

BIEN 2810 Biology for Engineers
JSCBB A108
Class: MWF 11:45am-12:35pm
Spring 2025

INSTRUCTOR: Laurel Hind
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ADVANCED TA: Meg Radke (TA)
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CLASS EMAIL: bien2810@colorado.edu

OFFICE HOURS: Prof. Hind: Friday 1-2pm, JSCBB E1B34
Meg: Monday 1-2pm, JSCBB D111

REQUIRED MATERIALS:

- **COURSE TEXT:** *Biology, 13th Edition* Raven, Johnson, Mason, Losos and Duncan. As a student enrolled in CHEN 2810, you will automatically be enrolled in Inclusive Access, which gives you access to the online textbook (ebook) and McGraw-Hill Connect.
- **CLICKER:** During each class, I will have several Clicker questions (see below for detailed information). Participation during class is mandatory, comprising of 10% of your final grade in the course.

COURSE DESCRIPTION

The purpose of this course is to develop a basic understanding of the science of biology. Particular emphasis will be placed on topics of potential importance and significance to chemical and biological engineers. This basic understanding will provide a solid foundation for subsequent courses related to biological and biomedical engineering.

COURSE OBJECTIVES/LEARNING OUTCOMES

Upon completion of this course, you will have an introductory understanding of the following biological areas:

- *Biochemistry: the molecular structure of proteins, carbohydrates, and nucleic acids*
- *Cell organization*
- *Metabolism*
- *Genetics*
- *Molecular Biology*
- *Recombinant DNA Technology*
- *Evolution and Natural Selection*
- *Special Topics (Tissue Engineering, Stem Cells, etc.)*

Teaching/Learning Methods: Much of what you will learn in this course you will do so through the reading of the textbook. There is not enough time during class meetings to cover everything in the text. *Class meetings should be thought of as supplemental to the text.* During class, I will emphasize the important and/or confusing concepts and expand upon concepts in the book as well as present interesting topics that are not in the book. As such, reading is of utmost importance and class attendance is crucial. You will be expected to have read the assigned reading for each class period prior to coming to class. Prior to each class, you must complete the McGraw-Hill Connect Reading Assignments. During class, you'll be expected to interact with/answer several Clicker questions (an integral part of your final grade). Homework assignments, projects, and exams will test your understanding of the material.

Furthermore, all exams and homework assignments are cumulative in nature (i.e., you are responsible for all material in the course up to the current exam/assignment). Since the Final Exam is cumulative, I find that having cumulative exams and homework assignments is valuable.

Course Website: The course website is available on Canvas (canvas.colorado.edu). The website will be invaluable for this course and I will be using it extensively to post announcements, homework tips/clarifications, important documents and links, and updated grades throughout the semester.

Email: Email has been deemed by the University of Colorado as an official method of communication. Please make sure you are having your Colorado.edu email forwarded to your main email if you do not use Colorado.edu email. Anything I announce via email is official. This may include things such as changes to the syllabus, changes to homework assignments, and other important course announcements. We will utilize a class email for this course, please direct all communication to the course email.

METHODS OF EVALUATION

Reading Assignments in McGraw-Hill Connect (15%): For almost every class period, you will be responsible for completing a Reading Assignment in McGraw-Hill Connect. You will read sections of the book and then be asked questions about those sections. McGraw-Hill Connect will adapt to your strengths and weaknesses and focus on the material that you need to learn. Links to the Reading Assignments can be found on Canvas through the McGraw Hill Connect tab.

Each student is expected to do these Reading Assignments *independently* with no help from other students, and they will be relatively easy if you read the assigned material. Reading Assignments must be completed and submitted by 11:45am the day of class. They will generally be available on the course website a week before they are due.

Instructions outlining how to register for McGraw-Hill Connect and Inclusive Access (online textbook) will be provided early in the semester.

Clicker Questions (10%): We will be using iClicker to enhance active learning and participation in the course. Our classroom (BIOT A108) has limited wifi capabilities; therefore, I recommend you purchase and use an iClicker + for class. If you choose to use the iClicker student app on your phone or tablet, keep in mind that you may experience connection issues, and I cannot be held responsible for any points lost due to this fact. You will need to have an iClicker student app account, register your clicker there (<https://buffportal.colorado.edu/card/cuclicker>), and download and set up the app BEFORE you get to class. Students MUST click in person themselves in A108 in order to receive clicker points; having someone else click in for you is considered cheating and academic misconduct.

