



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

Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight	SEMESTER	Compilation Date																																																																																																																
General biology	4620103033		T=2 P=1 ECTS=4.77	1	July 17, 2024																																																																																																																
AUTHORIZATION	SP Developer		Course Cluster Coordinator		Study Program Coordinator																																																																																																																
	Dr. Yuliani, M.Si.		Dr. Yuliani, M.Si.		Dr. H. Sunu Kuntjoro, S.Si., M.Si.																																																																																																																
Learning model	Case Studies																																																																																																																				
Program Learning Outcomes (PLO)	PLO study program that is charged to the course																																																																																																																				
	PLO-6	Able to apply logical, critical, systematic and innovative thinking in the context of developing or implementing science and/or technology according to their field of expertise.																																																																																																																			
	Program Objectives (PO)																																																																																																																				
	PO - 1	Mastering basic concepts in biology, including Biology as knowledge, cell structure and function, cell division, metabolism including transport, photosynthesis and respiration, genetics, biodiversity, evolution, structure and function of plant and animal organs and tissue, ecology, microbial growth and development , biotechnology, and training to solve issues using scientific method (knowledge)																																																																																																																			
	PO - 2	Able to apply basic knowledge and skills in applying basic Biology concepts in solving issues on natural resources and environment in laboratory works (knowledge)																																																																																																																			
	PO - 3	Able to apply transferable skills in Biology to develop ecopreneurship (eco-innovation, eco-opportunity, eco-commitment) (Special competences)																																																																																																																			
	PO - 4	Able to work and be responsible both independently or in group in performing tasks related to Basic Biology (attitude)																																																																																																																			
	PLO-PO Matrix																																																																																																																				
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Short Course Description	Understand the basic concepts of Biology as a science, structure and function of cells, metabolism which includes transport, photosynthesis and respiration, genetics, diversity of living things and nomenclature, origins of life, evolution, structure and function of plant and animal organ tissues, ecology, organism behavior and biotechnology, and practice solving problems using scientific methods. General Biology studies are accompanied by various process skills (minds on activity and hands-on activity) which will be used to solve problems in the field of Biology and its applications. Learning is delivered using the case method, presentations, discussions and practicums																																																																																																																				
References	Main : <ol style="list-style-type: none"> 1. Campbell, Neil A, Jane B.Reece dan Lawrence G.Mitchell. 2003. Biologi . California: Benjamin Cummings. 2. Kimball, J.W. 1993. Biologi Jilid I, II, III . Edisi Kelima. Cetakan Kedua. Jakarta: Penerbit Erlangga. 3. Rachmadiarti, F.,Yuliani, Widowati B., Rinie P, Mahanani T.A,Dyah H.,Herlina F.2022 Biologi Umum . Surabaya: UNESA Press. 4. Luria. 1981. A View of Life . California: Benyamin Cumming. 5. Reece, J. B., Urry, L. A., Cain, M. L., Wasserman, S. A., Minorsky, P. V., & Jackson, R. B. 2014. Campbell biology (Vol. 9). Boston: Pearson. 6. Biggs,A.Hagins W.C.Holiday,W.G.2008.Biology.New York:McGraw-Hill 7. Morris, J., Hartl, D., Knoll, A., Lue, R., Michael, M. 2019. Biology: How Life Works Third edition. Freeman. 8. Clark, M.A., Choi, J., Douglas, M. 2018. Biology 2e. Openstax, RICE University. 																																																																																																																				
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	<ol style="list-style-type: none"> Salisbury, J.W. dan Ross. 1995. Fisiologi Tumbuhan. Bandung ITB Sadava, D.E., Hillis, D., Heller, H.C. 2012. Life: the Science of Biology. Freeman. Campbell, N.A., Reece, J., Urry, L.A., Cain, M.L., Wasserman, S.A., Minorsky, P.V. 2020. Campbell Biology 10 ed. Pearson. Fowler, S., Roush, R., Wise, J. 2017. Concepts of Biology. Openstax, RICE University 						
