



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

Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date																																																																																																																																							
Developmental Biology and Tropical Biodiversity	1234502008	Compulsory Study Program Subjects	T=3	P=0	ECTS=6.72	1	April 28, 2023																																																																																																																																							
AUTHORIZATION		SP Developer	Course Cluster Coordinator			Study Program Coordinator																																																																																																																																								
		Dr. Novita Kartika Indah, S.Pd., M.Si.	Dr. Widowati Budijasturi, M.Si.			Prof. Dr. Yuliani, M.Si.																																																																																																																																								
Learning model	Project Based Learning																																																																																																																																													
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	PO - 1	Able to make discoveries in determining the biodiversity of animals adapted to the surrounding environment																																																																																																																																												
	PO - 2	Able to develop LKPD/LKS topics about the development and biodiversity of animals from the surrounding environment																																																																																																																																												
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	PO - 5	Able to conclude the evolution of tropical plant biodiversity																																																																																																																																												
	PO - 6	Able to complete project assignments regarding the development of tools based on discoveries about biodiversity in the surrounding environment																																																																																																																																												
	PLO-PO Matrix																																																																																																																																													
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Short Course Description	Studying advanced developmental biology in the structure of morphology, anatomy and embryonic development in the diversity of tropical animals and plants in Indonesia and their ability to interact in tropical habitats and their kinship relationships																																																																																																																																													
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	<ol style="list-style-type: none"> 1. Abdul, S.A, Amin Setyo Leksono, & Sun Kee Hong. 2022. Conserving Biocultural Landscapes in Malaysia and Indonesia for Sustainable Development. Springer. 2. Hitoshi et al. 2017. Sexual Reproduction in animal and plant 3. Supriatna, Jatna. 2018. Konservasi Biodiversitas. Jakarta: Yayasan Obor Indonesia. 4. Graham, Linda E. & Lee W. Wilcox. 2000. Algae. USA: Prentice- Hall. Inc. 																																																																																																																																													
Supporting lecturer	Dr. Widowati Budijastuti, M.Si. Dr. Novita Kartika Indah, S.Pd., 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	Able to analyze differences in the anatomical and embryological development of hydra and Sea Urchin	1.Summarizes the anatomical and embryological development of Hydra 2.Summarizes the anatomical and embryological development of the Sea Urchin	Criteria: 1.Participation Activities 2.Quiz Form of Assessment : Participatory Activities, Tests	Activities in groups. The lecturer provides problem cases regarding the role of hydras and sea urchins in life. Apart from that, it analyzes the development of both in Indonesian local wisdom. Students explore the references obtained to answer the various roles of organisms in biological products. In this activity, students can develop ideas to solve problems. Individual students in their groups can express their opinions. Lecturers facilitate students to discuss in class, present the results obtained in groups. Finally, students can classically conclude today's activities. Students are then asked to read further references. 2x50		Material: Development of Hydra anatomy and embryology Reader: <i>Scott F Gilbert. 2010. Developmental Biology Seventh edition. Sinauer.</i>	5%
2	Able to write scientific papers on the development of anatomy and embryology of worms/caterpillars/snails and their benefits for science and technology and society	Analyzing the results of scientific research on the development of anatomy and embryology of worms/caterpillars/snails and their benefits for science and technology and society. Trying out experimental activities on the embryological development of invertebrate animals	Criteria: 1.Student activities and responses during learning activities are assessed as PARTICIPATION, weight 20% 2.Assessment of project results Forms of Assessment : Participatory Activities, Project Results Assessment / Product Assessment	Activities in groups. The lecturer gives a project assignment on the growth and development of worms/caterpillars/snails. Apart from that, analyze its development. In this activity, students can develop ideas about the interaction of worms/caterpillars/snails with their environment. Individual students in their groups can express their opinions. Lecturers facilitate students to discuss in class, present the results obtained in groups. Finally, students can classically conclude today's activities. Students are then asked to read further references. 2 X 50		Material: Development of Hydra anatomy and embryology Reader: <i>Scott F Gilbert. 2010. Developmental Biology Seventh edition. Sinauer.</i>	20%
3	Able to write scientific papers on the development of anatomy and embryology of worms/caterpillars/snails and their benefits for science and technology and society	Analyzing the results of scientific research on the development of anatomy and embryology of worms/caterpillars/snails and their benefits for science and technology and society. Trying out experimental activities on the embryological development of invertebrate animals	Criteria: 1.Participation Activities 2.Project Results Assessment Forms of Assessment : Participatory Activities, Project Results Assessment / Product Assessment, Portfolio Assessment, Tests	Activities in groups. The lecturer gives a project assignment on the growth and development of worms/caterpillars/snails. Apart from that, analyze its development. In this activity, students can write articles about the interaction of worms/caterpillars/snails with their environment. Students individually write down the results of their projects so they can practice writing articles according to the data. Lecturers facilitate students to discuss in class, present the results obtained in groups. Finally, students can classically conclude today's activities. Students are then asked to read further references. 2 X 50		Material: Development of anatomy and embryology of worms/caterpillars/snails Reference: <i>Scott F Gilbert. 2010. Developmental Biology Seventh edition. Sinauer.</i>	14%

