

BCH 5045 GRADUATE SURVEY OF BIOCHEMISTRY SPRING 2025 COURSE SYLLABUS

Course Description

BCH 5045 – Credits 4; Prerequisite: Organic Chemistry or consent of the instructor.

This course provides an introduction to general biochemistry for graduate students in the Life and Agricultural Sciences that have not previously taken a biochemistry course before, and/or for those that would like a refresher course before going on to more advanced biochemistry courses. The chemical properties of low molecular weight biochemical molecules, macromolecules and supramolecular complexes essential for life are discussed in addition to basic reaction mechanisms and the integration and regulation of biochemical processes. Relevance to everyday life is used to place into context the central role that biochemistry has come to play in everyday life in the 21st century. There is limited discussion for a few major biochemical techniques.

Online Sections

Gainesville Campus Online (#25DC), Statewide (#2544). RECs: Balm (#2548), Fort Lauderdale (#2549), Milton (#255A), Apopka (#255D), Homestead (#255H), Quincy (#26A1).

Instructor

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Office Hours

I am in my office most days. While I don't set aside dedicated office hours, I am readily available to make appointments. To arrange an appointment email at the address listed above.

If you should need to speak to me face to face but cannot come to my office, I am happy to arrange a videoconference with you using Zoom or another videoconferencing platform.

Course Website

<https://lss.at.ufl.edu/>

The above web address directs you to the login page of the e-Learning CANVAS website, which houses the course. You will need to enter your GatorLink ID and password to gain access to the course using CANVAS.

Required eText

Lehninger Principles of Biochemistry 7th Ed.

By David L. Nelson and Michael M. Cox

ISBN-10: 1464126119

ISBN-13: 978-1464126116

To Purchase Textbook

Recommended to find a used textbook of PDF version from any trusted retailer.

Course Goal

The course is intended to meet the needs of students wishing to gain an appreciation of biochemistry through the survey of basic biochemical principles and metabolic pathways common to prokaryotes, plants, and animals. The overarching aim of this course is to provide a foundational level in understanding of the biochemical mechanisms of cell function. The goal is to enhance one's knowledge and to benefit the student's future endeavors within all areas of the life sciences, and in their day-to-day personal lives as well.

General Course Objectives and Learning Outcomes

At the completion of the course, students should be able to:

- Be able to outline the concepts of the major types of biochemical molecules including small, large, and supramolecular components found in cells
- Recognize the different types of biochemical molecules and know their essential chemical characteristics
- Explain basic energy metabolism of cells - where does ATP, NADH and NADPH come from?
- Tell the structure of DNA and RNA and why these molecules have different roles in the storage and decoding of the information of heredity and cell function
- Explain fundamental processes in the regulation of gene expression
- Identify examples of common reaction mechanisms in biochemical processes
- Describe how enzymes work and calculate basic enzyme kinetics
- Describe the central and essential importance of water as a polar solvent in biological chemistry
- Explain the importance of biochemistry for everyday life in the 21st century
- Explain the foundational role of biochemistry in the practice of medicine and biomedical research
- Assess the potential of basic science advances in biochemistry in the development of “translational applications” leading to new therapies and treatments in the fight against diseases, genetic maladies, pathogens, and chronic health conditions
- Assess the potential of basic science advances in biochemistry in the development of “translational applications” leading to new biotechnological advances in agriculture and bioenergy systems that increase food production, enhance the quality of life and help reduce environmental impacts.

Course Expectations

- Review the slide sets prior to viewing the lectures
- Keep current each week in studying the content of lectures and slide sets
- Prepare for weekly quizzes and major exams

- Complete the quizzes, exams, and projects as scheduled
- Contribute regularly to the Discussion Boards at the course e-Learning CANVAS website
- Participate in the online Q&A Chat Sessions prior to the major exams
- Maintain the highest ethical standards of academic honesty
- Try to make biochem fun and interesting
- Every student enrolled in BCH 5045 is expected to complete the online student course evaluation near the end of the course. This is a real expectation.

The course and instructor evaluation can be accessed at: <https://evaluations.ufl.edu>.

Course Organization

The course is based on streaming video of recorded lectures. All information contained in the lectures, slide sets, and textbook will be fair game for exams unless stated otherwise. The pace of the lectures will be swift, covering material from parts of most of the chapters in the text. Lecture slide sets and lecture streaming videos, based largely on the text, will be posted on the course website and made available each week. You should review the slide set before viewing the lectures. Please be prepared to ask questions and make insightful comments about the assigned material throughout the duration of the course using the Discussion Boards feature of the CANVAS e-Learning course website at: <https://lss.at.ufl.edu/>. You can always email me if you have a question at any time during the week. As time permits, I will expand and embellish on the slide sets.

