MSE 307, Fall 2015 Materials Laboratory I

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Teaching Assistants:

As you read this document look for items highlighted in RED. Those are key items you should be aware of.

OBJECTIVES: The objectives of the course are to teach you how experiments are developed to answer basic scientific questions, to conduct example experiments that illustrate selected behaviors of materials, to analyze the resulting data and reach conclusions on its basis, and to write effective reports on the work done that convey to a reader the nature of the experiments, their results and their analysis, and the conclusions drawn.

PREQUISITES: Credit for RHET 105 or other Composition I course. Credit or concurrent registration in MSE 401 (Thermodynamics), either MSE 201 or MSE 280, and completion of the math, chemistry, and physics sequences.

NOTES ON COURSE OPERATIONS:
Course Q&A: We will use Piazza (https://piazza.com/illinois/fall2015/mse307/home) as a primary forum for questions and answers outside of class time. Please post questions there any time. Someone will answer your question as soon as possible.

If you experience problems or have concerns with any of the other students in the class, the teaching assistants, Nicole Robards, or laboratory safety issues, please notify Prof. Rockett immediately. If you feel Prof. Rockett is not sufficiently responsive or if your concerns involve him please notify the Department Head, David Cahill.

Live lectures meet Monday and Tuesday 1–1:50. The Monday lecture meets in 269 Everitt Lab. The Tuesday lecture meets in 124 Burrill Hall. On-line lectures are posted as part of the e-text with updates posted as will be announced. There are no formal office hours other than the scheduled lecture times. Lectures will meet as defined in the course calendar posted on Compass2g with updates as appropriate.

SAFETY: You are required to have completed the on-line lab safety course prior to beginning the laboratory work and you are required to have safety glasses of your own when working in the laboratory. You must wear closed shoes and long pants in the laboratory. You will be denied access to the lab if you do not have safety glasses, long pants, and closed shoes. All students and TA’s are expected to wear their safety glasses in the laboratory at all times. Failure to do so may result in your being denied access to the laboratory.

LABORATORY NOTEBOOKS: You are required to keep a laboratory notebook that is your own observations on the experiments performed. You may not copy the notes of others. Your notebook should be your own work. The notebooks will be graded according to the rubric posted on Compass2g or in the e-text. Your notebook also serves as verification of your presence in the laboratory. Do not make up notes if you are not present. That is a violation of professional ethics and can result in a failing grade in the course.

NOTE ON WORKING TOGETHER & LAB TIMINGS – READ THIS
The time in the laboratory is very limited. You should be sure to arrive on time and should plan to use the full time of each lab meeting. If you run out of things to do you have not done everything you could do. I should not find the lab dark before the end of the class period. No additional lab times will be provided except in extreme cases of illness or other standard reason and only based on reasonable evidence of hardship.

Because of the limited time in the lab you are encouraged to work with other lab groups to maximize the amount of data you can collect. For example, you could arrange that different lab groups would compare which compositions of alloy you are studying in the phase equilibrium lab and see that each team studies complementary compositions to provide the most data in the final report. You are allowed to exchange data but you MUST document the full names of the students who collected that data (the full team). This documentation should be
referenced in your lab reports. This should allow you extra time in the lab to collect and analyze the data you do obtain. If your experiment does not work out for some reason you may use the data from other groups.

ATTENDANCE: We will be taking attendance in the laboratory and at selected lectures and you will be expected to document accurately your work in your lab notebook. Absences from the laboratory must be excused or you will receive no credit for that lab work. This course requires your active participation. Therefore even excused absences must be made up to receive credit for that laboratory. Students who can not make up the labs in a timely way for legitimate reasons will be expected to apply for an incomplete grade and will be expected to make up the laboratories missed and submit the appropriate lab notes and lab write-ups before receiving a grade. Labs that are not excused may not be made up. Any lab that is not made up will receive a zero credit. For a lab in which the student did half of the required work (i.e.: they only attended one of the two days during which the lab was performed) the maximum grade on the lab notebook and write up will be a 50%.

