



Universitas Negeri Surabaya
Faculty of Mathematics and Natural Sciences
Undergraduate Chemistry Study Program

Document
Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date																																
Biochemistry I: Structure & Function	4720102018		T=2	P=0	ECTS=3.18	5	July 18, 2024																																
AUTHORIZATION		SP Developer		Course Cluster Coordinator		Study Program Coordinator																																	
			Dr. Amaria, M.Si.																																	
Learning model	Project Based Learning																																						
Program Learning Outcomes (PLO)	PLO study program that is charged to the course																																						
	Program Objectives (PO)																																						
	PLO-PO Matrix																																						
		<table border="1" style="margin: auto;"> <tr> <td style="width: 10%; text-align: center;">P.O</td> <td colspan="6"></td> </tr> </table>						P.O																															
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Short Course Description	Study of the structure and function of protein macromolecules, enzymes, carbohydrates, lipids, nucleic acids, and membranes; as well as studies on the function of vitamins and minerals carried out through lecture, discussion and presentation methods																																						
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td rowspan="2" style="width: 5%; text-align: center;">P.O</td> <td colspan="16" style="text-align: center;">Week</td> </tr> <tr> <td style="width: 5%; text-align: center;">1</td> <td style="width: 5%; text-align: center;">2</td> <td style="width: 5%; text-align: center;">3</td> <td style="width: 5%; text-align: center;">4</td> <td style="width: 5%; text-align: center;">5</td> <td style="width: 5%; text-align: center;">6</td> <td style="width: 5%; text-align: center;">7</td> <td style="width: 5%; text-align: center;">8</td> <td style="width: 5%; text-align: center;">9</td> <td style="width: 5%; text-align: center;">10</td> <td style="width: 5%; text-align: center;">11</td> <td style="width: 5%; text-align: center;">12</td> <td style="width: 5%; text-align: center;">13</td> <td style="width: 5%; text-align: center;">14</td> <td style="width: 5%; text-align: center;">15</td> <td style="width: 5%; text-align: center;">16</td> </tr> </table>							P.O	Week																1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
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Supporting lecturer	Prof. Dr. Leny Yuanita, M.Kes. Prof. Dr. Hj. Rudiana Agustini, M.Pd. Dr. Prima Retno Wikandari, M.Si. Prof. Dr. Nuniek Herdyastuti, M.Si. Mirwa Adiprahara Anggarani, S.Si., M.Si.																																						
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	1. Explain the characteristics of living substances. 2. Explain the chemical processes in living substances. 3. Explain that cells are the smallest part of life. 4. Explain the parts of living cells. 5. Explain the function of each organelle 6. Explain the organization of molecules in cells 7. Explain the use of energy in living systems to maintain their structure	Criteria: 1. The assessment is carried out on the following aspects: 2.1. Participation during lectures is carried out through observation (weight 2) 3.2. The subsummative test is carried out twice, assessing all relevant indicators through a written exam, averaging them and giving them a weight (2) 4.3. Structured task assessment from each teacher and the scores are averaged then given a weight (3) 5.4. Summative tests as UAS scores are weighted (3) 6. The final NA is (participation value x2) (assignment value x 3) (UTS value x 2) UAS value (3) divided by 10	Question and answer discussion reflection 2 X 50			0%
2	Understand the structure and function of Carbohydrates	1. Classify carbohydrates based on the number of monomers that make up their functional groups and components. 2. Explain the center of asymmetry of the hawort ring structure, mutarotation and anomer. 3. Explain the functions of monosaccharides, disaccharides and polysaccharides in biological systems.	Criteria: 1. The assessment is carried out on the following aspects: 2.1. Participation during lectures is carried out through observation (weight 2) 3.2. The subsummative test is carried out twice, assessing all relevant indicators through a written exam, averaging them and giving them a weight (2) 4.3. Structured task assessment from each teacher and the scores are averaged then given a weight (3) 5.4. Summative tests as UAS scores are weighted (3) 6. The final NA is (participation value x2) (assignment value x 3) (UTS value x 2) UAS value (3) divided by 10	Question and answer discussion reflection 2 X 50			0%
3							0%
4							0%
5	Understand the structure and function of Proteins	1. Explain the structure of amino acids and the	Criteria: 1. The assessment is carried out on	Discussion Presentation 2 X 50			0%

