

Macromolecular, Supramolecular & Nanoscale Systems Section 01 CHEM 170A

Spring 2024 1 Unit(s) 01/24/2024 to 05/13/2024 Modified 01/23/2024

Contact Information

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pronouns: she/her/hers

Office Hours

Tuesday, 1:00 PM to 3:00 PM, ISB 254

or by appointment

Course Description and Requisites

Introduction to macromolecular, supramolecular, and nanoscale systems and the principles that govern them including preparation, characterization, and physical properties, with an emphasis on applications of these materials in chemistry and beyond.

Prerequisite(s): ½CHEM 112B (with grades of "C" or better; "C-" not accepted) or with instructor consent.

Letter Graded

Classroom Protocols

Respect

A class with a lot of discussion requires that we all be respectful to one another and one another's ideas. If anything in the classroom makes you feel uncomfortable or disrespected, especially if it is something that I say or do, please bring it to my attention. You all are students, but you are people first and foremost, and the classroom should be a place you feel welcomed and respected.

Punctuality and Attendance

Please be on time to class; we will start at 4:30 pm in DH 351. Punctuality will be taken into account when I grade your in-class participation.

Please do not come to class if you do not feel well.

If for health (or other reasons) you cannot attend class in person, please email me (ideally before the class period) and we can set up one of two options for you.

1. If you would like to attend class virtually, we can set up a Zoom meeting as long as you email me by 4:00 pm the day of class.
2. We can arrange for you to make up the in-class participation points.

Email and Canvas Messages

I receive a lot of emails/messages, so to be sure that I see your email, all Chem 170A emails should have Chem 170A 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. You can also message me via Canvas and I will target a similar turnaround time.

Program Information

Program Learning Outcomes Connected to this Course

This content of this course is intended to further develop the following Chemistry/Biochemistry PLOs.

- **Core Chemistry Ideas (Fundamentals)**

PLO 1.1 - Students will be able to identify, formulate, and solve a range of chemistry problems (fundamental to complex) through application of mathematical, scientific, and chemical principles.

PLO 1.2 - Students will be able to recognize, relate, and/or apply chemistry terms and concepts to propose and solve interdisciplinary and multidisciplinary real world problems.

- **Community, Social, Societal Implications**

PLO 3.1 Students will be able to explore, critique, and reflect on how chemistry relates to society, culture, and issues of equity and ethics that shape their scientific beliefs and identities.

PLO 3.2 Students will be able to identify as scientists within the scientific community through constructing peer reviews, engaging in collaborations, and participating in mentorship.

- **Communication Skills**

PLO 4.2 Students will be able to integrate research findings into a concise original written report that either analyzes collected data and obtained results or reviews and reflects on published scientific work.

PLO 4.3 Students will be able to identify an audience and construct a message tailored to that audience and act as a science ambassador by conveying the importance of the research or topic of study.

Course Goals

The first goal of this course is to introduce you to macro-, supra-, and nanomolecular chemistry (MSN), specifically regarding the preparation, characterization, and physical properties of these often inhomogeneous materials. The second goal is to have you consider and evaluate how research and developments in MSN are communicated.

Course Learning Outcomes (CLOs)

Upon successful completion of this course, students will be able to:

CLO 1: Define and explain characteristics that differentiate macromolecules, supramolecular assemblies, and nanomaterials from small molecules especially inhomogeneity and emergent properties and how these characteristics are measured.

CLO 2: Recognize and evaluate various applications for macromolecules, supramolecular assemblies, and nanomaterials in everyday life.

CLO 3: Examine and reflect on different modes of communication about MSN.

Course Materials

Library Resources

You should have a student library account with the King Library that allows you access the library electronic databases. If you plan to access the library services from off-campus, you may need to obtain a password and/or set up VPN to do so. Check the Library website for information. The reference Librarian for Chemistry is Ann Agee and her email address is ann.agee@sjsu.edu (<mailto:ann.agee@sjsu.edu>).

Course Requirements and Assignments

Graded work will include participation (30 points), reflections (40 points), and a final project (30 points), which will all contribute to the course learning outcomes. The class will be graded out of 100 points.

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. This course has been condensed into half a semester so that we will have ample time for in-class discussions. That means it will feel like a 2-unit course for the first 8 weeks of the semester, but then you

only have optional revisions to your final project and an optional, extra credit course feedback survey to work on after that. In other words, you should expect to do an average of ~4 hours of work outside of class each week for the first 8 weeks of the semester.

Participation: In-class and Canvas Discussions

Participation during in-class discussions about the course material and assigned readings and videos will account for 15 points (15%) of your grade.

Participation in Canvas discussions about the course material and assigned readings and videos will account for 15 points (15%) of your grade.