Each week will have either a quiz or an exam due. Every third week a project is due. It is the student's responsibility to stay on top of due dates. Discussion Post points will be calculated every 5th week and it is the student's responsibility to stay on top of these posts.

This semester there has been one new policy for students and that is an in person component. I will be flexible with this requirement and deal with this on an individual basis.

As your instructor, I will strive to make this course as relevant to both the professional and personal needs of all the members of the class. Lectures will be based on PowerPoint presentations using imagery from the required text and other appropriate sources.

Evaluation and Grading

Course grades will be based on 1000 points.

Task	Points
Intro and Exit (Completion based)	20
Exam 1	100
Exam 2	100
Comprehensive Final	150
Quizzes 7 pts each (12 total, drop two)	70
Project 1	60
Project 2	100
Project 3	100
Project 4	150
Participation	150
Total Points	1000

Intro and Exit: This include 5 points for doing a completion based pre-test, 5 points for a completion based syllabus quiz , and 10 points completion based post-test.

Exams: Will be open notebook, timed, and completed online. All exams will be cumulative with an emphasis on topics covered during the respective periods. Exams will be allowed to be taken during a three day period, but once open will be timed. Three hours will be allowed for Exam 1 and 2. Four hours will be allowed for the Comprehensive Final (exam 3).

Quizzes: There are 12 quizzes. Each quiz is worth 7 points. The lowest two quizzes are dropped. The quizzes are intended to be treated as practice for exams, think of them more as homework assignments. Each quiz will be open up at Friday 12:05AM of the week assigned and be closed Sunday at 11:55PM. The assignments are not timed, and you may open and close the quiz as many times as you wish during the three day period. However, once the quiz is submitted it can not be changed and you only get one attempt at each quiz. Feel, free to use the textbook and other resources to complete the assignment.

Projects: Will be explained in further details during the semester. Projects will be due by 11:55PM on the due date listed in the schedule.

Participation: Participation in the Discussion Boards is a course requirement. There are two deadlines within each week. The first is due 11:55 PM Wednesday of that week. This first post is a quality response to the prompt by Dr. Colquhoun. The second post needs to be completed starting Thursday at 12:05AM and is due Sunday 11:55PM. The second post can be a variety of things: 1) A quality question about content from this week. 2) Something relevant to this week such as a scientific article with your comments, a good YouTube video with your comments, etc. 3) A response to at least one other post. Responses do not need to be exceedingly long but does need to be of substance. You can answer a question, respond with your thoughts, link to some

useful content, etc. The first post is worth 7 participation points, the second post (response post) is worth 3.

Extra Credit: There may be a few opportunities throughout the semester to earn extra credit. Additionally, if you come across a really cool game or software tool that helps one learn or use biochemistry, submission of that to the instructor and/or discussion boards could potentially earn you extra credit points. Similarly, if you use or discover a really good website that has tools that biochemistry researchers (molecular biology, genomics, proteomics, metabolomics or any other omics, computational biochemistry, physical and structural biochemistry, molecule or structural viewer) use that could earn extra credit points. Dr. Colquhoun will be the sole arbitrator as to whether submission warrants the extra points or not.

Make Up Quizzes and Exams: During the course of the semester, I know from experience that “real life” happens over the period of course. For some members of the class, there will be circumstances that are not in their control which will lead to a missed quiz or exam. Missed quizzes and exams will count as a zero unless an arrangement to take a make-up is made PRIOR to the test date, or until you have discussed with me the reason for missing a quiz or exam. Make-up quizzes or exams will be arranged on an individual basis at the discretion of the instructor.

If you know in advance you are going to be out of town, at a professional meeting, or engaged in another activity that prevents you from properly preparing or taking a quiz or exam, please let me know **in advance** so that we can make alternative arrangements for you. One final word on this topic, I don’t want your grade in the course to reflect a legitimate reason for an unrepresentative performance on a quiz or exam. If you get sick, have an accident or other events that prevent you from performing at your best, contact me and we can make an arrangement that will let you be at your best during a quiz or exam.

Grading Scale	Percentages	Grade	Grade Point Equivalent
940 and above	>94	A	4.00
900-939	90-93	A-	3.67
840-899	84-89	B+	3.33
790-839	79-83	B	3.00
740-789	74-78	B-	2.67
690-739	69-73	C+	2.33
600-689	60-68	C	2.00
500-599	50-59	C-	1.67
400-499	40-49	D+	1.33
300-399	30-39	D	1.00
200-299	20-29	D-	0.67
199 and below	<20	E	0.00

Grades will be rounded to the nearest whole percentage point.

