

Chemistry 212 Natural Products Chemistry Spring 2021

Contact Information

Instructor:	Roy K. Okuda, PhD
Office Location:	Duncan Hall 9A (basement)*
Telephone:	(408) (924-2525)*
Email:	roy.okuda@sjsu.edu
Office Hours:	Tues 3:00 to 4:30pm (contact me by email to set up a Zoom meeting)
Class Days/Time:	Lecture MW 6:00pm - 7:15pm
Classroom:	Course will be presented using Zoom and Canvas
Prerequisites:	Chem 112A, 112B and 113A (or equivalent); Note Chem 114 is not essential for this course.

*due to COVID-19 safety protocols, I will not be available in my office, and will not use this phone. Contact me by email to set up an appointment.

Faculty Web Page and MYSJSU Messaging

Course materials such as syllabus, handouts, notes, assignment instructions, etc. can be found on my faculty web page at <http://www.sjsu.edu/people/firstname.lastname>. I use the email address listed on your mySJSU account regularly to send information on Chem 113A. You are responsible for checking for messages on this email on a regular basis to learn of any updates.

Course Description

Chemistry 212 will provide a comprehensive overview on the field of natural products chemistry. By nature, this is a very broad-based field, and will involve elements of organic chemistry, analytical chemistry, biochemistry and molecular biology. Emphasis will be placed on the structure analysis of secondary metabolites, and pathways and chemical methods for studying their biosynthesis. Other topics will included as time allows, including chemical ecology, toxins and drugs, marine natural products, clinically useful natural products, and molecular biology tools to produce "unnatural" natural products.

Chem 212 requires a good level of understanding of organic chemistry based on a typical undergraduate one-year course (Chem 112A and 112B @ SJSU, for example). This course will involve organic reaction mechanisms to understand the pathways leading to the biosynthesis of natural products. A good understanding of stereochemistry and nomenclature is expected. While this course will not involve any direct laboratory work, we will discuss experimental methods involving analytical methods, including chromatography, NMR and mass spectroscopy. The level of background needed of these methods is what is covered in Chem 113A @ SJSU.

Course Goals and Learning Objectives

Course Learning Outcomes (CLOs)

- Be able to define terms including natural products, secondary metabolites, biosynthesis, pharmacognosy
- Be able to classify natural products according to the major biosynthetic groups (polyketide, shikimate, terpene, alkaloid, mixed biogenesis); have a general understanding of biosynthetic pathways
- Understand how analytical methods (including isotopic labeling, mass spectrometry, NMR spectroscopy) are used to determine structure and biosynthetic pathways of natural products in conjunction with "feeding experiments" of live organisms or tissues.
- Learn of the biological and ecological roles of natural products
- Learn of the significance of natural products in human impact, including as drugs, toxins, and pharmacological tools.
- Learn of the molecular biology approaches to study natural product formation and to produce novel classes of compounds.
- Locate scientific information from literature
- Be able to prepare written and oral reports on selected topics on natural products.

Program Learning Outcomes (PLOs)

Chemistry 212 satisfies the following Graduate Program Learning Outcomes for the Chemistry Department:

- Program Learning Objectives #1 - To demonstrate an advanced understanding of selected topics in chemistry.

- Program Learning Objectives #2 - To demonstrate information literacy skills for acquiring knowledge of chemistry, both as a student and as a life-long learner.

Program Learning Objectives #3 - To demonstrate an understanding of experimentation, observation and data analysis, and their application to defined questions in chemistry. Program Learning Objectives #4 - To demonstrate a familiarity with available instrumentation for conducting specific scientific research.

- Program Learning Objectives #5 - To communicate effectively, verbally and written, for the purposes of conveying chemical information to both professional scientists and to the public.

Required Texts/Readings

Textbook

No textbook. Reading for this course will involve a reading list from journal articles.

Library Liaison

The Chemistry Library Liaison is Yen Tran (yen.tran@sjsu.edu)

Course Requirements and Assignments

Catalog Description Topics from the structure proof, synthesis and biosynthesis of secondary metabolites.

The scheduled time for this course is MW 6:00pm to 7:15pm. This course will be presented using a combination of Zoom and Canvas. In addition, it is possible one or two lectures from the Chemistry Department seminars (T 4:30 to 5:30pm) will be related to this course and are strongly recommended.

Tentative Course Calendar:

A tentative schedule for the semester appears at the end of this document. Note in particular the dates for the written and oral papers and Final Exams. TBD are 2 or 3 written problem sets.

