BSCI2520: Biochemistry **MWF 1:25-2:15 pm** **Furman 114**

Instructors

Dr. Jared Nordman (modules 1-10)
Dates: Aug 24th – Oct 10th
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***Use BSCI2520 in subject line when emailing*
Phone: 875-8365

Dr. Cynthia J. Brame (modules 11-20)
Dates: Oct. 12th – Dec. 7th
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Phone: TBD

Office hours:
Monday 8:30-10am via Zoom
Wednesday 2:30-4pm
SC1120

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Monday 8:30-10 am via Zoom
Wednesday 2:30-4pm
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While we value in-person office hours, we will be flexible due to the pandemic.

Graduate teaching assistant

Cole Meier
cole.j.meier@vanderbilt.edu
Office hours: Thursdays at 3:30-4:30 (via Zoom)
Friday: 2:30-3:30 BioSci Building U6202

Course format

BSCI2520 will be held in person this semester and will include both asynchronous and synchronous components. For the asynchronous component, students will watch a series of pre-recorded videos ahead of class time. For the synchronous component, we will meet during the allotted class time for mini lectures, group-based work, exams and Q+A sessions.

Course description

BSCI2520 will provide a foundational knowledge of biochemistry that will help prepare students for careers in biological research, medicine, or related endeavors. The course covers chemical and physical properties of all classes of biological molecules and their assemblies. Higher order structures and functions of proteins, nucleic acids, carbohydrates, and lipids will be addressed, as well as an introduction to biological membranes, enzyme kinetics, and enzymatic mechanisms. The cellular energy generating pathways (glycolysis, citric acid cycle, electron transport and oxidative phosphorylation) and their physiological manifestations are covered in detail. The mechanisms and significance of degradation and synthesis of carbohydrates, fatty acids, and amino acids are also discussed in depth. The application of biochemistry to human disease and medical therapy will be illustrated with recent examples. The overall goal of this course is for students to learn universal characteristics of biologically catalyzed reactions, including specificity, speed, and capacity for regulation. This will be accomplished on multiple levels: single reactions, intracellular metabolic pathways, and organism physiology. Because biochemistry is inherently a synthetic discipline, BSCI2520 requires knowledge of college level organic chemistry and biology.

Required course materials

Hard copies and/or digital copies of *Fundamentals of Biochemistry* (5th edition) by Voet, Voet, & Pratt can be purchased at the Vanderbilt Bookstore.

Course webpage

2520 will be taught using a flipped-classroom approach. Our course Brightspace page (brightspace.vanderbilt.edu) contains the syllabus, pre-recorded lectures, recommended problems, important announcements and Q&A/discussions about lecture material. *Please post questions about course organization and course material on the Whole Class Q&A discussion board, which will allow all students to benefit from posted questions and answers.* Be sure to set your notifications within Brightspace to allow announcements to be emailed or texted to you so that you don't miss important announcements.

Office hours

Office hours will begin on the second week of the semester and will combine both in-person and Zoom formats. Students are encouraged to use office hours and the discussion board to address questions and problems. For questions and/or concerns that are not well-suited for this format, we are available upon email request.

Exams

Exam 1	September 14th
Exam 2	October 7th
Exam 3	November 7th
Exam 4 and Final	Saturday, December 10th at 3pm (THERE WILL BE NO ALTERNATE) Note: The first hour of the exam period will be spent on Exam 4, the second on the final exam

Grading (and re-grading)

Exams:

Each exam is worth 15% of the final grade. Each midterm exam will emphasize material covered since the previous exam. However, biochemistry is comprehensive in nature and exam questions may require knowledge of earlier material. The final exam is worth 15% of the final grade and is comprehensive, and will include material covered on Exams 1-4. ***In lieu of a formal missed exam policy, the lowest grade of these five exams (4 semester exams and 1 final) will be dropped.***

We strive to be fair and accurate in grading, but mistakes do occur. Before requesting a re-grade, you must first consult the answer key. If you believe an error has occurred, submit a re-grade request outlining the reason for the request through Gradescope. Re-grade requests must be through Gradescope by the specified date and time. No exceptions will be given. Re-grade request are meant only for errors in grading and the entire exam will be subject to regrading. ***All regrade requests must be submitted through Gradescope.***

Exam corrections:

For exams 1-3, we will have an 'exam correction' program. A class period following each exam, students will receive a subset of questions from the exam to re-take with peers. If the class average is below an 80%, exam corrections will be for actual points that will be added to the exam total. For each exam correction, we will determine the maximum number of points that can be earned for that exam 're-take'. While students will work together in small groups for exam corrections, each student must submit their own responses to exam correction questions through Brightspace. Exam scores can exceed 100%.

