

# BCME 298 and BCME 299

Biomedical, Chemical and Materials Engineering Department

San Jose State University

**Generic Greensheet by Melanie McNeil, January 2014**

## Course Description

BCME 298: Master's project work in Chemical Engineering. Prerequisite: Admission to candidacy. Corequisite: 281.

BCME 299: Master's thesis work in Chemical Engineering. Prerequisite: Admission to candidacy. Corequisite: 281.

<b>Instructor:</b>	See Schedule
<b>Office Location:</b>	See Schedule
<b>Telephone:</b>	See Schedule
<b>Email:</b>	See Schedule
<b>Office Hours:</b>	See Schedule
<b>Class Time</b>	See Schedule (usually Fridays at 3 pm)

## Course Information

Upon completion of BCME 281, all BCME Master's students must enroll in 2 units of BCME 298. Student's doing a thesis must then enroll in an additional 3 units of BCME 299. All BCME Master's students who have completed 281 must be registered for at least 1 unit of BCME 298 or 299 or UNVS 290 for each semester (excluding summer) until they finish their project or thesis. UNVS 290 is a special course with reduced tuition-type fees as described here <http://www.sjsu.edu/gradstudies/policy/rpguidelines/>.

BCME 298/299 classes meet a number of times during the semester to cover material required for the student to complete their final project or thesis including final oral and written defense, including periodic progress reports. Attendance is mandatory. Students need to meet with their SJSU Research Advisor on a regular basis in order to accomplish the work their Reading Committee approved when their Thesis/Project Proposal was accepted. The BCME 298/299 instructor will require proof that students are regularly in touch with their SJSU research advisor.

## Grading Policy

BCME 298/299 courses are graded on a CR/NC basis. To receive CR for each semester you are registered you must submit monthly milestone updates to your primary SJSU research advisor and make satisfactory progress on your research and/or writing.

The milestone update should include a revised milestone chart similar to the one developed as part of the 281 proposal. In addition, an executive summary reviewing the main

accomplishments for that month, including any difficulties, results, and unanswered questions, should be included.

## **Committee Members**

As per BCME and University guidelines, the official Reading Committee must consist at the minimum of one BCME tenured or tenure-track faculty member, another SJSU faculty member who can be tenured/tenure track or temporary, and a third member who can be another faculty, tenured/tenure track or temporary, or an industrial representative who has a Ph.D. or is a senior level manager. If the work is being sponsored off-site then the Reading Committee must contain a senior representative from the company/agency sponsoring the work. Additional members can be added such as additional industrial representatives, but the three official members described must be at the oral defense or the defense will have to be rescheduled. Under no circumstances can the defense proceed if one of the three described members is not present. However, the Reading Committee can change between the Proposal Defense and the Final Thesis/Project defense as long as the three Reading Committee Members described are represented.

## **Final Written Report**

Project and thesis students must both submit final written reports. Both thesis and project reports must follow the CME thesis guidelines. The thesis report must also follow the SJSU thesis guidelines. These are available on the BCME graduate advising website.

You should be in frequent contact with your primary SJSU research advisor throughout the writing of the report. Contact your other committee members at least one month before the date of the defense to schedule the date and update them on your project.

At a minimum, a final draft following SJSU and BCME Thesis/Project Guidelines and that has been proofread to remove all formatting, referencing, grammar and spelling errors needs to be given to the SJSU research advisor at least 3 weeks before the intended oral defense date. This is a tentative date. Depending on the structure of the report, quality of writing, and technical analysis, some drafts may require extra time before a defense is allowed. A hard copy of your final draft is due to the remaining committee members at least one week before your oral defense date. An Executive Summary must also be attached to your report.

For thesis students, the APPROVED final report is due mid-semester to graduate studies. For the exact due date, see graduate studies website.

For project students, the APPROVED final report must be submitted to your primary SJSU research advisor by the last day of classes.

The final project or thesis report must be uploaded to Turnitin.com and reviewed by your primary SJSU research advisor. Your advisor will sign off on the review of this at your oral defense.

All Reading Committee members should be given a bound copy of the thesis after it has been bound by Graduate Studies or a corrected copy of the project report.

