

Introduction to Biological Molecules

Course #AS 020.205.21, Three credits

Summer 2017

The Johns Hopkins University

INSTRUCTORS

Richard Shingles, Ph.D.

TBA

UTL 281

Laboratory Teaching Assistant

Office hours: Tuesdays 12:00- 1:00 pm; Thursdays 12:00-1:00 pm in UTL 289

CLASS HOURS

Lectures: Mon., Wed., Fri. 9:00 am-11:30 am Hodson 315

Laboratory: Tuesday 9:00 am -11:30 UTL 174

COURSE DESCRIPTION

This course presents an overview and introduction to basic biochemistry and molecular biology, including perspectives on medicine and biotechnology. Students will be involved in lecture, class discussions, group presentations and laboratory exercises. The course will explore specific topics, such as, protein structure, enzyme kinetics, carbohydrate metabolism, DNA and RNA structure and function and recombinant DNA practices. Laboratory exercises will explore topics in pH and buffering, enzyme kinetics, DNA isolation and digestion, and bioinformatics.

LEARNING OBJECTIVES

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

- Compare and contrast the major non-covalent forces: H-bonds, hydrophobic effect, ionic bonds, Van der Waals interactions.
- Identify amino acids (structure, pKa) and apply knowledge of their characteristics (hydrophobicity, size, shape).
- Predict how changes in protein structure affect protein function.
- Define the characteristics of an enzymatic reaction.
- List and describe the major components of biomembranes.
- Name the major products of glycolysis.

- List cellular and organismal consequences of the following metabolic pathways: glycolysis, fermentation, citric acid cycle, oxidative phosphorylation.
- Identify the differences between DNA and RNA
- Describe how bacterial transcription is regulated
- Explain the potential consequences of an error in DNA replication, DNA repair, transcription, and translation on an encoded protein.

REQUIRED MATERIALS

TEXTBOOK: Campbell, M.K., Farrell, S.O. Biochemistry 8th edition

LABORATORY NOTEBOOK: Bound composition notebook (marble cover).

RECOMMENDED: Organic molecular model kit.

COURSE WEBSITE

The course website is an important tool for communication outside of class. We will use it to post announcements, assignments, grades, and lecture material. It is a Blackboard site and can be accessed at <http://blackboard.jhu.edu> and entering your JHED ID and password.

JOHNS HOPKINS POLICIES AND SUPPORT SERVICES

The Johns Hopkins University (JHU) Arts and Sciences / Engineering Catalog and the JHU Undergraduate Academic Manual contain information on a wide variety of topics, such as support services, clubs and student organizations, and policies relating to student rights and responsibilities. This course is governed by the policies set forth in these two documents.

Some JHU student support services you may find useful include...

SUPPORT SERVICE	LOCATION	PHONE NUMBER / WEBSITE
Summer Programs Office	3505 N. Charles St.	(410) 516-4548 summer@jhu.edu

CLASSROOM ACCOMODATIONS FOR STUDENTS WITH DISABILITIES

If you are a student with a documented disability who requires an academic adjustment, auxiliary aid or other similar accommodations, please contact the Disability Services Office at 410-516-4720.

STATEMENT OF DIVERSITY AND INCLUSION

Johns Hopkins University is a community committed to sharing values of diversity and inclusion in order to achieve and sustain excellence. We believe excellence is best promoted by being a diverse group of students, faculty and staff who are committed to creating a climate of mutual respect that is supportive of one another's success. Through its curricula and clinical experiences, we purposefully support the University's goal of diversity, and in particular, work toward an ultimate outcome of best serving the needs of students. Faculty and candidates are expected to demonstrate an understanding of diversity as it relates to planning, instruction, management, and assessment.

A WORD ON ETHICS

The strength of the university depends on academic and personal integrity. In this course, you must be honest and truthful. Ethical violations include cheating on exams, plagiarism, reuse of assignments, improper use of the Internet and electronic devices, unauthorized collaboration, alteration of graded assignments, forgery and falsification, lying, facilitating academic dishonesty, and unfair competition.

Report any violations you witness to the instructors.

ASSIGNMENTS

There will be regular daily assignments in this course. All of these will be individual assignments, to be completed alone. Assignments will always be due at the start of the following days class.

EXAMS

There will be one midterm exam and a final exam. Please see the course schedule for dates. If you have a conflict with an exam time, it is your responsibility to notify the instructors as soon as possible BEFORE the exam. Acceptable conflicts include team sporting events, religious observances, and documented illness or injury. Documentation for acute health problems is available from the campus Health and Wellness Center.

There can be a make-up for a missed midterm exam. If the final exam is missed due to an emergency or illness, arrangements must be made to take the exam at another time.

EXTRA HELP

Office hours will be staffed by Dr. Shingles. Please use office hours to...

- meet with your course faculty
- obtain help with homework assignments
- obtain help with laboratory assignments
- review class material

Office hours will be held in UTL 289 4:00 pm-5:00 pm on Tuesday and Thursday.

The Learning Den offers tutoring and help from Johns Hopkins undergraduates and recent graduates; all with experience in biochemistry and molecular biology. It is operated by the Johns Hopkins Office of Academic Assistance and can be contacted at tutoring@jhu.edu.

GRADING

Grades will be based on the following assessments:

ASSESSMENTS	PERCENT OF FINAL GRADE
Class Quizzes and Assignments	10%
Presentation and Report	10%
Laboratory	30%
Midterm exam	25%
Final exam	25%

Final grades will be based upon the following scale:

PERCENT	GRADE	PERCENT	GRADE	PERCENT	GRADE
95 - 100%	A ⁺	86 - 94 %	A	80 - 85%	A ⁻
77 - 79%	B ⁺	73 - 76%	B	70 - 72%	B ⁻
67 - 69%	C ⁺	63 - 66%	C	60 - 62%	C ⁻
50 - 59%	D				
Below 50%	F				

The information in this syllabus is subject to change.

COURSE SCHEDULE

Monday	Tuesday	Wednesday	Friday
July 3 Ch. 1 Introduction Ch 2. Biomolecules	July 4 HOLIDAY NO CLASS	July 5 Ch. 3 Amino acids, Peptides and Proteins Ch. 4 Protein Architecture and Biological Function	July 7 Ch. 5 Enzymes
July 10 Ch. 6 Enzymes II Ch. 7 Carbohydrates	July 11 Lab #1 Buffers and pH	July 12 Ch. 8 Lipids Ch. 9 Membranes (Dr. Lee)	July 14 Ch. 14 Metabolism (Dr. Behensky) Ch. 15 Glycolysis
July 17 Ch. 16 Citric Acid Cycle (Dr. Behensky) Ch. 17 ATP Formation (Dr. Behensky)	July 18 Lab #2 Enzyme Kinetics	July 19 Metabolism Poster Midterm Review	July 21 Midterm Exam
July 24 Ch. 10 DNA Structure (Dr. May) Ch. 10 RNA Structure	July 25 Lab #3 and #4 DNA Isolation (Dr. Lee) Restriction Mapping of DNA	July 26 Ch. 11 DNA Replication and Transcription (Dr. May) Ch. 12 Translation of RNA (Dr. Lee)	July 28 Ch. 13 Recombinant DNA (Dr. May) Ch. 13 Recombinant DNA
July 31 Presentations	Aug 1 Lab #5 Bioinformatics	Aug 2 Presentations Final Review	Aug 3 Final Exam