Please refer to the UF policy on Grading and Grades

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

Course Schedule

Semester begins January 8, 2024; Final Exam April 29 to May 3, 2024.

A more extensive schedule with dates for quizzes, exams and projects can be found on the course website.

Module	Week	Lectures	Week Topics	Chapters	Quiz or Exam	Other
1	1	1-4	Cells, organic compounds, thermodynamics	1	Quiz 1 (Lectures 1-4)	
	2	5-8	Water, pH, and air	2	Quiz 2 (Lectures 5-8)	<i>Project 1 Assigned</i>
	3	9-12	DNA-RNA	8	Quiz 3 (Lectures 9-12)	
	4	13-16	Genome	24	Quiz 4 (Lectures 13-16)	Project 1
	5	17-20	DNA Replication	25	Quiz 5 (Lectures 17-20)	Participation 1
	6	21-24	Amino Acids	3 & 4	Exam 1 (Week 1-5)	<i>Project 2 Assigned</i>
2	7	25-28	Protein Structure	4 & 5	Quiz 6 (Lectures 25-28)	
	8	29-32	Enzymes and Ligand Binding	6	Quiz 7 (Lectures 29-32)	Project 2
	9	33-36	Transcription	26 & 28	Quiz 8 (Lectures 33-36)	
	10	None	None		None	<i>Spring Break</i>
	11	37-40	Translation	27	Quiz 9 (Lectures 37-40)	Participation 2
	12	41-44	Primary metabolic pathways	14	Exam 2 (Week 6-11)	
3	13	45-48	Metabolic regulation	15	Quiz 10 (Lectures 45-48)	Project 3
	14	49-52	Lipids	10	Quiz 11 (Lectures 49-52)	<i>Project 4 Assigned</i>
	15	53-56	Membranes and transport	11	Quiz 12 (Lectures 53-56)	
	16	57-60	Applications of biochemistry		Comprehensive Final	Project

International Students

All international students will need to complete an International Student Activity Report because the course is greater than 3 credits online. More information will be given as an announcement.

Course Computer and Internet Access Requirements

The following minimum hardware configuration is recommended: Sample Configuration for Windows. If you want to buy a computer with Windows, confirm that your college and degree program will support the operating system.

Suggested Hardware Recommendation:

- Intel Core 2 Duo, or I series processor
- 4GB of RAM or more
- 256 Gigabyte Hard Drive or larger
- DVD-R/RW Drive
- USB ports (at least 2)
- 1366 x 768 or higher resolution monitor
- Video card and sound card
- Speakers or headphones
- Webcam
- Printer
- Wi-Fi wireless networking on laptops
- Network (Ethernet) Adapter Card for Broadband -- 100mbit or 1Gbit
- Broadband connection to the Internet and related equipment (generally supplied by the service provider). Cable or DSL highly recommended.

All students should have dedicated access to a computer using a modern operating system such as Windows 7 or Mac OS X. Students should make sure to have access to a back-up computer (work, friend or relative's computer) in case of equipment failure. A high-speed Internet connection is highly essential for accessing the lecture videos. Some wireless connections may also be problematic. Your hardware should include speakers, microphone, or headphones for the presentations. A webcam is not necessary, but could be helpful for videoconferencing over the Internet

Software Requirements

This software is available at no cost (the one exception is the MS Office suite, however there is a free alternative). Many technical problems you might encounter can be resolved by installing the latest version of the following software.

1. Firefox Web Browser – In order to simplify compatibility issues, we ask all students to access their courses using Firefox (Chrome, Internet Explorer or Safari have limited functionality)
2. Adobe Flash Player – Many courses include A/V presentations which require the Flash Player. Some of the videos useful for BCH 5045 may require the Flash Player. <https://get.adobe.com/flashplayer/>
3. Adobe Reader – Many courses include .pdf documents which require Adobe Reader. <http://www.adobe.com/support/downloads/product.jsp?platform=windows&product=10>

4. Java Runtime Environment – Many courses incorporate content which requires JRE. <http://www.oracle.com/technetwork/java/javase/downloads/index.html>

Windows-based computers are the dominant choice in most University of Florida academic programs. Students considering purchasing other platforms, such as a Mac, should carefully examine the requirements and recommendations of their academic programs.

University of Florida Honor Code

The University of Florida Honor Code was recently revised (3/16/2010) and may be found in the Regulations of the University of Florida under section 6C1-4.041

Preamble: In adopting this Honor Code, the students of the University of Florida recognize that academic honesty and integrity are fundamental values of the University community. Students who enroll at the University commit to holding themselves and their peers to the high standard of honor required by the Honor Code. Any individual who becomes aware of a violation of the Honor Code is bound by honor to take corrective action. Student and faculty support are crucial to the success of the Honor Code. The quality of a University of Florida education is dependent upon the community acceptance and enforcement of the Honor Code.