Supporting lecturer	Prof. Dr. Ir. Dyah Hariani, M.Si. Dra. Evie Ratnasari, M.Si. Dr. Nur Kuswanti, M.Sc.St. Prof. Dr. Mahanani Tri Asri, M.Si. Dr. Isnawati, M.Si. Ahmad Fudhaili, S.Si., M.Sc., Ph.D. Firas Khaleyla, S.Si., M.Si. Nur Anindya Syamsudi, S.Tr.Keb., M.Kes Farah Aisyah Nafidiastri, 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 steps of the scientific method in experimental research independently and honestly	<ol style="list-style-type: none"> 1. Explain the steps of the scientific method 2. Apply the steps of the scientific method in a simple experiment 3. Skilled in applying biological concepts in carrying out simple experiments 4. Demonstrate an honest and independent attitude during the learning process using observation instruments 5. Form: Written Test and Assignment Criteria: Indicators are achieved through assignments in independent and structured tasks	Criteria: <ol style="list-style-type: none"> 1. The assessment is carried out on the following aspects: 2. Participation during lectures is carried out through observing honest and independent attitudes. Student activities and responses during learning activities, especially practicals, are also assessed as participation, weight 20% 3. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 4. UTS weight 20% 5. US weight 30% 6. Essay questions are accessed jointly on UTS and US 7. Performance questions are integrated during learning Form of Assessment : Participatory Activities	Presentation discussion, practical activities/ case method trials 1. Pre-existing Material. The lecturer asks individual students to read references regarding scientific methods and their applications. 2. Activities in groups. The lecturer provides problem cases regarding the effects of water pollution on the survival of fish. Students carry out simple experiments to apply the steps of the scientific method. In this activity, students can develop ideas or thoughts to solve problems. Individual students in groups can express their opinions 3. Class Room Discussion Lecturers facilitate students to discuss in class, present the results obtained in groups. and classically obtained mass solutions and conclusions from the experiments carried out. Face to face: 2x50 minutes, Independent: 2x60 minutes, Structured: 2x60 minutes Making a practicum report, and Reading for the next meeting 3 X 50		Material: Biology as a science: Scientific method Problem formulation, hypothesis, research variables, operational definition of research variables, research design, research steps, References: Reece, JB, Urry, LA, Cain, ML, Wasserman, SA, Minorsky, PV, & Jackson, R.B. 2014. Campbell biology (Vol. 9). Boston: Pearson.	5%

2	Explain the structure of organism cells and relate them to their functions independently and honestly	<ol style="list-style-type: none"> 1. Describe the structure of cells 2. Explain the chemistry of life 3. Skilled in operating a microscope independently 4. Skilled in making observations with a microscope to compare plant and animal cells 5. Demonstrate an honest and independent attitude during the learning process using observation instruments 	<p>Criteria:</p> <ol style="list-style-type: none"> 1. The assessment is carried out on the following aspects: 2. Participation during lectures is carried out through observing honest and independent attitudes. Student activities and responses during learning activities, especially practicals, are also assessed as participation, weight 20% 3. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 4. UTS weight 20% 5. US weight 30% 6. Essay questions are accessed jointly on UTS and US 7. Performance questions are integrated during learning 8. Form: Written Test and Assignment <p>Criteria: Indicators are achieved through assignments in independent and structured tasks</p> <p>Forms of Assessment : Participatory Activities, Practical Assessment, Tests</p>	<p>Discussion, presentation, practical/experimental activities (3x50')</p> <p>Case method</p> <p>1. Pre existing Material. The lecturer asks students to individually read references about cells and organelles contained therein and their functions.</p> <p>2. Activities in groups. The lecturer provides problem cases regarding the structural differences between animal cells and plant cells. Students are asked to carry out simple experiments to prove the differences between animal and plant cells based on the references they have read. In this activity, students can develop ideas or thoughts to solve problems. Individual students in groups can express their opinions</p> <p>3. Class Room Discussion Lecturers facilitate students to discuss in class, present the results obtained in groups. and classically obtained problem solving and conclusions from the experiments carried out.</p> <p>Students make practical reports in independent assignments. 3 X 50</p>		<p>Material: • Cells: structure and function • Chemistry and Substances of Life</p> <p>References: <i>Rachmadiarti, F., Yuliani, Widowati B., Rinie P, Mahanani TA, Dyah H., Herlina F. 2022 General Biology. Surabaya: UNESA Press.</i></p>	5%