SJSU classes are designed such that in order to be successful, it is expected that students will spend a minimum of forty-five hours for each unit of credit (normally three hours per unit per week), including preparing for class, participating in course activities, completing assignments, and so on. More details about student workload can be found in [University Policy S12-3](http://www.sjsu.edu/senate/docs/S12-3.pdf) at <http://www.sjsu.edu/senate/docs/S12-3.pdf>.

NOTE that University policy F69-24, "Students should attend all meetings of their classes, not only because they are responsible for material discussed therein, but because active participation is frequently essential to insure maximum benefit for all members of the class. Attendance per se shall not be used as a criterion for grading."

Attendance Policy

As a graduate course, we will cover a significant amount of material during each class meeting. You should plan to attend all class meetings. Assignments may be given at any time, and you must be present to obtain these. Please arrive promptly at 6:00pm.

Grading Policy

GRADING (see below for numerical breakdown and percentages)

Grading for Chem 212 will be assigned according to the following components:

The grades for this course will assigned as "plus/minus" and will be based on the following categories:

Quizzes and/or problem sets	30 points	15%
Written report	50 points	25%
Oral report	60 points	20%
Final exam	60 points	40%
Total possible for 212	200 points total	

The overall course grade will generally follow the following correlations:
"A range" 90-100 %; "B" range 80-90 %, "C" range 70-80 %; "D" range 60-70 %, "F" less than 59 %.

For security, final course grades are not posted, sent by email, or given over the phone. If you would like a breakdown of your 113A scores, leave a stamped and addressed envelope with me at the final exam.

Other Class Policies:

Zoom Recording of Lectures: Lectures will be recorded via Zoom and made available after the lecture.

Cell Phones: Out of courtesy, turn these off during lectures.

Academic Integrity for Chem 212

Your commitment as a student to learning is evidenced by your enrollment at San Jose State University. The University Academic Integrity Policy S07-2 at <http://www.sjsu.edu/senate/docs/S07-2.pdf> requires you to be honest in all your academic course work. Faculty members are required to report all infractions to the office of

Student Conduct and Ethical Development. The [Student Conduct and Ethical Development website](http://www.sjsu.edu/studentconduct/) is available at <http://www.sjsu.edu/studentconduct/>.

Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade and sanctions by the University. For this class, all assignments are to be completed by the individual student unless otherwise specified. If you would like to include your assignment or any material you have submitted, or plan to submit for another class, please note that SJSU's Academic Integrity Policy S07-2 requires approval of instructors.

The SJSU "Policy on Academic Dishonesty" as described in detail in the SJSU Catalog will be the guideline for any action taken, and the case will be referred to the SJSU Office of Judicial Affairs. The instructor or the SJSU Office of Judicial Affairs may apply more serious penalties. An infraction may also result in a student's name being placed in a Chemistry Department file and other sanctions.

Campus Policy in Compliance with the American Disabilities Act

If you need course adaptations or accommodations because of a disability, or if you need to make special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible, or see me during office hours. [Presidential Directive 97-03](http://www.sjsu.edu/president/docs/directives/PD_1997-03.pdf) at http://www.sjsu.edu/president/docs/directives/PD_1997-03.pdf requires that students with disabilities requesting accommodations must register with the Accessible Education Center (AEC) at <http://www.sjsu.edu/aec/> to establish a record of their disability.

Note that accommodations for exams should be made well in advance of the exam date, since both I and the AEC need to make arrangements. Contact AEC well in advance of the first exam and arrange for your paperwork to be sent to me. Please note the following:

-exams to be accommodated must be given at times which overlap the time when the class will be taking it

-please send me an email a day or two before each exam to remind me to program Canvas for your accommodation.

Add / Drop Policies

Students are responsible for understanding the policies and procedures about add/drop, grade forgiveness, etc. Refer to the current semester's [Catalog Policies](http://info.sjsu.edu/static/catalog/policies.html) section at <http://info.sjsu.edu/static/catalog/policies.html>. Find calendars and information on adding or dropping courses on the Registrars page:

<https://www.sjsu.edu/registrar/>

Various forms and instructions are found here:

<https://www.sjsu.edu/registrar/forms/>

Note the Late Drop form states you should first consult with your academic advisor before submitting the form. If you ask me to sign a Late Drop Petition, I will ask you to verify that you have done so.

