

San José State University
Department of Chemistry
Physical-Inorganic Techniques, CHEM 146, Spring, 2020

Instructor:	Prof. Madalyn Radlauer
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Office Hours:	Tuesdays 3:00 pm – 4:00 pm Wednesdays 3:00 pm – 4:00 pm or by appointment
Class Days/Time:	Seminar: Fridays 9:00 am – 9:50 am Lab: Fridays 10:00 am – 3:40 pm
Classroom:	DH 010
Prerequisites:	CHEM 100W, CHEM 113A, CHEM 145 (with grades of "C" or better; "C-" not accepted) or instructor consent.

Course Website

Course materials such as syllabus, handouts, notes, assignment instructions, etc. can be found on [Canvas](https://sjsu.instructure.com/) (<https://sjsu.instructure.com/>). You are responsible for regularly checking with the messaging system in Canvas to learn any updates. Procedural write-ups, results and discussion reports, the proposal form, the response to reviews, the final report, and presentation slides must all be turned in via Canvas.

Course Description (from the course catalog)

Application of advanced instrumental and preparative techniques to the study of structure, reactivity and spectroscopy of inorganic and organic substances including materials. This is a capstone course. A grade of "C" or better is required for majors.

Course Goals and Learning Objectives

The goal of this course is to introduce physical and inorganic methodology, preparing students to understand and pursue related laboratory research. As a capstone course, this class will require students to integrate principles, theories, and methods learned in previous courses throughout the major. It will involve a significant amount of writing as well as multiple presentations, building the students' ability to effectively communicate scientific data and ideas. To that end, I will provide feedback on each of your assignments and part of your success in the course will be measured by your ability to integrate that feedback into later assignments.

Program Learning Objectives (PLO)

CHEM 146 will address the following [chemistry department program learning objectives](http://www.sjsu.edu/chemistry/Academic_Programs/Undergraduate_Programs/Undergraduate_Program_Learning_Objectives.html) (http://www.sjsu.edu/chemistry/Academic_Programs/Undergraduate_Programs/Undergraduate_Program_Learning_Objectives.html):

PLO #1 – Demonstrate understanding of core concepts, methods and limits of scientific investigation to effectively solve problems in inorganic chemistry.

PLO #4 – Demonstrate understanding of core concepts, methods and limits of scientific investigation to effectively solve problems in physical chemistry.

PLO #6 – Answer questions regarding safe practices in the laboratory and chemical safety.

PLO #7 – Demonstrate safe laboratory skills (including proper handling of materials and chemical waste) for particular laboratory experiments.

PLO #9 – Effectively present a scientific paper orally applying the scientific approach, as at an American Chemical Society symposium.

PLO #10 – Write a formal scientific laboratory report which applies the scientific approach to address a chemical problem and follows the format and style of an article in a peer-reviewed American Chemical Society journal.

Course Learning Outcomes (CLO)

The main student learning objectives for CHEM 146 students are as follows:

CLO #1 – To be able to independently design, implement, and report the results of a semester-long research project, with appropriate guidance from the instructor as needed.

CLO #2 – To demonstrate proficiency in literature searches and use of database resources as a tool for designing and implementing their semester-long project.

CLO #3 – To be able to independently execute synthetic and analytical experimental procedures found in the scientific literature in physical and inorganic chemistry safely and efficiently.

CLO #4 – To reinforce concepts previously learned in general, physical, analytical, and inorganic chemistry courses by applying them in a laboratory setting.

CLO #5 – To recognize potential shortcomings in a scientific procedure and develop alternate plans in the face of unsuccessful procedures (i.e. to troubleshoot in a laboratory setting).

CLO #6 – To demonstrate the ability to present the results of a project, both in an oral presentation and in a written journal-style scientific paper.

Texts/Readings

Textbook

No textbook is required for this course.

Other References (not required, these may provide further clarification of various topics)

Inorganic, physical, and analytical chemistry textbooks such as [Inorganic Chemistry](https://www.pearsonhighered.com/miessler5einfo/) (https://www.pearsonhighered.com/miessler5einfo/) by Gary L. Miessler, Paul J. Fischer, and Donald A. Tarr (5th edition, 2014) ISBN: 9780321811059 may be useful for background information.

Primary literature will be essential for the projects in this course. You should have a student library account with the King Library that allows you access the [library electronic databases](https://libguides.sjsu.edu/az.php) (https://libguides.sjsu.edu/az.php) such as [SciFinder](https://scifinder.cas.org/) (https://scifinder.cas.org/). If you plan to access the library services from off-campus, you may need to obtain a password and/or proxy to do so. Check the Library website for information.

