

College of Wooster

Senior Independent Study: Chemistry 451, Fall 2011 and Chemistry 452, Spring 2012

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Goals

I want you to invigorate your passion for learning.

I want you to stoke your curiosity about the world around you.

I want you to engage fully and enjoy yourself while doing it.

General expectation

“A course is defined as a unit of study which occupies one-fourth of a student’s time each semester, or approximately twelve hours per week.” For Sr IS, the chemistry department recommends investing 15 hours per week.

Prioritizing and Steady Progress

As you consider your goals and plan your strategy, keep in mind that Sr. I.S. encompasses the 16 weeks of fall semester and approximately 6 weeks of spring semester. So it is important to get an early start in the fall and to work consistently. On the average, I recommend 15 hours per week divided among library, lab work, seminars, and conferences. You will be (1) planning experiments, (2) conducting experiments, (3) maintaining your notebook, (4) regularly drafting your Experimental and Results/Discussion sections, (5) reading the literature, (6) planning for life after Wooster. It is imperative that you balance the urgent tasks of every day life with the important goal of completing Sr. I.S.

Weekly Conferences

We will meet weekly to review your experimental plans, results, writing progress, and career planning. I recommend that you start a project notebook (either three-ring or a bound composition book) that you can use to manage the many facets of your senior project. You should come to the meeting with a

- prioritized plan for how you want to use our time
- organized summary of what you have accomplished in the week.
- draft ideas of what you need/want to accomplish in the coming week
- your lab notebook (and project notebook if you have one)
- data with your initial analysis

You may want us to review your experimental plans, notebook, and relevant data analysis. You may find that your written summaries may also serve as thesis section drafts. During the conference you should *take notes* and revise your prioritized plan for the upcoming week. Periodically we may have group meetings at which you will present your research. This will include important background and progress to date.

Planning Experiments

I can be of most assistance if you share written experimental plans with me so that I can ask questions and make suggestions. You need to prepare a timeline and anticipate items that you may need to order and training that you may need to receive.

Conducting Experiments/Notebook keeping

It is important that you keep a notebook as you are doing the experiments: a bound notebook and a three-ring binder as your Data Archive Notebook. We will regularly review your notebooks. Archive all data in chronological order with a reference to your notebook.

Data analysis

It is best that you prepare an initial analysis of your data to organize your thoughts. We can review your work to be sure that you are accurately interpreting and archiving your work. It is essential that you archive your data and conduct data analysis in a timely manner.

Thesis drafting

I highly recommend that you draft your Experimental Methods and Results/Discussion sections as you go along. I will review your draft by about the 10th week of the semester and provide feedback. In the spring, I will review one draft of each section prior to submission of your final draft. It is important that the drafts that you give represent your best work so that we can both use our time most effectively.

Safety

Attending the two mandatory safety training sessions is just the beginning. Safety needs to be foremost in your mind when you are working in the lab, but also when others are working in the lab around you and any time you are in Severance.

Seminar

You will deliver a presentation on the background, goals, and preliminary results of your project as described in the *Department of Chemistry Handbook for Senior Independent Study*. The Departmental Seminar Coordinator will determine the schedule early in the semester. It is realistic to expect that you will present one piece of *experimental data* (a spectrum, table, graph, or reaction scheme, for instance) *per week* that you have been working on the project. (For example, if you give your presentation during the sixth week of classes, you should have 5 to 6 pieces of data to present.) If you want feedback on your slides or written abstract, please provide me with a copy *at least one week* prior to your presentation.

Poster Presentation

You will present a poster on your project as described in the *Department of Chemistry Handbook for Senior Independent Study*. If you want feedback on your poster, please provide me with a copy *at least one week* prior to your oral.

Oral Defense

In preparing for your oral defense I recommend reviewing notes and exams from all of the chemistry courses you have taken. Nearly all oral exams include the fundamental topics from introductory chemistry as well as broad suggestions for the future of the project. We will schedule your oral defense with your second reader for sometime in April. You will start the defense with a brief poster presentation and we will explore questions related to your project for about an hour.

Grading

The final grade for 451 is Satisfactory Progress (SP) or No Credit (NC). The final grade for 452 is Honors (H), Good (G), Satisfactory (S). Your grade is based on quality of the laboratory work, notebooks, drafting process, final written thesis, oral exam, senior seminar, and poster session, adherence to the timeline. The most significant criterion in my mind is “intellectual ownership” of the project. Refer to the *Department of Chemistry Handbook for Sr I.S.* for a detailed list of criteria. You will receive written and oral feedback on your performance throughout the year and are welcome to address concerns about your progress at any time.

