**BIOT 302 Fundamentals of Enzymology (4 credits) Sec A**

**Spring 2023**

Instructor: Mian Wajahat Hussain, *PhD*

OFFICE 353 Armacost Science Building

OFFICE HOURS 11:00 to 12:00 Noon MON & FRI, 8:00-9:00 THR or by appointment

OFFICE PHONE 99231581-88, Ext. 544

E-MAIL ADDRESS wajahathussain@fccollege.edu.pk

CLASS HOURS 10:00 to 10:50 MON, WED & FRI S-425

 2:00 to 3:50 WED Lab S-329

**Students Safety and Wellbeing**

The current situation is quite normal with regards to Covid 19 omicron variant and mask is not mandatory. However, it would be nice to remain protected from infection and air pollution which usually is high in the city. For more information related to pandemic please visit the FCC website <https://www.fccollege.edu.pk/updates-on-corona-virus/>

For health related issues or in any emergency students can visit Mercy Health Center, located towards the West side of Kennedy Hall. If for any reason your studies are affected please talk to friend, family member, teacher/advisor for help. If you need counselling, please contact Campus Counselling Center for assistance. You can fill-in online form at [**Online Session PRE- COUNSELING FORM**](https://forms.gle/MyFs7T2RfGTXf1Zq6) or email at  ccc@fccollege.edu.pk or call 03331-444-1518.

**Class Format**

Classes will be on the campus and all students are expected to attend classes fully in person

**Course Content**

This course has three components. The first part is designed to give fundamental understanding of properties, nomenclature, structure, purification of enzymes. This will be followed by basic principles of enzymatic reactions, enzyme kinetics and inhibition, factors affecting enzyme activity and mechanism of enzyme action. The last part covers the clinical aspects of enzymology and enzyme technology.

**Course Objectives:**

1. To understand the chemical nature, properties and classification of enzymes.
2. To explain the kinetics of chemical reactions and mechanism of enzyme action.
3. To perform lab experiment according to a standard protocol, collect, interpret and present data.
4. To apply the knowledge of enzyme assays in clinical diagnosis.
5. To explore the application of enzymology in industry.

**Students Learning Outcomes**

1. Describe the physiochemical characteristics of biomolecules especially bioactive proteins and enzymes.
2. Demonstrate knowledge of enzyme kinetics and mechanism of enzyme action.
3. Apply principles of analytical techniques to undertake experiments for isolation and purification of enzymes
4. Analyze and evaluate projects and scientific work to draw meaningful conclusions
5. Relate the knowledge of enzyme activities in medical field and industry

**List of Skills/Knowledge Needed**

* + Knowledge of the significance of carbon’s ability to form strong bonds with itself and other commonly found elements, thus forming the skeleton for the large molecules essential for the living systems.
	+ An understanding of molecular orbital theory and chemical bonding.
	+ An understanding of oxidation/reduction processes as well as some primary types of reactions (hydrolyses, dehydrations, condensations, etc.)
	+ A good handle on the chemical nature of macromolecules such as carbohydrates, lipids, proteins and nucleic acids.
	+ An understanding of the metric system (SI) and its application to volume, mass and linear measurements.
	+ Knowledge of the preparation of solutions of varying concentrations and dilutions

**Course Policies**

**Attendance**: Attendance is mandatory, and students are expected to actively participate in class activities. All students are required to maintain 80% attendance. If a student fails to meet 80% attendance requirement, (s)he will not be allowed to sit in the final exam. If a student miss classes on account of university events or religious obligations, he/she must report in advance to the instructor. Leave up to one week may be granted on account of illness and proper documentation will be required for this purpose. The weightage of the attendance will be 5% of the grade.

**Late arrival:** Students are expected to come to class as scheduled and on time. Late coming is not permitted and if for any reason you arrive late in class, lab or exam, you will not be allowed to enter the class.

**Exams**: In the beginning of this course students will be given a pre-test which is based on some basic information about the subject matter. It is evaluated but does not count towards the final grade. There will be

two lecture exams and one lab exams during the term. The first lecture exam will be of one-hour duration and the final exam will be of two-hour duration. First exam (midterm) will constitute 20% and the final will constitute 30% of the grade. The first lecture exam will include the topics covered during the first six/seven weeks whereas the second exam (Final exam) will be based on 70% of the course covered after the midterm

and 30% will include review of the first seven weeks course. The format of the exams will be both objective and essay type (limited choice will be given in the long answer type questions). Midterm exam will be held in seventh/eight week and final will be in the 3rd week of June 2023.

**Quizzes:** There will be THREE quizzes which would constitute 15% of the grades. If a student does not appear in the quiz s(he) will be awarded zero point. No makeup quiz will be given.

**Assignments:** Students are required to write one assignments during the semester that will be submitted latest by the end of FIFTH week (March 17, 2023). Each student is required to search for **two article** (review papers will not be acceptable) related to enzymology, published in journals/periodicals and get those approved from instructor. Subsequently, prepare a summary of the articles that will include the nature of the work, methods used, main findings and conclusions. The weightage of the assignment will be 10% of the grade. Detailed instructions for assignment and rubric will be provided separately.