## **Final Oral Defense**

Project and thesis students both must have an oral defense. The defense date should be scheduled at least two weeks prior to the due date of the final written report. This means a

complete final draft with minimal errors of any type, editing, formatting, grammar, spelling, must be submitted to your SJSU research advisor at least six weeks before the final report due date. The SJSU Research Advisors will not schedule a defense date until they approve the final draft of the complete thesis or project report.

The oral defense will last one hour at least; you should plan to speak for approximately 30 minutes, with the rest of the time for questions. The defense must utilize professional presentation software such as Power Point including the guidelines presented in BCME 281. The committee members should be given a hard copy of the slides at the presentation. The included rubric will be used by the committee members during the oral defense.

## **University Policies**

### **Academic integrity**

Your commitment as a student to learning is evidenced by your enrollment at San Jose State University. The [University's Academic Integrity policy](http://www.sjsu.edu/senate/S07-2.htm), located at <http://www.sjsu.edu/senate/S07-2.htm>, requires you to be honest in all your academic course work. Faculty members are required to report all infractions to the office of Student Conduct and Ethical Development. The [Student Conduct and Ethical Development website](http://www.sjsu.edu/studentconduct/) is available at <http://www.sjsu.edu/studentconduct/>.

Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade and sanctions by the University. For this class, all assignments are to be completed by the individual student unless otherwise specified. If you would like to include in your assignment any material you have submitted, or plan to submit for another class, please note that SJSU's Academic Policy F06-1 requires approval of instructors.

### **Campus Policy in Compliance with the American Disabilities Act**

If you need course adaptations or accommodations because of a disability, or if you need to make special arrangements in case the building must be evacuated, please let me know as soon as possible. [Presidential Directive 97-03](http://www.sjsu.edu/president/docs/directives/PD_1997-03.pdf) at [http://www.sjsu.edu/president/docs/directives/PD\\_1997-03.pdf](http://www.sjsu.edu/president/docs/directives/PD_1997-03.pdf) requires that students with disabilities requesting accommodations must register with the [Accessible Education Center](http://www.sjsu.edu/aec) (AEC) at <http://www.sjsu.edu/aec> to establish a record of their disability.



1. The student delivered a professional written report. (Note: 1 = insufficient technical content and/or major formatting, and/or lack of adequate referencing, and/or major grammatical/spelling errors, 3 = acceptable technical content, formatting, referencing and grammar/spelling, 5 = excellent report in all aspects) A level of 4 or above also implies that the report demonstrates a level of writing quality and technical analysis suitable for publication whether or not the focus is original enough to be published.

2. The student delivered a professional oral presentation. . (Note: 1 = insufficient technical content and/or major errors in grammar/spelling and/or insufficient use of presentation software and/or in major errors in deliverance of a practiced presentation including response to questions, 3 = acceptable technical content, grammar/spelling, use of presentation software and deliverance of a practiced presentation including response to questions, 5 = excellent presentation in all aspects)

3. The student was able to show how his/her project relates to work reported in the literature. (Note: 1 = incomplete or irrelevant literature cited and/or inadequate literature discussion, 3 = adequate amount and discussion of relevant literature, 5 = excellent discussion of relevant literature)

4. The student was able to defend his/her experimental results based on established and accepted engineering, science and statistical principles. (1 = student did not or was not able to adequately justify the majority of their experimental results (no verification runs etc.), 3 = student did adequately justify most aspects of their experimental results, 5 = excellent justification of all aspects of their experimental results)

5. The student was aware of the global impact of their work on society including the ethical and/or environmental and/or economic impact of his/her work. (Note: 1 = neither the oral nor written presentation had a separate section on the global impact of the proposed work, 3 = both the oral and written presentation had an adequate section on the global impact of the proposed work, 5 = both the oral and written presentation had an excellent section on the global impact of the proposed work).

Using another page if necessary, please write any other comments you think would be helpful to assess the quality of this project including whether the student showed significant improvement from the proposal defense to the final thesis/project defense.

## FINAL GRADUATION CHECKLIST

The following list of items need to be turned in to the graduate coordinator **AFTER** their oral and written final defense has been approved. The student should turn in all items **EXCEPT** the first item. All requested documents should be turned in to the Graduate Coordinator as soon as possible so that the student can meet semester graduation deadlines. The Graduate Coordinator cannot process the final paperwork without the following items.

