



DEPARTMENT OF BIOCHEMISTRY

**BCHM 60501 – Macromolecules**

3.00 Credit Hours

Fall 2025

**COURSE INFORMATION**

- **Course number and title:** BCHM 60501-Macromolecules
- **CRN:** 15564
- **Meeting times:**  
Lecture: Monday/Wednesday/Friday 9:30-10:20 AM, BCHM 105
- **Instructional Modality: Face-to-Face**  
**Course Credit hours: 3.00**
- **Course Materials:** <https://purdue.brightspace.com/>

**INSTRUCTOR:** Professor Barbara Golden  
office: BCHM 22  
e-mail: [barbgolden@purdue.edu](mailto:barbgolden@purdue.edu)

Office hours: After class or by appointment for in-person or online meetings

**TEACHING ASST:** Victor Gutierrez-Schultz  
office:  
e-mail: [gutierv@purdue.edu](mailto:gutierv@purdue.edu)

Office hours: Monday, Wednesday, Friday 10:30-11:30 in Opperman Commons

**COURSE DESCRIPTION**

A typical BCHM 60501 class includes students from a variety of departments, graduate programs, and scientific backgrounds. In this course we will explore the properties of proteins and nucleic acids from the perspective of the basic principles that underlie macromolecular structure. In the post-genomic age, we can use sequence analyses to predict protein and nucleic acid structure and to give clues as to their functions. Students will learn the basic concepts behind these techniques. Students will become familiar with methods used to determine the three-dimensional structures of macromolecules, and learn how to critically evaluate the accuracy of such structures. We will explore special topics in macromolecular science, including membrane proteins, CRISPR Cas genome modification and ribozymes, from structural and mechanistic perspectives. The course material is distilled from various textbooks and from the primary literature. Students will work in groups to present cutting-edge research in macromolecules to the class through oral

presentations, and they will prepare written summaries of the papers. A biochemistry course designated for majors is a prerequisite of the course.

## DEPARTMENTAL LEARNING OUTCOMES ADDRESSED BY THIS COURSE

- BCHM 60501 students will be able to describe the chemical structures of the building blocks of biological macromolecules, including amino acids and nucleic acids.
- BCHM 60501 students will demonstrate knowledge of the higher order structures of proteins and nucleic acids and be able to define the molecular forces that stabilize them.
- BCHM 60501 students will acquire information literacy: the ability to locate, evaluate and utilize information in the disciplines of biochemistry and molecular biology that is required for research, data analysis, and communication.

## TEXTBOOKS

See Brightspace page for links and more information.

Proteins: Structures and Molecular Properties (Thomas E. Creighton) no ebook  
**Biophysical Chemistry of Nucleic Acids and Proteins (Thomas E. Creighton) Online** – direct link available on the course Brightspace page  
**Physical and Chemical Basis of Molecular Biology (Thomas E. Creighton) Online** – direct link available on the course Brightspace page  
Protein Structure and Function, Primers in Biology (Gregory A. Petsko and Dagmar Ringe)  
Introduction to Protein Structure (Carl Branden and John Tooze)  
Structure and Mechanism in Protein Science: A guide to Enzyme Catalysis and Protein Folding (Alan Fersht).  
Nucleic Acids: Structures, Properties and Functions (Bloomfield, Crothers, Tinoco)

Some of the course material is taken from these texts but it is NOT necessary to purchase them. The books are on reserve at Purdue libraries (WALC and engineering). Two of the texts (shown in bold) are available online through the Purdue library using the Brightspace course site.

## BRIGHTSPACE

The syllabus for the course, lecture notes, and grading keys for problem sets and exams will be available via the Purdue University Brightspace site:

<https://purdue.brightspace.com/>

## ASSIGNMENTS

Your learning will be assessed through a combination of problem sets, student presentations and examinations. Details on these assignments and exams will be posted on Brightspace.

Students may use artificial intelligence (AI) language models, such as ChatGPT, in this course. Students who use AI in any of their assignments in this course, including homework, quizzes, and exams must disclose how AI was used. All source material must be referenced appropriately – note that ChatGPT and other AI does not provide scientific references and may not be accurate. *You are responsible for ensuring accuracy in content and cited references.*

**Problem sets:**

Problem sets will be distributed during the semester on Brightspace according to the schedule. Problem sets will be due one week following distribution. Students are permitted to work together on problem sets but must write up their own answers. If you are running late in submitting a problem set, you must contact Professor Golden before the due date to request an extension. There is no guarantee an extension will be provided for late problem sets. Problem sets are due by 11:59 on the due date. Requests for regrades must be completed within 1 week once graded problem sets are returned.

