



Universitas Negeri Surabaya
Faculty of Mathematics and Natural Sciences
Bachelor of Science Education Study Program

Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight	SEMESTER	Compilation Date
Basics of Biochemistry	8420103163		T=3 P=0 ECTS=4.77	3	July 18, 2024
AUTHORIZATION	SP Developer		Course Cluster Coordinator	Study Program Coordinator	
	Prof. Dr. Erman, M.Pd.	

Learning model	Case Studies
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Program Learning Outcomes (PLO)	PLO study program that is charged to the course	
	Program Objectives (PO)	
	PO - 1	Students can understand and explain the role of nutrients as an energy source
	PO - 2	Students can understand and explain the biochemical processes and reactions of carbohydrates, proteins and fats
	PO - 3	Students can adopt a healthy lifestyle by selecting the food they consume
	PO - 4	Students can adopt a healthy lifestyle by selecting the food they consume
	PO - 5	Students can adopt a healthy life by being selective in the food they consume

PLO-PO Matrix							
	<table border="1" style="margin: auto;"> <tr><td>P.O</td></tr> <tr><td>PO-1</td></tr> <tr><td>PO-2</td></tr> <tr><td>PO-3</td></tr> <tr><td>PO-4</td></tr> <tr><td>PO-5</td></tr> </table>	P.O	PO-1	PO-2	PO-3	PO-4	PO-5
P.O							
PO-1							
PO-2							
PO-3							
PO-4							
PO-5							

PO Matrix at the end of each learning stage (Sub-PO)																																																																																																																							
	<table border="1" style="margin: auto;"> <thead> <tr> <th rowspan="2">P.O</th> <th colspan="16">Week</th> </tr> <tr> <th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th><th>8</th><th>9</th><th>10</th><th>11</th><th>12</th><th>13</th><th>14</th><th>15</th><th>16</th> </tr> </thead> <tbody> <tr><td>PO-1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>PO-2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>PO-3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>PO-4</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>PO-5</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table>	P.O	Week																1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	PO-1																	PO-2																	PO-3																	PO-4																	PO-5																
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Short Course Description	Examining the role of nutrients as an energy source through understanding the structure, function and biochemical reactions of nutrients, so as to provide ideas for preventing metabolic disorders.
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References	Main :
	<ol style="list-style-type: none"> 1. Cambpbell. M.K. 1999. Biochemistry(3rd Ed). Harcourt College Publisher Foreworth. 2. Erman. 2007. Dasar-dasar Biokimia Olahraga . Surabaya: Unesa University Press. 3. Mathew. C.K. Van Holde. K.E.A.Hem, K.G. 2000. Biochemistry (3rd). San Fransisco: Longman Inc. 4. Stryer. L. 1996. Biokimia (ed 4). Jakarta: Penerbit Buku Kedokteran EGC. 5. Yohanes Ngili. 2010. Biokomia Dasar. Bandung: Rekayasa Sains.
	Supporters:

Supporting lecturer		Dra. Martini, M.Pd. Prof. Dr. Erman, M.Pd. Dr. Siti Nurul Hidayati, S.Pd., M.Pd. Beni Setiawan, S.Pd., M.Pd., Ph.D. Wahyu Budi Sabtiawan, S.Si., M.Pd., M.Sc. Fasih Bintang Ilhami, S.Kep., M.T., Ph.D. Emita Vika Aulia, S.Pd., M.Pd.					
Week-	Final abilities of each learning stage (Sub-PO)	Evaluation		Help Learning, Learning methods, Student Assignments, [Estimated time]		Learning materials [References]	Assessment Weight (%)
		Indicator	Criteria & Form	Offline (offline)	Online (online)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	1.Utilizing science and technology to understand the role of nutrients as an energy source. 2.Mastering the structure, function and biochemical reactions of nutrients.	1.Describe the chemical composition of protoplasm. 2.Describe biochemical processes in cells.	Criteria: According to the rubric Form of Assessment : Participatory Activities	Information and Literacy Discussion 3 X 50		Material: Cell Metabolism Reference: <i>Mathew. CK Van Holde. KEAHem, KG 2000. Biochemistry (3rd). San Francisco: Longman Inc.</i>	5%
2	1.Utilizing science and technology to understand the role of carbohydrates as an energy source. 2.Mastering the characteristics and role of enzymes as biocatalysts, as well as the role of hormones in the energy formation process.	1.Describe the characteristics and role of enzymes as biocatalysts. 2.Explain the role of hormones in the process of energy formation.	Criteria: According to the rubric Form of Assessment : Participatory Activities	Information and Literacy Discussion 3 X 50		Material: Enzymes and Hormones Reader: <i>Mathew. CK Van Holde. KEAHem, KG 2000. Biochemistry (3rd). San Francisco: Longman Inc.</i>	5%
3	1.Utilizing science and technology to understand the role of carbohydrates as an energy source. 2.Mastering the structure, function and biochemical reactions of carbohydrates.	1.Differentiate the structure of carbohydrates. 2.Describe the function of carbohydrates. 3.Describe the biochemical reactions of carbohydrates.	Criteria: According to the rubric	Information and Literacy Discussion 3 X 50		Material: Structure and function of carbohydrates Reference: <i>Mathew. CK Van Holde. KEAHem, KG 2000. Biochemistry (3rd). San Francisco: Longman Inc.</i>	5%
4	1.Utilizing science and technology to understand the role of nutrients as an energy source. 2.Mastering the biochemical reactions of carbohydrates as an energy source. 3.Mastering the concept of carbohydrate metabolism.	1.Distinguish between catabolism and anabolism. 2.Explain the meaning of energy charge. 3.Connecting energy charges with catabolism/anabolism processes. 4.Determine the amount of energy (ATP) from each stage of carbohydrate metabolism.	Criteria: According to the rubric. Form of Assessment : Participatory Activities	Information and Literacy Discussion 3 X 50		Material: Carbohydrate Metabolism Reference: <i>Mathew. CK Van Holde. KEAHem, KG 2000. Biochemistry (3rd). San Francisco: Longman Inc.</i>	0%