Reflections

There will be 4 short writing assignments each worth 10 points (40 points total, 40%) of your grade. They will cover different topics from the course. They will be completed outside of class, but discussed during class time.

Final Project

Instead of a final exam, you will complete a final project. For this project you will choose a recent (from the last 5 years) peer-reviewed publication on a topic directly related to this course that you are interested in learning more about (3 pts). After reading the paper, you will write a report on it (20 pts). You will also review the report of one of your classmates (7 pts). In addition to the peer review, you will receive comments on your report from me and you will have the opportunity to make revisions for additional credit (optional, due 4/8/24).

✓ Grading Information

All assignments should be submitted on or before the assigned deadline, but I will do my best to be accommodating for unforeseen circumstances if I receive appropriate communication. Please contact me with as much of a heads up as possible (ideally before the assignment deadline) if you have to miss an assignment and we can discuss the situation.

Breakdown

Grade	Range	Notes
A plus	96 and above	
A	92 to 95.9	
A minus	88 to 91.9	
B plus	84 to 87.9	
B	80 to 83.9	

Grade	Range	Notes
B minus	76 to 79.9	
C plus	72 to 75.9	
C	68 to 71.9	
C minus	64 to 67.9	
D plus	60 to 63.9	
D	50 to 59.9	
F	less than 50	

University Policies

Per [University Policy S16-9 \(PDF\)](http://www.sjsu.edu/senate/docs/S16-9.pdf) (<http://www.sjsu.edu/senate/docs/S16-9.pdf>), relevant university policy concerning all courses, such as student responsibilities, academic integrity, accommodations, dropping and adding, consent for recording of class, etc. and available student services (e.g. learning assistance, counseling, and other resources) are listed on the [Syllabus Information](https://www.sjsu.edu/curriculum/courses/syllabus-info.php) (<https://www.sjsu.edu/curriculum/courses/syllabus-info.php>) web page. Make sure to visit this page to review and be aware of these university policies and resources.

Course Schedule

When	Topic	Notes
Class 1 01/24/2024 4:30 PM - 6:10 PM DH 351	Introduction	What are macromolecules, supramolecular assemblies, and nanomaterials and what do they have in common? What do we mean by inhomogeneity and emergent properties?
Class 2 01/31/2024 4:30 PM - 6:10 PM DH 351	Macromolecules 1	Thinking about and measuring macromolecular size and an introduction to polymers: Synthesis, characterization, and applications
Assignment deadline 02/07/2024	Reflection #1	Submit Reflection #1 prior to class on 2/7. Be ready to share your findings in the class discussion.

When	Topic	Notes
Class 3 02/07/2024 4:30 PM - 6:10 PM DH 351	Supramolecular Assemblies 1	Intermolecular interactions, self assembly, and an introduction to supramolecular assemblies: Synthesis, characterization, and applications
Assignment deadline 02/14/2024	Reflection #2	Submit Reflection #2 prior to class on 2/14. Be ready to share your findings in the class discussion.
Assignment deadline 02/14/2024	Paper choice	Submit your paper choice for your final project by class time on 2/14.
Class 4 02/14/2024 4:30 PM - 6:10 PM DH 351	Nanomaterials 1	How nanometer size can change a material and an introduction to nanomaterials: Synthesis, characterization, and applications
Assignment deadline 02/21/2024	Reflection #3	Submit Reflection #3 prior to class on 2/21. Be ready to share your findings in the class discussion.
Class 5 02/21/2024 4:30 PM - 6:10 PM DH 351	Macromolecules 2	The environmental impact of plastics, recycling, and sustainable materials
Assignment deadline 02/28/2024	Reflection #4	Submit Reflection #4 prior to class on 2/28. Be ready to share your findings in the class discussion.
Class 6 02/28/2024 4:30 PM - 6:10 PM DH 351	Supramolecular Assemblies 2	Applications of supramolecular materials: molecular machines, agriculture, environmental remediation, and drug delivery
Assignment deadline 03/06/2024	Report (draft)	Submit your report draft prior to class on 3/6. This will go to a classmate for review right after class.
Class 7 03/06/2024 4:30 PM - 6:10 PM DH 351	Nanomaterials 2	Nanomaterial applications: Distinguishing from the bulk

When	Topic	Notes
Assignment deadline 03/13/2024	Peer review	Submit peer review prior to our final class period on 3/13.
Class 8 03/13/2024 4:30 PM - 6:10 PM DH 351	Final class	Given what we have learned, where can we go from here?
Assignment deadline (optional) 04/08/2024	Report revisions and course survey	If you would like to boost your report grade, you can submit revisions based on the peer review and comments you received from me. There will be an optional course survey that you can complete for extra credit.