

BIOS 10016 Biomolecules of Life Summer Course

Course Description:

This course will introduce students to the molecular building blocks of life (i.e., proteins, nucleic acids, carbohydrates, and lipids) and explain their structure and function. It is an interdisciplinary course that will require you to master a new language to describe concepts from multiple disciplines. Students will also learn how these molecules impact human health and contribute to disorders and diseases. Lab work will involve modern techniques used in biochemical and molecular biology research such as molecular modeling, rational drug design, protein purification and enzymatic assays.

Learning Goals:

By the end of this course, students will be able to:

1. Know the structures, chemical features and biological roles of the major classes of biomolecules in life: amino acids, proteins, carbohydrates, DNA, RNA, and lipids.
2. Understand the roles of these biological molecules in living cells.
3. Develop an understanding of the principles of chemical and enzyme kinetics.
4. Master core laboratory techniques in biochemistry and molecular biology.

Class Meeting Time and Location:

9 July - 25 July

Lecture - MTWRF 09:00 am – 11:30 am (with a 15-minute break), **BSLC 008**

Laboratory - MTWRF 1:00 pm – 3:00 pm, **BSLC R005**

Instructor: Wen Yi Low

Email: wlow@uchicago.edu, **BSLC 409**

Office Hours: M W 3:00 – 4:00 pm, **BSLC 300**

Note: Be sure to include “BIOS 10016” in the subject line of your email.

If you would like to share any comments, questions or issues, please fill up this [anonymous suggestion box](#).

Teaching Assistants:

Firas Alsanabani (ffiras@uchicago.edu)

Sebina Avdic (avdicsebina@uchicago.edu)

All information about Office Hours will be posted on CANVAS

Text:

No formal textbook is required for this course. Supplementary lesson videos will be uploaded to Canvas for viewing. These videos will be accompanied by quizzes listed under Assignments on Canvas. Any necessary readings for the course will also be posted on Canvas. If you prefer to use a textbook (optional), the following is recommended:

Biochemistry: A Short Course (4th edition) John L. Tymoczko, Jeremy M. Berg, Gregory J. Gatto Jr., Lubert Stryer (2018).

This book is available for borrowing from the Mansueto Library.

Laboratory:

Laboratory sessions are held daily, as outlined in the course schedule, and attendance is mandatory for all students. Labs are held in **BSLC R005**. The laboratory experiments account for **30%** of your grade. All laboratory exercises will be done with a lab partner, which will be arranged in class. **There is no makeup lab, a score of zero will be recorded for your lab if you have to be absent.**

The lab worksheets are due at 11:59 pm on the day of your lab unless told otherwise and should be uploaded onto Gradescope. **Late submissions will have a 50% penalty (1 day). No credit is given for submissions more than 1 day late.**

The laboratory manual for each exercise is available online at the course site on CANVAS (<https://canvas.uchicago.edu>). Printed copies are also available in the lab.

Exams:

Examinations will be held on the dates listed in the class schedule. No makeup examinations will be permitted without prior approval. While the exams are not specifically cumulative, they do depend on knowledge of previously covered material.

No electronic devices (most commonly cellular phones, laptops, tablets and smartwatches) are permitted to be out and visible during the exams. This includes use of a phone or smartwatches as a calculator. **If you need a calculator, we will provide one.** Any student in violation of this policy will have their exam graded as a zero. All electronic devices have to be turned off and placed in your backpack.

Class Participation (Poll Everywhere):

The Poll Everywhere response system will be used in lecture for quizzing and polling. **Your final Poll Everywhere grade will generally be based only on participation.** *You must be in the lecture room to answer in-class Poll Everywhere questions. Answering in-class questions while not in class will result in you losing the points for that day, and potentially obtaining an overall Poll Everywhere grade of zero.*

Missed Poll Everywhere questions will not be excused nor can be made up. Since technical difficulties are sometimes encountered and you may need to miss class for a good reason, you only need to get 85% of the Poll Everywhere points to receive full credit. Please contact Poll Everywhere support directly if you are having problems with your Poll Everywhere interface.