•Emergencies and Building Evacuations

If you hear a continuously sounding alarm, or are told to evacuate the building by an Emergency Coordinator, walk quickly to the nearest exit (facing Tower Lawn). Take your personal belongings as you may not be allowed to return. Follow the instructions of the Emergency Coordinators. Be quiet so you can hear instructions. Once outside, move away from the building. Do not return to the building unless the Police or the Emergency Coordinator announces that this is permissible.

University Policies

As a student at SJSU, you should review these University Policies which apply to ALL university courses.

<http://www.sjsu.edu/gup/syllabusinfo/#GeneralExpectations>

The topics include the following:

[General Expectations, Rights and Responsibilities of the Student](#)

[Dropping and Adding](#)

[Consent for Recording of Class and Public Sharing of Instructor Material](#)

[Academic integrity](#)

[Campus Policy in Compliance with the American Disabilities Act](#)

[Student Technology Resources](#)

[SJSU Peer Connections](#)

[SJSU Writing Center](#)

[SJSU Counseling and Psychological Services](#)

screens and monitors.

SJSU Peer Connections

Peer Connections, a campus-wide resource for mentoring and tutoring, strives to inspire students to develop their potential as independent learners while they learn to successfully navigate through their university experience. You are encouraged to take advantage of their services which include course-content based tutoring, enhanced study and time management skills, more effective critical thinking strategies, decision making and problem-solving abilities, and campus resource referrals.

In addition to offering small group, individual, and drop-in tutoring for a number of undergraduate courses, consultation with mentors is available on a drop-in or by appointment basis. Workshops are offered on a wide variety of topics including preparing for the Writing Skills Test (WST), improving your learning and memory, alleviating procrastination, surviving your first semester at SJSU, and other related topics. A computer lab and study space are also available for student use in Room 600 of Student Services Center (SSC).

Peer Connections is located in three locations: SSC, Room 600 (10th Street Garage on the corner of 10th and San Fernando Street), at the 1st floor entrance of Clark Hall, and in the Living Learning Center (LLC) in Campus Village Housing Building B. Visit [Peer Connections website](http://peerconnections.sjsu.edu) at <http://peerconnections.sjsu.edu> for more information.

SJSU Writing Center

The SJSU Writing Center is located in Clark Hall, Suite 126. All Writing Specialists have gone through a rigorous hiring process, and they are well trained to assist all students at all levels within all disciplines to become better writers. In addition to one-on-one tutoring services, the Writing Center also offers workshops every semester on a variety of writing topics. To make an appointment or to refer to the numerous online resources offered through the Writing Center, visit the [Writing Center website](http://www.sjsu.edu/writingcenter) at <http://www.sjsu.edu/writingcenter>. For additional resources and updated information, follow the Writing Center on Twitter and become a fan of the SJSU Writing Center on



Facebook. (Note: You need to have a QR Reader to scan this code.)

SJSU Counseling Services

The SJSU Counseling Services is located on the corner of 7th Street and San Fernando Street, in Room 201, Administration Building. Professional psychologists, social workers, and counselors are available to provide consultations on issues of student mental health, campus climate or psychological and academic issues on an individual, couple, or group basis. To schedule an appointment or learn more information, visit [Counseling Services website](http://www.sjsu.edu/counseling) at <http://www.sjsu.edu/counseling>.

Chemistry 212 Natural Products
Tentative Schedule for Spring 2021
(subject to change)

January 27	Introduction, greensheet
Feb 1 - 3	Overview of natural product (NP) classification and biosynthesis
Feb 8 - 10	Polyketide pathway
Feb 15 - 17	Mevalonate (Terpene) pathway
Feb 22 - 24	Other pathways
Mar 1 - 3	NP as Pharmaceuticals / Drug Discovery
Mar 8 - 10	NP as Pharmaceuticals / Drug Discovery
March 15 - 17	Marine Natural Products
Mar 22 - 24	Toxins / Drugs
March 24	Written paper due
April 5 - 8	Food / Fragrance / Cosmetics
April 12 - 14	Chemical Ecology
April 18 - 21	Analytical Methods in NP structure determination
April 26 - 28	Natural products as tools in biology and medicine
May 3 - 5	New frontiers in natural products
May 10 and/or 12	Oral Papers (dates as needed)
May 17	TBA
May 19	FINAL EXAM

Key Dates:

Paper 1 (written)	March 24
Oral Paper (in-class)	May 10 and/or 12 (as needed)
Final Exam	May 19, 5:15pm to 7:30pm

One or more special seminars given by researchers in the field will be given either during class time or in the Chemistry Department Seminars (held Tues 4:30pm). The dates will be announced when confirmed.

