Biochemistry II
BCHM 336
Spring 2021
Lecture hours: Tue, Thu 10:00 – 11:15 am online

Instructor: Dr. Cedric Owens
Office: Keck 226
Email: cpowens@chapman.edu

Office hours: Tue: 11:30 am-12:30 pm, Thu: 4-5 pm, Fri: 11:00 am-12:00 pm, and by appointment

Prerequisites: CHEM330

Required textbook:
David Nelson and Michael Cox, *Lehninger's Principles of Biochemistry*, 6th or 7th edition, Freeman and Company.

General description of the course:
This course discusses the principles of bioenergetics and metabolism. Students will learn key principles of thermodynamics and apply these principles to the study biological systems. Students will also learn about important metabolic pathways that make life possible. Furthermore, the course will examine regulation of metabolism and describe, at a chemical and molecular level, the processes that underlie each metabolic pathway.

Instructional format:
Most of the class is conducted in a lecture format with in class exercises in critical thinking. Reading assignments will be posted for every chapter covered. As part of the writing component of the course, students will read, critique and summarize scientific literature.

Make-up policy:
Students are expected to attend all classes. Exams and assignments can be made-up only with prior consent of the instructor. All make-ups must be completed before the tests are handed back to the class. Work handed in late will be marked down 20% per day they are turned in late.

Major fields of study:
1. *Principles of Bioenergetics:* Overview of thermodynamics as it applies to biochemical reactions, free energy, biological redox chemistry.
2. *Metabolic pathways:* Glycolysis, Krebs cycle, fatty acid catabolism, photosynthesis, and others.
3. *Biosynthetic pathways:* Biosynthesis of biomolecules such as carbohydrates, nucleotides and amino acids.

Learning objectives:
1. Learn the principles of bioenergetics, including key concepts such as the Gibbs free energy, reaction enthalpy and entropy, equilibrium, free energy in electron transport, and the role of ATP.
2. Learn key metabolic and biosynthetic pathways, how the pathways are regulated and connected to each other.
3. Apply knowledge gained in organic chemistry and BCHM 335 to understand the reactions described in this course.

4. Learn about methods used for studying biochemical pathways.
5. Improve problem solving and independent thinking ability
6. Become familiar with accessing, reviewing and evaluating scientific information.
7. Improve the ability to communicate work though written and oral communication.

Program Learning Outcomes:
In addition to the above learning outcomes, BCHM 336 support the program learning outcomes for the B.Sc. in Biochemistry and Molecular Biology:
1. Students will be able to apply the scientific method to solve problems
2. Students will communicate effectively to the science community.
3. Students will be able to apply critical thinking and analytical skills to design and execute a scientific experiment, thoroughly analyze the results, and arrive at well-reasoned scientific conclusions.
4. Students will be able to demonstrate an understanding of core knowledge in biochemistry

Tentative course schedule:

Week	**Topic**	**Chapter**
1 (1/31 – 2/06)	Bioenergetics	13
2 (2/07 – 2/13)	Bioenergetics, Regulation of metabolism part 1	13, 23
3 (2/14 – 2/20)	Glycolysis and gluconeogenesis	14
4 (2/21 – 2/27)	Glycolysis and gluconeogenesis, Metabolic regulation	14, 15 Journal club 1 due: Tue, 2/23
5 2/28 – 3/06)	Metabolic regulation	15
6 (3/07 – 3/13)	Citric acid cycle	15, 16 Exam 1, Thu 3/11
7 (3/14 – 3/20)	Citric acid cycle	16
8 (3/21 – 3/27)	Spring break	
9 (3/28 – 4/03)	Oxidative phosphorylation, electron transport chain, photosynthesis	19
10 (4/04 – 4/10)	Oxidative phosphorylation, electron transport chain, photosynthesis, Fatty acid catabolism	19, 17
11 (4/11 – 4/17)	Fatty acid catabolism, Amino acid oxidation, urea cycle	17, 18 Exam 2: Thu, 4/15
12 (4/18 – 4/24)	Amino acid oxidation, urea cycle, Carbohydrate biosynthesis	18, 20

13 (4/25 – 5/01)	Carbohydrate biosynthesis, Lipid biosynthesis	20, 21 Journal club 2 due: Tue, 4/27
14 (5/02 – 5/08)	Lipid biosynthesis, Biosynthesis on amino and nucleic acids	21, 22
15 (5/09 – 5/15)	Regulation of metabolism part 2	23
16 (5/16 – 5/22)	Finals week	Final exam: Thu, 5/20 8:00 - 10:30 am

Assessment policy and grading:

Total points: 1000

Midterm 1:	20% (200 pts)
Midterm 2:	20% (200 pts)
Final exam:	25% (250 pts)
Journal club 1:	15% (150 pts)
Journal club 2 (or Perspective):	15% (150 pts)
Quizzes:	2.5% (25 pts)
Participation:	2.5% (25 pts)

There will be 3 exams, 2 midterms and 1 final. Each exam will cover new material only, however, the final will have a bonus problem section that is cumulative. Each exam will consist of multiple choice, fill in the blank, short answer, and calculations.