**Missed Exam:** Students must take all the exams. If an exam is missed the student will receive a zero score. Make up-exam will only be given on account of hospitalization or death of immediate family member for which authentic documents will be needed.

**Cheating and Plagiarism:** There will be no tolerance for cheating/plagiarism. Any student caught cheating on the exam will be reported to the Academic Integrity Committee. The punishment may include F grade in the exam or in the course or suspension from the university. Detailed policy of classroom misconduct, cheating and plagiarism, given in the Student Handbook, will be strictly followed. Students are responsible for these directions given about dishonesty and plagiarism.

**Classroom Rules:** Students are not allowed to bring radios, food and beverages in the class. Students are advised to silence their mobiles before coming to class. If a student leaves early in the class time, s(he) will be marked absent except for an advance communication to the instructor.

**Lab Notebook:** A4 size standard notebook is required with numbered pages or number the pages yourself. You may opt for an electronic lab notebook or digital lab notebook. If you do so, then you will be required to print the notebook for submission on lab exam day. It is mandatory that students bring the lab notebook and work directly on it for all lab exercises.

Weight-age and Grading:

**Activity weightage (%)**

A 4.00 93 – 100% C 2.00 73 – 76%

A- 3.70 90 – 92% C- 1.70 70 – 72%

B+ 3.30 87 – 89% D+ 1.30 67 – 69%

B 3.00 83- -86% D 1.00 60 – 66%

B- 2.70 80 – 82 % F 0.00 59 or below

C+ 2.30 77 –79% Failing

Midterm exam 20

Final exam 30

Quizzes 15

Lab Exam 20

Assignment 10

Attendance 5 \_

 100

**Important Dates**

Quiz 1 Wednesday March 8, 2023, 2:00 PM

Assignment Due Friday March 17, 4:00 PM

Midterm Exam Wednesday Mar 29, 2:00 PM

Quiz 2 Wednesday May 3, 2:00 PM

Quiz 3 Wednesday May 31 2:00 PM

Lab Exam Wednesday June 7 2:00 PM Lab S-329

Final Exam Monday June 12 to 21, 2023

 (Date and time to be announced by academic office)

Expectations

1. Come on time. Preparation to be on time for the class is a professional attribute and a courtesy. You will not be permitted to enter the class if you arrive late.
2. Attend all class meetings and come prepared.
3. Switch mobile to silent mode before coming to class.
4. Observe dress code and display ID. Do not drink, eat or chew in the class.
5. If for some unavoidable circumstances you miss a class, it will be your responsibility to talk to your class fellow as to what was covered in lecture and what activity was assigned. You must come prepared with the relevant information in next class.
6. Go through the course policies and keep the document handy.
7. Ask questions to clarify fine points and actively participate in class discussions.
8. Set up an appointment or zoom/Microsoft meeting with instructor if you have difficulty in understanding the material presented in class.
9. I suggest that for every class lecture you must study THREE hours outside the class.
10. Complete all tasks on time.
11. Observe FCC core values.

**Course Outline BIOT 302: Fundamentals of Enzymology (4 credits) Sec A**

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| **Week** | **Date** | **Topic** |
| **1** | 13 Feb 2023 | Introduction to Enzymology, Nature and Properties of Enzymes  |
| **2** | 20 | Isolation and Purification of Enzymes |
| **3** | 27 | Isolation and Purification of Enzymes |
| **4** | 6 Mar | Structure of Enzyme |
|  |  | **Quiz 1 Wed Mar 8, 2:00 PM S-329**  |
| **5** | 13 | Structure of Enzyme |
|  |  | **Assignment due Mar 17, 4:00 PM** |
| **6** | 20 | Enzyme Kinetics |
| **7** | 27 | Enzyme Kinetics |
|  |  | **Midterm Exam Wed Mar 29, 2:00 PM S-329** |
| **8** | 3 Apr | Enzyme Inhibition |
|  |  | ***Easter Holidays April 6 - 10*** |
| **9** | 10 | Mechanism of Enzyme Action  |
| **10** | 17 | Mechanism of Enzyme Action  |
|  |  | ***Eid-ul-Fitr Holidays April 20 - 26*** |
| **11** | 24 | Multienzyme complex |
| **12** | 1 May | Multienzyme complex |
|  |  | **Quiz 2 Wed May 3, 2:00 PM S-329**  |
| **13** | 8 | Protein Turnover |
| **14** | 15 | Protein Turnover |
| **15** | 22 | Clinical Enzymology |
| **16** | 29 | Clinical Enzymology |
|  |  | **Quiz 3 Wed May 31, 2:00 PM S-329**  |
| **17** | 5 Jun | Industrial Enzymology |
|  |  | **Lab Exam Wed June 7, 2:00 PM S-329**  |
|  **Final Exam from June 12 to 21, 2023. Date and time will be announced by academic office** |