Each question will be worth two points: one point for answering and one point for getting the correct answer. The lowest 4 scores will be dropped to provide up to 4 absences, no questions asked. These absences cover illnesses, travel, or missing class for any other reason.

Homework (20%): On weeks that homework is assigned, it will be due on Fridays by 11:59 PM on Canvas through McGraw-Hill Connect. Homework assignments will be completed individually.

IMPORTANT: Homework assignments are cumulative! That means that each assignment will cover not only the most recent week's material, but I may pose questions from the entire semester to date. Up to 30-40% of an assignment may be review questions, and this approach will help you on the Final Exam, which is cumulative.

Projects (10%): There will be two short projects due during the semester. These projects are designed to show a deeper understanding of material covered in lectures, homeworks, and exams. More details will be provided later in the semester.

Exams (20%): There are 2 midterm exams in addition to the Final Exam. These exams will be taken during class time (maximum of 50 minutes). If you understand the homework, then you will do well on the exams. Exams are cumulative (everything since day 1 is fair game) and will be given on the following days during class: 2/26 and 4/9. If you have an accommodation letter that provides you extra time on exams, you will take your exams in the testing center.

Final Exam (25%): The Final Exam will be a cumulative evaluation of each student's knowledge of the subject material. The Final Exam will be given during the normal final exam scheduled time for this course: Sunday May 4th from 7:30-10pm.

Availability of Assignments and Submission Policies

Reading Assignments (McGraw-Hill Connect) will generally be available a week before they are due. Homework assignments are submitted online and are due on Friday by 11:59 p.m. (see above). They are generally available a week before they are due.

You are responsible for keeping copies of all work you submit for grading. Also, please plan to submit your homework in advance – there will be no exceptions in case your computer and/or internet connection are not working. Please plan to submit assignments at least a few hours early so that any connectivity or computer problems can be fixed or another computer/facility can be used.

LATE WORK

All assignments close at the stated times; no late work will be accepted except in the case of a documented emergency or medical situation. If you are having difficulties, please let the instructors know before due dates so we can work out a solution together.

GRADING

| Methods of Evaluation | Percentage of Final Grade |
|--|---------------------------|
| Reading Assignments in McGraw-Hill Connect | 15% |
| Clicker Questions (in-class participation) | 10% |
| Homework | 20% |
| Projects (2) | 10% |
| Exams (2 of these) | 20% (10% for each exam) |
| Final Exam (cumulative) | 25% |

GRADE ASSIGNMENTS

A curved grading scale promotes competition among students and hinders learning. Therefore, I will be using a fixed grading scale for the class (see below). Each of the components of your final grade, as well as the final course grade will be determined based on the following general rubric.

| Letter Grade | Percentage Grade | Description |
|--------------|---------------------------------|--|
| A | $93 \leq \text{score} \leq 100$ | Exceeds all required elements of an assignment, and the quality of the work is considerably greater than what was required. The quality of the work is considerably above the class average and impressive to the evaluator. |
| A- | $90 \leq \text{score} < 93$ | |
| B+ | $87 \leq \text{score} < 90$ | Meets all required elements of an assignment, and the quality of the work is better than what is required and demonstrated by the class average. |
| B | $83 \leq \text{score} < 87$ | |
| B- | $80 \leq \text{score} < 83$ | |

| | | |
|------|-----------------------------|---|
| C+ | $77 \leq \text{score} < 80$ | Meets all required elements of an assignment, no more, no less. Quality of assignment is satisfactory for college level work. |
| C | $73 \leq \text{score} < 77$ | |
| C- | $70 \leq \text{score} < 73$ | |
| D+ | $67 \leq \text{score} < 70$ | Fails to meet all required elements of an assignment, and/or the quality of the assignment is less than satisfactory. |
| D | $63 \leq \text{score} < 67$ | |
| D- | $60 \leq \text{score} < 63$ | |
| F | Less than 60 | Only meets some of the required elements of an assignment, and/or the quality of the assignment is considerably lower than satisfactory. 50% of points are not guaranteed. At this level points are only given if some elements of the assignment are met. If not, very low percentages are likely. |
| Zero | 0 | Fails to meet any of the required elements of an assignment, and/or the quality of the assignment is well below basic standards of writing, comprehension, and/or ability to follow instructions; assignment is late or incomplete; assignment is not turned in at all; assignment shows signs of plagiarism or other forms of academic dishonesty. |

COURSE COMMUNICATION

All class slides, homework, and videos will be placed on Canvas for students to download.