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3	Understand the concept of cell membranes and the stages of cell division	<ol style="list-style-type: none"> 1. Describe the cell membrane 2. Explain the stages of cell division 3. Skilled in carrying out practical activities like a drop of water in life 4. Demonstrate an honest and independent attitude during the learning process using observation instruments 	<p>Criteria:</p> <ol style="list-style-type: none"> 1. The assessment is carried out on the following aspects: 2. Participation during lectures is carried out through observing honest and independent attitudes. Student activities and responses during learning activities, especially practicals, are also assessed as participation, weight 20% 3. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 4. UTS weight 20% 5. US weight 30% 6. Essay questions are assessed jointly on UTS and US 7. Performance questions are integrated during learning 8. Form: Written Test and Assignment <p>Criteria: Indicators are achieved through assignments in independent and structured tasks</p> <p>Form of Assessment : Participatory Activities, Tests</p>	<p>Case method</p> <ol style="list-style-type: none"> 1. Pre-existing Material. The lecturer asks students to individually read references from books and journals regarding cell division and the mechanisms of mitosis and meiosis and their functions. This process is an assignment from the previous meeting which is reinforced by the lecturer. 2. Activities in groups. The lecturer gave a problem case regarding the differences in cell division mechanisms by mitosis and meiosis. Students are asked to provide their ideas and opinions based on the references they read. In this activity, students can develop ideas to solve problems. Individual students in groups can express their opinions 3. Class Room Discussion <p>Lecturers facilitate students to discuss in class, present the results obtained in groups, and classically obtained problem solving and conclusions from the activities carried out. Another activity for students in learning is carrying out practical activities on a drop of water in life, namely observing various aquatic organisms and practicing skills in using a microscope. Students make practical reports in independent assignments.</p> <p>3 X 50</p>	<p>Material: Cell division, Mitosis and Meiosis</p> <p>References: <i>Morris, J., Hartl, D., Knoll, A., Lue, R., Michael, M. 2019. Biology: How Life Works Third edition. Freeman.</i></p>	5%
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4	Distinguish between various types of cell transport used in everyday life independently and honestly	<ol style="list-style-type: none"> 1.Explain the concept of cell transport 2.Distinguish between passive and active transport 3.Skilled in carrying out practical activities observing cell plasmolysis 4.Demonstrate an honest and independent attitude during the learning process using observation instruments 	<p>Criteria:</p> <ol style="list-style-type: none"> 1.The assessment is carried out on the following aspects: 2.Participation during lectures is carried out through observing honest and independent attitudes. Student activities and responses during learning activities, especially practicals, are also assessed as participation, weight 20% 3. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 4. UTS weight 20% 5. US weight 30% 6.Essay questions are accessed jointly on UTS and US 7.Performance questions are integrated during learning 8.Form: Written Test and Assignment Criteria: Indicators are achieved through assignments in independent and structured tasks <p>Forms of Assessment : Participatory Activities, Practical Assessment, Tests</p>	<p>Case method</p> <ol style="list-style-type: none"> 1.Pre existing Material. The lecturer asks students to individually read references regarding cell transport, its mechanisms and functions. This process is an assignment from the previous meeting which is reinforced by the lecturer. 2. Activities in the group. The lecturer gives a problem case regarding the plasmolysis process that occurs in cells as a result of high solution concentrations outside the cell. Students are asked to carry out a simple experiment to prove plant cell plasmolysis based on the references they read. In this activity, students can develop ideas or thoughts to solve problems. Individual students in groups can express their opinions 3. Class Room Discussion Lecturers facilitate students to discuss in class, present the results obtained in groups. and classically obtained problem solving and conclusions from the experiments carried out. Students make practical reports in independent assignments. <p>3 X 50</p>	<p>Material: Metabolism, cell transport</p> <p>References: <i>Kimball, JW 1993. Biology Volumes I, II, III. Fifth Edition. Second printing. Jakarta: Erlangga Publishers.</i></p>	5%