Library Liaison

The reference Librarian for Chemistry is Yen Tran and her email is yen.tran@sjsu.edu.

Other Technology/Equipment/Material Requirements (more details in lab manual)

You will need a bound, lined laboratory notebook (a partly used notebook with at least 50 unused pages is acceptable); a calculator; lab glasses or goggles; and a lab coat. These are all needed for the first day of lab.

Course Requirements and Assignments

Graded work in this course will include quizzes; instructor evaluation of your lab technique, especially with regards to safety and your lab notebook; and assignments on three projects. Three of these assignments will be completed with a lab partner or group, indicated as “joint.” As the semester progresses you will get grades and feedback on your assignments. To succeed in this course it is important to read the feedback and incorporate it in your later assignments. As with anything in the course, the instructor will be available to answer any questions or clarify points in the grading and feedback.

Assignments	Points	Percent of Grade
Quizzes (10 points each, lowest grade is dropped)	50	5 %
Lab technique, safety, notebook	150	15 %
Magnetism Project		19 %
Procedure writeup	70	
Results and discussion (joint)	120	
Catalysis Project		19 %
Procedure writeup	70	
Results and discussion (joint)	120	
Spectroscopy Project		42 %
Proposal form (written)	40	
Proposal presentation (oral)	100	
Critiques of proposals	15	
Response to reviews	15	
Final report (written, joint)	125	
Final presentation (oral)	125	
Total	1000	

Success in this course is based on the expectation that students will spend, for each unit of credit, a minimum of 45 hours over the length of the course for instruction or preparation/studying or course-related activities including but not limited to internships, labs, clinical practical. Other course structures will have equivalent workload expectations as described in the syllabus.

- [University Syllabus Policy S16-9](http://www.sjsu.edu/senate/docs/S16-9.pdf) (<http://www.sjsu.edu/senate/docs/S16-9.pdf>)
- Office of Graduate and Undergraduate Programs' [Syllabus Information web page](http://www.sjsu.edu/gup/syllabusinfo/) (<http://www.sjsu.edu/gup/syllabusinfo/>)

Final Examination or Evaluation

The final reports and presentations on the polymerization catalysis project will serve as the culminating experiences of this course. Your presentations will be given on the last day of class (May 8, 2020) and the final version of your reports will be due by the end of the assigned exam time (9:30 am) on Monday, May 18, 2020.

Grading Information

Determination of Grades

Points will be distributed as described in Course Requirements and Assignments above. The course grade will be determined from the resulting average of the point total as follows. I reserve the right to shift the point breakdown for the course, but I will only do so in the direction that will benefit the class (i.e. the breakdown below is the hardest grading breakdown possible).

<u>Percentage of Total Points</u>	<u>Final Course Grade</u>
96-100	A+
92-95.9	A
88-91.9	A-
84-87.9	B+
80-83.9	B
76-79.9	B-
72-75.9	C+
68-71.9	C
64-67.9	C-
60-63.9	D+
56-59.9	D
52-55.9	D-
< 52	F

Classroom Protocols

Be on time to class; class starts at 9:00 am sharp. You must be present at every seminar and lab period in order to complete the work required for this course. That said, under unavoidable circumstances, students are required to provide explanations for missed class time in writing with supporting documentation.

Device use in class generally should be limited to use of calculators or note taking, though as we move through the course and rely more on the primary literature, you may want to access papers or work on reports on a laptop.

I hope that the classroom will serve as an environment that will promote learning and the development of new ideas, as well as be a safe and respectful community. Behavior that interferes with the normal academic function in the lab is unacceptable. Students exhibiting this behavior will be asked to leave the class and will not be given the opportunity to make up the time. The university has a [brochure on student conduct](http://www.sjsu.edu/studentconduct/docs/ENGLISH%20Brochure.pdf) that you can view at <http://www.sjsu.edu/studentconduct/docs/ENGLISH%20Brochure.pdf>.

I understand that the class period is long and goes over the lunch hour. You will be responsible for effectively using the lab time and thus it is up to your discretion when you would like to take a break for lunch. The only exception is that you must be present at the end of the class period to have your notebook and work space checked.

Safety Quiz

On the first day of class students will be required to take a safety quiz after a safety discussion. A score of 80% or higher in two attempts must be achieved on the safety quiz to remain enrolled in the course.

Laboratory Sessions

Students MUST adhere to safety regulations outlined during first day of class at all times. Persistent failure to adhere to safety protocols will result in a failing grade or removal from the course. Experiments unrelated to the assigned project will not be allowed in the laboratory under any circumstances, and students engaging in such experiments will be withdrawn from the laboratory immediately.

