CHE402L Senior Capstone Laboratory  
Fall 2017

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Office Hours:  Mon. 10 – 11 am; Tue. 1-2 pm; Wed. 10 – 11 am; and by appointment.

Prerequisite: CHE401

Credits: Lab portion of CHE402 (4 credits total)

Laboratory Session: Wednesday 1:00 – 3:50pm, Jaharis 215

Course Description
This capstone course will involve completing, documenting, and presenting a research project, along with attending seminar presentations and working on career-preparation tools. The research project will involve the development of an experimental plan, the use of integrative laboratory analysis using a wide range of equipment and instrumentation, the collection, analysis, and interpretation of data, and the presentation of results in written and oral formats. The course meets for two 2-hour periods per week plus laboratory. An integral part of the course will be attending the presentations of invited lecturers. There is also a focus on career preparation for which we will use on-campus professionals.

Course Materials

Course Objectives: Refer to the CHE402 Syllabus.

Assessment: Students will be assessed based on the quality of their research and written assignments as outlined in the CHE402 Syllabus

Grading: Refer to the CHE402 Syllabus.

The instructor and the College reserve the right to modify, amend or change the syllabus (course requirements, grading policy, etc.) as the curriculum and/or program require(s).

Students with documented disabilities who may need accommodations or any student considering obtaining documentation should make an appointment with Ms. Marti Bledsoe, our disability coordinator, no later that the first week of class. She can be reached by calling 524-7335 via email at mbledsoe@carrollu.edu.
**Safety:** Each student must observe safety requirements for laboratory. Proper attire and shoes must be worn in the lab. Eye protection is required whenever a student is working in the lab. No sandals or open-toed shoes are allowed. Shorts are also discouraged. The instructor reserves the right to dismiss a student from the laboratory at any time for violating safety procedures and protocol.

**Attendance:** You are required to attend lab during your assigned lab time, unless otherwise authorized by your instructor. Unauthorized absences will negatively affect your grade.

**Plagiarism or Unethical Behavior:** All students must abide by the ethical standards stated in the Carroll University Student Handbook. If any student is found to have cheated or plagiarized in any way on any assignment or exam, the student will receive a zero for that assignment and it will be reported to the Student, Faculty Ethics Committee. Reports of violation of ethical code become a part of your permanent record at Carroll.

**Assignments:** All written assignments must be turned in electronically to your instructor via e-mail attachment of a Word document by midnight on the due date.

**Research Projects:** Each project will involve initial consultation with a faculty member to help define the scope. During the project, questions and problems should be addressed with the CHE402L instructor. All written materials should be submitted to the CHE402L instructor, regardless of which faculty member helped initiate the project.

Students who have done applicable significant prior research must submit a summary of their prior research experience, including information about where the project was done, the duration, the research advisor, and what was actually done (as Project Proposal) for approval. Upon approval by the instructor, they are not required to do additional lab work, though the written assignments are the same.

Since independent research projects do not always proceed in a predictable way, it is imperative that you get an early start and work especially hard during the initial feasibility portion, the first few weeks when no writing is due. Since this is your Senior Capstone project, it is expected that your project will require more than the nominal 3 hours per week of assigned lab time. You should plan to spend 10-15 hours per week as it fits your project needs and your schedule. Keep in mind that instrument usage must always be coordinated/negotiated with other users.

*Written Assignment Formats*

**Draft Project Proposal:** A single page summarizing your proposed project or possible projects. For students who have done applicable significant prior research, write a summary of what project you did, in what lab, over what time period.

**Final Project Proposal (15 points):** A single page detailing your proposed project, including these sections: Title, Background and references, Scope of the project (what exactly you propose to do), Expected data/results.
Progress Reports (3 x 15 points): A single page with project title, date, and your name, stating 1) What was done since the previous report, 2) What significant results have been obtained, 3) Issues encountered and their resolution, and 4) Plan for the next steps. For students who have done applicable significant prior research, these reports should simply state where you stand on your writing.

Manuscript (500 points) (including Abstract, Background and Introduction, Materials and Methods, Data, Results and Conclusion, References): A complete description of your research should take at least 8 pages of text plus figures, tables and references. The key is to completely describe your research project. The manuscript should be written in a format similar to the articles in the Journal of Chemical Education, or other relevant journals.

Laboratory Notebooks (100 points): Perhaps the most important tool in conducting research is the lab book. The purpose of this book is to provide a single location where a researcher can record all procedures, observations, relevant literature citations, questions, answers, thoughts, etc. The lab book is also important because it provides formal documentation of exactly what was done and observed with regard to a project and a means for a researcher to later provide validation of published findings, conclusions, etc. All students are required to maintain a laboratory notebook using the format and "rules" described below:

- All lab books must have permanently bound pages such as those found in standard composition books (i.e., no spiral or loose-leaf notebooks).
- Your name and contact information should be placed on the cover AND in another place inside the lab book in case the book is ever lost.
- All pages should be numbered consecutively.
- The first few pages should be reserved as an expanding Table of Contents.
- All entries should be written in pen (if you make a mistake, cross it out with a single line through the incorrect portions)
- Start each entry with the date and time of the entry
- Standard referenced protocols may be copied and placed into the notebook (make sure to record the reference citation). Any modifications to the procedure should be recorded in the lab book.

WRITE EVERYTHING DOWN in your lab book (even if you think it is not important): procedures and modifications; set-ups; copies of and/or notes on how to run equipment; observations (the more descriptive the better); thoughts; feelings; questions and their answers; assay results or other data recordings (or copies of); etc. Realize that neatness is NOT required, as long as you can make sense of your notations. However, notebooks are used by others and may be audited by outside agencies. Always bring your lab books to class and mentor meetings.