The **SJSU Research Advisor** should personally turn in the original of this form to the Graduate Coordinator, although they may give a copy to the student.

- the original Final Defense Approval form including the signature for the statement “The Turnitin.com report has been reviewed”. There is a yellow copy of this form available in the main office. It is the same form appearing in this document; the yellow color is to make it more identifiable.

The **student** should collect the following items and turn them in to the Graduate Coordinator

- a copy of the title page
- a copy of the signed signature page that goes after the title page with the date of the defense listed
- a list of EACH 298/299 that currently has an RP or Incomplete grade listed, along with the semester you originally enrolled and the number of units you took.
- Your student ID number
- A request to have your Graduate Coordinate submit a Verification of Culminating Experience form to Graduate Studies

## Supplemental Information

### Writing Your Final Thesis/Project Report

You must follow the SJSU and BCME thesis guidelines when you write your final Thesis/Project and give your oral defense of your Thesis/Project. The minimum sections that must be included are listed below (you may also have a background chapter, you may also have a separate results chapter and discussion chapter, you may also have a separate future work chapter, etc.)

Title Page as all pre-Introduction Pages as per SJSU thesis guidelines following SJSU and BCME format rules

Table of Contents

Abstract

Introduction

Literature Review

Hypothesis/Objectives

Materials and Methods

Results and Discussion (including future work if applicable)

Conclusions

References in BCME guideline format

Appendices (if necessary)

All details of your work should be included in your report so that someone could recreate your experiments while only using your report for instructions. This means all chemicals, equipment, important size information, data, etc. should be included. Some of this information can appear in the appendices.

### Modification of 281 Proposal

You have the first four chapters by the time you pass 281, but need to modify:

1. Your literature review, which should have all the new literature from the time you end 281 to the time you defend. You might also find you need to add some basic literature review in order to adequately discuss your results.
2. Change the future tense in your materials and methods section to past tense and modify any procedures that you modified when you actually ran your experiments.

Your written report should include all results and all experimental details, especially since you might write a paper a few months down the road and need some detail that seemed trivial at the time but later some of your results will hinge on knowing the answer to that detail.

## Results and Discussion

For your final Thesis/Project written and oral presentation, your committee will be looking for the following to be covered in your results and discussion section where applicable

1. Good presentation of your results (this is merely how you choose to present your results so that you can show the details that are important, curves, histograms, tables etc. If you are comparing two models, for instance, it is best to put them on the same graph so differences are obvious. The author, meaning you, must decide what the best presentation is, so this is one area on which you are evaluated; do you pick an effective style to present your results?
2. Discuss the trend of the results. This is merely saying whether there is a trend such as a linear curve, a maximum, a minimum etc. exhibited by the results.
3. A discussion as to what the results mean. This is the skill that distinguishes you from a technician and what your committee will be most interested in. This is where you should, in most cases, discuss your results in comparison to work that has been done by other researchers that has been reported in the literature (and why you may find you need to add some papers to your literature review if they weren't there originally) or that has been done by other SJSU students. You will discuss where your work is consistent with theory or other researchers. Where it is not consistent you will discuss your thoughts as to why it is not, usually in reference to theory although you could also postulate with regards to the trends that were exhibited and what they might mean.

This is the part that goes in a separate Discussion chapter if you choose to keep your discussion separate from your results (you can have a single Results and Discussion chapter, or a separate chapter for each).

You can include a Future Work Section in your discussion in which you describe other experiments you think would be worthwhile to do based on your results, and your expertise in the area.

4. Discussion of the goodness of your data. You need to show your data is meaningful. Comparison to a known baseline, repeated runs with low standard deviation, consistency with theory or with others who have run the exact same experiments, etc. are some of the ways you can show this. You need to include some discussion of error and the goodness of your data if you do experimental work.
5. You also need a Conclusions Chapter. This should only focus on what you actually showed in your experiments (what you can prove per se). There should not be any global conclusions about what would happen in regions other than those you ran your experiments. Also, there should be no postulation as to meaning; postulation is only for the discussion section. The Conclusions Chapter is only for those facts you can definitively show based on your experimental results.