4	Able to write scientific papers on the development of anatomy and embryology of worms/caterpillars/snails and their benefits for science and technology and society	Analyzing the results of scientific research on the development of anatomy and embryology of worms/caterpillars/snails and their benefits for science and technology and society. Testing experimental activities on the embryological development of invertebrate animals	Criteria: 1. Practical reports and products are assessed as ASSIGNMENTS with a weight of 5% 2. Student activities and responses during learning activities are assessed as PARTICIPATION with a weight of 20%, Forms of Assessment : Participatory Activities, Project Results Assessment / Product Assessment, Practical Assessment	Activities in groups. The lecturer gives a project assignment on the growth and development of worms/caterpillars/snails. Apart from that, analyze its development. In this activity, students can write project results in the form of articles. Lecturers facilitate students to discuss in class, present the results obtained in groups. Finally, students can classically conclude today's activities. Students are then asked to read further references. 2 X 50		Material: Development of anatomy and embryology of worms/caterpillars/snails Reference: Scott F Gilbert. 2010. <i>Developmental Biology Seventh edition.</i> Sinauer.	5%
5	1. Able to analyze the development of tetrapod limbs from marketable tropical animals 2. Able to write scientific papers on the development of anatomy and embryology of worms/caterpillars/snails and their benefits for science and technology and society	1. Summarize the process of development of frog limbs 2. Summarizes the process of morphological, anatomical and embryological development in tropical vertebrate animals	Criteria: 1. Participation Activities 2. Student activities and responses during learning activities, especially practicums, are assessed as PARTICIPATION with a weight of 20% Forms of Assessment : Participatory Activities, Project Results Assessment / Product Assessment	Activities in groups. The lecturer gave a project assignment to analyze the development of tetrapods. In this activity, students can write down ideas and thoughts about tetrapods that can be developed for sale. Lecturers facilitate students to discuss in class, present the results obtained in groups. Finally, students can classically conclude today's activity regarding tetrapods that are worth buying and selling. Students are then asked to read further references. 2 X 50		Material: Development of anatomy and embryology of worms/caterpillars/snails and their benefits for science and technology and society. Reference: Warner A Mueller. 2012. <i>Development and reproduction.</i> Springer.	5%
6	Able to make discoveries in determining the biodiversity of animals adapted to the surrounding environment	1. Identifying the potential diversity of tropical animals adapted for cultivation and marketability M 2. Develop potential animal products adapted to cultivation techniques and marketability	Criteria: Student activities and responses during learning activities, especially practicums, are assessed as PARTICIPATION with a weight of 20% Form of Assessment : Project Results Assessment / Product Assessment	Experiment 3 X 50		Material: embryological development of invertebrate animals. Reference: Warner A Mueller. 2012. <i>Development and reproduction.</i> Springer.	5%
7	Able to make discoveries in determining the biodiversity of animals adapted to the surrounding environment	1. Identifying the potential diversity of tropical animals adapted for cultivation and marketability 2. Develop potential animal products adapted to cultivation techniques and marketability	Criteria: 1. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30%, 2. Student activities and responses during learning activities, especially practicums, are assessed as PARTICIPATION with a weight of 20% Form of Assessment : Project Results Assessment / Product Assessment	Activities in groups. The lecturer gives the task of analyzing discoveries, identifying and determining the biodiversity of animals adapted to the surrounding environment. In this activity, students can write down ideas about animals that are adapted to the surrounding environment. Lecturers facilitate students to discuss in class, present the results obtained in groups. Finally, students can classically conclude today's activity regarding tetrapods that are worth buying and selling. Students are then asked to read further references. 2 X 50	3 X 50	Material: Development of frog limbs. Reference: Warner A Mueller. 2012. <i>Development and reproduction.</i> Springer.	5%
8	1. Midterm exam 2. and an explanation of the project task, namely developing learning tools based on practicum results	1. LKM plans that are in accordance with biodiversity observation activities 2. results of observations of biodiversity activities and animal development	Criteria: assessment of article results and observations of biodiversity and animal development Form of Assessment : Project Results Assessment / Product Assessment, Test	1. make a plan 2. make a LKM design resulting from practicum activities 3. make a RPS design 4. Present the design results 5. Evaluate the LKM and RPS results of development and reflect on deficiencies 3 X 50		Material: animal development Bibliography: Scott F Gilbert. 2010. <i>Developmental Biology Seventh edition.</i> Sinauer. Material: development and entrepreneurship process of cultivating local animals/plants Reference: Hitoshi et al. 2017. <i>Sexual Reproduction in animals and plants.</i> Springer. Material: invertebrate zoological potential. Reader: Barnes. 2010. <i>Invertebrate Zoology.</i> McGraw Hill.	5%

