

Module Handbook of Enzymology

Module designation	Enzymology is a course specifically for students of the Agricultural Microbiology study program, Department of Agricultural Microbiology, Faculty of Agriculture. This course introduces the basics of enzymology. Topics covered include the basics of enzymology, enzyme classification, enzyme structure, introduction to enzyme kinetics, mechanism of enzyme action, control of enzyme activity, purification and application of enzymes.
Semester(s) in which the module is taught	Third Semester
Person responsible for the module	M. Saifur Rohman, S.P., M.Si., M.Eng., Ph.D.
Language	Bahasa Indonesia/Indonesian Language
Relation to curriculum	<i>Compulsory Course</i>
Teaching methods	<p>Lecture are conducted in the class with 30-40 students. In every meeting, there will be delivered interactive lecture and discussion. In some topics there will be quizzes, individual and/or group assignment.</p> <p>Details:</p> <ol style="list-style-type: none"> 1. Lectures 2. Assignment (Individual and Group) 3. Discussion 4. Midterm 5. Final Exam
Workload (incl. contact hours, self-study hours)	<ul style="list-style-type: none"> - Lectures = 2 SKS x 50 minutes x 16 meetings = 1.600 minutes = 26,67 hours = 26,67 hours/27,1 hours = 0,98 ECTS - Assignment = 2 SKS x 60 minutes x 16 meetings = 1.920 minutes = 32 hours = 32 hours/27,1 hours = 1,18 ECTS - Self Study = 2 SKS x 60 minutes x 16 meetings = 1.920 minutes = 32 hours = 32 hours/27,1 hours = 1,18 ECTS <p>Total Workload = 3,34 ECTS</p>
Credit points	<i>2/0 Credit Points</i>
Required and recommended prerequisites for joining the module	<i>Biochemistry, Organic Chemistry</i>

Module objectives/intended learning outcomes	<p><i>Program Learning Outcomes (PLO):</i></p> <p><i>PLO1: Able to explain theoretical concepts of biology microorganism and develop microbial-based technology to increase plant production and environmental services.</i></p> <p><i>PLO2: Able to describe the latest methodology in the field of microbiology to create environmentally friendly and sustainable agricultural development.</i></p> <p><i>PLO3: Able to select, utilize and manage the potential of microbes and microbiomes to build industrial and agricultural systems.</i></p> <p><i>Course Learning Outcomes (CLO):</i></p> <p><i>CLO1: Able to explain theoretical concepts regarding the basics of enzymology, basic enzyme structure, enzyme kinetics, enzyme working mechanisms, and control of enzyme activity.</i></p> <p><i>CLO2: Able to describe and give examples of various factors that influence enzyme performance, able to explain enzyme purification techniques and stages of the enzyme production process on an industrial scale.</i></p> <p><i>CLO3: Able to provide examples of enzyme applications in the field of microbiology and their application in other industrial fields.</i></p>																																				
Content	<ol style="list-style-type: none">1. Introduction: Lecture contract, terminology and classification of enzymes (1 meeting)2. Enzyme Structure (2 meeting)3. Introduction to Enzyme Kinetics (2 meetings)4. Enzyme Mechanisms (2 meeting)5. Enzyme Activity Control (2 meetings)6. Globin (1 meetings)7. Enzyme Purifications (2 meeting)8. Practical Measurement of Enzyme Activity (1 meeting)9. Materials review (1 meeting)																																				
Examination forms	<p><i>High Order Thinking Skills Examination</i></p> <table><tr><th colspan="4">Grade and Score</th></tr><tr><th>Grade</th><th>Score</th><th>Grade</th><th>Score</th></tr><tr><td>A</td><td>≥ 85</td><td>C+</td><td>64,0-66,9</td></tr><tr><td>A-</td><td>82,0-84,9</td><td>C</td><td>61,0-63,9</td></tr><tr><td>A/B</td><td>79,0-81,9</td><td>C-</td><td>58,0-60,9</td></tr><tr><td>B+</td><td>76,0-78,9</td><td>C/D</td><td>55,0-57,9</td></tr><tr><td>B</td><td>73,0-75,9</td><td>D+</td><td>52,0-54,9</td></tr><tr><td>B-</td><td>70,0-72,9</td><td>D</td><td>49,0-51,9</td></tr><tr><td>B/C</td><td>67,0-69,9</td><td>E</td><td><49</td></tr></table>	Grade and Score				Grade	Score	Grade	Score	A	≥ 85	C+	64,0-66,9	A-	82,0-84,9	C	61,0-63,9	A/B	79,0-81,9	C-	58,0-60,9	B+	76,0-78,9	C/D	55,0-57,9	B	73,0-75,9	D+	52,0-54,9	B-	70,0-72,9	D	49,0-51,9	B/C	67,0-69,9	E	<49
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Study and examination requirements	<i>To be able to take the final exams, the minimum of student attendance is 70% out of effective meetings. From 14 meetings, students must take a minimum of 10 meetings to take the exam.</i>
Reading list	<p><i>Main References:</i></p> <ol style="list-style-type: none"> 1. Buxbaum, E. 2007. <i>Fundamentals of Protein Structure and Function</i>. Springer Sci. & Business Media LLC 2. Withford, D. 2005. <i>Proteins: Structure and Function</i>. John Wiley & Sons. Ltd 3. Copeland, RA. 2000. <i>Enzymes: A Practical Introduction to Structure, Mechanism, and Data Analysis</i>. John Wiley & Sons. New York 4. Price, NC dan L. Steven. 1988. <i>Fundamentals of Enzymology</i>. 2nd Edition. Oxford Univ. Press. New York. 526p. 5. <i>The Journal of Biological Chemistry</i> (http://www.jbc.org/) <p><i>Additional References:</i></p> <ol style="list-style-type: none"> 1. <i>Scientific journal references on enzymes and enzyme purification techniques</i> 2. <i>Enzyme purification method reference via YouTube</i>