classification of amino acids. 2. Explain the nature of amphoteric acids and bases. Isoelectric point of separation of amino acids (electrophoresis and chromatography). Specific reactions for amino acids. 3. Explain the reaction of peptide bond formation 4. Explain the function of peptides in living systems 5. Explain the separation using gel electrophoresis filtration dialysis process 6. Explain the determination of the amino acid series by hydrolysis and amino acid reactions with Edman's FDNB dansyl chloride reagent 7. Explain the definition homologous proteins 8. Explain about fixed residues, non-fixed residues, homology series and examples of the importance of series homology from various species. Explain the classification of proteins based on the function of the constituent elements and their shape 10. Explain configuration and conformation 11. Explain the structure of α -helix, types of amino acids that make up its properties and structure as a constituent of keratin 12. Explain the structure of silk fibroin and the differences in its properties with α -helix 13. Explain the structure of the helix that makes up collagen. Properties of collagen in tendons and bone matrix 14. Explain the helical structure that makes up elastin and the properties of elastin in joints 15. Types and functions of globular proteins 16. Characteristics of the tertiary structure of globular proteins in myoglobin 17. Types of amino acids that make up globular proteins 18. tertiary structures in myoglobin 19. Differences in tertiary structures in several globular proteins 20. Types of bonds that stabilize tertiary structures 21. Definition of oligomeric

the following aspects:
2.1. Participation during lectures is carried out through observation (weight 2)
3.2. The subsummative test is carried out twice, assessing all relevant indicators through a written exam, averaging them and giving them a weight (2)
4.3. Structured task assessment from each teacher and the scores are averaged then given a weight (3)
5.4. Summative tests as UAS scores are weighted (3)
6. The final NA is (participation value x 2) (assignment value x 3) (UTS value x 2) UAS value (3) divided by 10

		proteins and examples of oligomeric proteins 22. Quaternary structures make up oligomeric proteins 23. Explain the function of hemoglobin and myoglobin. 24. Explain sickle cell anemia and other disorders caused by gene mutations					
6							0%
7							0%
8	Midterm exam		Criteria: 1. The assessment is carried out on the following aspects: 2.1. Participation during lectures is carried out through observation (weight 2) 3.2. The subsummative test is carried out twice, assessing all relevant indicators through a written exam, averaging them and giving them a weight (2) 4.3. Structured task assessment from each teacher and the scores are averaged then given a weight (3) 5.4. Summative tests as UAS scores are weighted (3) 6. The final NA is (participation value x2) (assignment value x 3) (UTS value x 2) UAS value (3) divided by 10	Giving a Subsummative written test-1 2 X 50			0%

9	Understand the structure and function of enzymes	<p>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 5. Name the six groups of enzymes along with the groups they attack 6. Explain the mechanism of enzymatic reactions 7. Explain the Michaelis-Menten equation 8. Determine the values of Vmax and KM. 9. Explain the Lineweaver-Burk equation 10. Explain the factors that influence enzyme activity 11. Explain the process of enzyme inhibition by inhibitors along with a binding model 12. Explain multi enzyme systems with</p>	<p>Criteria:</p> <ol style="list-style-type: none"> 1. The assessment is carried out on the following aspects: <ol style="list-style-type: none"> 2.1. Participation during lectures is carried out through observation (weight 2) 3.2. The subsummative test is carried out twice, assessing all relevant indicators through a written exam, averaging them and giving them a weight (2) 4.3. Structured task assessment from each teacher and the scores are averaged then given a weight (3) 5.4. Summative tests as UAS scores are weighted (3) 6. The final NA is (participation value x 2) (assignment value x 3) (UTS value x 2) UAS value (3) divided by 10 	Studying material from the book requires questions and answers to 2 X 50 practice questions			0%
10							0%
11	Understand the structure and function of vitamins and minerals	<p>1. Name water-soluble vitamins 2. Name fat-soluble vitamins 3. Describe the structure of water-soluble vitamins 4. Describe the structure of fat-soluble vitamins. 5. Explain the role of vitamins in biological systems. 6. Name the minerals needed in the nutrition of both plants and animals. 7. Explain the role of minerals in enzyme function.</p>	<p>Criteria:</p> <ol style="list-style-type: none"> 1. The assessment is carried out on the following aspects: <ol style="list-style-type: none"> 2.1. Participation during lectures is carried out through observation (weight 2) 3.2. The subsummative test is carried out twice, assessing all relevant indicators through a written exam, averaging them and giving them a weight (2) 4.3. Structured task assessment from each teacher and the scores are averaged then given a weight (3) 5.4. Summative tests as UAS scores are weighted (3) 6. The final NA is (participation value x 2) (assignment value x 3) (UTS value x 2) UAS value (3) divided by 10 	Studying material from the book requires questions and answers to 2 X 50 practice questions			0%
12							0%

