Materials Processing and Product Fabrication
(EK 132)

Course Description

Materials processing used to manufacture products is a very broad activity, encompassing everything from control theory to accountancy. The word *manufacture* is several centuries old, and was derived from two Latin words *manus* (hand) and *factus* (make); the combination implying made by hand. Although it accurately described manual methods used when the word was coined, today manufacturing is accomplished by automated and computer-controlled machinery. The course will concentrate on basic material processing techniques (i.e. casting, machining, and joining) that have been used throughout the centuries to convert materials into products. The scientific base and fundamental nature of these processes 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 a specific product and try and market it (to the class) to appraise its commercialization potential.

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Office Hours:	TT 12:00 –1:00 pm

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.

Syllabus

Topics:

1. General Introduction
    - 1.1 History of Materials Processing
    - 1.2 Definitions
    - 1.3 Materials
    - 1.4 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 Processing
    - 4.1 Materials
    - 4.2 Processes

This course is designed around the ability of the student to learn some basic material processing techniques and then to apply them to complete their project. The project will therefore be the focal point of this course and count for 40%, of the total grade. Attendance to all classes and labs (20% of the grade) is compulsory, since there will be no make up labs, and completion of the project is mandatory to pass the course. Each student will be required to make a short presentation of his or her project experience. One exam, which will include subject matter covered in both the lectures and labs, will count for 25%, while laboratory work, homework assignments, and short quizzes will count for the remaining 15% of the grade.

Schedule

Class	Day	Subject
1	Monday, March 18	Introduction/Basic Processes
2	Wednesday, March 20	ArtCam/Engineering Drawing
3	Monday, March 25	Casting/Metallography Demo.
4	Wednesday, March 27	Welding/P/M Process Demo
5	Monday, April 1	Machining
6	Wednesday, April 3	Process Kinetics
7	Monday, April 8	Process Kinetics
8	Wednesday, April 10	Project – Cutting
9	Monday, April 15	No Class
10	Wednesday, April 17	Project – Casting/Welding
11	Monday, April 22	Project – Casting/Welding
12	Wednesday, April 24	Project – Machining/Finishing
13	Monday, April 29	Exam
14	Wednesday, May 1	Presentations