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5	Understand the concept of photosynthesis and relate it to the physiological processes of plants and their benefits for other organisms independently and honestly	<ol style="list-style-type: none"> 1.Explain the concept of photosynthesis and relate it to the physiological processes of plants and its benefits for other organisms 2.Skilled in carrying out photosynthesis experimental activities 3.Demonstrate an honest and independent attitude during the learning process using the observation instrument sheet 	<p>Criteria:</p> <ol style="list-style-type: none"> 1.The assessment is carried out on the following aspects: 2.Participation during lectures is carried out through observing honest and independent attitudes. Student activities and responses during learning activities, especially practicals, are also assessed as participation, weight 20% 3. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 4. UTS weight 20% 5. US weight 30% 6.Essay questions are assessed jointly on UTS and US 7.Performance questions are integrated during learning 8.Form: Written Test and Assignment <p>Criteria: Indicators are achieved through assignments in independent and structured tasks</p> <p>Form of Assessment : Participatory Activities, Practical Assessment</p>	<p>Case method</p> <ol style="list-style-type: none"> 1.Pre existing Material. The lecturer asked students to individually read references regarding Photosynthesis, its mechanisms, influencing factors and functions. This process is an assignment from the previous meeting which is reinforced by the lecturer. 2. Activities in the group. The lecturer gave a problem case regarding the influence of light factors on the photosynthesis process. Students are asked to carry out simple experiments to prove photosynthesis in Elodea plants based on the references they have read. In this activity, students can develop ideas or thoughts to solve problems. Individual students in groups can express their opinions 3. Class Room Discussion <p>Lecturers facilitate students to discuss in class, present the results obtained in groups. and classically obtained problem solving and conclusions from the experiments carried out.</p> <p>Students make practical reports in independent assignments. 3 X 50</p>	<p>Material: Photosynthesis and factors that influence it</p> <p>Reference: Salisbury, JW and Ross. 1995. <i>Plant Physiology</i>. Bandung ITB</p>	5%
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6	Understand the concept of respiration and relate it to physiological processes and its benefits for other organisms independently and honestly	<ol style="list-style-type: none"> 1.Explain the concept of respiration and relate it to physiological processes and its benefits for other organisms 2.Skilled in carrying out respiration rate experimental activities 3.Demonstrate an honest and independent attitude during the learning process using the observation instrument sheet 	<p>Criteria:</p> <ol style="list-style-type: none"> 1.The assessment is carried out on the following aspects: 2.Participation during lectures is carried out through observing honest and independent attitudes. Student activities and responses during learning activities, especially practicals, are also assessed as participation, weight 20% 3. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 4. UTS weight 20% 5. US weight 30% 6.Essay questions are accessed jointly on UTS and US 7.Performance questions are integrated during learning 8.Form: Written Test and Assignment Criteria: Indicators are achieved through assignments in independent and structured tasks <p>Form of Assessment : Participatory Activities, Practical Assessment</p>	<p>Case method</p> <ol style="list-style-type: none"> 1.Pre existing Material. The lecturer asked students to individually read references regarding the concept of respiration and relate it to physiological processes and its benefits for other organisms. This process is an assignment from the previous meeting which is reinforced by the lecturer. 2. Activities in the group. The lecturer gave a problem case regarding the effect of biomass on the respiration rate. Students are asked to carry out a simple experiment to prove the rate of respiration in experimental animals based on the references they read. In this activity, students can develop ideas or thoughts to solve problems. Individual students in groups can express their opinions 3. Class Room Discussion Lecturers facilitate students to discuss in class, present the results obtained in groups. and classically obtained problem solving and conclusions from the experiments carried out. Students make practical reports in independent assignments. <p>3 X 50</p>		<p>Material: Respiration and Factors that Influence it</p> <p>References: <i>Fowler, S., Roush, R., Wise, J. 2017. Concepts of Biology. Openstax, RICE University</i></p>	5%
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7	Understand the concept of gene and chromosome structure, DNA, RNA, protein synthesis independently and honestly	<ul style="list-style-type: none"> · Describe the structure of genes and chromosomes and relate it to the mutation process in organisms · Differentiate the structure of DNA and RNA, and relate it to the DNA replication process · Explain the process of protein synthesis · Demonstrate an honest and independent attitude during the learning process using the observation instrument sheet 	<p>Criteria:</p> <ol style="list-style-type: none"> 1. The assessment is carried out on the following aspects: 2. Participation during lectures is carried out through observing honest and independent attitudes. Student activities and responses during learning activities, especially practicals, are also assessed as participation, weight 20% 3. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 4. UTS weight 20% 5. US weight 30% 6. Essay questions are assessed jointly on UTS and US 7. Performance questions are integrated during learning 8. Form: Written Test and Assignment <p>Criteria: Indicators are achieved through assignments in independent and structured tasks</p> <p>Form of Assessment : Participatory Activities, Practical Assessment</p>	<p>Presentation discussion The lecturer facilitates student-centered learning through group discussions and is responsible for discovering concepts (based on literature review) regarding genes and chromosomes, gene and chromosome structure in prokaryotes and eukaryotes, genetic expression, nucleic acids, protein synthesis guided by LKM. Students then present the results of their group work. The lecturer and students conclude the concept of genes and chromosomes. Students are asked to read references that will be used for the next meeting.</p> <p>The lecturer facilitates student-centered learning through group discussions and is responsible for finding concepts (based on literature review) regarding genes and chromosomes, the structure of genes and chromosomes. in prokaryotes and eukaryotes, genetic expression, nucleic acids, protein synthesis guided by LKM. Students then present the results of their group work. Lecturer and students conclude the concept of genes and chromosomes. Students are asked to read references that will be used for the next meeting 3 X 50</p>		<p>Material: 1. Genes and chromosomes 2. Structure of genes and chromosomes in prokaryotes and eukaryotes 3. Genetic expression 3. Nucleic acids 4. Protein synthesis</p> <p>Bibliography: <i>Campbell, Neil A, Jane B. Reece and Lawrence G. Mitchell. 2003. Biology. California: Benjamin Cummings.</i></p>	5%
8	Midterm exam	Skilled in applying basic Biological concepts and principles responsibly	<p>Criteria:</p> <ul style="list-style-type: none"> · UTS weight 20% <p>Form of Assessment : Participatory Activities, Tests</p>	2 X 50		<p>Material: Materials 1 to 7</p> <p>References: <i>Rachmadiarti, F., Yuliani, Widowati B., Rinie P, Mahanani TA, Dyah H., Herlina F. 2022 General Biology. Surabaya: UNESA Press.</i></p>	10%

9	Understand Mendel's laws and relate them to the process of inheritance of traits and the balance of gene frequencies in organisms independently and honestly	Describe Mendel's laws and relate them to the process of inheritance of traits and the balance of gene frequencies in organisms	<p>Criteria:</p> <ol style="list-style-type: none"> 1.The assessment is carried out on the following aspects: 2.Participation during lectures is carried out through observing honest and independent attitudes. Student activities and responses during learning activities, especially practicals, are also assessed as participation, weight 20% 3. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 4. UTS weight 20% 5. US weight 30% 6.Essay questions are accessed jointly on UTS and US 7.Performance questions are integrated during learning 8.Form: Written Test and Assignment <p>Criteria: Indicators are achieved through assignments in independent and structured tasks</p> <p>Form of Assessment : Participatory Activities, Practical Assessment</p>	Discussions and presentations Lecturers facilitate student-centered learning through group discussions and are responsible for discovering concepts (based on literature review) regarding Mendel's Laws, inheritance of traits and gene frequency balance guided by LKM. Students then present the results of their group work. Lecturer and students conclude the concept of Mendel's law. Students are asked to read references that will be used for the next meeting 3 X 50		<p>Material: Mendelian genetics and inheritance of traits</p> <p>References: <i>Clark, MA, Choi, J., Douglas, M. 2018. Biology 2e. Openstax, RICE University.</i></p>	5%
10	Distinguish between the theories of abiogenesis and biogenesis and understand genetic populations independently and honestly	<ol style="list-style-type: none"> 1.Distinguish between the theories of abiogenesis and biogenesis and understand population genetics 2.Demonstrate an honest and independent attitude during the learning process using the observation instrument sheet 	<p>Criteria:</p> <ol style="list-style-type: none"> 1.The assessment is carried out on the following aspects: 2.Participation during lectures is carried out through observing honest and independent attitudes. Student activities and responses during learning activities, especially practicals, are also assessed as participation, weight 20% 3. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 4. UTS weight 20% 5. US weight 30% 6.Essay questions are accessed jointly on UTS and US 7.Performance questions are integrated during learning 8.Form: Written Test and Assignment <p>Criteria: Indicators are achieved through assignments in independent and structured tasks</p> <p>Form of Assessment : Participatory Activities, Tests</p>	Discussion Presentation Lecturers facilitate student-centered learning through group discussions and are responsible for discovering concepts (based on literature review) regarding Biogenesis and abiogenesis (evolutionary theory). Students then present the results of their group work. Lecturer and students conclude the concept of evolution. Students are asked to read references that will be used for the next meeting 3 X 50		<p>Material: Evolution Origin of life Population Genetics</p> <p>Bibliography: <i>Campbell, Neil A, Jane B. Reece and Lawrence G. Mitchell. 2003. Biology. California: Benjamin Cummings.</i></p>	5%

