

CHEM T-550 Introductory Biochemistry (3 cr.)

100% online course
Full Semester - Summer 2022
6/6/2022-7/30/2022
Indiana University

Instructor Contact Information

Name: **Dr. Hitesh Kathuria**

Office: Indiana University East, School of Natural Science and Mathematics, WZ 254, 2325 Chester Blvd, Richmond, IN – 47374.

Phone: 765-973-8247 If I do not pick up the phone, please leave a voice mail. I will receive it through my e-mail and will get back to you as soon as possible.

Email: hikathur@indiana.edu

Communication Policy

You may send me a message through Canvas (my preferred mode of communication). I have multiple roles within the university and receiving messages through Canvas helps me stay organized. I will get back to you within 24-48 hours (excluding weekends and holidays when it might take longer to respond).

Office Hours

Typically, Monday mornings between 10:00-11:00 am is when I will be available via Zoom for office hours upon request via Canvas messages. Additional online video or web conferences can be arranged by appointment at a time convenient to students and instructor.

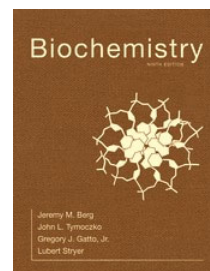
Q & A Forum

A question-and-answer (Q & A) forum has been set up in the Discussions tab on Canvas. Use this forum to post questions related to course setup or course content. I will provide answers to your questions on the forum within the week. If you have a question that you need a response to within 24-48 hours, please use Canvas messages. Students should feel free to respond to each other on the Q&A forum, especially if you know the answer to the question. Please do not post anything personal on this forum.

Required Materials: Textbook

Berg, Tymoczko, and Stryer, Biochemistry (9th Edition), 2019

- Print ISBN – 9781319114671
- eText version of the book is available to all students on Canvas.



Course Description and Structure

Protein composition and structure, Enzyme kinetics, catalytic and regulatory strategies, Carbohydrates, Nucleic acids, Lipids and cell membranes, Transducing and storing energy - metabolic cycles, Responding to environmental changes.

Website:

Lecture videos, quizzes and forum topics are available [on Canvas within weekly modules](#).

Students are responsible for printing/downloading their own lecture handouts and assignment instructions (if needed). Every effort will be made to post the lecture notes and assignments in a timely fashion.

Prerequisites & Necessary Skills:

This course is designed for existing dual-credit high school teachers who are seeking graduate credit to meet Higher Learning Commission standards. Students who want to become high school or community college instructors are also welcome to take this class. However, this class does not meet requirement for graduate schools like medical, dental, pharmacy, physician's assistant, etc. schools. If you need an online biochemistry class that meets graduate school requirement (as mentioned above) please consider enrolling in CHEM-C484 Biomolecules and Catabolism at IU East every fall semester.

Before taking this class please make sure you have taken two semesters of organic chemistry as an undergraduate student.

Required Computer & Digital Literacy Skills:

- Comfort using Canvas, sending email with attachments, downloading and installing software, and using video conferencing tools like Zoom.
- Proficiency using Microsoft Office programs like Word, PowerPoint, and Excel.
- Using online libraries and databases to locate and gather appropriate information.
- Using online search tools for specific academic purposes, including the ability to use search criteria, keywords, and filters.
- Properly citing information sources.
- Preparing a presentation of research findings.

Overview of Assignments

Modules:

The weekly modules in the Modules tab of Canvas contain an overview or information about weekly tasks including video lectures that are embedded within the module information. Also included is information about and links for quizzes, forums and/or other assignments with the due dates of each assignment. The modules will be made available to you as and when they are ready, but the schedule is made to end each module on a Monday.

Quick Checks:

Each video lecture within a module has a Quick Check associated with it. It includes one or more questions that are based on the content discussed in the video. There is no deadline for the quick checks, but the scores are added to the grade book on a weekly basis. Try to complete them by the end of the module.

Quizzes:

There will be a quiz posted on Canvas at the end of each chapter. **Each quiz is due at 9:00 am on the Monday** when the module is scheduled to end unless an alternate deadline is explicitly stated. Points will be deducted for late submissions (20% points deducted per day after the quiz is due). There will be no make-up quizzes. Under a limited set of circumstances, you may make arrangements to take a quiz early. Such arrangements will be granted only in case of genuine and documented emergencies. The quizzes will be available to you to study once the deadline has passed.

Forums or Discussions:

There will be weekly forums on topics related to the content. These research paper based forums are available in the Discussions tab of Canvas. Instructions are provided within each forum along with the rubric for grading it. Apart from the forum post, you also have to comment on other posts by your classmates. Please note that points will be deducted for late submissions (20% per day). Plan to post and comment before the deadline.

