Designation as a ‘Required’ or ‘Elective’ course
TYPE OF COURSE: Required for BSME AND BSIE Majors

Course (catalog) description
COURSE DESCRIPTION: Manufacturing Process Principles. 3 Hours. Introduction to basic manufacturing processes such as casting, bulk deformation, sheet metal forming, metal cutting. Interaction between materials, design, and manufacturing method. Economics of manufacturing. Prerequisite: CME 203.

Prerequisite(s)
PREREQUISITE(S): CME 203 Strength and Materials, 3 Hours.

Textbook(s) and/or other required material

Course objectives
COURSE OBJECTIVES: This course is designed to introduce students to engineering materials, manufacturing methods, and the importance of design and economic considerations in the selection of engineering materials and manufacturing processes to produce a desired part or a component. The course description is concerned mainly with the metals and manufacturing processes of metals, as outlined above, a course description which is a leftover-from-the 1960’s, when metals, then, were indeed the backbone of the manufacturing industry. However, since then, immense advances have been made in other materials, such as ceramics, polymers, and composite materials. Therefore, in order to be current in manufacturing industry and competitive in the domestic and global marketplace, metals, as well as engineering materials other than metals, namely, ceramics, polymers, and composite materials – metal matrix composites, ceramic matrix composites, and polymer matrix composites are presented to students. In addition to new engineering materials, manufacturing processes for these new engineering materials, such as plastic injection molding, filament winding, pultrusion are also presented to students. Accordingly, this course is aimed to maintain a fine balance between not overwhelming the students with details and yet not overlooking essentials that the students should be familiar with as they enter the business world.

Topics covered
MAJOR TOPICS: Hrs
1 Introduction to engineering materials and manufacturing processes 1-1/2
2 Metals and manufacturing processes for metals 3
3 Ceramics and manufacturing processes for ceramics 3
4 Polymers and manufacturing processes for polymers 3
5 Composite materials and manufacturing processes for composite materials 3
6 Metal casting 3
7 Powder metallurgy 1-1/2
8 Bulk deformation processes – rolling, forging, extrusion, and drawing 6
9 Sheet metalworking – cutting, bending, and deep drawing 3
10 Material removal processes by cutting tools – turning, drilling, and milling 6
11 Material removal processes by abrasives and non-traditional processes 3
12 Joining-welding, brazing, soldering, adhesive bonding and mechanical assembly 6
13 Examinations 3
14 Final examinations 2
Total 47
Class/laboratory schedule, i.e., number of sessions each week and duration of each session
CREDIT HOURS:  3 hours
TYPE OF INSTRUCTION:

<table>
<thead>
<tr>
<th>Type of Instruction</th>
<th>Contact Hours/Week</th>
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<tbody>
<tr>
<td>Lecture/Discussion</td>
<td>3</td>
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<tr>
<td>Laboratory</td>
<td>0</td>
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Contribution of course to meeting the professional component
Selection of engineering materials and manufacturing processes for an intended product do not only involve teams of engineers from various branches of engineering but in a broader sense they also involves purchasing, production, human resources, finance, sales, and marketing, complexity of the product, annual production rate, safety, quality, and environmental concerns. The shortcomings of traditional design-manufacturing engineering teams are compared with the benefits of concurrent engineering in addressing to Design for Manufacturability problems. Recycling of materials, conservation of energy, product liability suits, affordability, and social responsibility as engineers, safety, quality, and reliability, and affordability are stressed throughout the course.

Relationship of course to program outcomes
As shown in the BSME/BSIE Course Outcomes Matrix:

A. Ability to apply knowledge of mathematics, science and engineering
E. Ability to identify, formulate, and solve engineering problems
I. A recognition of the need for, and an ability to engage in life-long learning
J. Knowledge of contemporary issues.

Person(s) who prepared this description and date of preparation
Elisa Budyn, Department of Mechanical and Industrial Engineering, January 15, 2008
Updated by Elisa Budyn, August 25, 2008

Comments on outcomes
A. Students are able to use mathematical calculations in solving engineering problems. Students learn theory and applications of engineering problems concerning manufacturing processes through out-of-class assignments and examinations.
E. Ability to understand what is needed, ability to formulate problems mathematically, and ability to build on fundamental knowledge and apply it to new situations through out-of-class assignments.
I. Students are introduced to the application of systematic scientific methodologies to manufacturing and the need for further study to apply this in their future industrial or research careers is discussed.
J. Knowledge of major technological issues facing society and the world and appreciation of the society’s concerns with security in technology. The textbook is supplemented by the latest information from the latest publications, conferences, and trade shows. The planned tour of a steel plant had to be scrapped because of the adverse economic affect of dumping steel imports on the domestic steel producers.