11	Classify various living things based on a classification system independently and honestly	<ol style="list-style-type: none"> 1. Classify various living things based on a classification system 2. Explain the occurrence of variations 3. Skilled in creating dichotomous keys 4. Demonstrate an honest and independent attitude during the learning process using the observation instrument sheet 	<p>Criteria:</p> <ol style="list-style-type: none"> 1. The assessment is carried out on the following aspects: 2. Participation during lectures is carried out through observing honest and independent attitudes. Student activities and responses during learning activities, especially practicals, are also assessed as participation, weight 20% 3. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 4. UTS weight 20% 5. US weight 30% 6. Essay questions are assessed jointly on UTS and US 7. Performance questions are integrated during learning 8. Form: Written Test and Assignment Criteria: Indicators are achieved through assignments in independent and structured tasks <p>Forms of Assessment : Participatory Activities, Practical Assessment, Tests</p>	<p>Case method</p> <ol style="list-style-type: none"> 1. Pre-existing Material. The lecturer asks students to individually read references regarding the Classification of Living Creatures. This process is an assignment from the previous meeting which is reinforced by the lecturer. 2. Activities in groups. The lecturer provides problem cases regarding the classification of plants based on morphological characteristics. Students are asked to carry out a simple experiment to group types of plants that have the same characteristics using a dichotomous key based on the references they read. In this activity, students can develop ideas or thoughts to solve problems. Individual students in groups can express their opinions 3. Class Room Discussion Lecturers facilitate students to discuss in class, present the results obtained in groups. and classically obtained problem solving and conclusions from the experiments carried out. Students make practical reports in independent assignments. <p>3 X 50</p>		<p>Material: Diversity and Nomenclature - Classification Systems - Variations of Living Things - Key to the Dichotomy of Nomenclature: a. Binary system b. Rules for writing names</p> <p>Bibliography: <i>Rachmadiarti, F., Yuliani, Widowati B., Rinie P, Mahanani TA, Dyah H., Herlina F. 2022 General Biology. Surabaya: UNESA Press.</i></p>	5%
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12	Understand the structure of tissues and organs and relate their functions independently and honestly	Describe the structure of tissues and organs (plants and animals) and relate their functions	<p>Criteria:</p> <ol style="list-style-type: none"> 1.The assessment is carried out on the following aspects: 2.Participation during lectures is carried out through observing honest and independent attitudes. Student activities and responses during learning activities, especially practicals, are also assessed as participation, weight 20% 3. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 4. UTS weight 20% 5. US weight 30% 6.Essay questions are accessed jointly on UTS and US 7.Performance questions are integrated during learning 8.Form: Written Test and Assignment Criteria: Indicators are achieved through assignments in independent and structured tasks <p>Form of Assessment : Participatory Activities, Tests</p>	<p>Presentation. Observations, Discussions Lecturers facilitate student-centered learning through group discussions and are responsible for discovering concepts (based on literature review) regarding tissue and organ structure. Students then present the results of their group work. Lecturer and students conclude the concept of tissue and organ structure. Students are asked to read references that will be used for the next meeting 3 X 50</p>		<p>Material: Structure and function 1. Structure and function of animal tissues and organs 2. Structure and function of plant tissues and organs References: <i>Morris, J., Hartl, D., Knoll, A., Lue, R., Michael, M. 2019. Biology: How Life Works Third edition. Freeman.</i></p>	5%
13	Understand the concept of microbial growth and development and the influencing factors	Explain the growth and development of bacteria, viruses, fungi	<p>Criteria:</p> <ol style="list-style-type: none"> 1.The assessment is carried out on the following aspects: 2.Participation during lectures is carried out through observing honest and independent attitudes. Student activities and responses during learning activities, especially practicals, are also assessed as participation, weight 20% 3. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 4. UTS weight 20% 5. US weight 30% 6.Essay questions are accessed jointly on UTS and US 7.Performance questions are integrated during learning 8.Form: Written Test and Assignment Criteria: Indicators are achieved through assignments in independent and structured tasks <p>Form of Assessment : Participatory Activities, Tests</p>	<p>Presentation discussion Lecturers facilitate student-centered learning through group discussions and are responsible for discovering concepts (based on literature review) regarding microbial growth and development. Students then present the results of their group work. Lecturer and students conclude the concept of microbial growth. Students are asked to read references that will be used for the next meeting 3 X 50</p>		<p>Material: Growth and Development of microbes (structure, properties and function) • Bacteria • Fungi • Viruses References: <i>Kimball, JW 1993. Biology Volumes I, II, III. Fifth Edition. Second printing. Jakarta: Erlangga Publishers.</i></p>	5%