TopHat/Clicker questions:
10% of your final grade will be based on your responses to clicker questions through TopHat. You will not be graded on whether your answer is correct or incorrect, only on the number of questions you attempt to answer over the entire semester.
76-100% = 100% of possible points
50-75% = 66% of possible points
25-49% = 33% of possible points
0-24% = 0 pts

Graded homework:
There will be five graded homework assignments during the semester, which will account for 15% of your final grade. ***All homework assignments are due by 11:59pm on the indicated dates***. Late submissions will be accepted until 5 p.m. two days after the due date. At this point, answer keys for each assignment will be posted on Brightspace. Submissions after this point will only be considered under extreme and unexpected circumstances. While we encourage students to work collaboratively on graded homework problems, each student should write and submit their own final answers independently.

Quizzes:
There will be four graded quizzes during the semester, which will account for 15% of your final grade. Quizzes will be open for a 24-hour period (from 12:00 a.m. to 11:59 p.m. on the scheduled day) in Brightspace and can be taken at any point during this period. Quizzes are meant to ensure that students are keeping up with the material.

Grading transparency:
We have taken multiple steps to ensure a fair and accurate assessment of student's performance in this course. For example, we have intentionally added graded assessments to take the weight off of individual exams. ***For full transparency of grading, we will not use a curve to calculate final grades.*** As an alternative to curving, we have implemented exam corrections. The overall grading scheme for this section of 2520 is:

A	93-100	B-	80-82.9	D+	67-69.9
A-	90-92.9	C+	77-79.9	D	63-66.9
B+	87-89.9	C	73-76.9	D-	60-62.9
B	83-86.9	C-	70-72.9	F	<59.9

Weight of graded assignments

	Percent total	Total points
Exams (4)	60%	400
Quizzes (4)	15%	100
Homework (5)	15%	100
TopHat	10%	66
Total	100%	667

Inclusive learning environment

We are committed to creating and fostering a positive learning environment based on open communication, mutual respect, and inclusion. We strive to be respectful of differences in background and identity, and expect every member of this class to show respect for every other member.

Missing an exam

If a student needs to miss an exam, the exam score will be marked as a zero. Since you are allowed to drop your lowest exam grade, this score would be dropped in the final grade calculation. We do caution, however, that exams should only be missed in the most extreme circumstances as you are only allowed to drop one exam score.

Honor Code

The Vanderbilt Honor Code governs all hour exams, the final exam, and re-grade requests. No assistance may be given or received for any examination; more explicitly, students may not work with other individuals during exams. Any potential violations of the honor code will be reported to the Honor Council.

Recommendations for studying

Biochemistry is a structurally-driven, detail-rich discipline that can open up a new view of organismal function, but which requires careful study. The following is recommended for the greatest appreciation of this rich discipline:

1. **Regular, spaced, and focused study.** The cognitive science literature provides concrete evidence for a common-sense observation: We learn more effectively if we study at frequent, spaced intervals during which we pay careful attention to the question at hand. In other words, it's important to study every day. This observation is particularly relevant in a detail-rich discipline like biochemistry, where guiding principles emerge from an understanding of the details.

2. **Self-testing.** One of the most effective study tools in any discipline is self-testing, which can take the form of teaching the material to an empty classroom, using flashcards,

making up questions that could be on the exam, or answering the end-of-chapter questions.

3. **Careful attention to structures.** Molecular structure is at the heart of biochemistry. For each type of molecule that we consider, look carefully at it and consider why it exhibits the characteristics it does. How does each amino acid confer specific properties? Why are different cofactors used for decarboxylation of α- and β-keto acids? Why does AMP binding promote activity of phosphofructokinase? Why does hydrolysis of ATP have a significantly negative ΔG? These kinds of structurally-based questions will aid you throughout your study of biochemistry.

Graduate students

In addition to the above, graduate students will also complete two additional assignments to enrich their understanding of the biochemical mechanisms and pathways we discuss. These assignments are worth 16.7% of the final grade.

Students will submit two short *Nature* News & Views-style articles (~1,000 words with one figure) highlighting two key biochemical papers. The first article is due by **Friday, October 7th**, and the second is due on **Monday, December 12th**. This assignment will test students' ability to read and assess the scientific literature and allow students to improve their scientific writing. Detailed instructions are posted on Brightspace.

Weight of graded assignments (Graduate students)

	Percent total	Total points
Exams (4)	50%	400
Quizzes (4)	12.50%	100
Homework (5)	12.50%	100
TopHat	8.30%	66.6
News & Views (2)	16.70%	133.3
	100%	800

Course masking policy

We will be in compliance with Vanderbilt policy on masking throughout the semester. When masking is required by the university, students who are not wearing a mask during in-person sessions will be asked to leave. Repeated violations will be reported to the Dean's office.