

BIBC 102
Summer Session One
Center Hall 119
Monday and Wednesday from 11:00AM to 1:50PM

Course Information

Instructor: Matthew Flagg
mflagg@ucsd.edu

Office Hours: Wednesdays from 3-4, Thursdays at 1-2 in Pacific Hall Room 2130
Additional office hours available by appointment

Contacting me: Your first source for help should be discussion boards on Canvas. We will check these on a regular basis and reply to upvoted questions in sections. Otherwise, please try to attend my office hours if you have questions related to course material. It is much easier to explain concepts in person than by email. If you need to send me an email, please include "BIBC102" in the subject line and allow 24 hours for me to reply. If I have not replied in 24 hours, please send the email again.

IAs: Vivian Hua: vkhua@ucsd.edu
Section A01, MW 4:00-4:50PM in **HSS 1128A**
Office Hours: Mondays from 3-4 pm in HSS 1145L

Austin Zuckerman: azuckerm@ucsd.edu
Section A02 MW 5:00-5:50PM in **HSS 1128A**
Section A03 MW 6:00-6:50PM in **HSS 1128A**
Office Hours: Tuesdays from 11:30 AM-1:30 PM at HSS 1145L

Vipula Racha: vracha@ucsd.edu
Section A04, MW 2:00-2:50PM in **CENTR 217A**
Office Hours: Fridays from 5:30-6:30 at RIMAC Peet's

Midterm

Monday, July 15th from 11:00 to 12:30
Location TBD

Final exam

Friday, August 2nd from 11:30 to 2:30PM
Location TBD

Weekly Quizzes

Made available every Wednesday, Due on Friday by Midnight
On Canvas

Course Description

This course will cover thermodynamics, enzyme properties, and central metabolic pathways. In short, it will examine how thermodynamics and enzyme properties can be harnessed to facilitate the chemistry of life and to ensure both general and tissue-specific regulation of metabolism.

The course begins with a basic review of thermodynamics as it relates to chemical reactions. These concepts will allow us to understand the principles of direct and indirect coupling, the means by which the cells store and expend metabolic energy. We'll then take a detailed look at the action of enzymes. We will examine the kinetics of enzyme-catalyzed reactions, the chemical mechanisms through which enzymes produce catalysis, and the regulation of catalytic activity.

The remainder of the course will focus on central metabolism, the pathways by which basic biological molecules are broken or built. We'll aim to understand how energy flows in the cell, such as in the oxidation of glucose to produce ATP, and we'll see how this energy is utilized to construct new molecules, such as in the synthesis of fatty acids from acetyl-CoA. Finally, we'll learn about the panoply of mechanisms that coordinate metabolism not only in a single cell but also in the various tissue of a complex and dynamic metazoan organism.

Prerequisites: Chem 40A or Chem 140A or BENG 120 and Chem 40B or Chem 140B or BENG 120.

Note: Students may not receive credit for both BIBC 102 and Chem 114B.

About the Instructor

I am a sixth-year (almost finished) student in the biosciences doctoral program. The plan is to pursue a postdoc in academia with a continued focus on mentorship and teaching. If things go well, I'll eventually look for a professorship at a small liberal arts college. I imagine my research will always focus on biology, but I'm also interested in evidence-based learning and how college classes can be made not only more effective but also more engaging, thought-provoking, and career-oriented.

Course Learning Outcomes

Upon completion of this course, learners will be able to:

1. Use thermodynamic and biochemical principles to predict metabolic flux.
2. Use biochemical principles to model enzyme behavior.
3. Summarize (rather than memorize) the biochemical "logic" of central metabolism.
4. Effectively navigate a map of human metabolism and use it to generate hypotheses.
5. Appraise mechanistic explanations of human metabolic diseases.

Course Materials and Tools

Text/Readings/Other material

There are no required texts for this course. However, Lehninger's *Principles of Biochemistry* and Stryer's *Biochemistry* are both *far better* resources than Wikipedia or YouTube, in my experience.

We will make use of several writeups made by Randy Hampton throughout the quarter. Those will be made available on Canvas.

Accessing Canvas

<https://coursefinder.ucsd.edu/>

Login: UC San Diego Active Directory credentials

Technology Requirements

iClickers will be used each class. Please be sure to bring one.

If you haven't registered your iClicker, please do so ASAP! There is a registration link on our Canvas page, at the bottom of the left-hand-side menu.

Please download Stanford's [Pathways of Human Metabolism](#). This will also be used frequently.

Grading Information

Summary of Grade Criteria

Assignment	Weight
Attendance	12.5%
Quizzes x 5	20%
Midterm	30%
Final Exam	37.5%
	100%

Grading Scale

>93%	A	77-80%	C+
90-93%	A-	73-77%	C
87-90%	B+	70-73%	C-
83-87%	B	60-70%	D
80-83%	B-	<60%	F

Grading Procedure and Feedback

First and foremost, students in this class will in no way be competing with one another for grades. I have no quotas for As, Bs, Cs, etc. I reserve the right to adjust the above scale, but any changes will always work in your favor. I will NOT make the class more stringent.

