

**San José State University**  
**Chemistry Department**  
**Chem 232, Nucleic Acids, Spring 2021**

**Course and Contact Information**

<b>Instructor:</b>	Dr. Antonio Gomez
<b>Office Location:</b>	<a href="https://sjsu.zoom.us/j/87526695783?pwd=TXFLQ3lkcXJaNlZvMEZIRzRsYm11UT09">https://sjsu.zoom.us/j/87526695783?pwd=TXFLQ3lkcXJaNlZvMEZIRzRsYm11UT09</a>
<b>Telephone:</b>	415-504-Bio1 (2461)
<b>Email:</b>	antonio.gomez@sjsu.edu ( <i>preferred means of contact</i> )
<b>Office Hours:</b>	Tu/Th, 2:00 – 2:30 PM; We 2 – 3 PM ( <i>other times by appointment</i> )
<b>Class Days/Time:</b>	Tu/Th, 6 – 7:15 PM
<b>Classroom:</b>	Online (zoom)
<b>Prerequisites:</b>	CHEM 130A or CHEM 135 (or equivalent course with a grade of "C" or better; "C-" not accepted), or instructor consent.

**eCampus Course Page**

Online lectures and course materials including videos, pdf files, quizzes and exam assignments must be accessed through the [Canvas Learning Management System](http://sjsu.instructure.com) course login website at <http://sjsu.instructure.com>. The Powerpoint slides used in lecture will be posted prior to the corresponding class meeting as a pdf file such that students may print or view them while taking notes during the lecture. Other student resources related to online learning and technology may be found on the [Learn Anywhere](https://www.sjsu.edu/learnanywhere/) webpage: <https://www.sjsu.edu/learnanywhere/>.

**Course Description**

Topics include structural features of DNA and RNA, protein-DNA and RNA interactions, and an exploration of technological applications of nucleic acid molecules with emphasis on therapeutic possibilities. This course will have a specific emphasis on RNA structure and function.

**Course Goals and Learning Objectives**

**Program Learning Outcomes (PLO)**

[PLO's](http://www.sjsu.edu/chemistry/Academic_Programs/Graduate_Programs/Graduate_Program_Learning_Objectives.html) for the MS or MA degree in Chemistry may be found at the following URL:  
[http://www.sjsu.edu/chemistry/Academic\\_Programs/Graduate\\_Programs/Graduate\\_Program\\_Learning\\_Objectives.html](http://www.sjsu.edu/chemistry/Academic_Programs/Graduate_Programs/Graduate_Program_Learning_Objectives.html)

**Course Learning Outcomes (CLO)**

(1) To appreciate the role of nucleic acids in macromolecular interactions and cellular functions; (2) to become more familiar with current techniques that use nucleic acids for therapeutic purposes; (3) to read and critique multiple journal articles from the scientific literature; (4) to improve written and verbal communication skills

## Textbook

None required; most readings will come from scientific articles and will be shared as pdf files in Canvas. The following books are recommended for background material:

Alberts, et al., Molecular Biology of the Cell, 4th Edition, available online at <http://www.ncbi.nlm.nih.gov/books/NBK21054/>

Nelson and Cox, Lehninger Principles of Biochemistry

## Library Liaison

Yen Tran <yen.tran@sjsu.edu>

## General Requirements

### Web Camera

A webcam is needed for oral presentations and weekly participation in online zoom meetings. Note that PC laptops and tablets may be checked out for the entire semester from [Information Technology](#) services.

### Time Commitment

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 (normally three hours per unit per week) for instruction, preparation/studying, or course related activities, including but not limited to internships, labs, and clinical practica. Other course structures will have equivalent workload expectations as described in the syllabus. More details about student workload can be found in [University Policy S12-3](#) at <http://www.sjsu.edu/senate/docs/S12-3.pdf>.

## Grading Information

Letter grades will follow a traditional curve, the top 3% earning a plus grade and the bottom 3% earning a minus grade within each decade: 93.0-100% (A), 90.0-92.9% (A-), 87.0-89.9% (B+), 83.0-86.9% (B), 80.0-82.9% (B-), etc. The instructor reserves the right to lower the grading curve at the end of the semester if he deems it to be appropriate.

Misc assignments	85 points
Midterm exam	75
Online Participation	100
Oral Presentation	50
Term Paper	115
<u>Final Exam</u>	<u>75</u>
Total	500 points

### Miscellaneous Assignments

Miscellaneous homework assignments include 3 Chimera worksheets, intermediate steps in term paper preparation, and 3 peer evaluations of oral presentations. Students will also be graded on participation as evidenced by actively participating during class discussion and asking relevant questions during students' presentations. There will be a 20% deduction for any late assignment.