## **Common Written Presentation Errors**

The following are some errors that showed up in a number of written presentations and/or that Graduate Studies refused to accept some recent theses showing these errors:

1. Do not use bold characters on your Title Page or in the Table of Contents. (Graduate Studies)
2. Two spaces are required after any period or colon anywhere in your report.
3. Fives spaces is needed at the beginning of each paragraph. Graduate Studies takes this as indenting 0.5 inch. If you space over 5 times they consider that only 2.5 spaces (they are going by letters not empty spaces).
4. Graduate Studies requires a comma between nouns for three or more in a sentence; e.g. There are an apple, a banana, and an orange on the table.
5. The month and year that should appear on the title page is your graduation month such as May 2014, August 2014 or December 2014 (not your defense month if it is different).
6. In case of long headings (more than one line) for figures, tables or Table of Contents sections, these should be single-spaced. Double-space between one heading and the next in your Table of Contents. The same is true for the references. They are single-spaced within a reference but double-spaced from one reference citation to the next.
7. When referring to Chapter, Section, Appendix, etc. in the text, these should always begin with capital letter (same as Figure 3 or Table 4).

For example: As mentioned in Chapter Three.

As shown in Appendix A.

9. Your Objectives/Hypothesis Chapter must have a few paragraphs in order to be considered a chapter.

## **Final Thesis/Project Oral Presentation**

The oral thesis/project defense presentation should follow the 281 proposal defense guidelines in terms of using PowerPoint adequately and having a 30 minute time limit. Review those guidelines and remember the time limit!!

Your oral presentation should cover:

Title Page including Committee Members

Outline

Introduction

Literature Review

Hypothesis/Objectives

Materials and Methods

Results and Discussion

Conclusions (including future work if applicable)

## Acknowledgements

All of this in 30 minutes so you should have no more than about 35 slides!!!! Review the 281 oral presentation guidelines in the 281 Greensheet.

Your introduction can be the basic definitions of importance when you will discuss your results and the significance of your study, why was it important to do this study, what the potential benefit is. Your literature review can be the few key papers you will compare your results to, and perhaps the summary of the literature, at least what is pertinent to your results. Your objective(s)/hypothesis(s) should be shown, as well as the key parts of your methods sections such as your overall flowchart and experimental matrix. This should take no more than 12 minutes of your time.

Here, the main emphasis and time significance should be given to your results and discussion. You do not have to discuss every tiny result, but you do need to figure out which results were significant and show enough detail as to why those are significant.

You should end with a future work, if applicable, conclusions and acknowledgements.

## Common Oral Presentation Errors

The main corrections for the oral presentations are

Do a spell check. Make sure to spell your committee member's names (including Dr.), affiliations, correctly.

Be consistent in your capitalizing, if you capitalize only the first letter of the first word of your bullets do that for each one, if you prefer to capitalize the first letter of each word do that for each bullet.

Watch your use of the laser pointer so you are not running the laser through the audience.

## Laboratory Notebook Guidelines

Many students will run experiments or build equipment as part of their thesis or project. Even if you are doing a theoretical project, you should keep a lab notebook. The following guidelines will be useful for your thesis/project work and/or if you do laboratory work in industry. I took most of this information off web sites but if I modified something I put my initials next to it.

## Recording Practices

Write everything in a bound laboratory notebook immediately, don't write it anywhere else, especially on any scraps of paper.

A table of contents should be maintained for each book. Leave the first few pages free for this purpose

Especially when you are doing multi-year experiments you will want to be able to find certain runs or troubleshooting information immediately, especially if your results run to multiple lab notebooks.

It is also helpful to color-code information so you can find it quickly. For instance, the first time you mention equipment model numbers or chemical brand information you can box it in green.

For troubleshooting equipment, procedures etc. you can box those in red.

Since many of these things happen infrequently, so are rarely mentioned in the notebook, it is very helpful to color-code when you go back to look for them, for instance when the equipment problem happens again but a year later and you can't remember how you fixed it, or you're writing a paper and you need to get the chemical information for some reagent.

I box the topic by color in the Table of Contents, red for troubleshooting, green for equipment etc. info, no box for typical runs, but you need to keep up your Table of Contents in order to do that effectively. Otherwise at least box part of the page in some color or tab the pages using color-coded tabs.