GRADE: The grade will be based on the laboratory reports you submit (with a component from the e-text quizzes), your oral presentations, your lab notebooks, and an attendance grade. At the time of writing of this syllabus there are no other planned components of the grade. However, additional work may be assigned at any time, especially additional quizzes to see if you are reading/listening to the lectures on line. Changes to the grading structure of the class will be announced well in advance should any such changes occur. There is currently no plan for a final examination, hour examinations, or homeworks but this could be changed if discussions with the TA’s suggest it would be important. The objective of any changes would be to significantly improve the course and not to add pop quizzes or exams to the course or to surprise you. Those would be added most likely to provide exercise in topics such graphing or analyzing data. The most likely reason for the addition is observation that the class significantly lacks the ability to do these things that are necessary for write-ups.

Students found to have copied or plagiarized from other sources will receive a zero on the associated laboratory report. Students found to have copied or plagiarized on more than one assignment will fail the course. Students presenting the work of others as their own will be subject to discipline under the campus code and are liable for penalties up to and including expulsion from the University. Students may work together in teams to prepare their reports but are responsible for writing their own text or preparing their own slides. Students may not copy each other’s text in their reports.

QUIZZES: e-text quizzes count as 10% of the lab report grade. If you do not do the e-text quiz you will lose 10% off the top on your lab report (equivalent to one letter grade normally). NOTE: lab reports often receive a bonus for difficulty to increase the average score on the reports to a reasonable level. However, a student who does not do the quiz will not receive a bonus for that 10% lost score (I will apply the bonus before the lost 10% penalty.)

LABORATORY: You will work in groups of two or three students; each student should keep their own laboratory notebook and each student will turn in their own laboratory report. Each experiment will extend over 2 weeks. The final laboratory report will be due in the laboratory one week after the completion of each lab. The TA’s will return the graded reports one week later. You are allowed to rewrite one of the first or second lab reports and the fourth or fifth reports after getting feedback from the TAs. You will submit a revised report the week after each oral report at the time of your lab period. Grades will be determined by the clarity and completeness of the written descriptions (experimental approach, results, discussion, error analysis); the clarity and completeness of the figures (schematics of the experiment, raw data, analysis of data, summaries and comparisons of results, error analysis); and the depth and accuracy of your analysis. A grading rubric is posted with the e-text or on Compass2g. You are strongly encouraged to use Excel, Origin or some other scientific software for preparing figures. Hand drawn figures are normally unacceptable.

A penalty of 10% per day will be taken off for late lab reports. Oral reports may not be presented late without a specific reason and permission of the instructor and must be made up. Laboratory reports will be graded based on a rubric that will be distributed separately and will include components related to technical content and quality of writing. The latter will include spelling, grammar, organization, efficient use of space and adherence to format. Technical content will include the introduction of the experiment and any other relevant background information, description of the experimental apparatus and how the experiment was performed, description of the results obtained, description of the analysis of data performed, and conclusions drawn. In all cases grades will be lowered for ineffective use of space. Therefore a report that contains unnecessary or redundant information (as in
this sentence of this paragraph you may have noted) will receive a lower grade.

GRADING: The following weighting factors will be used to determine your final grade:
Grade components:
4 lab reports, 14% each (1.4% each for the e-text quizzes). Two oral reports, 14% each (1.4% for each e-text quiz). Lab notebook, 12%. Attendance: 4%. This is subject to change if additional grade components are concluded to be necessary to effectively judging your participation in the course.

REWRITES: You may not rewrite a lab report that received a zero grade either because of an academic integrity violation (e.g.: plagiarism) or because you simply did not turn anything in.

LAB REPORT PRESENTATIONS: All students will be required to present oral versions of two of the laboratories during the normal laboratory period in which your lab section meets in the class week following the third and sixth labs (6th is after the Thanksgiving holiday). The dates of the oral presentations are also listed in the course calendar on Compass2g. The presentations should be roughly 7 minutes long per student. Presentation slides in PowerPoint or Adobe Acrobat format must be turned in. It is recommended that you plan for no more than seven slides unless you can practice the talk within seven minutes. A description of how to produce your slides will be provided on Compass2g and will be discussed in class meeting. Due to the large number of presentations and the short time available you should anticipate that the lab sections the week of the presentations may run over their scheduled time. If you have a commitment between 5 and 6 pm on those days please inform the course instructor.