Quizzes will be administered weekly through Canvas. They will always be due Friday night.

The midterm and final will be graded in a timely fashion. Grades will be posted on Canvas.

Exam Regrades

All requests for exam regrades will be taken under consideration. Regrades should be submitted **within a week of the test being handed back**. The request should be a typed or neatly written explanation of why additional point should be awarded. This page should be stapled to the original test and handed in during class. I will personally evaluate regrades and pass them back in timely fashion.

Attendance and Participation

Section attendance is worth 5% of your total grade. Lecture attendance is also worth 5% of your final grade. Discussion board participation is worth 2.5% of your final grade.

Sections will start on the first day of class. I know this is a little atypical, but this class is too condensed to give up a section.

Students are required to attend the discussion sections they are enrolled in. There can't be any exceptions, and students who are not enrolled in a section will be turned away by the IAs. This is a matter of physical space: the rooms we've been assigned do not have enough seats for extra attendees.

While attendance and participation are two of my highest priorities in this highly condensed summer session, life happens. People have jobs, get sick, etc. So, **three absences from lecture and three absences from section will be excused without question**, and absences for any sincerely held religious belief, observance, or practice will be accommodated where reasonable. **Absences from lecture and section cannot be substituted for one another.** Use these absences wisely, as **additional ones will rapidly and significantly affect your grade. If a fourth section or lecture is missed, your attendance grade will be reduced to 60% (3 out of 5%) and will decrease by 10% for each additional absence.**

Meaningful participation on the discussion boards is **required each week**. You should do one of the following:

- 1) Ask a meaningful question.
- 2) Respond to a classmate's question in a meaningful way.
- 3) Present something interesting and meaningful about the week's topic.

I will present examples of each of these on the first day of class.

Extra Credit

2% extra credit will be given to the entire class if 90% of the class fills out their CAPES. We will take class time to do this.

Late or Missing Assignments

Online quizzes and discussion present the only concrete due dates in the course. They will be made available and be due at the same time every week, so barring technical issues, late or missing quizzes or posts will be counted as a zero.

Course Format

While the class will take place in a traditional lecture-hall setting, there will be a focus on combining elements of lecture and active learning. This seems necessary to me for a few reasons:

- 1) If I lecture for three hours every time, we will all be miserable and bored and probably won't learn anything.
- 2) Active learning will help me to understand how well I'm teaching. It will allow me to create a fairer class that is better suited to your needs.
- 3) Exhaustive meta-studies show that active learning works. It improves student learning and helps to retain students that might otherwise fail or withdraw from the class.

Discussion sections will be a similar mixture of lecture and active learning. So, please arrive at both lecture and section ready to participate, both for your own sake and for that of your peers. This highly condense, five-week-long session will fly by, and we all need to work together to pull it off.

General Course Schedule

Approx Week	Topics
1	Thermodynamics underpin metabolism
1	Catalysis and Enzyme Properties
2	Enzyme and Pathway Regulation
2	Redox Reactions, Glycolysis
3	Glycolysis, The Krebs Cycle
3	The Krebs Cycle
4	Midterm, Oxidative Phosphorylation
4	Fatty Acid Catabolism and Anabolism
4	Gluconeogenesis and Glycogen
4	Metabolic odds and ends: amino acids, nucleotides, and ammonia (Time permitting)
5	Metabolic Disorders and Their Causes (Time permitting)
5	Metabolic Disorders Continued (Time permitting)

Student Resources for Support and Learning

Library Help

For questions about eReserves and research tools:

<https://library.ucsd.edu/ask-us/triton-ed.html>

Learning Resources

[Writing Hub](#)

[Supplemental Instruction](#)

[Tutoring](#)

[Mental Health Services](#)

Community Centers

Learn about the different ways UC San Diego explores, supports and celebrates the many cultures that make up our diverse community.

<https://students.ucsd.edu/student-life/diversity/index.html>

Accessibility

Students requesting accommodations for this course due to a disability must provide a current Authorization for Accommodation (AFA) letter issued by the Office for Students with Disabilities (OSD) which is located in University Center 202 behind Center Hall. Students are required to present their AFA letters to Faculty (please make arrangements to contact me privately) and to the OSD Liaison in the department in advance so that accommodations may be arranged.

Contact the OSD for further information: <https://disabilities.ucsd.edu/>.
osd@ucsd.edu | 858. 534.4382

Inclusion

I am deeply committed to creating a learning environment that supports diversity of thought, perspective, experience, and identity. This will be key to our success. Science is all about pooling insight and seeing problems from as many perspectives as possible. So, please share your thoughts.

I am also open to anonymous feedback am fully willing to facilitate it.

