

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Office Hours:	TT 12:30 –1:30pm

Text

No assigned text

References

- 1) "Processes and Design for Manufacturing," Sherif D. Wakil, Second Edition, PWS Publishing Company, 1998.
- 2) "Principles of Material Science and Engineering," William F. Smith, Third Edition, McGraw Hill, 1996
- 3) ASM Handbooks, Volumes 1-18.

* Will need a Flash Drive for design project.

Syllabus

Topics

1. General Introduction
 - 1.2 History
 - 1.3 Definition
 - 1.4 Materials
 - 1.5 Processes
 - 1.6 Automation
2. Basic Processes
 - 2.1 Casting
 - 2.2 Forming
 - 2.3 Cutting
 - 2.4 Joining
3. Process Kinetics
 - 3.1 Nature of Materials
 - 3.2 Phase Transformations
 - 3.3 Structure/Property Relationships
 - 3.4 Microstructural Development
4. Future Aspects of Material Processes
 - 4.1 Materials
 - 4.2 Technology

Monday Class Schedule

This course is designed around the ability of the student to learn some basic processes and then to use them to complete their project. The project will therefore be the focal point of this course and count for 50%, of the total grade. **Attendance to all classes, labs (there will be no make up labs), and completion of the project is mandatory to pass the course.** Students will be required to make a presentation and write a term paper on their project. One exam, which will include subject matter covered in the lectures, handouts, and labs, will count for 30%, while laboratory work, homework assignments, and short quizzes will count for the remaining 20% of the grade.

Schedule

Class	Day	Subject (1/2)
1	Tuesday, September 4	Introduction/ Communication Demo.
2	Thursday, September 6	Basic Processes I
3	Tuesday, September 11	Welding Demonstration (1/2)
4	Thursday, September 13	Machining Demo/Exercise (1/2)
5	Tuesday, September 18	Casting Demonstration (1/2)
6	Thursday, September 20	Machining Project (1/2)
7	Tuesday, September 25	Engineering Drawing Exercise (1/2)
8	Thursday, September 27	Metallography/PM Demo. (1/2)
9	Tuesday, October 2	Design/Fabrication Exercise (1/2)
10	Thursday, October 4	ArtCAM Demo and Practice (1/2)
	Tuesday, October 9	Monday Class Schedule
11	Thursday, October 11	Design/Fabrication Discussion
12	Tuesday, October 16	Project Design (1/2)
13	Thursday, October 18	Mechanical Prop. (1/2)
14	Tuesday, October 23	Project Design (1/2)
15	Thursday, October 25	Vapor Deposition Demo. (1/2)
16	Tuesday, October 30	Machining/Die Fabrication
17	Thursday, November 1	Solid Works/ CAD/CAM Demo
18	Tuesday, November 6	Process Kinetics
19	Thursday, November 8	Process Kinetics
20	Tuesday, November 13	Project Casting
21	Thursday, November 15	Project Cutting
22	Tuesday, November 20	Project Welding
	Wednesday, November 21	Thanksgiving Break
23	Tuesday, November 27	Project Machining
24	Thursday, November 29	Review
25	Tuesday, December 4	Project Presentations
26	Thursday, December 6	Project Presentations
27	Tuesday, December 11	Exam