Schedule Overview for Senior Independent Study

General: Attend Tues/Thurs seminars (11:00 – 11:50 AM, Severance 009)
The Department will issue a detailed schedule early in the fall.

Fall Semester

August

Week 1

Attend safety training on **Thurs** (11:00 AM, Mateer Auditorium)
Revisit Jr IS proposal, Annotated Bibliography
Generate Overview of Goals
Meet with advisor, set up laboratory notebook, discuss information management
Set up carrel space, pick up key(s)
Update your resume (do you have a career notebook?)
Schedule NMR training (if needed)

September

Week 2

Attend safety training on **Tues** (11:00AM, Severance 009)
Check for up-to-date literature on your research topic
Begin to set up lab space
Define a hypothesis or scientific question to be answered and key specific aims; e-mail to me by **4:00 pm Fri September** _____
Submit written Experimental Plan for first experiment: include procedural details and a list of equipment, reagents, and safety precautions; e-mail to me by **4:00 pm Fri September** _____

Week 3

Begin full-time laboratory work, begin first experiment
Generate ideas for Copeland Funding (if interested)
Preview Several IS Theses to familiarize yourself with expectations

Week 4

Continue full-time laboratory work
Draft Introduction section—updating resources
Discuss career directions

Week 5

Continue full-time laboratory work
Finalize and submit Copeland Funding proposal (if interested)

October

Week 6

Continue full-time laboratory work
Discuss seminar plans (Chemistry)

Week 7

Continue full-time laboratory work
Complete first experiment before Fall Break
What figures and tables will be useful for your thesis/seminar/poster?
Submit by **4:00 PM Friday October** _____:
1) copy of annotated bibliography from Chem 401 Paper IV
2) updated annotated bibliography highlighting additional references, more current literature, and/or a change in focus of the project

- Week 8** _____ FALL BREAK How will you best use Fall Break?
Continue full-time laboratory work
Complete mid-term self-evaluation of progress and bring to I.S. meeting
- Week 9** _____ Continue full-time laboratory work
Submit first draft of Experimental Section to date by **4:00 PM Friday October** _____
Where do things stand with data analysis?
- Week 10** _____ Continue full-time laboratory work
- Week 11** _____ Continue full-time laboratory work
Submit revised Experimental Methods to date and corresponding Results and Discussion Section by 4:00 PM **Friday November** _____
- Week 12** _____ Continue full-time laboratory work
Discuss how to best use Thanksgiving and Winter breaks
- Week 13** _____ THANKSGIVING BREAK
- Week 14** _____ Continue full-time laboratory work
- Week 15** _____ Minimal laboratory work; focus on writing and data analysis
- Week 16** _____ Submit the following thesis sections by **4:00 PM Friday December** ____:
Introduction (complete and nearly final draft)
Experimental (draft to-date)
Results and Discussion (draft to-date)
Reference list (JACS format, including article title)

Chem 451: A grade of NC may be assigned if any of the above assignments are incomplete.

Spring Semester

- Week 1** _____ Resume full-time laboratory work
Revisions of thesis sections
Review career plans
- Week 2** _____ Continue full-time laboratory work, continue drafting
- Week 3** _____ Continue full-time laboratory work, continue drafting compiling data
- Week 4** _____ Continue full-time laboratory work, continue drafting compiling data
- Week 5** _____ Complete lab work to focus on writing
- Week 6** _____ Focus on writing

- Week 7** _____ Final thesis due by **4:00 PM Friday February** _____
I will provide feedback within one week of receiving your final draft
Begin cleaning up your lab space
- Week 8** _____ **Spring Break begins Friday March** _____
Complete thesis revisions
- Week 9** _____ Senior Thesis Due 5:00 p.m. **Monday March** _____
Study for DUCK and orals
Begin drafting poster, must be completed prior to orals
Schedule orals, must be completed before poster session
- Week 10** _____ Archive any relevant samples
Clean up IS research space and check out
Submit notebook and finalized data archive notebook
Study for DUCK and orals
Finish poster
- Week 11** _____ Prepare for orals
- Week 12** _____ Complete thesis revisions
- Week 13** _____ Research Symposium—Celebrate **Friday April** _____
- Week 14** _____ Get thesis copies bound (one for dept, one for me, at least one for you)
Submit electronic copy of thesis
Return keys to physical plant
Receive Sr. IS grade usually by **Friday**