Office of Equity, Diversity, and Inclusion:

858.822.3542 | diversity@ucsd.edu | <https://diversity.ucsd.edu/>

<https://students.ucsd.edu/student-life/diversity/index.html>

<https://regents.universityofcalifornia.edu/governance/policies/4400.html>

Basic Needs

Any student who has difficulty accessing sufficient food to eat every day, or who lacks a safe and stable place to live, and believes this may affect their performance in this course, is encouraged to contact:

foodpantry@ucsd.edu | basicneeds@ucsd.edu | (858)246-2632

Technical Support

For help with accounts, network, and technical issues:

<https://acms.ucsd.edu/contact/index.html>

For help connecting to electronic library resources such as eReserves and e-journals:

<https://library.ucsd.edu/computing-and-technology/connect-from-off-campus/>

For help installing Zoom for video conferencing, virtual office hours, synchronous lectures:

<https://blink.ucsd.edu/technology/file-sharing/zoom/index.html>

UC San Diego Academic Policies

Academic Integrity

Academic Integrity is expected of everyone at UC San Diego. This means that you must be honest, fair, responsible, respectful, and trustworthy in all of your actions. Lying, cheating, or any other forms of dishonesty will not be tolerated because they undermine learning and the University's ability to certify students' knowledge and abilities. Thus, any attempt to get, or help another get, a grade by cheating, lying or dishonesty will be reported to the Academic Integrity Office and will result in sanctions. Sanctions can include an F in the class and suspension or dismissal from the University. So, think carefully before you act. Before you act, ask yourself the following questions: a) is my action honest, fair, respectful, responsible, and trustworthy, and b) is my action authorized by the instructor? If you are unsure, don't ask a friend, ask your instructor, instructional assistant, or the Academic Integrity Office. You can learn more about academic integrity at academicintegrity.ucsd.edu.

(Source: Bertram Gallant, T. (2017). Teaching for integrity. UC San Diego Academic Integrity Office.)

Refer to:

[UCSD Student Conduct Code](https://students.ucsd.edu/_files/student-conduct/ucsandiego-student-conduct-code_interim-revisions1-16-18.pdf)

(https://students.ucsd.edu/_files/student-conduct/ucsandiego-student-conduct-code_interim-revisions1-16-18.pdf)

[Principles of Community](https://ucsd.edu/about/principles.html)

(<https://ucsd.edu/about/principles.html>)

Religious Accommodation

It is the policy of the university to make reasonable efforts to accommodate students having bona fide religious conflicts with scheduled examinations by providing alternative times or methods to take such examinations. If a student anticipates that a scheduled examination will occur at a time at which his or her religious beliefs prohibit participation in

the examination, the student must submit to the instructor a statement describing the nature of the religious conflict and specifying the days and times of conflict.

For final examinations, the statement must be submitted no later than the end of the second week of instruction of the quarter.

For all other examinations, the statement must be submitted to the instructor as soon as possible after a particular examination date is scheduled.

If a conflict with the student's religious beliefs does exist, the instructor will attempt to provide an alternative, equitable examination that does not create undue hardship for the instructor or for the other students in the class.

Discrimination and harassment

The University of California, in accordance with applicable federal and state laws and university policies, does not discriminate on the basis of race, color, national origin, religion, sex, gender, gender identity, gender expression, pregnancy (including pregnancy, childbirth, and medical conditions related to pregnancy or childbirth), physical or mental disability, medical condition, genetic information, ancestry, marital status, age, sexual orientation, citizenship, or service in the uniformed services (including membership, application for membership, performance of service, application for service, or obligation for service in the uniformed services). The university also prohibits harassment based on these protected categories, including sexual harassment, as well as sexual assault, domestic violence, dating violence, and stalking. The nondiscrimination policy covers admission, access, and treatment in university programs and activities.

If students have questions about student-related nondiscrimination policies or concerns about possible discrimination or harassment, they should contact the Office for the Prevention of Harassment & Discrimination (OPHD) at (858) 534-8298, ophd@ucsd.edu, or reportbias.ucsd.edu.

Campus policies provide for a prompt and effective response to student complaints. This response may include alternative resolution procedures or formal investigation. Students will be informed about complaint resolution options.

A student who chooses not to report may still contact CARE at the Sexual Assault Resource Center for more information, emotional support, individual and group counseling, and/or assistance with obtaining a

medical exam. For off-campus support services, a student may contact the Center for Community Solutions. Other confidential resources on campus include Counseling and Psychological Services, Office of the Ombuds, and Student Health Services.

CARE at the Sexual Assault Resource Center
858.534.5793 | sarc@ucsd.edu | <https://care.ucsd.edu>

Counseling and Psychological Services (CAPS)
858.534.3755 | <https://caps.ucsd.edu>

Subject to Change Policy

The information contained in this course syllabus, other than the grade and absence policies, may be—under certain circumstances such as mutual agreement to enhance student learning—subject to change with reasonable advance notice.