Exams:

There will one final exam between **Monday, July 25, 2022, 9 am EST – Friday, July 29, 2022, 5 pm EST**. The final exam is not cumulative and is based on a research paper. There will be no make-up quizzes or exam. Under a limited set of circumstances, you may make arrangements to take the final exam early (with proper documentation, subject to instructor discretion).

Tentative Schedule of Lectures:

The following schedule should be considered as an outline. Each module will cover one chapter. While assignment dates will not change, we may move through material more quickly or slowly than is indicated here. Changes will be announced on Canvas.

Module No.	Subject Reading	Module Open Date
1	Introduction to Biochemistry Ch. 1	Monday, June 6, 2022
2	Carbohydrates Ch. 11	Monday, June 6, 2022
3	Lipids and Cell Membranes Ch. 12	Monday, June 13, 2022
4	Protein Composition and Structure Ch. 2	Monday, June 13, 2022
5	Hemoglobin Ch. 7	Monday, June 20, 2022
6	Enzymes and Enzyme Kinetics Ch. 8	Monday, June 20, 2022
7	Catalytic Strategies Ch. 9	Monday, June 27, 2022
8	Regulatory Strategies Ch. 10	Monday, June 27, 2022
9	Glycolysis and Gluconeogenesis Ch. 16	Monday, July 4, 2022
10	Citric Acid Cycle Ch. 17	Monday, July 4, 2022
11	Oxidative Phosphorylation Ch. 18	Monday, July 11, 2022
12	Membrane Channels and Pumps Ch. 13	Monday, July 11, 2022
13	Sensory Systems Ch. 33	Monday, July 18, 2022
14	Molecular Motors Ch. 35	Monday, July 18, 2022

Forums/Discussion topics:

- Forum 1 - The Human Microbiome Project (Monday, June 5 – Monday, June 13, 9:00 am EST)
- Forum 2 - Diabetes and Diet (Monday, June 13 – Monday, June 20, 9:00 am EST)
- Forum 3 - Sickle Cell Anemia and Malaria (Monday, June 20 – Monday, June 27, 9:00 am EST)
- Forum 4 - Biotechnological Applications of Enzymes (Monday, June 27 – Monday, July 4, 9:00 am EST)
- Forum 5 - Alcohol Metabolism and the Effect of Alcohol on Human Health (Monday, July 4 – Monday, July 11, 9:00 am EST)

- No forum session between July 11 – July 18
- Forum 6 – Sensory Systems (Monday, July 18 – Monday, July 25, 9:00 am)

Course Grades

Course grades will be based on assignments (quick checks following each video lecture, quizzes, forums and the exam) as outlined in the table below. All your quizzes and forums that will be given during the semester will count towards your final score. Grades will be posted in Canvas within seven days of the due date. Since Canvas keeps track of all of your grades, you should always be able to calculate your current grade in the course. If you need assistance, please contact me.

The instructor does not grade on a curve. Final letter grades will be assigned on the basis of the following definitions: **(A)** An A student not only understands the material well but can apply it creatively to new situations: 90-100%. **(B)** A B student has a good, solid understanding of the material but has trouble applying that knowledge to new situations: 80-89%. **(C)** A C student has major gaps in understanding: 70-79%. Still larger gaps lead to a **D**: 60-69% or **F**: less than 60%, in the course. Point totals for the course will be available on Canvas.

Category	Percentage (%)
Quick Check	5
Weekly Quizzes	35
Research Paper Based Final Exam	10
Forums/Discussions	50
Total	100

Learning Outcomes

Students graduating from master's degree programs at IU East are expected to:

1. Demonstrate mastery of the knowledge and skills expected for the degree and for professionalism and success in the field.
2. Think critically and creatively to evaluate literature, solve problems, and improve practice in their field of study, applying sound judgment in professional and personal situations through an understanding and expression of a wide range of perspectives.
3. Communicate high level information effectively from their field of study to their peers, their clientele, and the general public.
4. Understand and abide by the ethical standards established for their discipline and/or profession.
5. Demonstrate the ability to conduct original research, scholarly project, or creative activity appropriate to the discipline.

After completing this course, students will be able to:

1. CLO 1 - Discuss how structure of biomolecules determines their overall biological function.
2. CLO 2 - Explain how various cellular factors impact the mechanisms that regulate metabolic pathways.
3. CLO 3 - Analyze and describe the biochemical principles that effect humans.
4. CLO 4 - Analyze, evaluate and discuss the contributions of biochemistry to society.
5. CLO 5 - Critically evaluate current research and communicate an understanding of the scientific literature in biochemistry.