9	Developing topics on animal development and tropical biodiversity adapted to the environment as learning tools that instill a sense of love for the country	Able to present topics and steps for topic activities in LKPD/LKS with the theme of development and diversity of tropical animals	<p>Criteria:</p> <ol style="list-style-type: none"> 1. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30%, 2. Student activities and responses during learning activities, especially practicums, are assessed as PARTICIPATION with a weight of 20% <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	Continue creating LKM and 3 X 50 assessment tools		<p>Material: development of morphology, anatomy and embryology in tropical vertebrate animals.</p> <p>Reference: Warner A Mueller. 2012. <i>Development and reproduction</i>. Springer.</p>	5%
10	<ol style="list-style-type: none"> 1. Understanding the diversity of algae 2. Understanding the diversity of mosses 	<ol style="list-style-type: none"> 1. Explain the differences in algae divisions in tropical areas. 2. Explain the life cycle of algae divisions 3. Explain the development of algae 4. Analyze the algae around us 	<p>Criteria:</p> <ol style="list-style-type: none"> 1. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30%, 2. Student activities and responses during learning activities, especially practicums, are assessed as PARTICIPATION, weight 20% <p>Forms of Assessment : Participatory Activities, Project Results Assessment / Product Assessment</p>	<p>Student activities in groups are reviewing articles about algae in East Java. The lecturer provides problem cases regarding the role of Rhodophyta and Phaeophyta in life. Apart from that, it analyzes the development of both in Indonesian local wisdom. Students explore the references obtained to answer the various roles of organisms in biological products. In this activity, students can develop ideas to solve problems. Individual students in their groups can express their opinions. Lecturers facilitate students to discuss in class, present the results obtained in groups. Finally, students can classically conclude today's activities. Students are then asked to read further references.</p> <p>2 X 50</p>		<p>Material: Algae and Moss</p> <p>Reference: Andreas W. Ebert and Johannes MM Engels. 2021. <i>Plant Biodiversity and Genetic Resources</i>. MDPI. St. Alban-Anlage 66 4052 Basel, Switzerland</p>	5%
11	Understanding the diversity of tropical ferns	<ol style="list-style-type: none"> 1. Make a table of differences between fern divisions 2. Explain the interaction of nails with the surrounding community 	<p>Criteria:</p> <ol style="list-style-type: none"> 1. PARTICIPATION Activities 2. Project Results Assessment <p>Forms of Assessment : Participatory Activities, Project Results Assessment / Product Assessment</p>	<p>Activities in groups. The lecturer gave an article about moss regarding its role in life. Apart from that, it analyzes the diversity of moss in everyday life. Students explore the references obtained to answer the various roles of moss in biological products. In this activity, students can develop ideas to solve problems. Individual students in their groups can express their opinions. Lecturers facilitate students to discuss in class, present the results obtained in groups. Finally, students can classically conclude today's activities. Students are then asked to read further references.</p> <p>2 X 50</p>		<p>Material: Pteridophyta and their relatives</p> <p>References: Andreas W. Ebert and Johannes MM Engels. 2021. <i>Plant Biodiversity and Genetic Resources</i>. MDPI. St. Alban-Anlage 66 4052 Basel, Switzerland</p>	5%
12	Understanding the diversity of spermatophyta	Write a short article about selected Gymnosperms based on the journals found	<p>Criteria:</p> <ol style="list-style-type: none"> 1. Activity PARTICIPATION weight 2. Project Results Assessment <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	<p>Activities in groups. The lecturer asked students to explore ferns and their role in life in their area. Apart from that, analyzing Pteridophyta in Indonesian local wisdom. In this activity, students can develop ideas to solve problems. Individual students in their groups can express their opinions. Lecturers facilitate students to discuss in class, present the results obtained in groups. Finally, students can classically conclude today's activities. Students are then asked to read further references.</p> <p>2X 50</p>		<p>Material: Gymnosperms</p> <p>Bibliography: Andreas W. Ebert and Johannes MM Engels. 2021. <i>Plant Biodiversity and Genetic Resources</i>. MDPI. St. Alban-Anlage 66 4052 Basel, Switzerland</p>	5%

