# 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 3 | Introduction/ Communication Demo. |
| 2 | Thursday, September 5 | Basic Processes I |
| 3 | Tuesday, September 10 | Solid Works/ CAD/CAM/3D Demo |
| 4 | Thursday, September 12 | Machining Demo/Exercise (1/2) |
| 5 | Tuesday, September 17 | Casting Demonstration (1/2) |
| 6 | Thursday, September 19 | Welding Demonstration (1/2) |
| 7 | Tuesday, September 24 | Engineering Drawing Exercise (1/2) |
| 8 | Thursday, September 26 | Metallography/PM Demo. (1/2) |
| 9 | Tuesday, October 1 | Design/Fabrication Exercise (1/2) |
| 10 | Thursday, October 3 | Design/Fabrication Discussion |
| 11 | Tuesday, October 8 | ArtCAM Demo and Practice |
| 12 | Thursday, October 10 | Mechanical Prop. (1/2) |
| | Tuesday, October 15 | Monday Class Schedule |
| 13 | Thursday, October 17 | Project Design (1/2) |
| 14 | Tuesday, October 22 | Project Design (1/2) |
| 15 | Thursday, October 24 | Vapor Deposition Demo. (1/2) |
| 16 | Tuesday, October 29 | Machining/Die Fabrication |
| 17 | Thursday, October 31 | Process Kinetics |
| 18 | Tuesday, November 5 | Process Kinetics |
| 19 | Thursday, November 7 | Process Kinetics |
| 20 | Tuesday, November 12 | Project Casting |
| 21 | Thursday, November 14 | Project Cutting |
| 22 | Tuesday, November 19 | Project Welding |
| 23 | Wednesday, November 20 | Project Machining |
| 24 | Tuesday, November 26 | Review |
| | Wednesday November 27 | Thanksgiving Break |
| 25 | Tuesday, December 3 | Exam |
| 26 | Thursday, December 5 | Project Presentations |
| 27 | Tuesday, December 10 | Project Presentations |