**Student presentations:**

Groups of students will prepare presentations to inform the rest of the class about cutting-edge findings relating to the structure and function of macromolecules. There will be four presentation days during the semester, and on each day, two presentations will be given. Each member of the class will be assigned to a group consisting of ~3-4 students. The groups will each be sent a paper to read, and members of the group will work together to prepare a 15 minute presentation. Each member of the group will separately prepare a single-spaced one-page summary description of the paper to hand in on the day of the presentation. The score for the assignment will be based on the presentation (35 pts, which will be the same for each group member) and the written assignment (35 pts).

**Exams:**

There will be in-class midterm examinations and a final exam. None of the exams is cumulative. Make-up exams will be provided at the discretion of the instructor.

Missing an exam will result in a grade of 0 being recorded. Any request to be excused from an exam should include documentation (request from academic advisor, etc.) explaining why the exam was or will be missed. The decision to allow a makeup exam is at the discretion of the instructor. If you have any disagreements with the grading of the exams, please consult the grading key first and then submit your paper to the lecture TA or instructor along with a written description of your concerns.

Requests for re-grades must be submitted no later than one week after the graded test or assignment has been returned.

The grading for this course will be as follows:

Syllabus quiz	10 points
Problem sets	180 points
Class Presentations/written summary	70 points
Exam 1	180 points
Exam 2	180 points
Final Exam	180 points
Total	800 points

**GRADING SCALE**

The cutoff values for letter grades are as follows (no +/- scores are given):

720 points	A
640 points	B
560 points	C
480 points	D

479 points and below F

## **EXTRA CREDIT**

There will be no opportunity for extra credit unless discussed explicitly during class.

## **OBTAINING EXTRA HELP**

Dr. Golden and the course teaching assistant will be available to answer your questions immediately after class, by e-mail or by arranging an in-person or virtual meeting.

## **CLASS ATTENDANCE**

Students are expected to be present for class or take personal responsibility for learning the course material.

Do not come to class if you are sick. There is not a requirement to attend any lectures in person. Lectures will be recorded by Boileercast and available online through Brightspace. They are divided into content areas to help you keep the material organized. There is no set time that you are required to be online, however, it is strongly recommended that you create a schedule for watching the lectures if you do not attend class. There is no limit to how many times you can view a lecture video or any other content.

That being said, outside of an excused absence, the instructor and the TA are not responsible for helping you to catch up should you fall behind in this graduate course. The best mechanism to keep up to date with this course may be to attend lectures.

When conflicts or absences can be anticipated, such as for many University-sponsored activities and religious observations, the student should inform the instructor of the situation as far in advance as possible. For unanticipated or emergency absences when advance notification to the instructor is not possible, the student should contact the instructor as soon as possible by email. When the student is unable to make direct contact with the instructor and is unable to leave word with the instructor's department because of circumstances beyond the student's control, and in cases falling under excused absence regulations, the student or the student's representative should contact or go to the [Office of the Dean of Students website](#) to complete appropriate forms for instructor notification. Under academic regulations, excused absences may be granted for cases of grief/bereavement, military service, jury duty, parenting leave, or emergent or urgent care medical care. For details, see the [Academic Regulations & Student Conduct section](#) of the University Catalog website.

## **ACADEMIC GUIDANCE IN THE EVENT A STUDENT IS SICK/QUARANTINED/ISOLATED**

If you must miss class at any point in time during the semester, please reach out to Dr. Golden via e-mail so that we can communicate about how you can maintain your academic progress. If you find yourself too sick to progress in the course, notify me via email or Brightspace. We will make arrangements based on your particular situation.

## ACADEMIC INTEGRITY

Academic misconduct of any kind will not be tolerated in any course offered by the Department of Biochemistry. Information on Purdue's policies with regard to academic misconduct can be found at [http://www.purdue.edu/studentregulations/student\\_conduct/regulations.html](http://www.purdue.edu/studentregulations/student_conduct/regulations.html)

Any incidence of academic misconduct will be reported to the Office of the Dean of Students. Academic misconduct may result in disciplinary sanctions including expulsion, suspension, probated suspension, disciplinary probation, and/or educational sanctions. In addition, such misconduct will result in punitive grading such as:

- receiving a lower or failing grade on the assignment, or
- assessing a lower or failing grade for the course

Punitive grading decisions will be made after consultation with the Office of the Dean of Students. Please note reported incidences of academic misconduct go on record for reference by other instructors. Further, a record of academic misconduct is likely to influence how current/future situations are handled.

To provide you with an unambiguous definition of academic misconduct, the following text has been excerpted from "Academic Integrity: A Guide for Students", written by Stephen Akers, Ph.D., Executive Associate Dean of Students (1995, Revised 1999, 2003), and published by the Office of the Dean of Students in cooperation with Purdue Student Government, Schleman Hall of Student Services, Room 207, 475 Stadium Mall Drive West Lafayette, IN 47907-2050.

