Syllabus  
MSE 308: Materials Laboratory-II  
Spring 2013

Instructor: J. K. Shang, 106 MSEB, 333-9268, jkshang@illinois.edu
Office Hours: 1:00 PM – 2:00 PM Wednesday or by appointment
Lecture: 1:00 PM, Tuesday and Thursday – 103 Transportation
Laboratory: 2:00 PM – 5:00 PM (M-F) – 105 SILC

Course Objectives:
1) To learn the principles of materials science and engineering though lab investigation;
2) To learn the basic skills required to properly use materials science instruments;
3) To learn to organize the lab results into a logic, concise and accurate report.

Text: Handouts for individual experiments.

Course Outline:

1. Mechanical Properties /(TT) 2 Wk
2. Thermal Diffusion (DS) 2 Wk
3. Polymer Crystallization (PM) 2 Wk
4. Flow Properties (FL) 2 Wk
5. Creep Deformation (CR) 2 Wk
6. Photovoltaic Cell (PV) 2 Wk

Website for course materials: https://compass2g.illinois.edu/
### Schedule: Spring 2012

<table>
<thead>
<tr>
<th>Week</th>
<th>Group A</th>
<th>Group B</th>
<th>Group C</th>
<th>Week</th>
<th>Lecture (T)</th>
<th>Lecture (R)</th>
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<tr>
<td>0</td>
<td>No Lab</td>
<td>No Lab</td>
<td>No Lab</td>
<td>1/14 – 1/18</td>
<td>Introduction</td>
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<td>1</td>
<td>TT1</td>
<td>DS1</td>
<td>PM1</td>
<td>1/21 – 1/25</td>
<td>DS</td>
<td>TT</td>
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<td>DS2</td>
<td>PM2</td>
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<td>PM1</td>
<td>TT1</td>
<td>2/4 – 2/8</td>
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<td>TT2</td>
<td>2/11 – 2/15</td>
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<td>3/4 – 3/8</td>
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<td>-</td>
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<td>3/18-3/22</td>
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<td>PV2</td>
<td>3/25 – 3/29</td>
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<td>FL2</td>
<td>CR2</td>
<td>4/22 – 4/26</td>
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<td></td>
<td>4/30</td>
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</table>

### Teaching Assistants:

Liv Dedon (dedon2@illinois.edu)
Jongmin Youn (youn2@illinois.edu)
Wenpei Gao (wga06@illinois.edu)
Tomasz Olewicz (tolewicz@illinois.edu)
Jingshu Hui (jhui6@illinois.edu)

**Lab Manager:** Nicole Robards nrobrads@illinois.edu 204A SILC (4-7498)

**SILC:** Student Instructional Laboratory Center *(Kiln House)*
Grading Policies and Procedures:

1. Each student will submit **6 individually written reports** during the course of the semester.

2. Both a hard copy and an electronic version of each lab report are required. The hard copy should be submitted directly to the TA; all pages should be stapled together. The electronic version must be submitted in the MSWord or PDF format to the Compass2g course website.

3. The reports are due exactly at **2:00 PM** in the Lab, **one week after** the experiment is finished. Any excuses must be presented to the instructor in writing before the due date of the report, and only then will the excuse be considered.

4. **No late reports will be accepted.**

5. Each report will be graded using a standard check list for a total of **100 points**.
   - 30% of which is allocated to the writing (organization, format, grammar, spelling, sentence construction, style and illustration).
   - 70% is allocated to the technical content (concepts, data analysis, interpretation and understanding).

6. Students are **required to maintain a lab notebook**, which should be **brought to all the lab classes**. **Penalty for not bringing and using the lab notebook** will be **5%** of the lab report grade **per event**.

7. The lab reports account for **100%** of the final **grade**.

8. **Final letter grades** will be awarded depending on the **class average** and the **relative performance** of the individuals. Overall score **less than 40%** is considered a **failing grade**.

9. **5% of the final grade** may be granted **solely at the discretion of the instructor** to a student(s) for displaying exceptional professional conduct during the course of the semester. Likewise, 5% penalty may be imposed on a student(s) for displaying unprofessional conduct.

