



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																																																
Environmental Microbiology*	4620102132		T=2	P=0	ECTS=3.18	7	July 18, 2024																																																
AUTHORIZATION	SP Developer		Course Cluster Coordinator			Study Program Coordinator																																																	
			Dr. H. Sunu Kuntjoro, S.Si., 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																																																						
		P.O																																																					
Short Course Description	This course examines the application of microbiology concepts to the environment which includes microbiological analysis of environmental quality, monitoring environmental quality based on microbial diversity, the role of microbes in biotransformation, biodegradation, bioremediation, biomining, and the function of microbes as bioindicators, biopesticides. This course is presented in theoretical and practical form.																																																						
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="16" style="text-align: center;">PO Matrix at the end of each learning stage (Sub-PO)</td> </tr> <tr> <td style="width: 5%;"></td> <td colspan="15" style="text-align: center;">Week</td> </tr> <tr> <td style="text-align: center;">P.O</td> <td style="text-align: center;">1</td> <td style="text-align: center;">2</td> <td style="text-align: center;">3</td> <td style="text-align: center;">4</td> <td style="text-align: center;">5</td> <td style="text-align: center;">6</td> <td style="text-align: center;">7</td> <td style="text-align: center;">8</td> <td style="text-align: center;">9</td> <td style="text-align: center;">10</td> <td style="text-align: center;">11</td> <td style="text-align: center;">12</td> <td style="text-align: center;">13</td> <td style="text-align: center;">14</td> <td style="text-align: center;">15</td> <td style="text-align: center;">16</td> </tr> </table>							PO Matrix at the end of each learning stage (Sub-PO)																	Week															P.O	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
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P.O	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16																																							
References	Main : 1. Hogg, S. 2005. Essential Microbiology . John Wiley & Sons. Chichester. 2. Laskin, A.I. 2003. Advances in Applied Microbiology . Elsevier. UK. 3. Madigan, M.T., J.M. Martinko, D.A. Stahl, dan D.P. Clark. 2012. Biology of Microorganism . Pearson. Boston. 4. Mitchell, R. dan J.D. Gu. 2010. Environmental Microbiology . Wiley-Blackwell. New Jersey 5. Tortora, G.J., B.R. Funke dan C.L. Case. 2007. Microbiology An Introduction . Addison Wesley Longman, Inc. San Fransisco. Supporters:																																																						
Supporting lecturer	MUSLIMIN IBRAHIM Prof. Dr. Mahanani Tri Asri, M.Si. Guntur Trimulyono, S.Si., M.Sc. Lisa Lisdiana, S.Si., M.Si., Ph.D. Dr. Pramita Yakub, S.Pd., M.Pd.																																																						
Week-	Final abilities of each learning stage (Sub-PO)	Evaluation		Help Learning, Learning methods, Student Assignments, [Estimated time]		Learning materials [References]	Assessment Weight (%)																																																
		Indicator	Criteria & Form	Offline (offline)	Online (online)																																																		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)																																																

1	Understand the scope of environmental microbiology	<ol style="list-style-type: none"> 1.Explain the scope of environmental microbiology 2.Identifying the position of microbes in soil habitat 3.Identifying the position of microbes in freshwater habitats 4.Identifying the position of microbes in seawater habitats 	<p>Criteria:</p> <ol style="list-style-type: none"> 1.Practical reports and products are assessed as assignments with a weight of 30% 2.USS weight 20% 3.Student activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20% 4.US weight 30% <p>Form of Assessment : Participatory Activities</p>	Presentation and discussion 2 X 50			5%
2	Understand the field of study in soil microbiology.	<ol style="list-style-type: none"> 1.Identify specific microbes in the soil 2.Explain the carbon cycle 	<p>Criteria:</p> <ol style="list-style-type: none"> 1.Practical reports and products are assessed as assignments with a weight of 30% 2.USS weight 20% 3.Student activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20% 4.US weight 30% <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	Presentation and discussion 2 X 50			5%
3	Understand the field of study in soil microbiology.	<ol style="list-style-type: none"> 1.Explain the nitrogen cycle 2.Explain the phosphate cycle 	<p>Criteria:</p> <ol style="list-style-type: none"> 1.Practical reports and products are assessed as assignments with a weight of 30% 2.USS weight 20% 3.Student activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20% 4.US weight 30% <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	Presentation and discussion 2 X 50			5%