13	Understanding the diversity of spermatophyta	Communicating the diversity of Gymnosperms	Criteria: Project Results Assessment Form of Assessment : Project Results Assessment / Product Assessment	Activities in groups. The lecturer asked students to explore gymnosperms and their role in life in their area. Apart from that, analyzing Gymnosperms in Indonesian local wisdom. In this activity, students can develop ideas for developing Gymnospermae products. Individual students in their groups can express their opinions. Lecturers facilitate students to discuss in class, present the results obtained in groups. Finally, students can classically conclude today's activities. Students are then asked to read further references. 3 X 50			5%
14	Understanding the diversity of spermatophyta	Writing articles on the diversity of selected Angiosperms	Criteria: USS weight 20% Form of Assessment : Project Results Assessment / Product Assessment	Activities in groups. The lecturer asked students to explore Angiosperms and their role in life in their area. Apart from that, analyzing Angiosperms in Indonesian local wisdom. In this activity, students can develop ideas for developing Angiospermae products. Individual students in their groups can express their opinions. Lecturers facilitate students to discuss in class, present the results obtained in groups. Finally, students can classically conclude today's activities. Students are then asked to read further references. 2 X 50		Material: Conservation Literature: <i>Supriatna, Jatna. 2018. Biodiversity Conservation. Jakarta: Indonesian Obor Foundation.</i>	5%
15	1. Understanding the diversity of spermatophyta 2. Putting forward the idea of conserving Indonesia's useful plants 3. Designing an article about the relationship between plants and local wisdom	1. Communicating the diversity of Angiosperms 2. Putting forward the idea of conserving Indonesia's useful plants	Criteria: 1. Student activities and responses during learning activities, especially practicums, are assessed as PARTICIPATION with a weight of 20%, 2. USS weight 20%, Forms of Assessment : Participatory Activities, Project Results Assessment / Product Assessment	Activities in groups. The lecturer asks students to write articles about Angiosperms and their role in life in their area. This article is based on the results of analysis of Angiosperms in Indonesian local wisdom. In this activity, students can develop ideas for writing Angiosperms. Individual students in their groups can express their opinions. Lecturers facilitate students to discuss in class, present the results obtained in groups. Finally, students can classically conclude today's activities. Students are then asked to read further references to make LKPD about Angiosperms. 3 X 50		Material: Diversity of Indonesian useful spermatophytes and conservation, References: <i>Supriatna, Jatna. 2018. Biodiversity Conservation. Jakarta: Indonesian Obor Foundation.</i>	5%
16	Final exams		Criteria: Final exams Form of Assessment : Project Results Assessment / Product Assessment, Test	Final Semester Exam (offline) 2 X 50			0%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	27.67%
2.	Project Results Assessment / Product Assessment	57.67%
3.	Portfolio Assessment	3.5%
4.	Practical Assessment	1.67%
5.	Test	8.5%
		99.01%

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.

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.