

**Fall 2012**

**Manufacturing Systems Engineering and Management**

**MSE 227L: Engineering Materials Lab - Class No. 15200 (1 Unit)**

**Time: Monday, 2:00-4:45 pm, room JD1504**

**Instructor:** Lisa Reiner

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**Prerequisites:** CHEM 101; PHYS 220A/L; MATH 150A;

**Corequisites:** MATH 150B; MSE 227.

Introductory lab course on engineering materials and their properties. Includes experiments in mechanical properties, heat treatment, metallography, corrosion properties and X-ray diffraction. Course culminates in a special project where students identify, design and perform group experiment. One 3-hour lab per week. (Design units: 0.25)

**Textbook and Other Materials**

David G. Rethwisch, William D. Callister Jr, Fundamentals of Materials Science and Engineering: An Integrated Approach, John Wiley & Sons, NY, 4th Edition, 2012.

Revised Laboratory Manual for MSE 227L: [http://www.csun.edu/~bavarian/mse\\_227\\_lab.htm](http://www.csun.edu/~bavarian/mse_227_lab.htm)

**Course Objectives:**

The objectives of this course are as follows:

- ☐ To apply theory of science and mathematics theory to engineering problems
- ☐ To perform experiments to obtain reliable data
- ☐ To learn to communicate the results of the engineering activities in the laboratory
- ☐ To develop a better understanding of the selection and use of materials and materials processes
- ☐ To develop and grow as a professional engineer

**Topics Covered:**

X-ray Diffraction of Cubic Metals  
Tensile Testing of Aluminum and Steel  
Impact Testing of Aluminum and Steel  
Metallography of Steel, Aluminum and Brass  
Heat Treatment of Aluminum  
Heat Treatment of Steel  
Jominy Test of Steel  
Corrosion of Steel and Brass  
Special Project

Contribution to Professional Component:    Engineering Science    0.75  
                                                                 Engineering Design    0.25

## **Objectives of Materials Engineering Laboratory**

The Materials Engineering Laboratory is one of the first professional engineering courses in the CSUN curriculum and is aimed at preparing the student to undertake future engineering projects. The laboratory experience should improve the abilities of the students:

- to apply theory to engineering problems
- to perform experiments to obtain reliable data
- to communicate the results of the engineering activities
- to develop a better understanding of the selection and use of materials, and
- to develop and grow as a professional engineer.

Ideal lab projects are ones that are entirely planned by the students, including the definition of the problem (objectives), the selection of the approach to solve the problem (method), the execution (planning and organizing), and the analysis of the results (relationship to objectives). Because this is a lower division lab course, most of the experiments (in terms of the objectives and procedures) will be clearly defined. It is expected that the students will make sufficient progress so that by the end of the semester they will be able to complete a special project.

## Evaluation of Effort

MSE 227-227L is an integrated lecture-laboratory course which is designed to familiarize student engineers with both the properties of engineering materials and the testing methods used in evaluating those properties. Although the course is integrated, separate grades for 227 and 227L are given. You will need the following items:

1. Course textbook
2. Laboratory manual
3. One bound quad ruled laboratory book.

The lab book is used to record data for all labs (and answer questions when no report is required). The notebook will be collected at the end of the semester and graded. Data shall be neat and orderly, recorded in ink, and initialed by either the lab instructor before the end of the period.

Although the performance of each experiment is a "group effort", each individual shall write up his/her own reports. Any incident of copied or identical lab reports will result in each individual receiving a zero for that experiment. The grade for some of the experiments depends heavily on the quality of the required reports. The grade will depend on the following items:

1. Completeness of the work presented
2. Care in collecting data
3. Accuracy in evaluation of data and in answering the questions
4. Neatness, organization, and clarity of written work
5. Evidence of understanding of the major points of the experiment
6. The overall quality of the written report in terms of grammar, spelling and punctuation.