Course Learning Outcome (CLO)	Chapter	Activity
1. CLO 1 - Discuss how structure of biomolecules determines their overall biological function.	Carbohydrates Ch. 11 Lipids and Cell Membranes Ch. 12 Protein Composition and Structure Ch. 2 Hemoglobin Ch. 7 Carbohydrates Ch. 11 Lipids and Cell Membranes Ch. 12	Quiz, Forum, Quick Check
2. CLO 2 - Explain how various cellular factors impact the mechanisms that regulate metabolic pathways.	Glycolysis and Gluconeogenesis Ch. 16 Citric Acid Cycle Ch. 17 Oxidative Phosphorylation Ch. 18 Enzymes and Enzyme Kinetics Ch. 8 Catalytic Strategies Ch. 9 Regulatory Mechanisms Ch. 10	Quiz, Forum, Quick Check
3. CLO 3 - Analyze and describe the biochemical principles that effect humans.	Introduction to Biochemistry Ch. 1 Carbohydrates Ch. 11 Lipids and Cell Membranes Ch. 12 Hemoglobin Ch. 7 Catalytic Strategies Ch. 9 Regulatory Mechanisms Ch. 10	Forum
4. CLO 4 - Analyze, evaluate and discuss the contributions of biochemistry to society.	Enzymes and Enzyme Kinetics Ch. 8 Catalytic Strategies Ch. 9 Regulatory Mechanisms Ch. 10	Forum
5. CLO 5 - Critically evaluate and communicate their understanding of current research in biochemistry.	Introduction to Biochemistry Ch. 1 Carbohydrates Ch. 11 Lipids and Cell Membranes Ch. 12 Hemoglobin Ch. 7 Enzymes and Enzyme Kinetics Ch. 8	Forum

Technical Requirements

You will need the following in order to participate in this course:

1. Computer hardware requirements:
 - A laptop or desktop computer (iPad and Chromebooks not recommended due to compatibility issues)
 - An internet connection
 - Speakers and a microphone – built-in or USB plug-in or wireless Bluetooth
 - A webcam or HD webcam - built-in or USB plug-in
2. Computer software requirements:
 - Adobe Acrobat or a similar PDF reader
 - Web Browser
 - Desktop version of Zoom
 - Microsoft Word, PowerPoint, Excel
3. Internet browser requirements:
 - Up-to-date
 - Google Chrome or Mozilla Firefox are recommended
4. Internet connection speed requirements:
 - Broadband wired or wireless (3G or 4G/LTE)

Course Policies

IU East course policies can be found on [this website](#).

Academic Misconduct:

Academic honesty is fundamental to the activities and principles of this university. All members of the academic community must be confident that each person's work has been responsibly and honorably acquired, developed and presented. Any effort to gain an advantage not given to all students is dishonest whether or not the effort is successful. All submitted written work is to be done by the student her/himself. The academic community regards academic dishonesty as an extremely serious matter, with serious consequences that range from reduction in grade, probation to expulsion. Using someone else's work as if it is your own— plagiarism— is a serious university offense and will be dealt with following university guidelines. You must cite borrowed ideas or text, including lecture material, regardless of whether it is a direct quote or a paraphrasing. When in doubt— cite. ([See section III, Student Misconduct, of the Code of Student Rights, Responsibilities, and Conduct](#), available on the "Campus Course Policies" link, available on the left tab of your courses in Canvas). Honesty requires that any ideas or materials taken from another source for either written or oral use must be fully acknowledged. Offering the work of someone else as one's own is plagiarism. The language or ideas thus taken from another may range from isolated formulas, sentences, or paragraphs to entire articles copied from books, periodicals, speeches, or the writings of other students. The offering of materials assembled or collected by others in the form of projects or collections without acknowledgment also is considered plagiarism. Any student who fails to give credit for ideas or materials taken from another source is guilty of plagiarism (Faculty Council, May 2, 1961; University Faculty Council, March 11, 1975; Board of Trustees, July 11, 1975) Source comes from [IU's Policies site](#).

According to the [Indiana University Code of Student Rights, Responsibilities, and Conduct \(2010\)](#), a student must give credit to the originality of others and acknowledge indebtedness whenever:

1. Directly quoting another person's actual words, whether oral or written;
2. Using another person's ideas, opinions, or theories;
3. Paraphrasing the words, ideas, opinions, or theories of others, whether oral or written;
4. Borrowing facts, statistics, or illustrative material; or

Offering materials assembled or collected by others in the form of projects or collections without acknowledgment.

