COURSE SYLLABUS
MFG 240
MANUFACTURING MATERIALS AND PROCESSES
3 Semester Hours

Spring 2015

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Office Hours: By Appointment

Class Time: Lecture - Monday 5:00-7:00 p.m. - AAB 306
Lab - Monday 7:15-10:15 p.m. - AAB 306

COURSE DESCRIPTION
This course emphasizes the materials and processes used in manufacturing. Fundamentals include the properties, structure and nature of materials for manufactured goods, such as ferrous and nonferrous metals and alloys, plastics, composites and ceramics, and the selection of materials for various functions. Casting and form casting processes, mold castings, powder metallurgy, and metal and nonmetal fabrication processes are included. Material transformation processes and numerical control (NC) and computerized numerical control (CNC) machining centers are also covered. Additional assembly and joining processes include integrated electronic circuits, gas flame, arc, resistance, welding, brazing and soldering, adhesive bonding, and surface treatment and finishing. Manufacturing production and process quality control are integrated throughout the course. This course is usually offered in the spring.


COURSE OBJECTIVES, ASSESSMENT GOALS AND ASSESSMENT STRATEGIES

1. Describe the relationship of product design, product function, materials used, and manufacturing processes used.
   a. Given any generic manufactured product, list the issues to be considered in its manufacture.
   Assessment Strategy: Exam questions, quizzes and homework. *

2. Describe the physical properties of materials.
   a. Define the key physical properties of materials.
   Assessment Strategy: Exam questions, quizzes, homework and Lab. *
3. Compare basic physical, mechanical, manufacturing properties, and testing methods of common engineering materials.
   a. Define the key mechanical properties of materials.
   b. Draw a stress-strain diagram for typical low-carbon steel and label the key transition areas.
Assessment Strategy: Exam questions, quizzes, homework and Lab. *

   a. Given a specific material and reference tables, be able to determine the physical and mechanical properties of that material.
   b. Given design requirements of yield strength and hardness of a material and reference tables, be able to recommend an engineering material that will meet the design requirements
Assessment Strategy: Exam questions, quizzes, homework and Lab. *

5. Understand the relative advantages/disadvantages of common forming and shaping manufacturing processes.
   a. Given a specific part and material, select an appropriate forming and shaping process to manufacture the part. Communicate the reasons for the choice made.
Assessment Strategy: Exam questions, quizzes, homework and Lab. *

6. Understand the relative advantages/disadvantages of common machining manufacturing processes.
   a. Given a specific part, select an appropriate machining process to manufacture the part. Communicate the reasons for the choice made.
Assessment Strategy: Exam questions, quizzes and homework. *

7. Demonstrate the ability to calculate machining speeds and feeds for specific applications.
   a. Given a specific part, material, cutting tool, and machine, calculate the appropriate cutting speed and feed.
Assessment Strategy: Exam questions, quizzes, homework and Lab. *

8. Demonstrate the ability to define and document a manufacturing process.
   a. Given a part, material, and process of the students choosing, create a document defining the manufacturing process so the part can be mass produced.
Assessment Strategy: Exam questions, quizzes, homework and Lab. *

*Note: Assessment Strategy There is a required Graded internet assignment.

Major Topics:
1. Introduction to materials and processes
   a. Relationship to design, function, materials, processes, and cost
   b. Environmental concerns
   c. Energy concerns
   d. Safety on the shop floor
   e. Quality assurance, metrology, and Geometric Dimensioning and Tolerancing

2. Fundamentals of Materials
   a. Physical properties
   b. Manufacturing properties
c. Chemical properties.
d. Metal and Alloys
e. Non-metal materials

3. Forming and shaping processes
   a. Casting, Forging, Rolling
   b. Extrusion, Molding

4. Machining processes and machine tools
   a. Basic and Advanced machining processes

5. Joining and Welding

6. Surface techniques

7. Manufacturing in a competitive environment
   a. Cost / Volume / Profit analysis
   b. Speed to market

   a. Lean Manufacturing approach to layout.
   b. Evaluation of different layouts.
   c. Work station layout and line balancing issues.

**COURSE REQUIREMENTS**

**Grading:**
Grading will be determined on the basis of tests, homework assignments, quizzes, Electronic Library project, and a comprehensive final exam. A lab grade will be entered each scheduled lab for participation and progress toward course objective.

The course grade will be determined as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework</td>
<td>15%</td>
</tr>
<tr>
<td>Laboratory Projects</td>
<td>20%</td>
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<tr>
<td>Electronic Project</td>
<td>10%</td>
</tr>
<tr>
<td>Tests and Quizzes</td>
<td>20%</td>
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<tr>
<td>Competencies</td>
<td>25%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>10%</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
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**Conversion of numeric average to final (letter) grade:**

- 90 –100 = A
- 80 –89  = B
- 70 – 79 = C
- 60 – 69 = D
- 0 – 59 = F
Attendance Policy:

Students are urged to attend all lecture and laboratory periods. However, if such a class is missed, it is the student’s responsibility to determine course material covered in that class and to come to the class prepared to actively participate. Absence from a quiz or test may result in a grade of zero. However, if the absence is due to mitigating circumstances, as determined by the faculty member, a make-up quiz or test may be taken. Missed labs may be coordinated with the faculty member.

Late Assignment Policy:
All homework, laboratories, and reading assignments must be submitted on time. A 10% per week penalty will be deducted from the grade for late turn in.

Mid-term and Final Exam:
If you miss the Mid-Term or Final Exam, no make up will be given. You will receive a Zero grade. These tests can be arranged to be taken before their test date when and if circumstances necessitate such action; so it is your responsibility to contact the instructor. The Quizzes, Mid-Term, and Final Exam will be based on the text, lecture material, lab exercises, and handouts.

ACADEMIC HONESTY POLICY
Students are required to maintain a high level of academic performance. Cheating and plagiarism are defined in Wor-Wic's Student Conduct Policy found in the College Catalog. Infractions of this policy will result in the student's failure for the assignment or test.

H1N1 STATEMENT
In the event of a flu epidemic or other emergency that results in the suspension of classes, faculty will be communicating with students about their courses and course requirements, such as assignments, quiz and exam dates, and class and grading policies, via faculty websites or blackboard. Students will be responsible for completing all these assignments in accordance with class policies. Information about the resumption of classes will be communicated via the college’s web site and email system.