### ESM 355 MATERIALS AND PROCESSES IN MANUFACTURING DESIGN (REQUIRED)
Credit: 3

#### COURSE CATALOG DESCRIPTION:
The design of mechanical and electrical systems, material selection, and fabrication processes are surveyed and shown to be essential components of manufacturing engineering. The mechanical and thermal processing of a wide range of metallic and nonmetallic materials is reviewed. Modern computer based materials selection, advanced processing methods, and automation are explored.

#### PRE- OR COREQUISITE(S):
ESG332 Materials Science I: Structure and Properties of Materials or ESG333 Materials Science II: Electronic Properties

#### TEXT(S) OR OTHER REQUIRED MATERIAL:

#### COURSE LEARNING OUTCOMES

<table>
<thead>
<tr>
<th>COURSE LEARNING OUTCOMES</th>
<th>SOS</th>
<th>ASSESSMENT TOOLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thorough understanding of a broad array of manufacturing techniques for metallic, ceramic, polymer, electronic, and composite components in products</td>
<td>a, f, h, j</td>
<td>Homework assignments; in-class problems; research paper and oral presentation; exams</td>
</tr>
<tr>
<td>Comprehension of the role that materials selection and processing has in meeting property requirements for manufactured components</td>
<td>a, e, h, j</td>
<td>Homework assignment; exam</td>
</tr>
<tr>
<td>Understanding of quality assessment in manufacturing processes</td>
<td>f, h, j</td>
<td>Homework assignment; exam</td>
</tr>
<tr>
<td>Appreciation of the use of computer technology in manufacturing</td>
<td>h, j</td>
<td>Homework assignment; exam</td>
</tr>
<tr>
<td>Enhancement of problem solving skills related to materials science and processing in manufacturing</td>
<td>a, d, e, k</td>
<td>Homework assignments; exam</td>
</tr>
<tr>
<td>Enhancement of written and oral communications skills on technical topics in manufacturing processes</td>
<td>g, i, k</td>
<td>Research paper and oral presentation</td>
</tr>
</tbody>
</table>

#### COURSE TOPICS
Week 1: Materials Science Review
Week 2: Metal Casting
Week 3: Rolling and Forging
Week 4: Extrusion and Drawing
Week 5: Sheet Metal Forming
Week 6: Powder Metallurgy
Week 7: Electronics
Week 8: Ceramics
Week 9: Polymers
Week 10: Composites
Week 11: Joining
Week 12: Surface Treatment
Week 13: Quality
Week 14: Materials Selection

CLASS/ LABORATORY SCHEDULE:

<table>
<thead>
<tr>
<th>ESM</th>
<th>355</th>
<th>Materls &amp; Procss in Manuf Des</th>
<th>LEC</th>
<th>TUTH</th>
<th>12:50 PM</th>
<th>2:10 PM</th>
</tr>
</thead>
</table>

CURRICULUM

This course contributes 3 credit hours toward meeting the required 48 hours of engineering topics.

STUDENT OUTCOMES (SCALE 1-3):

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>J</th>
<th>K</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td></td>
<td></td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

3 – Strongly supported  2 – Supported  1 – Minimally supported

LEAD COORDINATOR(S) WHO PREPARED THIS DESCRIPTION AND DATE OF PREPARATION:

Christopher M. Weyant 5/15/2010