4	Understand the field of study in aquatic microbiology	Explain the living needs of aquatic microbes	<p>Criteria:</p> <ol style="list-style-type: none"> 1. Practical reports and products are assessed as assignments with a weight of 30% 2. USS weight 20% 3. Student activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20% 4. US weight 30% <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	Presentation and discussion 2 X 50			5%
5	Understand the field of study in aquatic microbiology	Identifying specific microbes in freshwater waters	<p>Criteria:</p> <ol style="list-style-type: none"> 1. Practical reports and products are assessed as assignments with a weight of 30% 2. USS weight 20% 3. Student activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20% 4. US weight 30% <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	Presentation and discussion 2 X 50			5%
6	Understand the field of study in aquatic microbiology	Identifying specific microbes in seawater	<p>Criteria:</p> <ol style="list-style-type: none"> 1. Practical reports and products are assessed as assignments with a weight of 30% 2. USS weight 20% 3. Student activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20% 4. US weight 30% <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	Presentation and discussion 2 X 50			5%

7	Understand methods of detection and isolation of microbes from the environment	<ol style="list-style-type: none"> 1. Identify methods for detecting and isolating microbes from soil samples 2. Identify methods for detecting and isolating microbes from water samples 3. Skilled in isolating microbes from soil and water samples 	<p>Criteria:</p> <ol style="list-style-type: none"> 1. Practical reports and products are assessed as assignments with a weight of 30% 2. USS weight 20% 3. Students' activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20% 4. US weight 30% <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	Presentation and discussion Practice 2 X 50		5%
8	U.S.S	U.S.S	<p>Criteria:</p> <ol style="list-style-type: none"> 1. Practical reports and products are assessed as assignments with a weight of 30% 2. USS weight 20% 3. Student activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20% 4. US weight 30% <p>Form of Assessment : Participatory Activities, Project Results Assessment / Product Assessment</p>	Giving written test USS 1 2 X 50		15%
9	Understand environmental quality analysis methods with microbial parameters	<ol style="list-style-type: none"> 1. Explain the position of microbes in environmental quality analysis 2. Identify soil quality analysis methods with soil microbial diversity parameters 3. Identify methods for analyzing soil quality with parameters for the number of water microbes 4. Skilled in analyzing environmental quality with microbial parameters 	<p>Criteria:</p> <ol style="list-style-type: none"> 1. Practical reports and products are assessed as assignments with a weight of 30% 2. USS weight 20% 3. Student activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20% 4. US weight 30% <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	Presentation and discussion Practice 2 X 50		5%

10	Understand the role of microbes in the environment	Explain the role of microbes in the biotransformation process	Criteria: 1. Practical reports and products are assessed as assignments with a weight of 30% 2. USS weight 20% 3. Student activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20% 4. US weight 30% Form of Assessment : Project Results Assessment / Product Assessment	Presentation and discussion 2 X 50			5%
11	Understand the role of microbes in the environment	Explain the role of microbes in the biodegradation and bioremediation processes	Criteria: 1. Practical reports and products are assessed as assignments with a weight of 30% 2. USS weight 20% 3. Student activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20% 4. US weight 30% Form of Assessment : Project Results Assessment / Product Assessment	Presentation and discussion 2 X 50			5%
12	Understand the role of microbes in the environment	Explain the role of microbes in the biomining process	Criteria: 1. Practical reports and products are assessed as assignments with a weight of 30% 2. USS weight 20% 3. Student activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20% 4. US weight 30% Form of Assessment : Participatory Activities	Presentation and discussion 2 X 50			5%

13	Understand the role of microbes in the environment	Explain the role of microbes as bioindicators	Criteria: 1. Practical reports and products are assessed as assignments with a weight of 30% 2. USS weight 20% 3. Student activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20% 4. US weight 30% Form of Assessment : Project Results Assessment / Product Assessment	Presentation and discussion 2 X 50			5%
14	Understand the role of microbes in the environment	Explain the role of microbes as biosensors	Criteria: 1. Practical reports and products are assessed as assignments with a weight of 30% 2. USS weight 20% 3. Student activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20% 4. US weight 30% Form of Assessment : Participatory Activities	Presentation and discussion 2 X 50			5%
15	Understand the role of microbes in the environment	Explain the role of microbes as biopesticides	Criteria: 1. Practical reports and products are assessed as assignments with a weight of 30% 2. USS weight 20% 3. Student activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20% 4. US weight 30% Form of Assessment : Participatory Activities	Presentation and discussion 2 X 50			10%
16			Form of Assessment : Participatory Activities				10%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	42.5%
2.	Project Results Assessment / Product Assessment	57.5%
		100%

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 Small Group Discussion, 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.