



Universitas Negeri Surabaya
Faculty of Mathematics and Natural Sciences
Master of Science Education Study Program

Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight	SEMESTER	Compilation Date																																																		
Biological Science Study IV	8410103073		T=3 P=0 ECTS=6.72	3	July 18, 2024																																																		
AUTHORIZATION	SP Developer		Course Cluster Coordinator		Study Program Coordinator																																																		
		Dr. Eko Hariyono, S.Pd., M.Pd.																																																		
Learning model	Case Studies																																																						
Program Learning Outcomes (PLO)	PLO study program that is charged to the course																																																						
	Program Objectives (PO)																																																						
	PLO-PO Matrix																																																						
		<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="width: 100px; height: 30px;">P.O</td> </tr> </table>					P.O																																																
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	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td colspan="17" style="text-align: center;">PO Matrix at the end of each learning stage (Sub-PO)</td> </tr> <tr> <td rowspan="2" style="width: 50px; height: 30px;">P.O</td> <td colspan="16" style="text-align: center;">Week</td> </tr> <tr> <td style="width: 20px;">1</td> <td style="width: 20px;">2</td> <td style="width: 20px;">3</td> <td style="width: 20px;">4</td> <td style="width: 20px;">5</td> <td style="width: 20px;">6</td> <td style="width: 20px;">7</td> <td style="width: 20px;">8</td> <td style="width: 20px;">9</td> <td style="width: 20px;">10</td> <td style="width: 20px;">11</td> <td style="width: 20px;">12</td> <td style="width: 20px;">13</td> <td style="width: 20px;">14</td> <td style="width: 20px;">15</td> <td style="width: 20px;">16</td> </tr> </table>					PO Matrix at the end of each learning stage (Sub-PO)																	P.O	Week																1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
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Short Course Description	The course examines the molecular review of genetic material, including: structure and organization of genetic material, reproduction of genetic material, work of genetic material, transfer of genetic material, changes in genetic material, control of the expression of genetic material, engineering of genetic material, equilibrium of genetic material in populations, Lectures presented in the form of a literature review assignment, presenting the results of the review in the colloquium forum																																																						
References	Main :																																																						
	<ol style="list-style-type: none"> 1. Ibrahim Muslimin. 2018. Materi Genetik: Tinjauan pada Level Molekul, Surabaya: Joudar Press 2. Brandenberg, Oliver, Sensi Alessandra, Ghos, Kakoli, Sonnini, Andrea. 2011. Introduction of Molecular Biology and Genetics Engineering. Rome: Food and Agriculture Organization of The United Nation Rome. 3. Ekinici, Deniz (ed).2015. Biotechnology. In Tech Has Received Trustes 4. Lyons, Robert H. Molecular Biology Glossary. Michigan: Michigan University 5. Scheleif, Robert F. 1993. Genetics and Molecular Biology- 2nd Edition. Baltimore: AddisonWesley Publishing Company 																																																						
	Supporters:																																																						
Supporting lecturer	MUSLIMIN IBRAHIM																																																						
Week-	Final abilities of each learning stage (Sub-PO)	Evaluation		Help Learning, Learning methods, Student Assignments, [Estimated time]		Learning materials [References]	Assesment Weight (%)																																																
		Indicator	Criteria & Form	Offline (offline)	Online (online)																																																		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)																																																