Email Policy

I receive a lot of emails, so to be sure that I see your email, all Chem 146 emails should have Chem 146 in the subject line. I will do my best to respond to class-related emails within 1 business day of receiving them, however, keep in mind that this may not always be possible, especially during high volume times (e.g. around exams). Please try not to wait until the last minute to ask questions via email. I may also be slower to respond to emails late at night or over the weekends. Office hours are the best way to get timely answers to more complicated questions.

Reagent Requests

Request for reagents for the next week's lab session must be made by 5:00 PM on the preceding Monday. If a request is not received by that time, it will be assumed no additional reagents are needed, other than those already available in the lab. Every effort will be made to honor reagent requests.

Collaborative Work

The majority of the lab work will be done with a partner or in a group of three. Group members are responsible for the equitable division of labor. If there is a problem regarding contribution (or lack thereof) from your lab partner, please bring this to my attention as soon as it becomes an issue. There are only 15 class meetings, though each is roughly 7 hours, so we must be vigilant. If I notice that any student does not appear to be pulling their weight, I will address the group at my discretion. Every member is required to maintain their own laboratory notebook and only three of the graded assignments will be turned in jointly: the written reports for the projects. For these assignments, all members of the group will receive the same grade unless an issue has previously been brought to my attention.

Plagiarism of any sort will not be tolerated. Students who do not submit their own work will receive a zero, and continuing to do so will result in a failing grade in the course.

Assignment Deadlines

All assignments are required to be submitted on or before the assigned deadline. No assignments will be accepted after the deadline, and will result in a zero grade for that assignment.

Make-up Sessions

There will be no makeup sessions for missed laboratory classes and/or oral presentations.

University Policies

Per University Policy S16-9, university-wide policy information relevant to all courses, such as academic integrity, accommodations, etc. will be available on Office of Graduate and Undergraduate Programs' [Syllabus Information web page](http://www.sjsu.edu/gup/syllabusinfo/) at <http://www.sjsu.edu/gup/syllabusinfo/>.

Physical-Inorganic Techniques, Chem 146, Spring 2020, Course Schedule

The tentative course calendar below includes weekly course content as well as assignment due dates, quiz dates, and presentation dates (in bold). Dates may be subject to change, but prior to this, fair notice will be given during class and through Canvas.

Tentative Course Schedule

Week	Date	Topics, Readings, Assignments, Deadlines
1	F 01/24	First day of class Course introduction and review of syllabus, lab check-in, safety session, project descriptions and assignments, group assignments, introduction to library research and discussion of literature, syllabus/lab manual quiz, safety quiz
2	F 01/31	Practical training on air and water sensitive techniques, and (A) Procedure write-up 1 , start magnetism project or (B) Paper(s) about targeted catalytic complex , glovebox training
3	F 02/07	Quiz 1 , (A) continue magnetism project or (B) Procedure write-up 1 , start catalysis project
4	F 02/14	Proposal check-in 1 , (A) finish magnetism project or (B) continue catalysis project
5	F 02/21	(A) Paper(s) about targeted catalytic complex , glovebox training or (B) continue catalysis project
6	F 02/28	Procedure write-up 2, Quiz 2 , (A) start catalysis project, turn in lab notebooks for initial grading or (B) finish catalysis project
7	F 03/06	Proposal check-in 2 , (A) continue catalysis project or (B) start magnetism project, turn in lab notebooks for initial grading
8	F 03/13	Quiz 3 , (A) continue catalysis project or (B) continue magnetism project
9	F 03/20	Results and discussion 1 , (A) finish catalysis project or (B) finish magnetism project
10	F 03/27	Proposal form, proposal presentations, and critiques
	F 04/03	<i>Spring Recess – no class, campus closed</i>
11	F 04/10	Results and discussion 2, response to proposal reviews , final project group assignments, determine final project plan, start spectroscopy project
12	F 04/17	Continue spectroscopy project
13	F 04/24	Project check-in , continue spectroscopy project
14	F 05/01	Quiz 4 , Finish spectroscopy project
15	F 05/08	Last day of class Clean up and check-out, turn in lab notebooks for final grading, final presentations
Final report	M 05/18	Assigned Final Exam time (7:15 to 9:30 am) Final report due to Dr. Muller (DH 412A) by 9:30 am, extra credit survey , graded lab notebooks can be picked up at this time
	F 05/22	Grades due (grades will be available starting Saturday 05/23)