If you don't have some method of finding this information, it can be like looking for a needle in a haystack, especially if you have multiple notebooks. MM"

<http://otl.stanford.edu/inventors/resources/labnotebooks.html>

Notebook entries should follow these procedures (if there is no chance they will be used in legal proceedings you should follow as many as feasible. These are written assuming the notebooks might be part of legal proceedings at some time. MM):

1. Make entries in permanent medium.
2. Use consecutive pages (don't skip pages or if you do draw a line diagonally across them so it is obvious they were meant to be blank MM).
3. Date entries.
4. Identify subject matter.
5. Include sketches, diagrams, etc.
6. Explain sketches, etc.
7. Photos, drawing, etc., should be identified and permanently attached.
8. Avoid erasures (draw a single line through an erroneous entry so what was originally written is still legible MM).
9. Don't change entries; make new a entry.
10. Pages should be signed and dated after inked entries by the person or persons performing the activity and by at least one corroborating witness. Number 10 was modified to reflect wording shown at

<http://www.otc.umd.edu/Gateway/Winter99/qanda.html>

Also see <http://research.umbc.edu/~lkelly/LabNB.htm>

Your laboratory notebook is the only record of how you actually carried out the experiment. "It is a bad habit to get into if you write down what you think you will do, instead of what you really did do as you did it. For instance, you need to let your furnace heat up to the working temperature, but one set of samples comes back with oxide growth less than expected. You didn't write down whether the furnace had reached the working temperature or not. It is easy to make mistakes and forget to do a certain step. You will

not catch these mistakes if you write down what you "intended" to do instead of what you actually "did" do. MM"

The first time you use a chemical, note the brand, catalog number and reference to any relevant hazardous information. Future mentions of the chemicals should refer back to this page number for easy reference.

Equipment also comes under this category, and equipment parts. List the equipment used for the experiment including make and model. Be careful to note if there are perishable solutions as part of the piece of equipment and note the date prepared.

It is adequate to mention each item only the first time you use it and then refer back to the original page for subsequent references (which you can find in your Table of Contents if you keep one). Note changes relevant to each experiment, e.g. you changed the column, or the column media, etc. (you should already be dating each page of your notebook so the date will be available).

You should include details of how to set up the equipment, if it needs to be set up. You should include relevant times, such as how long it takes to warm up, if it needs to warm up, etc.

You should include details of the order you put chemicals into solutions, list it in an objective and convenient manner, such as the following list of chemicals in a medium:

To make 1 liter:

In 700 mls of distilled water

$\text{KH}_2\text{PO}_4$  13.3 g/l

$(\text{NH}_4)_2\text{HPO}_4$  4.0 g/l

$\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$  1.2 g/l

pH to 7.0 with 10N NaOH, add water to 1 liter.

Notice the way this is written: it lists the exact amounts added and also the molal concentrations. Molar are also fine, then include the actual weights added. If it matters in which order to add the components, note it. (Modified from ChE 194 Greensheet by Dr. Claire Komives)

Note ALL of the observations you observed at each step during the experiment.

<http://www.chem.sunysb.edu/courses/notebook.html>

Depending on the type of investigation, these may include;

colors (especially note when they change),

production of a gas during a reaction,

formation of a solid (precipitate)

pH,

wavelength at which light is absorbed,

any blank you used for calibration or taring purposes,  
pressure and temperature.

Your memory is not a permanent and accurate repository of these types of information. The fact that you record ALL your observations could mean the difference between success (and being able to publish results) and having to repeat all your experiments again to verify results. MM

Put down all ALL of the quantitative information you need to analyze your results.

For instance, keep track of all intermediate calculations. Don't just put a final calculation without showing all the numerical values of intermediate steps. For instance, you might have wanted 1N NaOH solution but on looking back, because you put all the weights/volumes in, you, or someone else, finds out you actually made 2N NaOH. MM

If you think your notebook might be used in legal proceedings (patents etc.), the following web pages may be of interest:

<http://www.otc.umd.edu/Gateway/Winter99/qanda.html>

<http://www.darbylaw.com/note.html>