

Course Title and Number: CHEM 4334
Instructor: Dr. Ricardo A. Bernal
TA: Kelly Aguirre / Fernando Chavira

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

Class: Monday & Wednesday CCSB G.0704 from 12:00-1:20 pm
Lab: Monday CCSB G.0704 9:00-11:50 pm **Meets for 1st time the week of September 11th**

Office Hours: **Ricardo Bernal**, by appointment
Kelly Aguirre / Fernando Chavira, by appointment

Email Address: rbernal@utep.edu; kaaguirremende@miners.utep.edu; fchaviraquerr@miners.utep.edu
Campus Office: Bernal (CCSB G.0504), TA office (CCSB G.0512A)
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 email me as soon as possible, so that we can work on appropriate accommodation. 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 of 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 cryo-EM 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 as well as the methods used in scientific research.

Lab grading: Everyone will need to turn in a lab report for exercises assigned by the teaching assistant. Lab reports must contain Summary, Introduction/Background, Methods, Results, and Discussion Sections. Information for the background section must be obtained from current literature and a references section included at the end of the report.

A poster presentation must be prepared and presented at the end of the semester discussing the results obtained throughout the semester.

Optional 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 Leininger (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 website

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 the 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).
- If you miss an exam with a university excused absence, then the makeup exam will be a comprehensive exam the week of finals.

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. The lowest exam grade will be dropped, and only excused absences (official University recognized) will be allowed for missed exams. **You must have taken an exam for it to be dropped. I will not drop any zeros or missed exams.** 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. 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** in class. Students are responsible for attending lectures and lab regularly **IN-PERSON** 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 as this constitutes plagiarism and will result in significant point loss. Furthermore, the student will be referred to the Professor in charge of the lab for further discussion of the misconduct.
- 3) **Do NOT** Violate lab rules (safety/lab etiquette). We want you all to be safe and those around you to be safe as well.