Your lab notebook: Please watch the lecture on taking notes in the laboratory. Your notebook will be graded on the following components: All notes dated and kept in an organized notebook rather than on random scraps of paper. For each experiment you need to describe and sketch how you had the equipment set up and note the make and model of the instruments used if you can determine these. Your notes should be sufficiently clear that another student looking at your notebook would be able to reconstruct the apparatus the way you set it up. NOTE: It is important that you keep accurate notes about the way the apparatus was set up. Some of the experiments are very sensitive to this and your experimental errors can only be deduced by comparison with other groups, especially in how the apparatus was set up and used. Your notes should include the experimental procedures used including the order in which experiments were performed, how chemicals were measured, and so on. This should be sufficiently detailed that you can determine what went right or wrong in your measurement by comparison with other groups. Your lab notebook should provide a discussion of any problems encountered (for example, that the frequency of the QCM changed when you bumped the table…). If you do not observe any problems with the lab then you should get a very reliable result or you did not look carefully enough for problems. Finally your lab notebook should contain a record of the data obtained. This should include things like tables of compositions measured and key values such as temperatures of phase transformations. Things like acoustic spectra should be printed and taped into the lab notebook for the record. Images from the phase transformation experiment should be printed and attached in the lab notebook, etc. It is not necessary to print everything but representative examples should be included for reference.

SUPPLIES: You should bring with you to lab sessions a notebook, a USB memory stick for transferring data, and safety glasses. Note the requirement that you bring your own safety glasses. Students who are not properly equipped may be denied access to the laboratories.

Plagiarism

Your reports may not include passages taken verbatim or paraphrased closely from the sources without quotation and citation of the original source. As an illustration, the following example is provided. Suppose you were writing about gettering of impurities in semiconductors by defects and chose the book by Mayer and Lau “Electronic Materials Science: For Integrated Circuits in Si and GaAs” (Macmillan). (Do not worry about the topic of the following, just focus on how the words are used.)

Consider the following two paragraphs from a hypothetical term paper.
Example 1:
“To improve electronic performance, gettering, a processing step, is used. This is especially common in Si technology. The basic idea of gettering is utilization of the stress fields of dislocations to capture impurities at
moderate temperatures.”

Example 2:
“It is common practice in semiconductor processing to use stress fields around dislocations to capture impurities. This is especially important in Si technology where devices are very sensitive to certain impurities. This “gettering” process has the additional advantage that it does not require high processing temperatures.”

Compare these with page 176 of Mayer and Lau “Electronic Materials Science: For Integrated Circuits in Si and GaAs” (Macmillan, New York, 1990), section 6.8 which states:

“As discussed previously, defects and impurities in semiconductors adversely affect the performance of devices. To improve electronic performance, a processing step known as “gettering” is practiced, especially in Si technology. The basic principle of gettering is utilization of the stress fields of strategically located dislocations to capture impurities at moderate temperatures…”

While not an exact duplication of the Mayer and Lau passage, the first hypothetical paragraph includes virtually identical wording.

To improve electronic performance, gettering, a processing step, is used. This is especially common in Si technology. The basic idea of gettering is utilization of the stress fields of ... dislocations to capture impurities at moderate temperatures.

The second describes the concepts from Mayer and Lau without excessive duplication. A few minor changes to word order or to specific words do not constitute creation of an original passage. It is not uncommon for authors to use sections of their own work nearly verbatim in other publications especially when one publication has a very limited audience. However, caution should be used when doing this as copyright agreements with publishers may forbid this.

It is entirely unacceptable to make use of another author’s writing without citation!! If you are using the words of another author you MUST put that text in quotes and cite the source. You should reproduce that author’s words exactly and not rephrase or reword the text even to the extent of correcting poor English.

In the example provided above the first example is unacceptable and not an original contribution. Therefore significant content that is this close to the original source that is not cited and quoted would result in a zero grade on the assignment.

In some cases it is difficult to rewrite another author’s text in your own words, for example when describing an experimental procedure. In that case you should use an approach such as ‘In their work [Reference], Jones et.al. used the following experimental procedure “[quoted text].’