The Journal Club consists of a guided critical analysis of a research paper. You will answer questions regarding the paper's contents and provide both critiques and suggestions for further research.

In the "Perspective" you will write a short article in the style of a Science "Perspective". In this article, you will highlight a recently published scientific paper. The Perspective will consist of background on the work's importance, a summary of the scientific paper and a perspective on future research. More information on Journal Clubs and "Perspective" will be provided in class.

Each quiz will consist of a short 5-10 min in-class examination containing a few fill in the blank, multiple choice or short answer questions. There will be 5 quizzes.

Participation will be assessed based on in-class participation, in-class behavior and attendance.

Grading scheme:
934-1000= A; 900-933= A-; 867-899= B+; 834-866= B; 800-833=B-; 767-799=C+; 734-766=C; 700-733=C-; 667-699- D+; 634-666=D; 600-633=D-; 599 and below= F.

Class management system:
Important announcements and resources will be posted on Blackboard. Please make sure you are enrolled and can view this class at blackboard.chapman.edu.

Academic honesty:
Chapman University is a community of scholars which emphasizes the mutual responsibility of all members to seek knowledge honestly and in good faith. Students are responsible for doing their own work, and academic dishonesty of any kind will subject to sanction by the instructor and referral to the university Integrity committee which may impose additional sanctions including expulsion. Cheating on exams or plagiarism will result in a zero (no credit) for that assignment or exam. Please see the full description of Chapman University's policy on Academic Integrity at www.chapman.edu/academics/academicintegrity/index.aspx.

Accessibility:
In compliance with ADA guidelines, students who have any condition, either permanent or temporary, that might affect their ability to perform in this class are encouraged to contact the Disability Services Office. If you will need to utilize your approved accommodations in this class, please follow the proper notification procedure for informing your professor(s). This notification process must occur more than a week before any accommodation can be utilized. Please contact Disability Services at (714) 516–4520 or visit www.chapman.edu/students/student-health-services/disability-services if you have questions regarding this procedure or for information or to make an appointment to discuss and/or request potential accommodations based on documentation of your disability. Once formal approval of your need for an accommodation has been granted, you are encouraged to talk with your professor(s) about your accommodation options. The granting of any accommodation will not be retroactive and cannot jeopardize the academic standards or integrity of the course.
Equity and diversity
Chapman University is committed to ensuring equality and valuing diversity. Students and professors are reminded to show respect at all times as outlined in Chapman's Harassment and Discrimination Policy. Please see the full description of this policy at http://www.chapman.edu/faculty-staff/human-resources/eoo.aspx.
Any violations of this policy should be discussed with the professor, the dean of students and/or otherwise reported in accordance with this policy.

Student support:
Over the course of the semester, you may experience a range of challenges that interfere with your learning, such as problems with friend, family, and or significant other relationships; substance use; concerns about personal adequacy; feeling overwhelmed; or feeling sad or anxious without knowing why. These mental health concerns or stressful events may diminish your academic performance and/or reduce your ability to participate in daily activities. You can learn more about the resources available through Chapman University's Student Psychological Counseling Services here: https://www.chapman.edu/students/health-and-safety/psychological-counseling/

Fostering a community of care that supports the success of students is essential to the values of Chapman University. Occasionally, you may come across a student whose personal behavior concerns or worries you, either for the student's well-being or yours. In these instances, you are encouraged to contact the Chapman University Student Concern Intervention Team who can respond to these concerns and offer assistance: https://www.chapman.edu/students/health-and-safety/student-concern/index.aspx

While it is preferred that you include your contact information so this team can follow up with you, you can submit a report anonymously. 24-hour emergency help is also available through Public Safety at 714-997-6763.

Spring 2021 COVID-related information

In this class, software will be used to record live class discussions. As a student in this class, your participation in live class discussions will be recorded to assist those who cannot attend the live session, or to serve as a resource for those who would like to review content that was presented. These recordings will be made available only to students who are enrolled in the class, and only during the period in which the course is offered. All recordings will become unavailable to students in the class shortly after the course ends. Students who prefer to participate via audio only will be allowed to disable their video camera so only audio will be captured. Please discuss this option with your instructor.

In response to the current COVID-19 pandemic, Chapman University has developed the CU Safely Back program (CUSBP) and mandatory safety measures (https://news.chapman.edu/coronavirus/). The University's mandatory safety measures may be stricter than local, state or federal guidelines and may be subject to change at any time. Students are expected to adhere to the University's safety measures while attending classes, including when entering and exiting classrooms, laboratories, or other instructional areas. Individual faculty may choose to have requirements for their courses that are stricter than the University's. Safety precautions and procedures may change in response to emerging findings and the recommendations of scientific experts and authorities. Refusal to abide by the University's mandatory safety measures or to the safety requirements specific to this course will result in your being asked to leave the area immediately, and may result in an administrative dismissal from this course.

The COVID-19 pandemic requires all of us to accept the possibility that changes in how this course is taught may be required and that some changes may occur with little or no notice. For example, some or all of the in-person aspects of a course may be shifted to remote instruction. If this occurs, you will be given clear instructions as to how to proceed. The uncertainty of the situation is not ideal for any of us. We must all try to approach this situation with good-will, flexibility, and mutual understanding.