Penalties:

- **No late submission is allowed.**

- **Copying or Sharing:**
  - 25 - 50% penalty for copying or sharing any individual report material

- **Plagiarism:**
  As per the University Code of Policies and Regulations, the instructor may impose one or more of the following penalties depending on the severity of the infraction:
  - A reduced grade for the lab report
  - A "0" for the lab report
  - A reduced grade for the course
  - A failing grade for the course
  - Recommend to the head of the department that the student be suspended or dismissed from the University
Laboratory Rules and Regulations:

A) Safety:
1) Always use appropriate safety equipment and follow proper safety procedures
2) Always bring your own Safety Glasses and wear them during the lab period (safety glasses will not be provided for you. No exceptions)
3) Always wear proper attire (shirt, pants and full shoes)
4) Long hair? properly contain it so that it will not be hazardous to you and to your fellow classmates and will not damage the very sensitive and the high temperature equipment in the labs
5) ABSOLUTELY NO:
   • Food (solid or liquid)
   • Roller Skates/Blades
   • Game playing (of any sort, particularly on the computers)
   is allowed inside the labs
   • If anyone caught violating the above laboratory rules:
     - Will be expelled from the lab
     - No compensating lab time will be given to complete the experiment(s) and
     - Will not be allowed back into the labs without a letter from the Head of the Department of Materials Science and Engineering

B) General:
• You are responsible for the clean up of the common as well as the individual work areas at the end of your lab period
• After you are done with your experiment, you should not leave the lab premises without checking with your TA
• Pay particular attention to the proper use of equipment and experimental procedures. Use your down time wisely. No loud and excessive conversations
• You should not leave the area of your experimental set up in the middle of the experiment without a proper cause and/or permission from the lab supervisor
• Save your data on your own storage media immediately after the experiment is done, as the computers might be reallocated from time-to-time depending on the necessity
Guidelines to Preparing Laboratory Reports

Department of Materials Science and Engineering
University of Illinois at Urbana-Champaign

The following guidelines are for writing formal laboratory reports for the MatSE-307 and 308 laboratory courses taught in the Department of Materials Science and Engineering at the University of Illinois at Urbana-Champaign.

All laboratory reports should contain the following in order:

Title Page:
The following information should be centered on the front page: (with no page number)

Experiment Number
Title of the Experiment
Author
Class______, Section_______
Date Due________
Date Received________(leave blank)

Abstract:
The abstract is to be placed on Page 1, in block style with no paragraph indentation and in bold type. It should be no more than 150 to 200 words in length.
The abstract should be a concise summary of the experiment, containing general statements of the investigation, the methods used, materials tested, and the main results. It should not include procedural details.

The following sections of the report should start at the top of Page 2:

Introduction and Background:
The Introduction and Background section should include: (1) statements that clearly define the purpose of the experiment; (2) its significance; (3) background information necessary to understand the concepts, methods, and procedures presented in the subsequent sections. This section should not contain the details of the laboratory procedures and the data analyses.

The purpose of this section is to identify the reasons for performing the experiment. What are you measuring or determining and why? What is the significance of your observations? Try to say this in your own words. Do not copy the "objectives" from the laboratory manual or any handout that might be given to you. The purpose is also to supply the minimum supplementary information necessary to understand the methodology employed and the theoretical background of the experiment. When this section is properly written, the logic behind the experimental approach will be clear.

Experimental Procedure:
The Experimental Procedure section should give an explicit, and concise account of the methods and procedures followed during the experiment without getting into the operational details of the equipment used. Do not refer to the laboratory manual or a handout. The details should be sufficient to perform the experiment without referring to the laboratory manual or a handout. A person with technical background should be able to carry out the experiment without any difficulty by reading this section and the appropriate equipment manuals.
This section should include, when applicable, raw materials, compositions, batch formulas, and specific processing and analytical procedures used to make, test, and analyze the samples. Brief descriptions of equipment, diagrams of apparatus, sketches of circuits, etc., should be included when needed for clarity.

**Results and Discussion:**

This section will be the majority of your report. All pertinent observations and the refined data should be presented and discussed in logical order. Whenever possible, data should be presented in graphical form to show any relationships between variables. Raw data should be tabulated and placed in an appendix.

The interpretations and significance of the results should be discussed, including whether the purpose of the experiment had been fulfilled. The results should be compared with those found in the literature and if possible, with theory. Any specific experimental conditions that may have affected the results and any sources of error should also be discussed.

**Conclusions:**

This section should be a brief summary of the important findings, preferably in itemized form.

**References:**

References acknowledge the sources of non-original information, data, and ideas (i.e., not those of the author), and are used to support the author's point of view or observations.

References should be numbered consecutively in the order they appear in the text and listed in this section with the following information. The references should be listed in the format as indicated by the following examples:

**Journal:**


**Proceedings:**


**Books:**


**Patents:**


**Appendices:**

The Appendices are used for placing the material that is pertinent, but would cause a disruption to the flow of the text in the main body of the report. Raw data, sample calculations, and extensive derivations are typically included. Appendices should be lettered consecutively (e.g., Appendix A, Appendix B, etc.) and given a descriptive title.
General Guidelines:

Format:
All reports must be typewritten, single sided and double-spaced, with one-inch margins on all sides and the pages numbered. Reports must be either stapled at the upper left-hand corner or bound in a report cover. Any handwritten annotations, equations, etc. must be neat and legible.

