Course Syllabus

SMFG 211- Materials and Quality Testing – 3.0 Units

Prerequisite: CHEM 107 or CHEM 111, PHYS 202A.

Recommended: MATH 105

Course Times:
Lecture M, W 11 AM – 11:50 AM OCNL 121
Lab F 11 AM – 1:50 pm OCNL 130

Instructor: Christopher M. Gallagher (@csuchico.edu)

Office: Location- Siskiyou 100A – Phone: M: 9-50AM and 12 – 12:50 PM
Hours W: 12 to 12:50 PM

Course Description
Study of the manufacturing, processing, applications, and testing of common industrial materials, including metals, polymers, and composites.

Course Goal
Provide students a thorough study of metals and polymer materials and material properties and testing methods. Provide an introduction to sustainability for the manufacturing industry.

Laboratory Goal
Provide students a thorough knowledge of the testing methods and laboratory procedures for plastic, composite, and metal materials.

Student Learning Objectives
Students will gain understanding and practice of testing metal and plastic materials for quality assurance testing and sustainability measurements.

Course Content Learning Outcomes
Upon successful completion of this course, students will be able to:
1. Measure the hardness of several metal and plastic materials.
2. Measure the tensile properties of plastics and metals.
3. Measure the thermal properties of plastics.
4. Measure the chemical structure of transparent plastics.
5. Measure the stress concentration of rubber near holes.
6. Understand the relationship between cold working and hardness and tensile strength.
7. Understand the sustainability issues for manufacturing industry.
8. Record data in a log book and write technical test reports.
Course Usage of Blackboard Learn

Copies of the course syllabus, lectures, and major assignments may be found on Blackboard Learn. You are responsible for regularly checking the online resources, which is accessed through the Chico State Portal at http://portal.csuchico.edu.

Required Textbook and Materials

- Lab Notebook, Available from SPE student chapter

Safety

Laboratory Safety Policies and Procedures are strictly enforced in the labs. Students will be given safety training and are expected to become familiar with the safety policies and procedures. Each student is required to submit a signed acknowledgement form for safety training before the first lab experiment. A sticker will be placed on the student’s campus ID card upon completion of training.

General

1. Absences are allowed only for illness (doctor’s note required) or other serious reasons with permission prior to the class. There will be grade penalty for absence, arriving after roll call, or leaving before completion of the experiment. Three or more absences will result in an incomplete for SMFG 211.

2. All cellular phones should be turned off in the lab except when they are used for timing purpose in experiments with instructor’s permission.

3. Shirts and shoes are required in the laboratory. Sandals and open-toe shoes are not allowed for safety reason. Students not safely dressed will be asked to leave the laboratory resulting in an absence.

4. Students run experiments in groups, all data collection in lab books are individual work. Students are encouraged to work together in data processing, but printing copies of the same figures from others is not allowed. University policies, due process, and sanctions for academic dishonesty are followed.

5. Quizzes and tests can have one-page of notes. Make-up exams and quizzes are closed book and notes unless prior arrangements are made.

6. Grades will be reduced one full grade for each week assignment is late.

7. Each lab report must be signed by each lab member signifying that each member worked on the lab.

8. The format of the papers is provided on BlackBoard Learn class folder.

9. Each student will complete a lab data sheet for each lab and record it in the notebook and include the following items: experiment purpose, equipment, methods, results, observations, and conclusions. The notebook will be graded in lab according to effectiveness and organization of the data. The format of the notebook will be provided in class. Be sure to answer the questions provided for each lab.

10. The notebook will be graded every week for the work from the previous week.

11. You are responsible for understanding the policies and procedures about add/drops, academic renewal, etc. found http://www.csuchico.edu/catalog/. You should be aware of the new deadlines and penalties for adding and dropping classes.
12. If you need course adaptations or accommodations because of a disability or chronic illness, or if you need to make special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible, or see me during office hours.