1	<p>Understand the lecture linkup Molecular review of genetic material Understand the concept of genetic material Understand the structure and organization of genetic material</p>	<p>Explain the scope of the Biology IV lecture, namely a molecular review of genetic material, explain the meaning, examples and role of genetic material, explain the structure and hierarchical organization of genetic material in prokaryotes and eukaryotes</p>	<p>Criteria: 1.Participation weight 20% 2.Duty weight 30% 3.UTS Weight 30% 4.UAS weight 30% 5.All values are averaged for each component then multiplied by weight, summed for the 4 components divided by 10</p>	<p>Presentations, discussions and assignments 3 X 50</p>		0%
2	<p>Understand the concept of reproduction of genetic material</p>	<p>Explaining the meaning of reproduction of material Sequencing the stages and mechanisms of reproduction of genetic material Identifying the molecules involved in the reproduction of genetic material Identifying the enzymes involved in the reproduction of genetic material and their functions Explaining with examples the meaning and examples of terms related to the reproduction of genetic material such as replication, origin, heterocatalyst, sense band, antisense band, leading strands, lagging strands, okazaki fragments, replication fork, anti-parallel</p>	<p>Criteria: 1.Participation weight 20% 2.Duty weight 30% 3.UTS Weight 30% 4.UAS weight 30% 5.All values are averaged for each component then multiplied by weight, summed for the 4 components divided by 10</p>	<p>Presentations, discussions and assignments 3 X 50</p>		0%
3	<p>Understand the concept of reproduction of genetic material</p>	<p>Explaining the meaning of reproduction of material Sequencing the stages and mechanisms of reproduction of genetic material Identifying the molecules involved in the reproduction of genetic material Identifying the enzymes involved in the reproduction of genetic material and their functions Explaining with examples the meaning and examples of terms related to the reproduction of genetic material such as replication, origin, heterocatalyst, sense band, antisense band, leading strands, lagging strands, okazaki fragments, replication fork, anti-parallel</p>	<p>Criteria: 1.Participation weight 20% 2.Duty weight 30% 3.UTS Weight 30% 4.UAS weight 30% 5.All values are averaged for each component then multiplied by weight, summed for the 4 components divided by 10</p>	<p>Presentations, discussions and assignments 3 X 50</p>		0%

4	Understand the mechanism of action of genetic material	<ol style="list-style-type: none"> 1.Explain the meaning of the health function of genetic material 2.Explain the relationship between the work of genetic material and the coordinating function of cells by genetic material 3.Explains the steps of the central dogma, which include transcription and translation 4.Comparing the process and results of protein synthesis in prokaryotes and eukaryotes 	<p>Criteria:</p> <ol style="list-style-type: none"> 1.Participation weight 20% 2.Duty weight 30% 3.UTS Weight 30% 4.UAS weight 30% 5.All values are averaged for each component then multiplied by weight, summed for the 4 components divided by 10 	Assignments, presentations and discussions 3 X 50			0%
5	Understand the mechanism of action of genetic material	<ol style="list-style-type: none"> 1.Explain the meaning of the health function of genetic material 2.Explain the relationship between the work of genetic material and the coordinating function of cells by genetic material 3.Explains the steps of the central dogma, which include transcription and translation 4.Comparing the process and results of protein synthesis in prokaryotes and eukaryotes 	<p>Criteria:</p> <ol style="list-style-type: none"> 1.Participation weight 20% 2.Duty weight 30% 3.UTS Weight 30% 4.UAS weight 30% 5.All values are averaged for each component then multiplied by weight, summed for the 4 components divided by 10 	Assignments, presentations and discussions 3 X 50			0%

6	Understand the concept and mechanism of change in genetic material	<ol style="list-style-type: none"> 1.Explain the meaning of changes in genetic material (mutations) 2.Explain with examples the various types of mutations in genetic material 3.Explaining mechanisms at the molecular level of changes in genetic material 4.Comparing the mechanisms and impacts of silent, nonsense, missense, point, frameshift mutations 5.Explaining the mechanism of mutation in several mutagens with a molecular explanation 	<p>Criteria:</p> <ol style="list-style-type: none"> 1.Participation weight 20% 2.Duty weight 30% 3.UTS Weight 30% 4.UAS weight 30% 5.All values are averaged for each component then multiplied by weight, summed for the 4 components divided by 10 	Assignments, presentations and discussions 6 X 50			0%
7	Understand the concept and mechanism of change in genetic material	<ol style="list-style-type: none"> 1.Explain the meaning of changes in genetic material (mutations) 2.Explain with examples the various types of mutations in genetic material 3.Explaining mechanisms at the molecular level of changes in genetic material 4.Comparing the mechanisms and impacts of silent, nonsense, missense, point, frameshift mutations 5.Explaining the mechanism of mutation in several mutagens with a molecular explanation 	<p>Criteria:</p> <ol style="list-style-type: none"> 1.Participation weight 20% 2.Duty weight 30% 3.UTS Weight 30% 4.UAS weight 30% 5.All values are averaged for each component then multiplied by weight, summed for the 4 components divided by 10 	Assignments, presentations and discussions 6 X 50			0%