14	Understand ecological concepts and apply them in daily life independently and honestly	<ol style="list-style-type: none"> 1.Explain about ecology 2.carry out research related to ecosystems, 3.communicate the results of investigations and apply them in everyday life. 4.Demonstrate an honest and independent attitude during the learning process using the observation instrument sheet 	<p>Criteria:</p> <ol style="list-style-type: none"> 1.The assessment is carried out on the following aspects: 2.Participation during lectures is carried out through observing honest and independent attitudes. Student activities and responses during learning activities, especially practicals, are also assessed as participation, weight 20% 3. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 4. UTS weight 20% 5. US weight 30% 6.Essay questions are accessed jointly on UTS and US 7.Performance questions are integrated during learning 8.Form: Written Test Assignment Criteria: Indicators achieved through assignments in independent and structured tasks <p>Form of Assessment : Participatory Activities, Practical Assessment</p>	<p>Case method</p> <ol style="list-style-type: none"> 1.Pre existing Material. The lecturer asks students to individually read references regarding the concept of Ecology. This process is an assignment from the previous meeting which is reinforced by the lecturer. 2. Activities in the group. The lecturer provides problem cases regarding the analysis of plant vegetation and their interaction patterns. Students are asked to carry out simple experiments to analyze vegetation around the biological garden based on the references they have read. In this activity, students can develop ideas or thoughts to solve problems. Individual students in groups can express their opinions 3. Class Room Discussion Lecturers facilitate students to discuss in class, present the results obtained in groups. and classically obtained problem solving and conclusions from the experiments carried out. <p>3 X 50</p>		<p>Material: Ecology 1. Individuals to ecosystems 2. Energy flow, 3. interaction patterns References: <i>Reece, JB, Urry, LA, Cain, ML, Wasserman, SA, Minorsky, PV, & Jackson, RB 2014. Campbell biology (Vol 9). Boston: Pearson.</i></p>	5%
15	Understand biotechnology and apply it in daily life independently and honestly	<ol style="list-style-type: none"> 1.distinguish between traditional and modern biotechnology 2.apply biotechnology in everyday life 3.Demonstrate an honest and independent attitude during the learning process using the observation instrument sheet 	<p>Criteria:</p> <ol style="list-style-type: none"> 1.The assessment is carried out on the following aspects: 2.Participation during lectures is carried out through observing honest and independent attitudes. Student activities and responses during learning activities, especially practicals, are also assessed as participation, weight 20% 3. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 4. UTS weight 20% 5. US weight 30% 6.Essay questions are accessed jointly on UTS and US 7.Performance questions are integrated during learning 8.Form: Written Test and Assignment Criteria: Indicators are achieved through assignments in independent and structured tasks <p>Form of Assessment : Participatory Activities</p>	<p>presentation discussion Lecturers facilitate student-centered learning through group discussions and are responsible for discovering concepts (based on literature review) regarding Biotechnology. Students then present the results of their group work. Lecturers and students summarize traditional and modern biotechnology concepts. 3 X 50</p>		<p>Material: Biotechnology a. Traditional Biotechnology b. Modern Biotechnology c. Biotechnology Applications Library: <i>Rachmadiarti, F., Yuliani, Widowati B., Rinie P, Mahanani TA, Dyah H., Herlina F. 2022 General Biology. Surabaya: UNESA Press.</i></p>	10%

16		Skilled in applying basic Biological concepts and principles responsibly	Criteria: · US weight 30% Form of Assessment : Participatory Activities, Tests	UAS 3 X 50		Material: material 9 to 15 References: <i>Rachmadiarti, F., Yuliani, Widowati B., Rinie P, Mahanani TA, Dyah H., Herlina F. 2022 General Biology. Surabaya: UNESA Press.</i>	15%
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Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
1.	Participatory Activities	55.01%
2.	Practical Assessment	17.51%
3.	Test	27.51%
		100%

Notes

- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- Forms of assessment:** test and non-test.
- 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.
- 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.
- Learning materials** are details or descriptions of study materials which can be presented in the form of several main points and sub-topics.
- 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%.
- TM=Face to face, PT=Structured assignments, BM=Independent study.