UNIVERSITY POLICIES

University Policies can be found [here](#) and below.

Honor Code

All students enrolled in a University of Colorado Boulder course are responsible for knowing and adhering to the [Honor Code](#). Violations of the Honor Code may include but are not limited to: plagiarism (including use of paper writing services or technology [such as essay bots]), cheating, fabrication, lying, bribery, threat, unauthorized access to academic materials, clicker fraud, submitting the same or similar work in more than one course without permission from all course instructors involved, and aiding academic dishonesty. Understanding the course's syllabus is a vital part in adhering to the Honor Code.

All incidents of academic misconduct will be reported to Student Conduct & Conflict Resolution: StudentConduct@colorado.edu. Students found responsible for violating the [Honor Code](#) will be assigned resolution outcomes from the Student Conduct & Conflict Resolution as well as be subject to academic sanctions from the faculty member. Visit [Honor Code](#) for more information on the academic integrity policy.

Accommodation for Disabilities, Temporary Medical Conditions, and Medical Isolation

If you qualify for accommodations because of a disability, please submit your accommodation letter from Disability Services to your faculty member in a timely manner so that your needs can be addressed. Disability Services determines accommodations based on documented disabilities in the academic environment. Information on requesting accommodations is located on the [Disability Services website](#). Contact Disability Services at 303-492-8671 or DSinfo@colorado.edu for further assistance. If you have a temporary medical condition, see [Temporary Medical Conditions](#) on the Disability Services website.

If you have a temporary illness, injury or required medical isolation for which you require adjustment, please email Dr. Hind.

Accommodation for Religious Obligations

Campus policy requires faculty to provide reasonable accommodations for students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. Please communicate the need for a religious accommodation in a timely manner. In this class, please email Dr. Hind within the first week of class. See the [campus policy regarding religious observances](#) for full details.

Preferred Student Names and Pronouns

CU Boulder recognizes that students' legal information doesn't always align with how they identify. Students may update their preferred names and pronouns via the student portal; those preferred names and pronouns are listed on instructors' class rosters. In the absence of such updates, the name that appears on the class roster is the student's legal name.

Classroom Behavior

Students and faculty are responsible for maintaining an appropriate learning environment in all instructional settings, whether in person, remote, or online. Failure to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, marital status, political affiliation, or political philosophy.

For more information, see the [classroom behavior policy](#), the [Student Code of Conduct](#), and the [Office of Institutional Equity and Compliance](#).

Sexual Misconduct, Discrimination, Harassment and/or Related Retaliation

CU Boulder is committed to fostering an inclusive and welcoming learning, working, and living environment. University policy prohibits protected-class discrimination and harassment, sexual misconduct (harassment, exploitation, and assault), intimate partner abuse (dating or domestic violence), stalking, and related retaliation by or against members of our community on- and off-campus. The Office of Institutional Equity and Compliance (OIEC) addresses these concerns, and individuals who have been subjected to misconduct can contact OIEC at 303-492-2127 or email CUreport@colorado.edu. Information about university policies, [reporting options](#), and [OIEC support resources](#) including confidential services can be found on the [OIEC website](#).

Please know that faculty and graduate instructors are required to inform OIEC when they are made aware of incidents related to these concerns regardless of when or where something occurred. This is to ensure that individuals impacted receive outreach from OIEC about their options and support resources. To learn more about reporting and support for a variety of concerns, visit the [Don't Ignore It page](#).

Mental Health and Wellness

The University of Colorado Boulder is committed to the well-being of all students. If you are struggling with personal stressors, mental health or substance use concerns that are impacting academic or daily life, please contact [Counseling and Psychiatric Services \(CAPS\)](#) located in C4C or call (303) 492-2277, 24/7.

Free and unlimited telehealth is also available through [Academic Live Care](#). The Academic Live Care site also provides information about additional wellness services on campus that are available to students.

