SOUTHERN POLYTECHNIC STATE UNIVERSITY
DEPARTMENT OF SYSTEMS AND MECHANICAL ENGINEERING
COURSE SYLLABUS

MATERIALS SCIENCE AND ENGINEERING

Semester: Fall 2014
Instructor: Dr. M. Loraine Lowder
Course Number: ME 3101
Course Registration Number: 1301

Course Start Date: Thursday, August 14th
Room Number: Q314
Meeting Days: TR
Meeting Times: 4:30 PM – 5:45 PM

Instructor Contact Information:
Office: G171
Telephone: (678)915-3425
Email: llowder@spsu.edu
Office Hours:
Tuesday & Thursday: 9:45 AM – 10:15 AM in Q326
Tuesday & Thursday: 2:20 PM – 4:20 PM in G171
(Additional Office Hours are Available by Appointment)

Credit Hours: 3

Prerequisite(s): CHEM 1211K: Chemistry I (or CHEM-2211)
Co-requisite(s): ENGR 3131: Strength of Materials

The Instructor may remove a student at any time during the term if it is noted that these requirements have not been met. The student will receive a W or F as appropriate.

Course Description
A study of metals, ceramics, polymers, and composites as related to design. Areas include corrosion, atomic structure, mechanical properties, failure theories, fatigue, creep, cold working, heat treating, alloying, and non-destructive testing.

Required Textbook
Materials Science and Engineering - An Introduction, 8th Edition (2009), Callister

Essentials
Scientific Calculator
Course Objectives:
Develop an understanding of the following:
1. The relationships between material structures and engineering properties.
2. How structures are manipulated in common industrial processes to optimize properties.
3. How material selection is an integral part of engineering design.

Learning Outcomes:
Develop understanding of fundamentals and application of the following topics:
1. General characteristics of major material groups.
2. Atomic and microstructure of materials.
3. Mechanical, chemical, electrical and thermal properties of materials.
4. Deformation and failure mechanisms.
5. Equilibrium phase diagrams and microstructure transformations.
7. Integration of information to develop material selection.
8. Communications skills, written and oral.

This list is tentative and may be revised.

Course Topics:
1. Atomic Structure and Interatomic Bonding
2. The Structure of Crystalline Solids
3. Imperfection of Solids
4. Diffusion
5. Mechanical Properties of Metals
6. Dislocations and Strengthening Mechanisms
7. Failure
8. Phase Diagrams
9. Phase Transformations
10. Applications and Processing of Metal Alloys
11. Structure and Properties of Ceramics
12. Applications and Processing of Ceramics
13. Polymer Structures
15. Composites
16. Corrosion and Degradation of Materials

Important Dates
Holiday: Thursday, November 27th
Last Day to Withdraw: Thursday, October 2nd
Last Day of Classes: Monday, December 1st
Commencement: Saturday, December 13th
All Grades Posted: Monday, December 15th
ADA Compliance Statement
If you have a documented disability as described by the Rehabilitation Act of 1973 and the Americans with Disabilities Act (ADA) that may require you to need assistance attaining accessibility to instructional content to meet course requirements, we recommend that you contact the ATTIC at (678)915-7361 as soon as possible. It is then your responsibility to contact and meet with your instructor. The ATTIC can assist you and the instructor in formulating a reasonable accommodation plan and provide support in developing appropriate accommodations for your disability. Course requirements will not be waived but accommodations will be made, when appropriate, to assist you to meet the requirements.

Course Delivery Method
This course will use a variety of instructional strategies and techniques including, but not limited to, face-to-face lectures, demonstrations, problem solving sessions, and small group discussions. Some lecture sessions may be replaced by assignments (such as research on special topics on engineering materials), videos, industrial tours or professional lectures, all of which are aimed at providing the students with a broader, contemporary knowledge of engineering materials in design and manufacturing.

Class Policies:

Attendance Policy:
- Students are expected to attend every class and be on time. Students are responsible for material covered in class, as well as all assignments, even if they are absent or tardy. Tardiness to (or leaving early from) two classes is considered one unexcused absence. Five unexcused absences may result in a student’s final course grade being lowered by one full letter grade.
- Excused absences require documentation:

<table>
<thead>
<tr>
<th>Reason</th>
<th>Required Documentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illness</td>
<td>Original hard copy of doctor’s excuse on letterhead</td>
</tr>
<tr>
<td>Death in the family</td>
<td>Obituary or death certificate</td>
</tr>
<tr>
<td>Sponsored SPSU event</td>
<td>Program with student’s name printed on it</td>
</tr>
</tbody>
</table>

Make-up Policy:
- Assignments are due at the BEGINNING of class on the due date. Late assignments will not be accepted except in the case of an excused absence.
- Make-up assessments will not be allowed except in the case of an excused absence.

Emergency Policies:
- In the event of an emergency that forces the college to close for an extended period, students must contact the instructor of this class within 48 hours using the contact information (e.g., email address, or Desire2Learn) on the syllabus to obtain directions for continuing the course. The instructor will provide directions for the transmission and submission of course assignments and course assessments, including due dates.
• If the instructor for the course cannot be reached within the specified period of time (within 2 business days), the chair of the department responsible for the course can be reached at the email address posted on the university’s website.

Academic Honesty:
• Consistent with the university’s policy, cheating of any kind on any assignment will not be tolerated and will be punished by academic and/or disciplinary sanctions. Cheating will result in severe penalties including a zero for the assignment, failure in the course, and/or expulsion.

