



College of Arts & Sciences

Research in Chemistry – CHEM 3304-001 – Syllabus*

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Class Meetings: TBD
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GroupMe: Link

Course Objectives:

The objectives for this course are focused on developing foundational research skills, fostering scientific inquiry, and preparing students to engage in meaningful research projects.

1. Understanding the Research Process
 - Introduction to the overall structure and purpose of scientific research in chemistry.
 - Teach the essential steps of the scientific method, including hypothesis formation, experimentation, data collection, and analysis.
2. Developing Research Skills
 - Equip students with the ability to conduct literature reviews, identify credible sources, and synthesize information from scientific papers.
 - Familiarization with key laboratory techniques and methods commonly used in chemistry research, including safety protocols.
3. Critical Thinking and Problem Solving
 - Encourage students to develop critical thinking skills by analyzing scientific data, interpreting results, and drawing meaningful conclusions.
 - Promote creativity in designing and refining experimental methods to address research questions.
4. Effective Communication of Scientific Findings
 - Guide students in the preparation and presentation of research proposals, reports, and posters.
 - Teach the principles of clear and concise scientific writing, including formatting, citation practices, and the presentation of results.
5. Ethical Conduct in Research
 - Emphasize the importance of ethics in scientific research, including responsible data management, honesty in reporting results, and respect for intellectual property.
 - Discuss issues related to reproducibility, peer review, and scientific integrity.
6. Teamwork and Collaboration
 - Facilitate opportunities for students to engage in collaborative research projects, fostering teamwork and communication among peers.

* This syllabus is tentative and subject to change at the professor's discretion.

- Teach students how to effectively contribute to group research projects and navigate common challenges in collaborative environments.

7. Introduction to Research Tools and Technologies

- Provide hands-on experience with instrumentation and advanced lab equipment relevant to chemistry research.
- Introduce students to software and tools commonly used in chemistry research, such as data analysis programs, molecular modeling software, and research databases.

8. Preparing for Future Research Opportunities

- Help students develop the skills necessary to transition to more advanced research opportunities, such as independent studies, internships, or participation in research labs.
- Provide an overview of how research experiences can be integrated into future academic and career goals, including graduate school and industry.

By the end of the course, students should feel confident in their ability to initiate, conduct, and communicate chemistry research projects, and be prepared to take on more advanced research challenges in their academic careers.

Student Responsibilities:

- Complete 45 hours of independent research over the course of the semester (approximately 3 hours/week for every credit hour enrolled).
- Participate in biweekly if not weekly group and/or one-on-one meetings with mentor.
- Participate in end of the semester lab clean-up. Time to be arranged.
- Keep a neat and organized lab notebook and/or computer directories.

Safety:

Students are expected to read the booklet Safety in Academic Chemistry Laboratories, participate in a safety orientation, and conduct themselves appropriately at all times. Any careless activity, which endangers you or your fellow students in lab, will not be tolerated. Safety goggles must be worn at all times when in the wet lab section of the lab.

Evaluation:

Evaluation includes lab performance, attendance, notebook, and final report. Grades are awarded on the following relative scale of excellent (A), good (B), fair (C), poor (D). When this course is repeated, the performance expectation is raised for each subsequent semester.

Student Specific Responsibilities:

The following are examples and will be tailored to each student

- Continually review past and current literature regarding your project.
- Prepare a formal background report and presentation on your project.
- Perform authorized experiments as needed, with supervision when required.
- Give verbal weekly updates on your progress and planned research activities.
- Write informal reports summarizing results every 3 weeks.
- Prepare an abstract for a poster or oral presentation
- ACS Spring Meeting, Abstracts are usually due in early October
- Outline future project directions and goals

A&M-SA Chemistry Program Mandates:

CHEM 3304 students are required to spend 3 hours per week working in the lab, reading journal articles or working on other research related activities deemed appropriate by their research mentor for every hour they are registered for CHEM 3304. Students will work with their research advisor to coordinate their schedule and keep track of their progress.

Student Credit Hours Enrolled	# hours expected per week	# hours expected per semester	# hours incomplete per 10% reduction of grade
1	3	45	5
2	6	90	9
3	9	135	13