



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																																																																																																				
Microbiology	4720102143	Study Program Elective Courses	T=2	P=0	ECTS=3.18	4	August 21, 2023																																																																																																				
AUTHORIZATION		SP Developer	Course Cluster Coordinator			Study Program Coordinator																																																																																																					
		Prof. Dr. Rudiana Agustini, M.Pd	Prof. Dr. Rudiana Agustini, M.Pd			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)																																																																																																										
	PO - 1	Mastering concepts about structure, function, distribution patterns and the role of microorganisms as well as examples related to the fields of environment, health, foodstuffs, industry, agriculture and chemistry																																																																																																									
	PO - 2	Able to solve science, technology and art problems in the general field of chemistry and within a simple scope and have skills in isolating and identifying enzymes, proteins and DNA from various sources as well as applying relevant technology																																																																																																									
	PO - 3	Mastering techniques or methods for making media for microbial growth, isolation, purification of bacteria and identification of microbes (colony shape, cell shape, gram staining, response to oxygen) from various sources, and application of relevant technology																																																																																																									
	PO - 4	Able to show a cooperative attitude																																																																																																									
	PLO-PO Matrix																																																																																																										
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PO Matrix at the end of each learning stage (Sub-PO)																																																																																																											
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Short Course Description	Study of structure, function, distribution patterns and microorganisms as well as examples related to the fields of environment, health, foodstuffs, industry, agriculture and chemistry as well as skills in isolating and identifying microbes from various sources. The study was carried out through discussions, presentations and practicums																																																																																																										
References	Main :																																																																																																										
	<ol style="list-style-type: none"> 1. Pelczar, Michael, 1986.Dasar-dasar Mikrobiologi(terjemahan) Jilid 1 dan 2, Jakarta: UI-Press 2. Mitchel R. , and Gu Ji-Dong, 2010, Enviromental Microbiology, second edition, A John Wiley & Sons, Inc. publication, New Jersey 3. Brock, D. Thomas, 1994.Biology of Microorganism, seventh ed. London: Prentice-Hall International Inc. 4. Seckbach J. and Oren A. , 2010, Microbial Mats Modern and Ancient Microorganisms in Stratified Systems, Springer Dordrecht Heidelberg London New York 4. Hadioetomo Ratna Siri, 1990.Mikrobiologi Dasar dalam Praktek, Teknik dan Prosedur Dasar Laboratorium. Jakarta: Gramedia. 																																																																																																										

	Supporters:						
Supporting lecturer	Prof. Dr. Hj. Rudiana Agustini, M.Pd. Dr. Prima Retno Wikandari, M.Si. Prof. Dr. Nuniek Herdyastuti, 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 history of the development of microbiology, the scope and direction of current development. Understand structure and function: bacteria fungi algae protozoa and viruses Understand microbial genetics	1.Explain the history of the development of microbiology 2.Explain the scope of microbiology 3.Explain the role of microbiology	Form of Assessment : Participatory Activities, Project Results Assessment / Product Assessment	Lectures, questions and answers, answers to 2 X 50 practice questions		Material: history of the development of microbiology 2. Explaining the scope of microbiology Explaining the role of microbiology 3. Explaining the direction of current development of microbiology Reference: <i>Pelczar, Michael, 1986. Basics of Microbiology (translation) Volumes 1 and 2, Jakarta: UI-Press</i>	5%
2	Understand the structure and role: bacteria, fungi, algae, protozoa and viruses	1.Explain the structure of bacteria 2.Explain the role of bacteria in life 3.Explain the structure of fungi 4.Explain the role of fungi in life 5.Explain the structure of algae	Criteria: Criteria: Participation with a weight of 20%; Performance assessment is carried out in an integrated manner with learning Form of Assessment : Participatory Activities	Presentation and discussion 2 X 50	Group assignments are related to the structure and function of bacteria, fungi and algae	Material: structure and role: bacteria fungi algae protozoa and viruses Reference: <i>Pelczar, Michael, 1986. Basics of Microbiology (translation) Volumes 1 and 2, Jakarta: UI-Press</i>	5%
3	Understand the structure and role: bacteria, fungi, algae, protozoa and viruses	1.Explain the structure of protozoa 2.Explain the role of protozoa in life 3.Explain the structure of viruses	Form of Assessment : Participatory Activities	Presentation and discussion 2 X 50	Group assignments related to protozoa and viruses	Material: structure and role: bacteria, fungi, algae, protozoa and viruses. Reference: <i>Brock, D. Thomas, 1994. Biology of Microorganisms, seventh ed. London: Prentice-Hall International Inc. 4. Seckbach J. and Oren A., 2010, Microbial Mats Modern and Ancient Microorganisms in Stratified Systems, Springer Dordrecht Heidelberg London New York</i>	5%