13	Understand the structure and function of nucleic acids	<p>1. Explain the nucleoside components of nucleotides. 2. Explain the main components of DNA and RNA nucleic acids; free nucleotides 3. Describe the structure of DNA and RNA nucleic acids; free nucleotides 4. Explain the nature of nucleic acids DNA RNA 5. Explain the nature of tRNA rRNA mRNA 6. Explain the relationship between transcription translation protein synthesis</p>	<p>Criteria:</p> <ol style="list-style-type: none"> 1. The assessment is carried out on the following aspects: <ol style="list-style-type: none"> 2.1. Participation during lectures is carried out through observation (weight 2) 3.2. The subsummative test is carried out twice, assessing all relevant indicators through a written exam, averaging them and giving them a weight (2) 4.3. Structured task assessment from each teacher and the scores are averaged then given a weight (3) 5.4. Summative tests as UAS scores are weighted (3) 6. The final NA is (participation value x2) (assignment value x 3) (UTS value x 2) UAS value (3) divided by 10 	Question and answer discussion reflection 2 X 50			0%
14	Understand the structure and function of lipids and bio-membranes	<p>1. Explain the structure of lipids. 2. Explain the function of lipids in biological systems. 3. Explain the main components of membranes. 4. Describe the fluid mosaic structure of membranes. 5. Explain the nature of the lipid bilayer in membranes. 6. Explain the function of membranes.</p>	<p>Criteria:</p> <ol style="list-style-type: none"> 1. The assessment is carried out on the following aspects: <ol style="list-style-type: none"> 2.1. Participation during lectures is carried out through observation (weight 2) 3.2. The subsummative test is carried out twice, assessing all relevant indicators through a written exam, averaging them and giving them a weight (2) 4.3. Structured task assessment from each teacher and the scores are averaged then given a weight (3) 5.4. Summative tests as UAS scores are weighted (3) 6. The final NA is (participation value x2) (assignment value x 3) (UTS value x 2) UAS value (3) divided by 10 	Questions and answers answering 2 X 50 practice questions			0%

15	Understand the structure and function of Hormones	Describe the role of each hormone in primary and secondary target hormones	Criteria: 1.The assessment is carried out on the following aspects: 2.1. Participation during lectures is carried out through observation (weight 2) 3.2. The subsummative test is carried out twice, assessing all relevant indicators through a written exam, averaging them and giving them a weight (2) 4.3. Structured task assessment from each teacher and the scores are averaged then given a weight (3) 5.4. Summative tests as UAS scores are weighted (3) 6.The final NA is (participation value x2) (assignment value x 3) (UTS value x 2) UAS value (3) divided by 10	Questions and answers answering 2 X 50 practice questions			0%
16	UAS		Criteria: 1.The assessment is carried out on the following aspects: 2.1. Participation during lectures is carried out through observation (weight 2) 3.2. The subsummative test is carried out twice, assessing all relevant indicators through a written exam, averaging them and giving them a weight (2) 4.3. Structured task assessment from each teacher and the scores are averaged then given a weight (3) 5.4. Summative tests as UAS scores are weighted (3) 6.The final NA is (participation value x2) (assignment value x 3) (UTS value x 2) UAS value (3) divided by 10	2 X 50			0%

Evaluation Percentage Recap: Project Based Learning

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.