A good laboratory report should be concise and comprehensive, and need not be long. The text of a typical laboratory report usually ranges from 10 to 13 pages in length (excluding tables and figures).

Writing:
- Always save your report file on a backup disk
- Use concise and economical wording of sentences and paragraphs without being choppy
- Particular attention should be given to proper word usage, correct spelling, proper punctuation, and the use of complete sentences
- Keep the tense consistent in a given section. Usually simple present tense is best. The main exception is the description of the experimental procedure where past tense is often more natural.
- Typically, sentences should be written in third person, but first person can be used where appropriate. Avoid a conversational style of writing.
- Avoid using gender-specific references.
- Avoid the use of absolute, unrestricted, or unqualified statements
- Reports should be written based on the premise that the reader may not be well informed on the subject. Reports should be concise, but they must be sufficiently complete to supply the necessary information.
- If you have general comments, which you care to make about the laboratory, this is not the place to make them. Such comments should be directed to the instructor or to a teaching assistant on a separate note.

Tables:
All tables should be numbered in the order they appear and placed successively in the text. Each table should have a descriptive caption above the table, and numbered as Table I, Table II, etc. as per the following example:

Table I. Mg and Fe Contents in the External Oxide Layer as a Function of Time and Temperature

<table>
<thead>
<tr>
<th>Sample no.</th>
<th>Oxidation temperature (°C)</th>
<th>Oxidation time (h)</th>
<th>Fe content (\times 10^3/cm^2)</th>
<th>Mg Content (\times 10^2/cm^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-1a</td>
<td>1000</td>
<td>0.5</td>
<td>120</td>
<td>160</td>
</tr>
<tr>
<td>4-1b</td>
<td>1000</td>
<td>1.0</td>
<td>210</td>
<td>190</td>
</tr>
<tr>
<td>4-1c</td>
<td>1000</td>
<td>4.0</td>
<td>320</td>
<td>340</td>
</tr>
<tr>
<td>4-1d</td>
<td>1000</td>
<td>10.0</td>
<td>480</td>
<td>550</td>
</tr>
<tr>
<td>4-1g</td>
<td>1000</td>
<td>40.0</td>
<td>960</td>
<td>1200</td>
</tr>
<tr>
<td>5-b1</td>
<td>700</td>
<td>10.0</td>
<td>33</td>
<td>29</td>
</tr>
<tr>
<td>5-b3</td>
<td>800</td>
<td>10.0</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>2-1a</td>
<td>900</td>
<td>10.0</td>
<td>330</td>
<td>460</td>
</tr>
<tr>
<td>5-b2</td>
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<td>10.0</td>
<td>470</td>
<td>480</td>
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<td>5-b5</td>
<td>1100</td>
<td>10.0</td>
<td>1100</td>
<td>770</td>
</tr>
<tr>
<td>10-b3b</td>
<td>700</td>
<td>70.0</td>
<td>220</td>
<td>150</td>
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<td>10-b4b</td>
<td>810</td>
<td>49.3</td>
<td>460</td>
<td>250</td>
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<tr>
<td>10-b5b</td>
<td>907</td>
<td>10.0</td>
<td>440</td>
<td>310</td>
</tr>
<tr>
<td>9-b5b</td>
<td>1100</td>
<td>1.0</td>
<td>350</td>
<td>160</td>
</tr>
</tbody>
</table>
Figures:

All figures should also be numbered in the order they appear and placed successively in the text. Each figure should have a descriptive caption below the figure, and numbered as Fig. 1, Fig. 2, etc. as per the following examples:

![Graph Example](image1.png)

Fig. 1. Acceptable example of a graph.

![Scale Bars](image2.png)

Fig. 2. Acceptable examples of scale bars.

When micrographs are to be included in the report, use scale bars as shown above and indicate the magnification in the caption, in parenthesis.

The axes of each graph must be labeled and their units clearly designated in parenthesis. Take error into account.

Photographs:

Unless photographs have been digitally scanned and printed on the page, they should be taped or glued to hold them in their proper place.

Mathematical Expressions:

Equations should be consecutively numbered and all variables identified. Decimal numbers less than one must have a leading zero such as 0.01, not .01. Every symbol must be defined, and avoid multiple meanings for the same symbol. In displaying equations with fractions (except superscripts), numerators should be stacked over denominators rather than placed on a single line and separated by a slash (/). Very large and very small numbers should be expressed in scientific notation, e.g., 4.53 x 10^8 and 2.98 x 10^-8.
Note:  
If you choose to include tables and figures within the body of your report, always place them (along with the equations) after their point of reference. Otherwise, put your tables and figures at the end of the report (after References)

SI Units:  
Use metric units of measurement, specifically SI units. English or non-metric units may appear in the report, but they should appear only in parenthesis following the SI units, e.g., 32 mm (1.25 in.).