5	<p>1.Utilizing science and technology to understand the role of carbohydrates as an energy source.</p> <p>2.Mastering the biochemical reactions of carbohydrates as an energy source.</p> <p>3.Mastering the concept of carbohydrate metabolism.</p>	<p>1.Distinguish between catabolism and anabolism.</p> <p>2.Explain the meaning of energy charge.</p> <p>3.Connecting energy charges with catabolism/anabolism processes.</p> <p>4.Determine the amount of energy (ATP) from each stage of carbohydrate metabolism.</p>	<p>Criteria: According to the rubric</p> <p>Form of Assessment : Participatory Activities</p>	Information and Literacy. Discussion. 3 X 50		<p>Material: Carbohydrate Metabolism</p> <p>Reference: <i>Mathew. CK Van Holde. KEAHem, KG 2000. Biochemistry (3rd). San Francisco: Longman Inc.</i></p>	5%
6	<p>1.Utilizing science and technology to understand metabolic disorders of carbohydrate biochemical reactions.</p> <p>2.Mastering the prevention of metabolic disorders of carbohydrate biochemical reactions.</p>	<p>1.Understanding metabolic disorders of carbohydrate biochemical reactions.</p> <p>2.Mastering the prevention of metabolic disorders of carbohydrate biochemical reactions.</p>	<p>Criteria: According to the rubric</p> <p>Form of Assessment : Participatory Activities</p>	Information and Literacy. Discussion. Assignment. 3 X 50		<p>Material: Carbohydrate metabolic disorders and their prevention.</p> <p>Reference: <i>Stryer. L. 1996. Biochemistry (4th ed.). Jakarta: EGC Medical Book Publishers.</i></p>	5%
7	<p>1.Able to write ideas about the effects and prevention of carbohydrate metabolic disorders.</p> <p>2.Responsible for informed opinions/ideas.</p>	Student Presentation	<p>Criteria: According to the rubric</p>	Group discussion and presentation 3 X 50		<p>Material: Exploration of carbohydrate metabolic syndrome</p> <p>Library: <i>Journals related to the material</i></p>	15%
8	MIDTERM EXAM	Indicators from Meetings 1 to 7		- 3 X 50			0%
9	<p>1.Utilizing science and technology to understand the role of lipids as an energy source.</p> <p>2.Mastering the structure, function and biochemical reactions of lipids.</p> <p>3.Mastering the concept of lipid metabolism.</p>	<p>1.Describe the stages in lipid metabolism in the process of energy formation.</p> <p>2.Describe lipid biosynthesis.</p> <p>3.Determines the amount of energy (ATP) resulting from lipid metabolism.</p>	<p>Criteria: According to the rubric</p> <p>Form of Assessment : Participatory Activities</p>	Discussion of information and literacy 3 X 50		<p>Material: Function, structure and metabolism of lipids</p> <p>Reference: <i>Campbell. MK 1999. Biochemistry (3rd Ed). Harcourt College Publisher Foreworth.</i></p>	5%
10	<p>1.Utilizing science and technology to understand metabolic disorders of lipid biochemical reactions.</p> <p>2.Mastering the prevention of metabolic disorders of lipid biochemical reactions.</p>	<p>1.Understanding metabolic disorders of lipid biochemical reactions.</p> <p>2.Mastering the prevention of metabolic disorders of lipid biochemical reactions.</p>	<p>Criteria: According to the rubric</p> <p>Form of Assessment : Participatory Activities</p>	Discussion of information and literacy Assignment 3 X 50		<p>Material: lipid metabolism disorders and their prevention.</p> <p>Reference: <i>Campbell. MK 1999. Biochemistry (3rd Ed). Harcourt College Publisher Foreworth.</i></p>	5%