The Honor Pledge:

"We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity by abiding by the Honor Code."

On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "on my honor, I have neither given nor received unauthorized aid in doing this assignment."

REMINDER: YOU HAVE SIGNED THE FOLLOWING STATEMENT

"I understand that the University of Florida expects its students to be honest in all their academic work. I agree to adhere to this commitment to academic honesty and understand that my failure to comply with this commitment may result in disciplinary action up to and including expulsion from the University."

Software Use

The principles for using and managing software derive from U.S. copyright law, the Florida Computer Crimes Act, and legal agreements in the form of licenses and purchase agreements. That foundation makes the basic policy governing software clear: all faculty, staff, and students of the University of Florida are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate.

Distance Education Courses

Each online distance learning program has a process for, and will make every attempt to resolve, student complaints within its academic and administrative departments at the program level. See <http://distance.ufl.edu/student-complaints> for more details.

University of Florida Counseling Services

If during the course of the semester you experience a personal crisis, help is available through the Counseling and Wellness Center is located at 3190 Radio Rd. The phone number is 352.392.1575.

If you or someone you know is experiencing a crisis: the Counseling and Wellness Center (CWC) is available to help. Students presenting in emergency circumstances during office hours will be seen by Center staff to provide timely assistance. CWC counselors also provide consultation to faculty and staff working in crisis situations where student well-being in a classroom or other university setting is of concern.

Access to Emergency Services

Radio Road Site: Students can walk-in to the CWC Radio Road site located at 3190 Radio Road (just west of the Lakeside Residence Hall complex) Students, faculty and staff can contact the CWC by calling 352-392-1576

Peabody Hall Site: Students may also be brought by faculty and staff to the CWC Crisis and Emergency Resource Center located on the 4th floor of Peabody Hall [adjacent to Criser Hall]. Faculty and Staff may contact the CERC by calling 352-392-1576.

Hours of Operation:

Radio Road – The CWC at 3190 Radio Road is open from 8-5 Monday through Friday. We have some limited appointments available from 5-7 Monday through Wednesday. Your initial appointment needs to be scheduled during regular office hours. You may talk to your counselor about availability after 5 pm. Peabody Hall Crisis and Emergency Resource Center: Office hours are Monday through Friday 8:00 a.m. – 5:00 p.m.

Evening and Weekend Resources

For urgent concerns occurring after business hours or on the weekend, phone consultation services are available by calling: the Counseling and Wellness Center at (352) 392-1575 or the Alachua County Crisis Center (352) 264-6789.

If immediate safety is a concern, call 911

More information is available on the web at: <http://www.counseling.ufl.edu/cwc/default.aspx>
Evening and Weekend Resources – for emergencies occurring in the evening or on the weekend, crisis-counseling services are available through the Alachua County Crisis Center by calling 264-6789. Students may also call the clinician on-call at Student Mental Health for phone call back and consultation at 392-1171.

Students with Disabilities Act

Section 504 of the Rehabilitation Act of 1973 and Title II of the Americans with Disabilities Act of 1990 are the primary pieces of legislation that affect postsecondary institutions and students with disabilities.

The Rehabilitation Act of 1973 was designed to empower individuals with disabilities to gain employment, economic self-sufficiency, independence, inclusion and integration into society. Section 504 of the Rehabilitation Act of 1973 was designed to ensure that any program or activity

receiving federal assistance did not discriminate on the basis of disability for “otherwise qualified” individuals. No “otherwise qualified” individuals, solely by reason of their disabilities can “be denied the benefits of, be excluded from participation in, or be subjected to discrimination” in these programs.

Reasonable accommodations are established by the Disability Resource Center (DRC). Students with disabilities are issued accommodation letters which specify their accommodations and are responsible for providing the letters to their faculty members. Upon receipt of the accommodation letter, a faculty member is responsible for reviewing the information in the letter and providing the requested accommodations. If there are any questions or concerns about the information contained in the letter, a faculty member should immediately contact the Disability Resource Center. Unless the DRC is contacted, it can only be assumed that there are no questions or concerns with any particular student's accommodation package. Most classroom accommodations are easy to arrange and will not take much time to administer. If, however, assistance is needed, please contact the DRC. The Disability Resource Center attempts to make the accommodation process as efficient and effective as possible for everyone involved.

For more information on student services please call 352.392.8565, or visit office 0001 Reid Hall, or the webpage at: www.dso.ufl.edu/drc/

Edited: December 2024