



**Universitas Negeri Surabaya
Faculty of Sports and Health Sciences,
Undergraduate Nutrition Study Program**

**Document
Code**

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date																																
Biochemistry	1321102004	Compulsory Study Program Subjects	T=2	P=0	ECTS=3.18	2	January 4, 2022																																
AUTHORIZATION	SP Developer		Course Cluster Coordinator			Study Program Coordinator																																	
	Satwika Arya Pratama,S.Gz., M.Sc.		Satwika Arya Pratama,S.Gz., M.Sc.			Amalia Ruhana, S.P., M.P.H.																																	
Learning model	Case Studies																																						
Program Learning Outcomes (PLO)	PLO study program that is charged to the course																																						
	PLO-8	Able to master the scientific basis of nutrition, food, biomedicine, humanities and public health sciences.																																					
	PLO-9	Able to have an attitude of belief in the Almighty God, be ethical, disciplined, aware of the law, have a social and cultural insight, and behave professionally.																																					
	Program Objectives (PO)																																						
	PLO-PO Matrix																																						
		<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>P.O</td> <td>PLO-8</td> <td>PLO-9</td> <td colspan="4"></td> </tr> </table>						P.O	PLO-8	PLO-9																													
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PO Matrix at the end of each learning stage (Sub-PO)																																							
	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td rowspan="2">P.O</td> <td colspan="16">Week</td> </tr> <tr> <td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td> </tr> </table>						P.O	Week																1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16																							
Short Course Description	Discussion of theories regarding the chemical characteristics of nutritional substances in the human body. The discussion includes the structure, types, functions, roles and molecular reactions of carbohydrate nutrients, proteins, lipids, nucleic acids, vitamins and minerals in organs, tissues and cells of the human body. Learning activities are carried out through learning experiences, lectures, discussions and assignments.																																						
References	Main :																																						
	<ol style="list-style-type: none"> 1. Brody,T. 1999. Nutritional Biochemistry,Second Edition. Academi & Press, Sandiego-California-USA 2. Linder,M. C. 1991. Nutritional Biochemistry andMetabolism with Clinical Applications, Second Edition. Departement ofChemestry and Biochemistry, California-USA. 3. Lininger. 1982. Principles of Biochemistry. Rand Mc Nally and Company, USA 4. Stipanuk, M. H. 2000. Biochemical and Physiological Aspects of Human, Nutrition,Sanders-USA. 																																						
	Supporters:																																						
Supporting lecturer	Dr. Ir. Asrul Bahar, M.Pd. Lini Anisfatus Sholihah, S.Gz., M.Sc. Satwika Arya Pratama, S.Gz., M.Sc.																																						
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	Understand the molecules of living organisms (biomolecules) and their composition	<ol style="list-style-type: none"> 1.Explain the characteristics of living substances 2.Explain chemical processes in living substances 3.Explain that cells are the smallest part of life. 4.Explain the parts of a living cell and the function of each cell organelle 5.Explain the organization of molecules in cells 6.Explain the use of energy in living systems to maintain their structure 		Lecture, Question and answer, discussion, reflection 2 X 50			0%
2	Understand the structure of amino acids	<ol style="list-style-type: none"> 1.Explain the structure of amino acids and the classification of amino acids 2.Explain the properties of acids, bases, amphoteries and isoelectric points 3.Explain essential and non-essential amino acids 		Lectures, questions and answers, discussions, reflections. 2 X 50			0%
3	Understand protein structure	<ol style="list-style-type: none"> 1.Explain the structure of primers and peptide bonds 2.Explain the secondary structure of proteins (α-helix and β-sheet) and their properties 3.Explain the tertiary and quaternary structures of proteins and their properties 4.Explain the process of denaturation and its effect on protein structure 		Lectures, questions and answers, discussions, reflections. 2 X 50			0%

4	Understand protein structure	<ol style="list-style-type: none"> 1.Explain the structure of primers and peptide bonds 2.Explain the secondary structure of proteins (α-helix and β-sheet) and their properties 3.Explain the tertiary and quaternary structures of proteins and their properties 4.Explain the process of denaturation and its effect on protein structure 		Lectures, questions and answers, discussions, reflections. 2 X 50			0%
5	Understand the function of proteins	<ol style="list-style-type: none"> 1. Explain fiber and globular proteins and their properties and examples 2. Explain the function of proteins in living systems 		Lecture, Question and answer, discussion, reflection 2 X 50			0%
6	Understand the structure and function of enzymes	<ol style="list-style-type: none"> 1.Explain the structure of enzymes 2.Explain the properties of enzymes 3.Explain the function of enzymes 4.Explain the difference between trivial and systematic naming of enzymes 		Lectures, questions and answers, discussions, reflections. 2 X 50			0%
7	Understand the mechanisms of enzymatic reactions and enzyme activity	<ol style="list-style-type: none"> 1.Explain the mechanism of enzymatic reactions 2.Explain the kinetics of enzyme reactions 3.Explain the factors that influence enzyme activity 		Lectures, questions and answers, discussions, reflections. 2 X 50			0%
8	Sub summative exam	Sub summative exam		2 X 50			0%
9	Understand the structure of Carbohydrates	<ol style="list-style-type: none"> 1. Classify carbohydrates based on the number of constituent monomers, functional groups and constituents. 2. Explain the center of asymmetry, ring structure, Haworth, mutarotation, and anomers. 		Classification of carbohydrates and carbohydrate structure. 2 X 50			0%
10	Understand the function of carbohydrates	Explain the functions of monosaccharides, disaccharides and polysaccharides in biological systems.		Lectures, questions and answers, discussions, reflections. 2 X 50			0%

11	Understand the structure and function of lipids	<ol style="list-style-type: none"> 1.Explain the structure of lipids 2.Explain the function of various lipids in biological systems 		Lectures, questions and answers, discussions, reflections. 2 X 50			0%
12	Understand the structure and function of nucleic acids	<ol style="list-style-type: none"> 1.Explain the meaning of nucleic acids, nucleotides, DNA and RNA 2.Explain the structure of DNA and RNA 3.Explain the function of nucleic acids in living systems 		Lectures, questions and answers, discussions, reflections. 2 X 50			0%
13	Understand the basic principles of practical activities for testing carbohydrate and fat compounds	<ol style="list-style-type: none"> 1.Understand the basis of biochemical reactions in the body 2.Distinguish between polysaccharide, disaccharide and monosaccharide tests 3.Determine reducing sugars in the test solution 4.Proving the solubility of fats in non-polar solvents 		Practical activities in the laboratory 2 X 50			0%
14	Understand the basic principles of practical activities for checking glucose in urine	<ol style="list-style-type: none"> 1.Know the physical properties of urine 2.Determine whether there is glucose in the urine 3.Determine whether there is albumin in the urine 4.Recognize the smell of ammonia from the decomposition of urea in urine 		Practical activities in the laboratory 2 X 50			0%

15	Understand the basic principles of practical activities in protein compound testing and enzyme analysis	<ol style="list-style-type: none"> 1. Understand the basis of biochemical reactions in the body 2. Indicates the presence of the amino acid tyrosine in a protein sample 3. Determines the presence of protein in the test solution 4. Understand how enzymes work 5. Know the factors that influence enzyme activity 6. Knowing the effect of temperature on the amylase enzyme 		Practical activities in the laboratory 2 X 50			0%
16							0%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
		0%

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** ability in the process and student learning outcomes are specific and measurable statements that identify the ability 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.