ESM 455 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.


TEXT(S) OR OTHER REQUIRED MATERIAL:  

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<tr>
<th>COURSE LEARNING OUTCOMES</th>
<th>SOS</th>
<th>ASSESSMENT TOOLS</th>
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<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>
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<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>
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<td>Understanding of quality assessment in manufacturing processes</td>
<td>f, h, j</td>
<td>Homework assignment; exam</td>
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<td>Appreciation of the use of computer technology in manufacturing</td>
<td>h, j</td>
<td>Homework assignment; exam</td>
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<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>
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<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>
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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:

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CURRICULUM

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

STUDENT OUTCOMES (SCALE 1-3):

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<th>A</th>
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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