Homework (Quizzes):

Complementary videos related to each lecture will be posted online. After attending a lecture, you are expected to watch the videos and complete the corresponding quiz. Quiz questions will cover both in-class content and material from the videos. Each quiz is due by 9:00 am the following day (e.g., Monday's lecture quiz is due Tuesday at 9:00 am).

Final project:

At the end of the course, students will work in groups to complete a final project. This project involves identifying a disease or biological process that features one or more of the biomolecules covered in class. Your group will clearly explain the chosen disease or biological process, describe the role of the relevant biomolecule(s), outline the molecular mechanism underlying the disease/disorder and discuss current treatments or therapeutic strategies. You are encouraged to be creative in how you present your

project. Possible formats include, but are not limited to, a skit, poster, song, or even a virtual reality experience. Presentation time is limited to 15 minutes, followed by 5 minutes of Q&A from your peers and instructors.

Student Disability Services:

The University is committed to ensuring full participation of all students in its programs. If you require any accommodations, please, provide a copy of your Accommodation Determination Letter (provided to you by the Student Disability Services office) at the start of the course. To receive appropriate accommodation, you must be registered with Student Disability Services. SDS is located at 5501 S. Ellis Ave. Please, contact the SDS office by email (disabilities@uchicago.edu) or by telephone at 773-702-6000/TTY 773-795-1186, or visit the website at <https://disabilities.uchicago.edu>.

Honesty Statement:

You are encouraged to discuss lessons and lab work with other students and in groups. However, what you hand in should be your own. Everything you submit should be entirely your own work. Copying sentences from any materials is considered to be academic dishonesty. *Do not make copies of or duplicate anyone else's work. Do not copy answers or text verbatim from online sources, including usage of any generative AI tools.* Proper acknowledgment of another's ideas, whether by direct quotation or paraphrase, is expected. The University's policies on academic honesty, plagiarism, and academic fraud can be found [here](#).

Instances of academic dishonesty will be reported to the Office of College Community Standards and may result in failure of the course on the first offense regardless of the value of the assignment. Cheating will not be tolerated.

Grades

The distribution of points contributing to the final grade is given below:

Grading	% of Grade
Exam 1	20
Exam 2	20
Homework (Quizzes)	10
Class participation (Poll everywhere)	10
Final project	10
Laboratory	30

Course Outline and Schedule
(Dates of topics covered in lecture will be adjusted, as necessary)

Date	Lecture Topic [^]	Lab Experiment*
7/9/25	Introduction to the course Lab Safety Orientation (9:30 – 11 am) Pre-lab discussion	Introduction to pipetting Protein concentration determination
7/10/25 [#]	Aqueous chemistry, acid-base chemistry	Molecular modeling (PyMOL + AlphaFold)
7/11/25	Amino acids	Molecular modeling (Virtual Reality)
7/14/25	Protein structure and folding	Protein purification, design and media selection
7/15/25	Techniques in protein biochemistry	Proteinase K crystallization trials
7/16/25	Enzyme kinetics	Enzyme kinetics
7/17/25 [#]	Exam 1	Restriction enzyme mapping of DNA plasmid + checking crystals
7/18/25	Carbohydrates	DNA UV damage
7/21/25	Lipids and Membranes	Running gels + Final project preparation (forming groups and selecting a topic)
7/22/25	Advanced Electron Microscopy Facilities Tour	Final project preparation
7/23/25	Nucleic Acid Structure, DNA, RNA, Protein Synthesis	Final project preparation
7/24/25 [#]	Final project presentation	
7/25/25	Exam 2	

[^] The last 15-20 minutes of each lecture will be dedicated to a pre-lab discussion to help you prepare for the afternoon lab session.

* Lab worksheets are due 11:59 pm on the day of lab unless otherwise instructed.

[#] Please attend the research seminars that begins at 12:00 pm on the following days listed below. Pizza lunch will be available starting from 11:45 am.

Date	Room No.	Speaker	Title of Talk
7/10/25	BSLC 109	Joon Seo Park	Harnessing the microbiome to enhance cancer immunotherapy
7/17/25		Zewdi Tsegai	Reconstructing locomotion in fossil human relatives from the internal structure of the skeleton
7/24/25		Martina Damo	Immune checkpoint receptors in physiology and cancer immunotherapy