**The last day to drop: Friday, September 14, 2012.**

**Grading:**

The basis of the laboratory course grade is as follows:

Individual Memo Reports	50%
Bound Lab Book with <b>data written in pen</b>	10%
Attitude/participation	10%
Final Exam (closed book, no notes, individual work)	10%
Group project – formal report - outline	10%
PowerPoint presentation (Group)	10%

**\*Attendance is not optional, role will be taken.**

The grade for the laboratory depends upon the degree of participation and attitude of the student during the lab period. Evidence of loafing, lackadaisical or immature behavior or misuse of equipment will be cause for ejection from the laboratory. In addition, it is expected that the student will be extremely conscientious about personal safety of themselves and others, particularly when clear directions have been given pertaining to safety. If you have a question, ask before you proceed.

In addition to the lab experiments which have been assigned, each group will be expected to come up with a topic and carry out a Special Project. These projects should require three lab periods to complete. Possible topics and experiments that can be done with the available equipment will be supplied by your instructor. A **formal report** will be required of each group for the Special Project. A **20-minute (per group) oral presentation** of the project will be made during the last week of the semester using PowerPoint.

Students are encouraged to use labs during periods other than their own. To do so, the following restrictions apply:

1. First preference for equipment use goes to students registered to take the lab at the desired time.
2. If the lab is vacant, students must always work with at least one other person and with the full knowledge and permission of a faculty member.
3. If the lab is occupied with another lab, the students should seek the permission of the instructor or teaching assistant before beginning.
4. Students are expected to attend their lab section meetings.

**Communication**

The writing of reports, letters, and papers is a major activity of practicing engineers. Oral communication skills are also important. The ability to communicate is frequently the single greatest factor in the professional growth of engineers.

**Laboratory Operations**

The specimens required to perform standard experiments will be provided to each group. At the start of the laboratory, each group should appoint one member to get equipment and tools needed for their experiment. This person is also responsible for returning the equipment not later than

10 min. before the end of the lab. A third member should be appointed to be an observer. This individual will record all data that should be copied by the others who are actually performing the experiment. Reference books are available for use in the laboratory. The books must not be removed from the laboratory so that all students can use them.

### Schedule for lab and report submission

Date	Group 1	Group 1	Group 2	Group 2	Group 3	Group 3	Group 4	Group 4
<b>Monday</b>	LAB	Report Due	LAB	Report Due	LAB	Report Due	LAB	Report Due
Aug 27	Intro		Intro		Intro		Intro	
<b>Sept 3</b>	<b>Holiday</b>							
Sept 10	Exp 1		Exp 1		Exp 1		Exp 1	
Sept 17	Exp 2		Exp 3		Exp 4		Exp 5	
Sept 24	Exp 3		Exp 4		Exp 5		Exp 2	
Oct 1	Exp 4	Exp 2	Exp 5		Exp 2	Exp 4	Exp 3	
Oct 8	Exp 5		Exp 2	Exp 4	Exp 3		Exp 4	Exp 2
Oct 8	<b>Project outlines due</b>							
Oct 15	Exp 6	Exp 4	Exp 7		Exp 8	Exp 2	Exp 9	
Oct 22	Exp 7		Exp 6	Exp 2	Exp 9		Exp 8	Exp 4
Oct 29	Exp 8	Exp 6 - 7	Exp 9	Exp 6 - 7	Exp 6	Exp 8	Exp 7	Exp 9
Nov 5	Exp 9		Exp 8		Exp 7	Exp 9	Exp 6	Exp 8
<b>Nov 12</b>	<b>Holiday</b>							
Nov 19	Project	Exp 8, 9	Project	Exp 8, 9	Project	Exp 6 - 7	Project	Exp 6 - 7
Nov 26	Project		Project		Project		Project	
Dec 3 – last day of class	<b>Final</b>	<b>Formal Project/ PPTs / Lab books</b>	<b>Final</b>	<b>Formal Project/ PPTs / Lab books</b>	<b>Final</b>	<b>Formal Project / PPTs / Lab books</b>	<b>Final</b>	<b>Formal Project/ PPTs / Lab books</b>

**All MEMO reports must be submitted before November 26, 2012.**