### **Online Participation**

Students are expected to participate in the discussion of each of the assigned journal articles (typically a Thursday evening class meeting). Five points will be awarded for joining the live zoom session, turning on your camera, and participating in the discussion of each journal article.

### **Oral Presentation**

The oral presentations will elaborate on the methods and results of a single journal article that illustrates methodological, technological, clinical, or other applications of nucleic acids. The article should be referenced in the term paper and approved by the instructor. Article selections may be aided by the instructor. The length of the oral presentation should be  $20 \pm 5$  minutes with 5 minutes for questions and class discussion. Each presentation will be critiqued by one or more classmates in addition to the instructor. The final exam will include questions taken from material covered in the oral presentations, so all students should be active listeners.

### **Term Paper**

Term papers will review a biochemical technique that specifically relates to nucleic acids, as selected by the student and approved by the instructor. Details for writing the term paper will be discussed in class. Writing expectations and grading criteria will be issued to each student in the form of a table near the beginning of the semester. See the course schedule for deadlines in preparation of the term paper.

### **Exams**

The midterm and final exams will be take-home. The final exam must be taken to pass the course. If you know in advance that you have an excusable time conflict, let the instructor know as soon as possible. If you are registered with the AEC office and have been approved for extra accommodations, let the instructor know at the start of the semester, long before the first midterm. If you miss a midterm exam due to illness or other unforeseen circumstance, please let the instructor know your situation when you are first able.

### **Statement Regarding Online Cheating**

Any form of cheating is a serious violation of SJSU's Academic Integrity Policy. A student caught cheating on an exam will receive a zero score and may be subject to further administrative sanctions, including probation, suspension, or expulsion. Chegg and other "solution" websites are strictly prohibited during an exam.

### **University Policies**

Per [University Policy S16-9](http://www.sjsu.edu/senate/docs/S16-9.pdf) (<http://www.sjsu.edu/senate/docs/S16-9.pdf>), relevant information 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/>. Make sure to visit this page, review and be familiar with these university policies and resources.

## Chem 232 / Nucleic Acids, Spring 2021

### Course Schedule, Chem 232

(check Canvas for updates)

Week	Date	Topics, Readings, Assignments, Deadlines
1	Aug 19	Overview of Course; killer nucleotides
2	Aug 24 Aug 26	Intro to nucleic acids Nucleic acid structure; ChimeraX Exercise #1 Due
3	Aug 31 Sep 2	Elements of RNA structure Elements of RNA structure <span style="float: right;"><b>presentation 1</b></span>
4	Sep 7 Sep 9	Nucleic acid-protein interactions Nucleic acid-protein interactions <span style="float: right;"><b>presentation 2</b></span>
5	Sep 14 Sep 16	Nucleic acid-protein interactions; ChimeraX Exercise #2 Due Nucleic acid therapeutics (technical considerations) <span style="float: right;"><b>presentation 3</b></span>
6	Sep 21 Sep 23	Methods for studying RNA structure Methods for studying RNA structure <span style="float: right;"><b>presentation 4</b></span>
7	Sep 28 Sep 30	Aptamers – <i>paper topic due</i> Aptamers <span style="float: right;"><b>presentation 5</b></span>
8	Oct 5 Oct 7	Ribozymes; ChimeraX Exercise #3 Due Ribozymes <span style="float: right;"><b>presentation 6</b></span>
9	Oct 12 Oct 14	Riboswitches – <i>key references due</i> Riboswitches <b>MIDTERM POSTED Oct 13</b> <span style="float: right;"><b>presentation 7</b></span>
10	Oct 19 Oct 21	Pre-mRNA splicing <b>MIDTERM DUE <u>Mon Oct 18</u></b> Correcting pre-mRNA splicing defects <span style="float: right;"><b>presentation 8</b></span>
11	Oct 26 Oct 28	RNA splicing in parasite – <i>outline due</i> RNA nuclear transport <span style="float: right;"><b>presentation 9</b></span>
12	Nov 2 Nov 4	RNA mediated epigenetics mRNA-mediated gene delivery <span style="float: right;"><b>presentation 10</b></span>
13	Nov 9 Nov 11	RNA interference I & II <b>Veteran's Day NO CLASS</b>
14	Nov 16 Nov 18	Long non-coding RNA – <i>early paper bonus</i> mRNA editing <span style="float: right;"><b>presentation 11</b></span>
15	Nov 23 Nov 25	NO CLASS <b>Thanksgiving Holiday NO CLASS</b>
16	Nov 30 Dec 2	Gene editing – <i>paper due</i> Gene editing <span style="float: right;"><b>presentation 12</b></span>
Final	December 14	<b>Final Exam Due 6:00 – 7:15 pm (let instructor know if you have conflict)</b>