"Purdue prohibits "dishonesty in connection with any University activity. Cheating, plagiarism, or knowingly furnishing false information to the University are examples of dishonesty." [Part 5, Section III-B-2-a, *Student Regulations*] Furthermore, the University Senate has stipulated that "the commitment of acts of cheating, lying, and deceit in any of their diverse forms (such as the use of substitutes for taking examinations, the use of illegal cribs, plagiarism, and copying during examinations) is dishonest and must not be tolerated. Moreover, knowingly to aid and abet, directly or indirectly, other parties in committing dishonest acts is in itself dishonest." [University Senate Document 72-18, December 15, 1972]

More specifically, the following are a few examples of academic dishonesty which have been discovered at Purdue University.

- substituting on an exam for another student
- substituting in a course for another student
- paying someone else to write a paper and submitting it as one's own work
- giving or receiving answers by use of signals during an exam
- copying with or without the other person's knowledge during an exam
- doing class assignments for someone else
- plagiarizing published material, class assignments, or lab reports
- turning in a paper that has been purchased from a commercial research firm or obtained from the internet
- padding items of a bibliography
- obtaining an unauthorized copy of a test in advance of its scheduled administration
- using unauthorized notes during an exam
- collaborating with other students on assignments when it is not allowed
- obtaining a test from the exam site, completing and submitting it later

- altering answers on a scored test and submitting it for a regrade
- accessing and altering grade records
- stealing class assignments from other students and submitting them as one's own
- fabricating data
- destroying or stealing the work of other students

Plagiarism is a special kind of academic dishonesty in which one person steals another person's ideas or words and falsely presents them as the plagiarist's own product. This is most likely to occur in the following ways:

- using the exact language of someone else without the use of quotation marks and without giving proper credit to the author
- presenting the sequence of ideas or arranging the material of someone else even though such is expressed in one's own words, without giving appropriate acknowledgment
- the syllabus easter egg is a quiet stream in the middle of the forest

In addition, while use of AI chatbots is allowed in BCHM 60501, they often do not provide accurate references or citations for their content. This could lead a breach of scientific integrity if references are not accurately cited.

Academic integrity is one of the highest values that Purdue University holds. Individuals are encouraged to alert university officials to potential breaches of this value by either emailing [integrity@purdue.edu](mailto:integrity@purdue.edu) or by calling 765-494-8778. While information may be submitted anonymously, the more information that is submitted provides the greatest opportunity for the university to investigate the concern. More details are available on our course Brightspace under University Policies.

## NOTICE OF COPYRIGHT PROTECTION OF COURSE MATERIALS

Effective learning environments provide opportunities for students to reflect, explore new ideas, post opinions openly, and have the freedom to change those opinions over time. Students and instructors are the authors of the works they create in the learning environment. As authors, they own the copyright in their works subject only to the university's right to use those works for educational purposes (Visit [Purdue University Copyright Office](#)). Students may not copy, reproduce or post to any other outlet (e.g., YouTube, Facebook, or other open media sources or websites) any work in which they are not the sole or joint author or have not obtained the permission of the author(s).

The policy regarding copyrighted materials can be found in the course **Brightspace** page under "University Policies" and "Use of Copyrighted Materials."

Among the materials that may be protected by copyright law are the lectures, notes, and other material presented in class or as part of the course. Always assume the materials presented by an instructor are protected by copyright unless the instructor has stated otherwise. Students enrolled in, and authorized visitors to, Purdue University courses are permitted to take notes, which they may use for individual/group study or for other non-commercial purposes reasonably arising from enrollment in the course or the University generally.

Notes taken in class are, however, generally considered to be "derivative works" of the

instructor's presentations and materials, and they are thus subject to the instructor's copyright in such presentations and materials. No individual is permitted to sell or otherwise barter notes, either to other students or to any commercial concern, for a course without the express written permission of the course instructor. To obtain permission to sell or barter notes, the individual wishing to sell or barter the notes must be registered in the course or must be an approved visitor to the class. Course instructors may choose to grant or not grant such permission at their own discretion, and may require a review of the notes prior to their being sold or bartered. If they do grant such permission, they may revoke it at any time, if they so choose.

## **EMERGENCY PREPAREDNESS**

In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances beyond the instructor's control. Relevant changes to this course will be posted onto the course website or can be obtained by contacting the instructors or TAs via email or phone. You are expected to read your @purdue.edu email on a frequent basis. The entire policy can be found through the "Emergency Preparedness" Statement on Brightspace.

