Course Number & Name: MET 201 Manufacturing Processes and Materials

Credit Hours: 3.0 Contact Hours: 4.5 Lecture: 2.0 Lab: 2.5 Other: N/A

Prerequisites: Grade of “C” or better in PHY 101 or placement

Co-requisites: None Concurrent Courses: None

Course Outline Revision Date: Fall 2010

Course Description: This course deals with the principles, methodology, and economics of manufacturing processes with respect to materials, production operations, and quality control. The topics also include tooling, automation, maintenance, industrial organization and management, marketing, and statistics applied to manufacturing problems. Laboratory work is included.

Course Goals: Upon successful completion of this course, students should be able to do the following:

1. demonstrate knowledge of properties of manufacturing materials;
2. demonstrate skills of measurement, inspection, and testing; and
3. demonstrate knowledge of casting and forming processes.

Measurable Course Performance Objectives (MPOs): Upon successful completion of this course, students should specifically be able to do the following:

1. Demonstrate knowledge of properties of manufacturing materials:
   1.1 determine static properties of manufacturing materials by using tensile, compression, and hardness tests;
   1.2 determine dynamic properties of manufacturing materials by using impact and fatigue tests;
   1.3 determine temperature effects on manufacturing materials;
   1.4 determine bonding and grain structures of metals and alloys;
   1.5 sketch and interpret stress-strain diagrams;
   1.6 sketch and interpret equilibrium-phase diagrams and determine the effects of heat treatments on manufacturing materials;
   1.7 describe properties of ferrous metals and alloys;
   1.8 describe properties of nonferrous metals and alloys;
   1.9 describe properties of nonmetallic materials including plastics, elastomers, and ceramics; and
   1.10 select materials for specific given purposes based on their determined properties
Measurable Course Performance Objectives (MPOs) (continued):

2. Demonstrate skills of measurement, inspection, and testing:
   2.1 \textit{apply standards of measurement};
   2.2 \textit{determine allowance and tolerance}; and
   2.3 \textit{determine inspection methods and measuring instruments}

3. Demonstrate knowledge of casting and forming processes:
   3.1 \textit{discuss expendable-mold and multi-use-mold casting processes};
   3.2 \textit{discuss bulk-forming and sheet-forming processes}; and
   3.3 \textit{discuss powder metallurgy processes}

Methods of Instruction: Instruction will consist of lectures and supervised experiments in the lab.

Outcomes Assessment: Selected homework, quiz, test, and exam questions are blueprint to course objectives. A checklist rubric is used to evaluate projects and lab reports for the presence of course objectives. Data is collected and analyzed to determine the level of student performance on these assessment instruments in regards to meeting course objectives. The results of this data analysis are used to guide necessary pedagogical and/or curricular revisions.

Course Requirements: All students are required to:

1. Maintain regular attendance and participate in classroom discussions.
2. Complete homework assignments and lab reports on time.
3. Take all quizzes, tests and exams as scheduled.
4. Participate in all lab experiments and submit lab reports.
5. Read all assigned textbook pages.
6. Make oral presentations of projects.
7. Share responsibilities when working as a team.
Methods of Evaluation: Final course grades will be computed as follows:

<table>
<thead>
<tr>
<th>Grading Components</th>
<th>% of final course grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Homework, Quizzes and Class Participation</td>
<td>10 – 30%</td>
</tr>
<tr>
<td>A perusal of homework and quiz questions and analysis of class discussion will indicate the extent to which students master course objectives.</td>
<td></td>
</tr>
<tr>
<td>• Projects and Lab Reports</td>
<td>15 – 30%</td>
</tr>
<tr>
<td>Projects will show evidence of the extent to which students can apply course concepts to real world problems, design a solution, and compose a technical report. Lab reports will show evidence of the extent to which students can apply course concepts to physical problems, analyze errors, and compose a technical report. Labs are designed to reinforce student mastery of course objectives.</td>
<td></td>
</tr>
<tr>
<td>• 3 or more Tests (dates specified by the instructor)</td>
<td>30 – 50%</td>
</tr>
<tr>
<td>Tests will show evidence of the extent to which students meet course objectives, including but not limited to identifying and applying concepts, analyzing and solving problems, estimating and interpreting results and stating appropriate conclusions using correct terminology.</td>
<td></td>
</tr>
<tr>
<td>• Final Exam (comprehensive)</td>
<td>20 – 30%</td>
</tr>
<tr>
<td>The same objectives apply as with tests, but it is anticipated that students will provide increased evidence of synthesizing a combination of concepts.</td>
<td></td>
</tr>
</tbody>
</table>

NOTE: The instructor will provide specific weights, which lie in the above-given ranges, for each of the grading components at the beginning of the semester.

Academic Integrity: Dishonesty disrupts the search for truth that is inherent in the learning process and so devalues the purpose and the mission of the College. Academic dishonesty includes, but is not limited to, the following:

• plagiarism – the failure to acknowledge another writer’s words or ideas or to give proper credit to sources of information;
• cheating – knowingly obtaining or giving unauthorized information on any test/exam or any other academic assignment;
• interference – any interruption of the academic process that prevents others from the proper engagement in learning or teaching; and
• fraud – any act or instance of willful deceit or trickery.

Violations of academic integrity will be dealt with by imposing appropriate sanctions. Sanctions for acts of academic dishonesty could include the resubmission of an assignment, failure of the test/exam, failure in the course, probation, suspension from the College, and even expulsion from the College.
**Student Code of Conduct:** All students are expected to conduct themselves as responsible and considerate adults who respect the rights of others. Disruptive behavior will not be tolerated. All students are also expected to attend and be on time for all class meetings. No cell phones or similar electronic devices are permitted in class. Please refer to the Essex County College student handbook, *Lifeline*, for more specific information about the College’s Code of Conduct and attendance requirements.

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic/Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction to Manufacturing Materials and Processes</td>
</tr>
<tr>
<td>2</td>
<td>Properties of Metals and Alloys: Stress-Strain Diagrams</td>
</tr>
</tbody>
</table>
| 3    | Lab 1: Tensile Test  
**Test 1**  |
| 4    | Equilibrium Diagrams |
| 5    | Heat Treatment |
| 6    | Nonferrous Metals and Alloys |
| 7    | Lab 2: Brinnel Hardness Test  
**Test 2**  |
| 8    | Nonmetallic Materials: Plastics, Elastomers, and Ceramics |
| 9    | Quality Control: Measurement, Inspection, and Testing |
| 10   | Casting Processes |
| 11   | Casting Processes (continued)  
**Test 3**  |
| 12 – 13 | Forming Processes |
| 14   | Introduction to Other Traditional and Nontraditional Processes |
| 15   | Comprehensive Final Exam |