Materials Processing and Product Fabrication
(EK 131)

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, and also introduce some of the more recent processes used to convert materials into products. The scientific base and fundamental nature of these processes will be discussed 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 develop a manufacturing strategy for its commercialization.

Instructor: Prof. Vinod K. Sarin
Office: 730 Commonwealth Ave., Room 208
Tel: (617) 353-6451
E-mail: sarin@bu.edu
Office Hours: **1:30 to 2:30 MW**

Text:

No assigned text

References

1) "Processes and Design for Manufacturing," Sherif D. Wakil, Second Edition, PWS Publishing Company, 1998.

2) "Introduction to Materials Science for Engineers," James F. Shackelford, 8th Edition, Prentice Hall, 2014

3) ASM Handbooks Series, Volumes 1-20.

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. Advance Processes
    - 4.1 Powder Metallurgy
    - 4.2 3D Printing
    - 4.3 Vapor Deposition

4. Process Kinetics
    - 3.1 Nature of Materials
    - 3.2 Structural Characteristics
    - 3.3 Structure/Property Relationships

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 (15% of the grade) is compulsory, since 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 short presentation of their project. One exam, which will include subject matter covered in both the lectures and labs, will count for 25%, while laboratory work, assignments, and short quizzes will count for the remaining 20% of the grade.

Schedule

Class	Day	Subject
1	Wednesday, September 7	Introduction/Basic Processes
2	Monday, September 12	Casting/Metallography Demo.
3	Wednesday, September 14	Welding/P/M Process Demo.
4	Monday, September 19	Machining/3D Printing Demo.
5	Wednesday, September 21	Eng. Drawing/Stand Design
6	Monday, September 26	Process Kinetics
7	Wednesday, September 28	Process Kinetics
8	Monday, October 3	Project – Casting
9	Wednesday, October 5	Project – Cutting
	Monday, October 10	Columbus Day
10	Tuesday, October 11	Project – Welding
11	Wednesday, October 12	Project – Machining
12	Tuesday, October 17	Exam
13	Wednesday, October 19	Presentations