

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

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**MATERIALS SCIENCE AND ENGINEERING**

<b>Semester:</b> Fall 2014	<b>Course Start Date:</b> Thursday, August 14 <sup>th</sup>
<b>Instructor:</b> Dr. M. Loraine Lowder	<b>Room Number:</b> Q314
<b>Course Number:</b> ME 3101	<b>Meeting Days:</b> TR
<b>Course Registration Number:</b> 1301	<b>Meeting Times:</b> 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)

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**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, 8<sup>th</sup> 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.
6. Mechanisms of strengthening techniques.
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
14. Characteristics, Applications, and Processing of Polymers
15. Composites
16. Corrosion and Degradation of Materials

**Important Dates**

Holiday: Thursday, November 27<sup>th</sup>

Last Day to Withdraw: Thursday, October 2<sup>nd</sup>

Last Day of Classes: Monday, December 1<sup>st</sup>

Commencement: Saturday, December 13<sup>th</sup>

All Grades Posted: Monday, December 15<sup>th</sup>

## 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:

Reason	Required Documentation
Illness	Original hard copy of doctor's excuse on letterhead
Death in the family	Obituary or death certificate
Sponsored SPSU event	Program with student's name printed on it

### 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:**

Three Exams:	40%	Homework:	5%
Four Quizzes	25%	Final Exam:	20%
Research, Report, & Presentation:	10%		

**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:**

Week	Day	Date	Topic	Quiz/Exam
1	Thursday	8/14/2014	Chapter 1	
1	Tuesday	8/19/2014	Chapter 2	
2	Thursday	8/21/2014	Chapter 3	
2	Tuesday	8/26/2014	Chapter 3	Quiz 1
3	Thursday	8/28/2014	Chapter 4	
3	Tuesday	9/2/2014	Chapter 5	
4	Thursday	9/4/2014	Chapter 6	
4	Tuesday	9/9/2014		Exam 1
5	Thursday	9/11/2014	Chapter 7	
5	Tuesday	9/16/2014	Chapter 7	
6	Thursday	9/18/2014	Chapter 8	
6	Tuesday	9/23/2014	Chapter 8	Quiz 2
7	Thursday	9/25/2014	Chapters 8 & 9	
7	Tuesday	9/30/2014	Chapter 9	
8	Thursday	10/2/2014	Chapter 9	
8	Tuesday	10/7/2014		Exam 2
9	Thursday	10/9/2014	Chapter 10	
9	Tuesday	10/14/2014	Chapter 10	
10	Thursday	10/16/2014	Chapter 11	
10	Tuesday	10/21/2014	Chapter 11	Quiz 3
11	Thursday	10/23/2014	Chapters 11 & 12	
11	Tuesday	10/28/2014	Chapters 12 & 13	
12	Thursday	10/30/2014	Chapters 13 & 14	
12	Tuesday	11/4/2014		Exam 3
13	Thursday	11/6/2014	Chapters 14 & 15	
13	Tuesday	11/11/2014	Chapters 15 & 16	
14	Thursday	11/13/2014	Chapter 16	
14	Tuesday	11/18/2014	Chapter 17	
15	Thursday	11/20/2014	Chapter 17/Student Presentations	Quiz 4
15	Tuesday	11/25/2014	Student Presentations	
16	Thursday	11/27/2014	Thanksgiving Holiday	

*This schedule is tentative and may be revised.*