**Grading**

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Midterm exam</td>
<td>20%</td>
</tr>
<tr>
<td>1 Final exam</td>
<td>20%</td>
</tr>
<tr>
<td>Class quizzes</td>
<td>10%</td>
</tr>
<tr>
<td>Lab (3 Lab Reports + notebook + lab quizzes)</td>
<td>30%</td>
</tr>
<tr>
<td>Literature Review (2 papers)</td>
<td>10%</td>
</tr>
<tr>
<td>Homework-Attendance</td>
<td>10%</td>
</tr>
</tbody>
</table>

**100%**

**Reports** (All reports are typed with 1” margins and double spaced. Format is provided on Portal)

1. **Lab Reports (Teams of 2 students)**
   Each student works in a team to conduct experiments to mechanical or physical properties of the material sample.
   - A. Each student will participate in a group assignment for the lab experiments. Each student group (2 students max) is required to complete a lab assignment and write the results in a notebook. Be sure to answer the questions in the back of each lab.
   - B. Each student group of two students will complete lab reports describing several material samples, e.g., ferrous, non-ferrous, plastic, and composite. (10 to 12 pages typed with 1” margins and double spaced).
     - Report 1 from Hardness Testing lab. **Due October 2, 2016**
     - Report 2 from Tensile Testing lab. **Due October 30, 2016**
     - Report 3 from Sustainability Report **Due December 11, 2016**

2. **Literature Review**–
   - Summary report on any current article concerning materials testing of polymers, composites, ferrous, and non-ferrous materials. Available resources will be provided on PORTAL. (3 to 4 pages typed with 1” margins and double spaced).
   - Summary report on any current article concerning Life Cycle Analysis of a manufacturing operation for plastics, metals, or other manufactured product. (3 to 4 pages typed with 1” margins and double spaced).
   - Optional: Summary report of “Sustainability” programs at Sierra Nevada Brewery (3 to 4 pages typed with 1” margins and double spaced).
   - **Due Dates**
     - Paper 1: **September 18, 2016**
     - Paper 2: **November 20, 2016**
## SMFG 211 Schedule for Fall 2016

<table>
<thead>
<tr>
<th>Week of</th>
<th>Chapter (Homework** due: M; papers due: W)</th>
<th>Lab (Note: Tentative labs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Aug 22</td>
<td>(1, 2) Intro &amp; Atomic Bonding</td>
<td>Safety/Groups/ Excel HW</td>
</tr>
<tr>
<td>2 Aug 29</td>
<td>(3) Crystalline Structure</td>
<td>Quality Testing Plastics</td>
</tr>
<tr>
<td>3 Sep 5</td>
<td>(Mon-Holiday)</td>
<td>Hardness</td>
</tr>
<tr>
<td>4 Sep 12</td>
<td>(6) Mechanical Behavior Lit 1</td>
<td>Burnoffs- composites and soil</td>
</tr>
<tr>
<td>5 Sep 19</td>
<td>Quiz (Wed)</td>
<td>Microscopic Examination</td>
</tr>
<tr>
<td>7 Oct 3</td>
<td></td>
<td>Tensile Testing</td>
</tr>
<tr>
<td>8 Oct 10</td>
<td>(9) Engineering Alloys</td>
<td>Strain Hardening 1</td>
</tr>
<tr>
<td>9 Oct 17</td>
<td>Midterm (Wed)</td>
<td>Strain Hardening 2</td>
</tr>
<tr>
<td>10 Oct 24</td>
<td>(10) Polymeric Materials</td>
<td>Stress Concentration</td>
</tr>
<tr>
<td>11 Oct 31</td>
<td>(12) Composite Materials <em>Tensile Test Report</em></td>
<td>FTIR and DSC plastics</td>
</tr>
<tr>
<td>12 Nov 7</td>
<td>No School Friday Quiz (Wed)</td>
<td>No lab</td>
</tr>
<tr>
<td>13 Nov 14</td>
<td>Green Chemistry Lit 2</td>
<td>Impact Testing</td>
</tr>
<tr>
<td>Nov 21</td>
<td>Thanksgiving break</td>
<td>No Classes /lab</td>
</tr>
<tr>
<td>14 Nov 28</td>
<td>Sustainable Manufacturing</td>
<td>Jominy End Quench</td>
</tr>
<tr>
<td>15 Dec 5</td>
<td><strong>Sustainability Report</strong></td>
<td>LCA Mfg Operation with LCA tool</td>
</tr>
<tr>
<td>16 Dec 12</td>
<td>Final Monday 12 – 1:50 PM</td>
<td></td>
</tr>
</tbody>
</table>

** Note: The schedule may change during the semester.