Accessibility Services:

Every attempt will be made to accommodate qualified students with disabilities (e.g. mental health, learning, chronic health, physical, hearing, vision neurological, etc.) You must have established your eligibility for support services through the appropriate office that services students with disabilities. Note that services are confidential, may take time to put into place and are not retroactive; Captions and alternate media for print materials may take three or more weeks to be produced. Please contact your campus office as soon as possible if accommodations are needed. [Find your campus office serving students with disabilities](#).

Title IX and Sexual Misconduct:

As your instructor, one of my responsibilities is to help create a safe learning environment on our campus. Title IX and our own Sexual Misconduct policy prohibit sexual misconduct. If you have experienced sexual misconduct, or know someone who has, the University can help. I encourage you to visit [Stop Sexual](#)

[Violence website](#) to learn more. If you are seeking help and would like to speak to someone confidentially, you can make an appointment with a [Mental Health Counselor on campus](#).

It is also important that you know that Title IX and University policy require me to share any information brought to my attention about potential sexual misconduct, with the campus Deputy Title IX Coordinator or IU's Title IX Coordinator. In that event, those individuals will work to ensure that appropriate measures are taken and resources are made available. Protecting student privacy is of utmost concern, and information will only be shared with those that need to know to ensure the University can respond and assist. I encourage you to visit stopsexualviolence.iu.edu to learn more.

Technology and Support:

Students who need help accessing Canvas, resetting a password, using email, or with any technology problems, can contact their campus IT Helpdesk using the link below.

- [University Information Technology Services \(UITS\)](#)

Students can also find answers to frequently asked technology questions in the [IU Knowledge Base](#). Get no-cost access to hundreds of software programs and applications (including Microsoft Office or Adobe Creative Cloud) through IUware and IUanyWare. All you need is your IU email address. Use [IUware](#) to install software directly onto your hard drive. Use [IUanyWare](#) to stream 400+ apps on your desktop or through the mobile app with your IU login.

Academic Support and Student Services:

IU Online provides quick and easy access to tools, tips, and IU resources to help you succeed in your online courses, including:

- Math and Writing Support: Direct access to IU-trained math mentors and writing consultants
- Libraries and Research: Online access to IU library resources and research librarians
- Technology: A full suite of software, collaboration tools, cloud storage, and training

For more information, visit: [IU Online Academic Support](#)

Course Technology Accessibility Statements and Privacy Policies:

- [Canvas Accessibility Statement](#): This course uses technologies that may support accessibility in different ways.
- [Canvas Privacy Policy](#): This course uses technologies that provide privacy.
- Statements for all other IU-supported learning tools can be found in the [Knowledge Base](#).

Online Etiquette:

It is important to build a class climate that is welcoming and safe for everyone. Please display respect for everyone in the class. You should avoid racist, sexist, homophobic, or other negative language that may exclude members of our campus and classroom community.

- Humor and sarcasm don't translate very well when using email or online discussions. Be careful. I **will delete** any posting that I believe is inappropriate.
- Keep in mind that there's a real, live human being with feelings on the other end of your email or discussion posting--if you were sitting in front of that person would you say to their face what you're saying in your email or discussion posting? Remember that your words are written in an email or discussion posting -- you can't take them back.
- Avoid offensive language, especially comments that might be construed as racist or sexist.
- Remember that the law still applies in cyberspace. Do not commit illegal acts online, such as libeling or slandering others, and do not joke about committing illegal acts.
- Do not post a message more than once.

- Generally speaking, avoid putting words into full capitals. Online, all-caps is considered SHOUTING.
- If you are following up a previous message or posting, summarize that message or posting. Read existing follow-up postings and don't repeat what has already been said.
- Reveal only information that you are comfortable sharing.

Fair Use Policy:

Copying or recording synchronous classes and asynchronous course materials without the express prior approval of [the professor] is prohibited. All copies and recordings remain the property of Indiana University and [the professor.] IU and [the professor] reserve the right to retrieve, inspect, or destroy the copies and recordings after their intended use. These policies are not intended to affect the rights of students with disabilities under applicable law or IU policies.

Code of Student Rights, Responsibilities, and Conduct:

Students are expected to adhere to the Code of Student Rights, Responsibilities, and Conduct at all times. Any inappropriate behavior, disruptive conduct (e.g., engaging in hostile or disrespectful commentary on the site, or discussing irrelevant evidence) or non-compliance with faculty directions can result in a charge of Academic and/or Personal Misconduct, the consequence of which could be a variety of sanctions either from the instructor or the Dean of Students. For more information see [The Code of Student Rights, Responsibilities, and Conduct](#).

Syllabus Revision:

The instructor reserves the right to revise or adjust the course syllabus to best accommodate the pace and needs of the students.