**EMAT 354**
**Materials Eng. & Design Lab**
Lecture M 2:00-2:50 & Lab: M & Tue 15:00–16:50,

Instructor: **Sudhakar Vadirejja, Ph.D., P.E.**
Office: ELC 218, x 4267
Office Hours: M through F, 1:00 pm–2:00 pm or by appointment

**Catalogue Description:**
This is a continuation of Microstructural Interpretation but includes application to non-ferrous metals, ceramic and polymeric systems. Experiments are performed in heat treating, casting, working, and mechanical property evaluation of materials. Evaluation and interpretation of the materials are incorporated. Laboratory experiments are performed requiring engineering reports. Laboratory safety is emphasized.

**Credits:** 1.0 Credit (Lecture & Lab)

**Designation:** Required course (Metallurgical and Materials Engineering, General Engineering- Welding Option)

**Prerequisites:** EMAT 351/EMAT 353 or permission of the instructor.

**Textbook:** None, lab précis will be provided.

**References:** As per lab précis.

**Relationship of Course to Metallurgical and Materials Engineering Program Outcomes:**
This course provides practical experience in the fundamental themes of materials science and engineering.

**Objectives:** The objective of this course is to provide the student with:
1) Practical experience with the processing, microstructure and performance of materials, and
2) Practical experience with the relationships between them.

**Outcomes:** Graduates of the course will be experienced in technical report writing, in which the graduates will have related their familiarity with:
1) Relate material behavior to mechanisms at an atomic/microstructure level,
2) Performance measures in materials testing,
3) Common microstructures encountered in non-ferrous alloys,
4) The effect of heat treatments on microstructures of non-ferrous alloys, and
5) Fulfill **ABET** outcomes 6 & 9 (Consult the course catalogue and Department Guidelines)
### Tentative Laboratory Plan

<table>
<thead>
<tr>
<th>Date</th>
<th>Activity/Experiments</th>
</tr>
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<tbody>
<tr>
<td>Week 1</td>
<td>Safety - Sign-up</td>
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<tr>
<td>Week 2</td>
<td>Aluminum Casting</td>
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<tr>
<td><strong>Holiday</strong></td>
<td><strong>Martin Luther King Day</strong></td>
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<tr>
<td>Week 3</td>
<td>Aluminum Casting</td>
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<tr>
<td>Week 4</td>
<td>Aluminum Precipitation Strengthening</td>
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<tr>
<td>Week 5</td>
<td>Aluminum Precipitation Strengthening</td>
</tr>
<tr>
<td><strong>Holiday</strong></td>
<td><strong>Presidents Day</strong></td>
</tr>
<tr>
<td>Week 6</td>
<td>Cold Work and Annealing</td>
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<tr>
<td>Week 7</td>
<td>Cold Work and Annealing</td>
</tr>
<tr>
<td>Week 8</td>
<td>Cold Work and Annealing</td>
</tr>
<tr>
<td><strong>Holiday</strong></td>
<td><strong>Spring Break</strong></td>
</tr>
<tr>
<td>Week 9</td>
<td>Fractography</td>
</tr>
<tr>
<td>Week 10</td>
<td>Stainless Steel Welds</td>
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<tr>
<td>Week 11</td>
<td><strong>Spare</strong></td>
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<tr>
<td>Week 12</td>
<td><strong>Spare</strong></td>
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<tr>
<td>Week 13</td>
<td>Returning of the graded lab reports (ALL)</td>
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</tbody>
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**Expectations:**

1) Attend the lab, and let me know in case you need to be elsewhere prior to any class.

2) **Note that all reports must be satisfactorily completed before a grade is assigned. You will lose 1 point per day for late submission.**

**Assessment:**

The assessment will be an average of the ALL the required lab reports submitted **PLUS attendance, and active participation in the lecture class and labs.**

\[
A = (92-100), A- = (90-91.9), B+ = (88-89.9), B = (82-87.9), B- = (80-81.9), \\
C+ = (78-79.9), C = (72-77.9), C- = (70-71.9), D+ = (68-69.9), D = (62-67.9), D- = (60-61.9), \ F = (0-59.9) 
\]

**Contribution to Professional Component:**

- Engineering Topics - Yes
- Engineering Design - No
- Computer Usage - Yes – spreadsheets, word processor
- Ethics - No
- Statistics - No
- Safety - Yes

**ABET outcomes covered: 6 & 9**

- (6) Design and conduct experiments, analyze and interpret data
- (9) To integrate the understanding of the scientific and engineering principles underlying the four major elements of the field: structure, properties, processing, and performance related to material systems appropriate to the field

**Prepared by:** Dr. Sudhakar Vadiraja