11	<ol style="list-style-type: none"> 1.Able to write ideas about the effects and prevention of lipid metabolic disorders. 2.Responsible for informed opinions/ideas. 	Student Presentation.	Criteria: According to the rubric	Group discussion and presentation 3 X 50		Material: Exploration of lipid metabolic syndrome Reference: <i>Campbell. MK 1999. Biochemistry (3rd Ed). Harcourt College Publisher Foreworth.</i>	15%
12	<ol style="list-style-type: none"> 1.Utilizing science and technology to understand the role of protein as an energy source. 2.Mastering the structure, function and biochemical reactions of proteins. 3.Mastering the concept of protein metabolism. 	<ol style="list-style-type: none"> 1.Distinguish protein structures. 2.Describe the function of proteins. 3.Describe biochemical reactions and protein metabolism. 	Criteria: According to the rubric	Information and Literacy Discussion 3 X 50		Material: Structure and function of proteins Reference: <i>Erman. 2007. Basics of Sports Biochemistry. Surabaya: Unesa University Press.</i>	5%
13	<ol style="list-style-type: none"> 1.Utilizing science and technology to understand the role of protein as an energy source. 2.Mastering the concept of protein metabolism. 	<ol style="list-style-type: none"> 1.Explain the digestion and absorption of proteins. 2.Explain the biosynthesis of amino acids. 	Criteria: According to the rubric Form of Assessment : Participatory Activities	Information and Literacy Discussion 3 X 50		Material: Protein metabolism. Reference: <i>Erman. 2007. Basics of Sports Biochemistry. Surabaya: Unesa University Press.</i>	5%
14	<ol style="list-style-type: none"> 1.Utilizing science and technology to understand metabolic disorders in protein biochemical reactions. 2.Mastering the prevention of metabolic disorders of protein biochemical reactions. 	<ol style="list-style-type: none"> 1.Understanding metabolic disorders of protein biochemical reactions. 2.Mastering the prevention of metabolic disorders in protein biochemical reactions. 	Criteria: According to the rubric Form of Assessment : Participatory Activities	Discussion of information and Literacy Assignment 3 X 50		Material: Protein metabolic disorders and their prevention Reference: <i>Erman. 2007. Basics of Sports Biochemistry. Surabaya: Unesa University Press.</i>	5%
15	<ol style="list-style-type: none"> 1.Able to write ideas about the effects and prevention of protein metabolic disorders. 2.Responsible for informed opinions/ideas. 	Student Presentation	Criteria: According to the rubric	Group discussion and presentation 3 X 50		Material: Exploration of protein metabolic syndrome Library: <i>Journals related to the material</i>	15%
16	<ol style="list-style-type: none"> 1.Able to write ideas about the effects and prevention of protein metabolic disorders. 2.Responsible for informed opinions/ideas. 	Student Presentation	Criteria: According to the rubric	Group discussion and presentation 3 X 50		Material: Exploration of protein metabolic syndrome Library: <i>Journals related to the material</i>	15%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
1.	Participatory Activities	40%
		40%

Notes

1. **Learning Outcomes of Study Program Graduates (PLO - Study Program)** are the abilities possessed by each Study Program graduate which are the internalization of attitudes, mastery of knowledge and skills according to the level of their study program obtained through the learning process.
2. **The PLO imposed on courses** are several learning outcomes of study program graduates (CPL-Study Program) which are used for the formation/development of a course consisting of aspects of attitude, general skills, special skills and knowledge.
3. **Program Objectives (PO)** are abilities that are specifically described from the PLO assigned to a course, and are specific to the study material or learning materials for that course.
4. **Subject Sub-PO (Sub-PO)** is a capability that is specifically described from the PO that can be measured or observed and is the final ability that is planned at each learning stage, and is specific to the learning material of the course.
5. **Indicators for assessing** abilities in the process and student learning outcomes are specific and measurable statements that identify the abilities or performance of student learning outcomes accompanied by evidence.
6. **Assessment Criteria** are benchmarks used as a measure or measure of learning achievement in assessments based on predetermined indicators. Assessment criteria are guidelines for assessors so that assessments are consistent and unbiased. Criteria can be quantitative or qualitative.
7. **Forms of assessment:** test and non-test.
8. **Forms of learning:** Lecture, Response, Tutorial, Seminar or equivalent, Practicum, Studio Practice, Workshop Practice, Field Practice, Research, Community Service and/or other equivalent forms of learning.
9. **Learning Methods:** Small Group Discussion, Role-Play & Simulation, Discovery Learning, Self-Directed Learning, Cooperative Learning, Collaborative Learning, Contextual Learning, Project Based Learning, and other equivalent methods.
10. **Learning materials** are details or descriptions of study materials which can be presented in the form of several main points and sub-topics.
11. **The assessment weight** is the percentage of assessment of each sub-PO achievement whose size is proportional to the level of difficulty of achieving that sub-PO, and the total is 100%.
12. TM=Face to face, PT=Structured assignments, BM=Independent study.