## **ON-LINE COURSE EVALUATIONS**

During the last two weeks of the semester, you will be provided an opportunity to evaluate this course and your instructor(s). To this end, Purdue has transitioned to online course evaluations. On Monday of the fifteenth week of classes, you will receive an official email from evaluation administrators with a link to the online evaluation site. You will have two weeks to complete this evaluation. Your participation in this evaluation is an integral part of this course. Your feedback is vital to improving education at Purdue University. I strongly urge you to participate in the evaluation system.

## **DIVERSITY AND INCLUSION**

Purdue University is committed to maintaining a community which recognizes and values the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her potential. In pursuit of its goal of academic excellence, the University seeks to develop and nurture diversity. The University believes that diversity among its many members strengthens the institution, stimulates creativity, promotes the exchange of ideas, and enriches campus life. A hyperlink to Purdue's full Nondiscrimination Policy Statement is included in our course Brightspace under University Policies.

In our discussions, structured and unstructured, we will explore a variety of challenging issues, which can help us enhance our understanding of different experiences and perspectives. This can be challenging, but in overcoming these challenges we find the greatest rewards. While we will design guidelines as a group, everyone should remember the following points:

- We are all in the process of learning about others and their experiences. Please speak with me, anonymously if needed, if something has made you uncomfortable.
- Intention and impact are not always aligned, and we should respect the impact something may have on someone even if it was not the speaker's intention.
- We all come to the class with a variety of experiences and a range of expertise, we should respect these in others while critically examining them in ourselves."

1. This course, as with every course offered at Purdue, plays a part in creating and sustaining a welcoming campus where all students can excel. There are many initiatives in the Biochemistry department and supported by the university focused on this goal, and this course is designed to take advantage of those resources. Learning experiences and assignments address diversity and inclusion, not because they are “topics,” but because they are necessary to prepare students to be successful in a diverse, global environment.
2. We strive for equity, providing equal access and opportunity, and working to maximize student potential. This requires both instructor and students to identify and remove barriers that may prevent someone from full access or full participation. You can help by:
  - Contacting me, anonymously if needed, if you see a potential barrier for someone or yourself in participating fully in the class. This might be a physical barrier such as access to technology or a personal situation.
  - Suggesting ways in which members of our class can support each other. Virtual study groups and discussion boards are examples, but I encourage you to be creative in your ideas.
  - Getting to know each other as contributing members of our learning community. Everyone has something to contribute, and while I designed the course to take advantage of the wealth of knowledge, expertise, and experience we bring together, I cannot do it well without your participation. There are many opportunities built into this course for this type of work. It is important we do it together.

## MENTAL HEALTH

**If you find yourself beginning to feel some stress, anxiety and/or feeling slightly overwhelmed, try [WellTrack](#).** Sign in and find information and tools at your fingertips, available to you at any time.

**If you need support and information about options and resources,** please contact or see the [Office of the Dean of Students](#). Call 765-494-1747. Hours of operation are M-F, 8 am- 5 pm.

**If you find yourself struggling to find a healthy balance between academics, social life, stress,** etc. sign up for free one-on-one virtual or in-person sessions with a [Purdue Wellness Coach at RecWell](#). Student coaches can help you navigate through barriers and challenges toward your goals throughout the semester. Sign up is completely free and can be done on BoilerConnect. If you have any questions, please contact Purdue Wellness at [evans240@purdue.edu](mailto:evans240@purdue.edu).

If you're struggling and need mental health services: Purdue University is committed to advancing the mental health and well-being of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of mental health support, services are available. For help, such individuals should contact [Counseling and Psychological Services \(CAPS\)](#) at 765-494-6995 during and after hours, on weekends and holidays, or by going to the CAPS office on the second floor of the Purdue University Student Health Center (PUSH) during business hours.

## BASIC NEEDS SECURITY

Any student who faces challenges securing their food or housing and believes this may affect their performance in the course is urged to contact the Dean of Students for support. There is no appointment needed and Student Support Services is available to serve students 8 a.m.-5 p.m. Monday through Friday. Considering the significant disruptions caused by the current global crisis as it related to COVID-19, students may submit requests for emergency

assistance from the [Critical Needs Fund](#)

## **ACCESSIBILITY AND ACCOMODATIONS**

Purdue University strives to make learning experiences as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, you are welcome to let me know so that we can discuss options. You are also encouraged to contact the Disability Resource Center at: [drc@purdue.edu](mailto:drc@purdue.edu) or by phone: 765-494-1247.

## **DISCLAIMER**

This syllabus is subject to change. You will be notified of any changes as far in advance as possible via an announcement on Brightspace. Monitor your Purdue email daily for updates.