Honor Code information and provisions are available at: http://www.spsu.edu/honorcode/

Methods of Assessment:
• **Exams**
  There will be THREE EXAMS. Each exam will cover the material presented in the lecture, reading assignments, and homework assignments.

• **Quizzes**
  There will be FOUR QUIZZES.

• **Homework**
  Homework will be assigned for the purpose of strengthening of the concepts covered in lectures. While students are expected to complete all of the problems that have been assigned, only select homework problems will be collected and graded.

• **Research, Report, and Presentation**
  Each student will conduct a research study on a topic considered ‘State of the Art’ in the area of nanomaterials and then present the findings.

• **Final Exam**
  THE FINAL EXAMINATION WILL BE COMPREHENSIVE.

Evaluation:

*Your grade will be assigned on the following basis of an overall score, derived as follows:*

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Three Exams</td>
<td>40%</td>
</tr>
<tr>
<td>Four Quizzes</td>
<td>25%</td>
</tr>
<tr>
<td>Homework</td>
<td>5%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>20%</td>
</tr>
<tr>
<td>Research, Report, &amp; Presentation</td>
<td>10%</td>
</tr>
</tbody>
</table>
Letter grades will be awarded using the following guidelines:

- **A**: 90 – 100%
- **D**: 60 – 69%
- **B**: 80 – 89%
- **F**: 59% or below
- **C**: 70 – 79%

Problems related to grading should be first brought to the attention of the professor for the course. However, a resolution of unsettled problems or concerns may be pursued by following the procedures outlined in the SPSU Catalog.

**Course Schedule:**

<table>
<thead>
<tr>
<th>Week</th>
<th>Day</th>
<th>Date</th>
<th>Topic</th>
<th>Quiz/Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Thursday</td>
<td>8/14/2014</td>
<td>Chapter 1</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Tuesday</td>
<td>8/19/2014</td>
<td>Chapter 2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Thursday</td>
<td>8/21/2014</td>
<td>Chapter 3</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Tuesday</td>
<td>8/26/2014</td>
<td>Chapter 3 Quiz 1</td>
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<tr>
<td>3</td>
<td>Thursday</td>
<td>8/28/2014</td>
<td>Chapter 4</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Tuesday</td>
<td>9/2/2014</td>
<td>Chapter 5</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Thursday</td>
<td>9/4/2014</td>
<td>Chapter 6</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Tuesday</td>
<td>9/9/2014</td>
<td>Exam 1</td>
<td></td>
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<tr>
<td>5</td>
<td>Thursday</td>
<td>9/11/2014</td>
<td>Chapter 7</td>
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<td>5</td>
<td>Tuesday</td>
<td>9/16/2014</td>
<td>Chapter 7</td>
<td></td>
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<tr>
<td>6</td>
<td>Thursday</td>
<td>9/18/2014</td>
<td>Chapter 8</td>
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<td>6</td>
<td>Tuesday</td>
<td>9/23/2014</td>
<td>Chapter 8 Quiz 2</td>
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<tr>
<td>7</td>
<td>Thursday</td>
<td>9/25/2014</td>
<td>Chapters 8 &amp; 9</td>
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<tr>
<td>7</td>
<td>Tuesday</td>
<td>9/30/2014</td>
<td>Chapter 9</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Thursday</td>
<td>10/2/2014</td>
<td>Chapter 9</td>
<td></td>
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<td>8</td>
<td>Tuesday</td>
<td>10/7/2014</td>
<td>Exam 2</td>
<td></td>
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<td>9</td>
<td>Thursday</td>
<td>10/9/2014</td>
<td>Chapter 10</td>
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<td>9</td>
<td>Tuesday</td>
<td>10/14/2014</td>
<td>Chapter 10</td>
<td></td>
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<td>10</td>
<td>Thursday</td>
<td>10/16/2014</td>
<td>Chapter 11</td>
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<td>10</td>
<td>Tuesday</td>
<td>10/21/2014</td>
<td>Chapter 11 Quiz 3</td>
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<tr>
<td>11</td>
<td>Thursday</td>
<td>10/23/2014</td>
<td>Chapters 11 &amp; 12</td>
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<tr>
<td>11</td>
<td>Tuesday</td>
<td>10/28/2014</td>
<td>Chapters 12 &amp; 13</td>
<td></td>
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<tr>
<td>12</td>
<td>Thursday</td>
<td>10/30/2014</td>
<td>Chapters 13 &amp; 14</td>
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<tr>
<td>12</td>
<td>Tuesday</td>
<td>11/4/2014</td>
<td>Exam 3</td>
<td></td>
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<tr>
<td>13</td>
<td>Thursday</td>
<td>11/6/2014</td>
<td>Chapters 14 &amp; 15</td>
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<td>13</td>
<td>Tuesday</td>
<td>11/11/2014</td>
<td>Chapters 15 &amp; 16</td>
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<tr>
<td>14</td>
<td>Thursday</td>
<td>11/13/2014</td>
<td>Chapter 16</td>
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<td>14</td>
<td>Tuesday</td>
<td>11/18/2014</td>
<td>Chapter 17</td>
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<tr>
<td>15</td>
<td>Thursday</td>
<td>11/20/2014</td>
<td>Chapter 17/Student Presentations Quiz 4</td>
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<tr>
<td>15</td>
<td>Tuesday</td>
<td>11/25/2014</td>
<td>Student Presentations</td>
<td></td>
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<tr>
<td>16</td>
<td>Thursday</td>
<td>11/27/2014</td>
<td>Thanksgiving Holiday</td>
<td></td>
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*This schedule is tentative and may be revised.*