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