4	Understand media and how to make media for microbial growth	1.Explain nutritional requirements 2. Explain types of bacterial nutrition 3. Explain bacteriological media 4. Explain how to make liquid media and solid media 2.Explain the types of bacterial nutrition 3.Explain bacteriological media	Form of Assessment : Participatory Activities	Presentation and discussion 2 X 50	The group assignment is related to media and how to make microbial growth media	Material: media and methods of making media for microbial growth. Reference: <i>Pelczar, Michael, 1986. Basics of Microbiology (translation) Volumes 1 and 2, Jakarta: UI-Press</i>	7%
5	Understanding the isolation of microbes from various sources (groundwater and air)	1. Create a microbial growth medium 2. Can isolate microbes from water 3. Can isolate microbes from soil 4. Can isolate microbes from the air	Form of Assessment : Participatory Activities, Practical Assessment	Practical Discussion 2 X 50	Study material related to how to make media for microbial growth	Material: Isolation of microbes from various sources (groundwater and air) References: <i>Pelczar, Michael, 1986. Basics of Microbiology (translation) Volumes 1 and 2, Jakarta: UI-Press</i>	6%
6	Understanding the isolation of microbes from various sources (groundwater and air)	1. Isolate microbes from water 2. Isolate microbes from soil	Form of Assessment : Participatory Activities, Practical Assessment	Study material from the mandatory book Practical questions and answers 2 X 50		Material: Isolation of microbes from various sources (groundwater and air) References: <i>Pelczar, Michael, 1986. Basics of Microbiology (translation) Volumes 1 and 2, Jakarta: UI-Press</i>	6%
7		1. Study material related to how to make media for microbial growth 2. Carrying out bacterial purification	Form of Assessment : Participatory Activities, Practical Assessment	Practical Discussion 2 X 50	Study material related to how to make media for microbial growth	Material: how to purify bacteria and identify them (colony shape, gram staining cell shape, response to oxygen) References: <i>Pelczar, Michael, 1986. Basics of Microbiology (translation) Volumes 1 and 2, Jakarta: UI-Press</i>	7%
8	Sub summative exam		Form of Assessment : Test	Giving a 2 X 50 Sub-summative written test			10%

9	Understanding microbial genetics	Explain the nature of genetic material in microbes	Form of Assessment : Participatory Activities	Case method 2 X 50	Study material related to microbial genetics	Material: microbial genetics References: <i>Brock, D. Thomas, 1994. Biology of Microorganisms, seventh ed. London: Prentice-Hall International Inc. 4. Seckbach J. and Oren A., 2010, Microbial Mats Modern and Ancient Microorganisms in Stratified Systems, Springer Dordrecht Heidelberg London New York</i>	7%
10	Understand the concept of metabolism	<ol style="list-style-type: none"> 1.Explain the process of energy change 2.Explain oxidation and energy production 3.Explain energy production through anaerobic processes 4.Explain fermentation 5.Explain energy production through aerobic processes 6.Explain energy production through photosynthesis 7.Explain the mechanism of ATP synthesis 	Form of Assessment : Participatory Activities, Project Results Assessment / Product Assessment	Case method 2 X 50	Study material related to microbial genetics	Material: metabolic concept Reference: <i>Pelczar, Michael, 1986. Basics of Microbiology (translation) Volumes 1 and 2, Jakarta: UI-Press</i>	7%
11	Understand the microbial control process	<ol style="list-style-type: none"> 1.Explain the basics of controlling microorganisms 2. 3. Explain how to control microorganisms with chemicals 2.Explain how to physically control microorganisms 	Form of Assessment : Participatory Activities, Project Results Assessment / Product Assessment	Case method 2 X 50	Study material related to microbial control		5%

12	Understand environmental microbiology and health	<ol style="list-style-type: none"> 1. Describe the normal microbiota of the human body 6. Explain host resistance and immunity 7. Explain the diagnostic application of antigen antibody reactions 2. Explain host and parasite interactions 3. Explain antibodies 4. Explain the structure of antigens 5. Explain host resistance and immunity 6. Explain the diagnostic application of antigen antibody reactions 	Form of Assessment : Participatory Activities, Project Results Assessment / Product Assessment	Case method 2 X 50	Study material related to environmental microbiology	Material: environmental microbiology and health Reference: <i>Pelczar, Michael, 1986. Basics of Microbiology (translation) Volumes 1 and 2, Jakarta: UI-Press</i>	5%
13	Understand industrial microbiology	<ol style="list-style-type: none"> 1. Explain the role of microorganisms in industry. Name industrial products that use microorganisms 2. Name industrial products that utilize bacteria 	Form of Assessment : Participatory Activities, Project Results Assessment / Product Assessment	Case method 2 X 50	Study material related to industrial, mining and petroleum microbiology	Material: industrial microbiology Reference: <i>Brock, D. Thomas, 1994. Biology of Microorganisms, seventh ed. London: Prentice-Hall International Inc. 4. Seckbach J. and Oren A., 2010, Microbial Mats Modern and Ancient Microorganisms in Stratified Systems, Springer Dordrecht Heidelberg London New York</i>	5%
14	Understanding food microbiology	<ol style="list-style-type: none"> 1. Explain the importance of microorganisms in food 2. Explain the microbial flora in foodstuffs 3. Explain the control of microorganisms in foodstuffs 4. Explain how to examine food ingredients microbiologically 	Form of Assessment : Participatory Activities, Project Results Assessment / Product Assessment	Case method 2 X 50	Study material related to food microbiology	Material: food microbiology Reference: <i>Brock, D. Thomas, 1994. Biology of Microorganisms, seventh ed. London: Prentice-Hall International Inc. 4. Seckbach J. and Oren A., 2010, Microbial Mats Modern and Ancient Microorganisms in Stratified Systems, Springer Dordrecht Heidelberg London New York</i>	5%

15	Understand mining and petroleum microbiology	1.Explain the role of microorganisms in mining 2.Explain the role of microorganisms in petroleum	Form of Assessment : Participatory Activities	Case method 2 X 50	Study material related to mining and petroleum microbiology	Material: mining and petroleum microbiology Reference: <i>Brock, D. Thomas, 1994. Biology of Microorganisms, seventh ed. London: Prentice-Hall International Inc. 4. Seckbach J. and Oren A., 2010, Microbial Mats Modern and Ancient Microorganisms in Stratified Systems, Springer Dordrecht Heidelberg London New York</i>	5%
16	UAS		Form of Assessment : Test	2 X 50			10%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	54.5%
2.	Project Results Assessment / Product Assessment	16%
3.	Practical Assessment	9.5%
4.	Test	20%
		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** abilities in the process and student learning outcomes are specific and measurable statements that identify the abilities 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.