BCH 401 – Advanced Enzymology

COURSE PARTICULARS

Course Code: BCH 401  
Course Title: Advanced Enzymology  
No. of Units: 3  
Course Duration: Three hours of per week for 15 weeks.  
Status: Compulsory  
Course Email Address: dmsanni@futa.edu.ng  
Prerequisite: BCH312

COURSE INSTRUCTORS

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and

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COURSE DESCRIPTION

The course covers general and specialized topics in enzymology and specifically designed for biochemistry students. It is expected that students must have successfully undertaken and passed BCH 312- Enzymology which serves as a prerequisite before registering for the advanced enzymology. The earlier part of the course will deal with subjects such as steady state kinetics, Michealis – Menten equation and the transient kinetic methods. General topics in enzyme catalyzed reaction such as enzyme catalysis, mechanisms of action, binding energy, enzyme assay, stereochemistry, enzyme/substrate interaction, allosteric interactions and other regulatory enzyme will be adequately covered. The course will be concluded by introducing students to other practical and applied subject; molecular model of allosterism, enzyme reconstitution, criteria for determining purity of enzyme, genetic engineering, protein engineering and biotechnology.

COURSE OBJECTIVES

The objectives of this course are to:

- teach the students on the kinetic of enzyme catalysis; steady state enzyme and transient kinetic.
- provide students with opportunities to learn and understand the basic concept behind enzyme and enzyme catalyzed reaction.
- understand the various application of enzyme techniques in genetic engineering etc.

COURSE LEARNING OUTCOMES / COMPETENCIES

Upon successful completion of this course, the students are expected to have good understanding in the general and applied areas of enzymology which will enable individual student to undertake independent research work in enzymology and successfully undertake postgraduate study.

GRADING SYSTEM FOR THE COURSE

This course will be graded as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignments</td>
<td>10%</td>
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<tr>
<td>Test(s)</td>
<td>20%</td>
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<tr>
<td>Final Examination</td>
<td>70%</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td><strong>100%</strong></td>
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</table>
GENERAL INSTRUCTIONS

Attendance: It is expected that every student will be in class for lectures. Attendance records will be kept and used to determine each person’s qualification to sit for the final examination. In case of illness or other unavoidable cause of absence, the student must communicate as soon as possible with any of the instructors, indicating the reason for the absence.

Academic Integrity: Violations of academic integrity, including dishonesty in assignments, examinations, or other academic performances are prohibited. You are not allowed to make copies of another person’s work and submit it as your own; that is plagiarism. All cases of academic dishonesty will be reported to the University Management for appropriate sanctions in accordance with the guidelines for handling students’ misconduct as spelt out in the Students’ Handbook.

Code of Conduct in Lecture Rooms: Students should turn off their cell phones during lectures. Students are prohibited from engaging in other activities (such as texting, watching videos, etc.) during lectures. Food and drinks are not permitted in the classroom.

READING LIST


Legend
1- Available in the University Library
2- Available in Departmental/School Libraries
3- Available on the Internet.
4- Available as Personal Collection
5- Available in local bookshops.
## COURSE OUTLINE

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Remarks</th>
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<tbody>
<tr>
<td>1</td>
<td>Introduction and General Overview Of the course</td>
<td>Students will be informed of the important of regular class attendance and the grading system for the course.</td>
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<tr>
<td>2</td>
<td>Steady state enzyme kinetics</td>
<td>Students will be expected to know the differences between a chemical equilibrium and steady state kinetics.</td>
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<tr>
<td>3</td>
<td>Limitation of Michealis-Menten equation, Multisubstrate systems</td>
<td>Students are expected to understand Michealis-Menten equation and its limitations.</td>
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<tr>
<td>4</td>
<td>Measurement and magnitude of enzyme rate constant. The pH dependence of enzyme catalysis</td>
<td>Students should be able to calculate rate constant and kinetic parameters.</td>
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<tr>
<td>5 &amp; 6</td>
<td>Transient kinetic methods, Detection of intermediate in reactions.</td>
<td>Students should learn the different transient kinetic methods.</td>
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<tr>
<td>7</td>
<td>Chemistry of enzyme catalysis</td>
<td>Students should learn the different between collision and transition state theory and be able to use transition state to explain enzyme catalysis.</td>
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<tr>
<td>8</td>
<td>Mechanisms of action of enzymes</td>
<td>Understanding of various methods of rate enhancement is essential.</td>
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<tr>
<td>10</td>
<td>Thermodynamics of enzyme-substrate interactions, Binding energy in catalysis</td>
<td>Students are expected to understand the energy profile in chemical reaction and enzyme catalyzed reaction.</td>
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<tr>
<td>11</td>
<td>Stereochemistry of enzymatic reaction; Active site-directed and enzyme activated irreversible inhibitors, Cooperativity, allosteric interactions and regulation</td>
<td>Students are expected to take advantage of the previous lectures from BCH 312</td>
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<td>12</td>
<td>Regulatory enzymes; regulation of enzyme activity and synthesis, Molecular models for allosterism, Multienzyme complexes</td>
<td>Students are expected to understand different regulatory mechanism</td>
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<tr>
<td>13</td>
<td>Enzyme reconstitution, Enzyme assays, Criteria for determining purity of enzymes</td>
<td>Emphasis will be on different methods and techniques for determining purity and enzyme assays.</td>
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<td>14</td>
<td>Practical kinetics; genetic engineering, protein engineering and biotechnology</td>
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<tr>
<td>15</td>
<td>Revision</td>
<td>Revision</td>
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