Acceptable Use of AI in this Class

Generative artificial intelligence tools—software that reproduces text, images, computer code, audio, video, and other content—have become widely available. Well-known examples include ChatGPT for text and DALL•E for images. This statement governs all such tools, including those released during our semester together. Keep in mind that the goal of gen AI tools is to reproduce content that seems to have been produced by a human, not to produce accurate or reliable content; therefore, relying on a gen AI tool may result in your submission of

inaccurate content. It is your responsibility—not the tool's—to assure the quality, integrity, and accuracy of work you submit in any college course. If gen AI tool use is suspected in completing assignments for this course in ways not explicitly authorized, I will follow up with you. I may contact the Office of Student Conduct & Conflict Resolution to report suspected Honor Code violations. In addition, you must be wary of unintentional plagiarism or data fabrication. Please act with integrity, for the sake of both your personal character and your academic record.

Limited Gen AI Use: You may NOT use gen AI tools on most assignments in this course including reading assignments, homeworks, clicker questions, or exams. You MAY use gen AI tools in a limited capacity for the projects. They may be used for generating ideas or outlines and for spelling and grammar checks. They **MAY NOT** be used for writing or rewriting sections of the project, generating images, or finding citations. The final work must be student-generated with proper critical evaluation and original analysis as outlined in the project guidelines. If you use gen AI tools in this class, document your usage with the Chicago Manual of Style or appropriate citation guidelines for this course.

BIEN 2810 SCHEDULE – SPRING 2025 (SUBJECT TO CHANGE)

| Week | Monday | Wednesday | Friday |
|----------------------|--|---|---|
| #1 1/13- 1/17 | 1: Intro; Syllabus | 2: Nature of Molecules Ch. 1, 2.1, 2.2 | 3: Properties of Water Ch. 2.3-2.6 HW #1 |
| #2 1/20- 1/24 | MLK DAY (NO CLASS) | 4: Carbon + Carbohydrates Ch. 3.1-3.2 | 5: Nucleic Acids + Proteins Ch. 3.3-3.4 HW #2 |
| #3 1/27- 2/31 | 6: Proteins + Lipids Ch. 3.5 | 7: Cells I Ch. 4.1-4.5 | 8: Cells II Ch. 4.6-4.8 HW #3 |
| #4 2/3- 2/7 | 9: Membranes I Ch. 5.1-5.3 | 10: Membranes II Ch. 5.4-5.6 | 11: Metabolism I Ch. 6.1-6.3 HW #4 |
| #5 2/10- 2/14 | 12: Metabolism II Ch. 6.4-6.5 | 13: Cellular Respiration I Ch. 7.1-7.3 | 14: Cellular Respiration II Ch. 7.4-7.6 HW #5 |
| #6 2/17- 2/21 | 15: Cellular Respiration III Ch. 7.7-7.8 | 16: Cell Communication I Ch. 9.1-9.3 | 17: Cell Communication II Ch. 9.4-9.5 HW #6 |
| #7 2/24- 2/28 | 18: Review Day | 19: EXAM I | 20: NO CLASS |
| #8 3/3- 3/7 | 21: Cell Division I Ch. 10.1-10.3 | 22: Cell Division II Ch. 10.4-10.7 | 23: Meiosis and Sexual Reproduction Ch. 11 Project 1 Due |
| #9 3/10- 3/14 | 24: Inheritance I Ch. 12 | 25: Inheritance II Ch. 13.1-13.2 | 26: Inheritance III Ch. 13.3-13.5 HW #7 |
| #10 3/17- 3/21 | 27: DNA Ch. 14 | 28: Gene Expression I Ch. 15.1-15.3 | 29: Gene Expression II Ch. 15.4-15.8 HW #8 |
| #11 3/24- 3/28 | Spring Break – No Class | Spring Break – No Class | Spring Break – No Class |
| #12 3/31- 4/4 | 30: Gene Expression III Ch. 16.1-16.4 | 31: Control of Gene Expression Ch. 16.5-16.7 | 32: Biotechnology and Genomics I Ch. 17.1-17.4 HW #9 |
| #13 4/7- 4/11 | 33: Review Day | 34: EXAM II | 35: NO CLASS |
| #14 4/14- 4/18 | 36: Biotechnology and Genomics II Ch. 17.5-17.7 | 37: Evolution I Ch. 20 | 38: Evolution II Ch. 21.1-21.2 Project 2 Due |
| #15 4/21- 4/25 | 39: Evolution III Ch. 21.3-21.4 | 40: Origin of Species I Ch. 22.1-22.4 | 41: Origin of Species II Ch. 22.5-22.7 HW #10 |
| #16 4/28- 4/30 | 42: Special Topic TBD | 43, Review for Final Exam | Reading Day, No Class |
| May | Final Exam on Sunday, May 4 from 7:30-10 pm | | |