ENG ME 465/MS 465 Materials Processing

2008-2009 Catalog Data:
ENG ME 465/MS 465 Materials Processing Prereq: ENG EK 156, ENG ME 305, ENG ME 306, and ENG ME 304 or ENG EK 424. The influence of manufacturing processes on structure and properties of materials. Manufacturing by liquid and solid state processing techniques, material removal processes and bonding and joining processes. Surface modification techniques for enhancing performance and product service life. Includes lab. 4 cr., 2nd sem.

Class/Lab Schedule: 4 lecture hours per week

Status in the Curriculum: Required in Manufacturing Program

Textbook(s) and/or Other Required Material: Manufacturing Processes for Engineering Materials, Serope Kalpakjian Prentice Hall, Fifth Edition, 2006/2008.

Reference: Transport Phenomena in Materials Processing, D.R. Poirier & G.H. Geiger
Materials Selection in Mechanical Design, M. Ashby
Transport Phenomena Archive: http://teaching.matdl.org/

Coordinator: Adam Powell, Assistant Adjunct Professor, Mechanical Engineering

Prerequisites by topic:
1. An understanding of the laws of thermodynamics.
2. An understanding of materials and process design.
3. An understanding of mechanical properties of materials.

Goals:
This course utilizes the fundamentals to study the practical manufacturing aspects of synthesis of bulk materials, solid-and-liquid-state processing, welding and joining, material-removal processes, surface modification and finishing operations. It is intended to draw together the various earlier courses in the curriculum to understand the science and engineering of manufacturing processes. The course has a laboratory component and requires working, reporting and presenting a team project. The idea is to obtain hands-on experience and learn to work in teams, and be able to communicate effectively through presentations and reports.

Course Learning Outcomes:

As an outcome of completing this course, students will:

i. Gain a thorough understanding of various manufacturing processes.
ii. Gain an in-depth understanding of one of the industrial sectors through project work.
iii. Gain experience and confidence in working in a team environment.
iv. Learn to produce well-organized and clearly written engineering reports.
v. Learn to make a clear and well-organized presentation.
vi. Be able to relate theory and practice through laboratory exercise.

Course Learning Outcomes mapped to Program Outcomes:

Program:	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Course:	i, vi	iv, vi, ii	ii, iii	iii, ii	i, vi	iii, vi	iii, iv, v	ii, i	i	i, ii	i, ii, vi	i, ii, vi	i, ii, vi	i, ii
Emphasis:	4	4	4	4	4	3	4	4	4	4	5	5	4	3

Topics (time spent in weeks):

1. Introduction and Process Selection (1)
2. Casting and Heat Treatment (2)
3. Deformation Processes (2)
4. Welding and Joining Processes (1.5)
5. Material Removal Processes (2)
6. Finishing Processes (1)
7. Computation in Process Engineering (2)
8. Student Presentations of Project (1.5)

Project Assignments (Lab):

Teams are formed with 5-6 students per team by second week. Each team picks one industrial sector such as the automobile, energy, iron and steel, aerospace, plastic and chemicals, paper, cement/concrete, glass, electronics, etc. Sometimes a particular company is identified within the industrial sector. Students identify all the manufacturing steps/processes involved in the production of a final product. These steps are divided equally among the team members for independent research.

Each student will report on his/her process in three formats:

1. The written report
2. A web page, or set of pages, should present the same information.
3. Each team will give a one hour presentation including discussion.

Contribution of Course to Meeting the Professional Component:

Engineering topics: 100%

Status of Continuous Improvement Review of this Course:

Prepared by: Adam Powell Date: 6/17/2009