

Course Title and Number: CHEM 4334
Instructor: Dr. Ricardo A. Bernal
TA: Alejandro Rodriguez

Day, Time, and Location (room and building):

Class: Monday & Wednesday CCSB 1.0204 from 12:00-1:20 pm
Lab: Tuesday CCSB G.0704 12:00-2:50 pm **Meets for 1st time September 7th**

Office Hours: **Ricardo Bernal**, by appointment
Alex Rodriguez, by appointment

Email Address: rbernal@utep.edu; arodriguez109@miners.utep.edu
Campus Office: Bernal (CCSB G.0504), Rodriguez (CCSB G.0910)
Best way to contact us is by email.

COVID-19 PRECAUTION STATEMENT

Please stay home if you have been diagnosed with COVID-19 or are experiencing COVID-19 symptoms. If you are feeling unwell, please let me know as soon as possible, so that we can work on appropriate accommodations. If you have tested positive for COVID-19, you are encouraged to report your results to covidaction@utep.edu, so that the Dean of Students Office can provide you with support and help with communication with your professors. The Student Health Center is equipped to provide COVID-19 testing.

The Center for Disease Control and Prevention recommends that people in areas of substantial or high COVID-19 transmission wear face masks when indoors in groups of people. The best way that Miners can take care of Miners is to get the vaccine. If you still need the vaccine, it is widely available in the El Paso area, and will be available at no charge on campus during the first week of classes. For more information about the current rates, testing, and vaccinations, please visit epstrong.org.

Course Description

The course will focus on the function and structure of macromolecular complexes and proteins and emphasizes the physical and chemical foundations of molecular biology. The class will be an introduction to modern structural biology with descriptions of methods used to study structure and dynamics of macromolecules, and their application to various biological systems including soluble and membrane-bound proteins. The two instructors will focus on theories as well as practical aspects of the two major techniques employed in structural analyses of macromolecules at atomic resolution, namely cryo-EM and X-ray crystallography. Contents of the course include the basics of amino acids, primary, secondary and tertiary structure, three-dimensional structure determination (x-ray crystallography and cryo-Electron Microscopy). The latter is an emerging discipline that permits understanding of large biological complexes such as viruses.

The laboratory will reflect the topics covered in class but will include hands-on experimentation and structure determination. This course should give you a good idea what research is all about.

After successful completion of the course, students should be able to demonstrate the following skills:

- Laboratory
 - UV spectroscopy to determine bacterial growth rates and protein concentration
 - Expressing proteins in bacteria
 - Using chromatography methods to purify proteins
 - Run, stain and destain SDS-PAGE gels
 - Use computational software to reconstruct protein structures from high-resolution images

- General
 - Lab safety
 - Research ethics
 - Maintaining lab notebook
 - Measuring volumes and weights (using micropipettes, weighing balances, etc.)
 - Communicating research findings

Lab Scope: A practical exercise in biochemical techniques meant to familiarize the students with protein structure and function.

Textbooks & Other Required Materials

- The students will work individually and will be issued a laptop on which to do computational work to determine structures.
- No Textbook needed for this class. For the review material, you can use Lehninger (any version) If you want a reference book for the structural biology then I suggest the following **optional** books

Crystallography Made Crystal Clear 3rd Edition A Guide for Users of Macromolecular Models Authors: Gale Rhodes eBook ISBN: 9780080455549 Paperback ISBN: 9780125870733	Three-Dimensional Electron Microscopy of Macromolecular Assemblies: Visualization of Biological Molecules in Their Native State 2nd Edition by Joachim Frank ISBN-13: 978-0195182187 ISBN-10: 0195182189
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Course Information and web-site

The material related to this course (e.g., syllabus, news, reading material, slides, etc.) will be available through Blackboard. The instructor will upgrade the information every week as needed, therefore you are encouraged to consult the information available on course website (Blackboard) on a weekly basis.

Prerequisites

It is recommended that students take CHEM 3330 (Introductory Biochemistry) and pass with at least a B before taking this course.

Grading:

LECTURE

- 3 Exams (33.3% each)

LAB

- Poster presentation at the end of the semester (50%)
- Lab notebooks (50%)

A straight average of all the exams will determine the overall grade. Lowest exam grade will be dropped, and only excused absences (official University recognized) will be allowed for missed exams. If you have a missed excused exam, then that will be the one dropped. There will be no "extra credit" or additional assignments given at the end of the semester so please do not come begging to have your grade bumped up for no reason. You are in complete control over your grade so please try hard from the first day of class to the last.

All grades of Incomplete must be accompanied by an Incomplete Contract that has been signed by the instructor of record, student, departmental chair, and the dean. Although UTEP will allow a maximum of one year to complete this contract, the College of Science requests it be limited to one month based upon

completion data. A grade of Incomplete is only used in extraordinary circumstances confined to a limited event such as a missed exam, project, or lab. If the student has missed a significant amount of work (e.g. multiple assignments or tasks), a grade of Incomplete is not appropriate or warranted. Generally, I do not give grades of Incomplete and so please do not insist on it unless it meets the above criteria (extraordinary circumstances).

Lab Notebook

Each laboratory module will require the creation of a report with introduction, methods, results, and analysis of results in your lab notebook. TA or instructor will let you know when each is due

Withdrawal Policy:

The last day for you to withdraw from any course with an automatic "W" is listed in the UTEP Academic Calendar. It is **October 29th** this semester. Please note that it is the student's responsibility to officially withdraw from a course. I will not administratively drop anyone after the deadline.

Class Attendance:

Class (lecture + lab) attendance is required. Students are responsible for attending lecture and lab regularly and knowing what takes place during classes. This includes not only the material covered in the class, but also all announcements, handouts, changes in the syllabus, etc. *If you must* miss a class, you need to make a special effort to learn what occurred during your absence. Please be prepared to participate in the class by asking lots of questions.

Disability:

If you have or suspect a disability and need accommodations you should contact Disabled Student Services Office (DSSO) at 747-5148 or at dss@utep.edu or come by Room 106 Union East Building.

List of things NOT to do:

- 1) **Do NOT** Cheat on quizzes or exams
- 2) **Do NOT** Copy lab reports or poster information.
- 3) **Do NOT** Violate lab rules (safety/lab etiquette)