

RESEARCH IN CHEMISTRY (CHEM 430), 2020-2021

Monmouth College, Department of Chemistry and Biochemistry

Research Advisors:

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Scientists engage in *scholarly* activities, generally referred to as “research.” The term “*scholarly*” is defined as, “*showing knowledge and devotion to academic pursuits.*” Involvement in research will allow you the opportunity to apply knowledge gained through your course work to a specific area of science. You are expected to read the literature in order to understand the intricacies of a research area with the goal of advancing our understanding of the given topic. In your research experience, you will be challenged by both the details of the research hypothesis and by the experimental procedures required to explore these previously uncharted waters.

COURSE TIMELINE (Fall/Spring: Tentative)

Semester start date: Aug 18th / Jan 14th
Introductory meeting; Aug 2st / Jan 15th
RSI document due: Aug 28th / Jan 22nd
PPD document due: Sept 4th / Jan 29th
Res Report: Dec 4th / May 12th
Scholars Day poster session: April 20th, 2021

TIME/WORKLOAD EXPECTATIONS: Research students are expected to spend four hours per week in the laboratory per 0.25 credit hour of CHEM 430. The traditional enrollment is for 0.25 or 0.50 credit hours, which translates into 4 or 8 hours of lab time each week. As with any class, additional time (1-2 hours per week) is required outside of lab (for example, reading, writing reports, preparing for presentations, and designing experiments).

RESEARCH STUDENT INFORMATION: Each research student will complete a *Research Student Information* (RSI) document to be turned into the research coordinator. This document will indicate when you will be conducting research and will also be used to schedule any supplemental meeting times.

PROPOSED PROJECT DESCRIPTION: Each research student will complete a *Proposed Project Description* (PPD) document, to be turned in to the research coordinator. The form should be filled out *after consultation, and in conjunction with*, the research advisor. The form represents an agreement between the research student and faculty advisor regarding the scope and nature of the project. The PPD document will contain the following information: student's name, advisor/co-advisor's name, project title, project description (small paragraph), general instrumentation needs, *at least* two starting references generally provided by the research advisor and the *Research Pledge*. Continuing research students should use this

opportunity to expand/edit previous versions.

LAB NOTEBOOKS: Lab notebooks will be provided by the Department and will remain the possession of the Department (copies can be made). *All* laboratory work will be documented in these lab notebooks. If the experiment or lab activity is not documented in your lab notebook *you never did the experiment*. You are encouraged to print out spectra, chromatograms, or other similar electronic data in hard copy and organized in a 3-ring binder (available). Your research advisor may have some specific lab notebook guidelines. Student progress will be evaluated based on the contents of your lab notebook and 3-ring binder.

PRESENTATIONS: Information gather through research activities will be disseminated in 3 ways: 1) written report (see below), 2) Science Seminar presentation(s), and 3) Scholars Day Celebration poster session. *Research students are strongly encouraged to present information gathered through their research activities in Science Seminar (Chem 350). At least one Science Seminar presentation must be on your Chem 430 research, preferably both presentations.* There may be other informal opportunities to present at group meetings setup by your research adviser. All research students are encouraged to present their research on Scholars Day; *graduating students are required*. All students are strongly encouraged to present at off-campus meetings (national/regional/ local ACS, PittCon, NCUR, for example). Funds are available for off-campus presentations.

- Local ACS Section Meeting (St. Ambrose) is in Nov (TBA)
- Spring ACS meeting (San Antonio, TX) March 21-25, 2021
- Spring ASBMB: virtual?

WRITTEN REPORTS: Research students are expected to write a report and submit it to the research coordinator *by the last day of regular semester classes*. These reports are intended to summarize the data collected over the course of the semester. Since this research course requires you to enroll in at least two semesters of research, two reports will be generated. The first semester report should be considered a work in progress, where as the final report should be a more comprehensive summary of your research project. These reports are necessary since several researchers may work on each project. The report will be organized so that it is clear what material is new and what material is review. When available, research students will be provided with an electronic copy of the latest report on their project. The research student is expected to update and improve the introduction, background, and literature sections with each report. Results that challenge earlier conclusions will be justified in a discussion section. Reports will be submitted in both electronic and hard copy to the Faculty Research Advisor AND Research Coordinator.

1. **Descriptive information:** a project title, the names of the researcher (past and current), faculty research advisor, and other relevant student researchers and/or collaborators, the name and page numbers of the lab notebook(s) where the research is described, the dates when the work was done, and the names of the document file and its immediate precursor.

2. **Introduction:** State of the motivation for the project of interest in terms of current literature. This section can be largely copied from an earlier report(s), if they exist, but it is expected that this section is edited to include newly found background information. Note: if the author of previous reports is included as a contributor to the project, you may cut and paste text; this is not plagiarism.

3. **Background from earlier reports.** This section will summarize the work reported in earlier reports. If significant results were presented in the *most recent report*, these results will be summarized and in most cases can be added to that reports background section. This section is included mainly to confirm the current students overall understanding of the project.

4. **Experimental:** This section describes experiments done during the period covered by the report. Usually, this work will be similar or identical to that described in the prior report, if they exists. Any new experiments will be written up and added to the experimental section. Any experiments preformed under identical conditions need only reference previous reports.

5. **Results:** This section documents the results of the experiments done during the period covered by the report. Tabulation of data is encouraged; representative spectra presented.

6. **Discussion:** In this section, the student will discuss the results of their work in context of the literature and the

results of earlier reports. Questions that have been raised in earlier reports may be addressed here.

7. **Conclusions:** Restate the findings of this period of research. The statement "*No conclusions have been reached,*" is an acceptable statement.

8. **Future Directions:** In this section, the student will discuss possible experiments intended to address unanswered questions or technical problems on the project.

9. **Literature references:** Literature referenced in the report will be cited. This will be copied from the earlier report, and the student is expected to contribute to the accumulation of relevant literature. *Remember that all cited literature must be read.*

10. **Signature:** Two copies of the report will be signed and dated and turned in to the Faculty Research Advisor and archived by the Research Coordinator.

LITERATURE: Research students are expected to read/organize literature relevant to their research topic. This literature should contribute to the accumulation of literature for the research group as a whole. Students unfamiliar with literature searching and full text retrieval can attend a 'library day' presentation (to be announced).

SUMMARY OF EXPECTATIONS

- 1) The majority, if not all, of your research time will be spent in the lab.
- 2) Research activities will be documented in a lab notebook.
- 3) Written report due are by the last day of regular classes each semester.
- 4) At least one science seminar (Chem 350) will be over your research activities; data will be presented.
- 5) Graduating students will present at the Scholars Day poster session.

CLOSING COMMENTS

- 1) Since all chemistry or biochemistry students take the same courses, your research activity is what makes you different from all other majors.
- 2) Letters of recommendation are highly influenced by a student's research performance.