8	KA meeting 1st. 7	Meeting indicators 1 to 1. 7	Criteria: 1.Participation weight 20% 2.Duty weight 30% 3.UTS Weight 30% 4.UAS weight 30% 5.All values are averaged for each component then multiplied by weight, summed for the 4 components divided by 10	Written test 3 X 50			0%
9	Understand the concept and mechanism of transfer of genetic material	1.Explain the meaning of transfer of genetic material 2.Explain the types and mechanisms of transfer of genetic material (conjugation, transformation and transduction) 3.Explain the role of the transfer of genetic material for living things	Criteria: 1.Participation weight 20% 2.Duty weight 30% 3.UTS Weight 30% 4.UAS weight 30% 5.All values are averaged for each component then multiplied by weight, summed for the 4 components divided by 10	Assignments, presentations and discussions 3 X 50			0%
10	Understand the concept and mechanism of transfer of genetic material	1.Explain the meaning of transfer of genetic material 2.Explain the types and mechanisms of transfer of genetic material (conjugation, transformation and transduction) 3.Explain the role of the transfer of genetic material for living things	Criteria: 1.Participation weight 20% 2.Duty weight 30% 3.UTS Weight 30% 4.UAS weight 30% 5.All values are averaged for each component then multiplied by weight, summed for the 4 components divided by 10	Assignments, presentations and discussions 3 X 50			0%
11	Control of the expression of genetic material	1.Explain the meaning of operon 2.Explain the components of operons and their functions (lac operon, Trp operon, etc.) 3.Explain the mechanisms controlling gene expression (operons, feedback mechanisms, allosteric enzymes)	Criteria: 1.Participation weight 20% 2.Duty weight 30% 3.UTS Weight 30% 4.UAS weight 30% 5.All values are averaged for each component then multiplied by weight, summed for the 4 components divided by 10	Assignments, presentations and discussions 3 X 50			0%

12	Understand the concept of genetic material engineering	Explains the process and genetic therapy	Criteria: 1.Participation weight 20% 2.Duty weight 30% 3.UTS Weight 30% 4.UAS weight 30% 5.All values are averaged for each component then multiplied by weight, summed for the 4 components divided by 10	3 X 50 assignments and presentations			0%
13	Understand the concepts and implications of genetic material engineering	Explain the supporting technology that allows the enrichment of genetic material to be carried out (biological scissors, biological glue, conjugation, gene sequencing, PCR, electrophoresis, etc.)	Criteria: 1.Participation weight 20% 2.Duty weight 30% 3.UTS Weight 30% 4.UAS weight 30% 5.All values are averaged for each component then multiplied by weight, summed for the 4 components divided by 10	Presentations, assignments and discussions 3 X 50			0%
14	Understand the concepts and implications of genetic material engineering	1.Explain the meaning of genetic material engineering 2.Explain recombinant DNA technology 3.Explain the gene cloning process 4.Explain the process of engineering genetic material in plants and animals 5.Explains the concept and examples of applications of genetic engineering in plants and animals 6.Explain the impact of genetic engineering in the fields of environment, religion, economics, defense 7.Explain d=DNA fingerprint	Criteria: 1.Participation weight 20% 2.Duty weight 30% 3.UTS Weight 30% 4.UAS weight 30% 5.All values are averaged for each component then multiplied by weight, summed for the 4 components divided by 10	Assignments, presentations, discussions 3 X 50			0%

15	Understand the concept of population genetics	<ol style="list-style-type: none"> 1.Explain the meaning of population genetics 2.Explain Hardy Weinberg's law 3.Explain the meaning of gene frequency, genotype, phenotype, allele 4.Explain the requirements for the application of Hardy Weinberg's law 5.Solving gene equilibrium problems based on a given particular case 	Criteria: <ol style="list-style-type: none"> 1.Participation weight 20% 2.Duty weight 30% 3.UTS Weight 30% 4.UAS weight 30% 5.All values are averaged for each component then multiplied by weight, summed for the 4 components divided by 10 	Assignment, solving questions about population genetics 3 X 50			0%
16							0%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
		0%

Notes

1. **Learning Outcomes of Study Program Graduates (PLO - Study Program)** are the abilities possessed by each Study Program graduate which are the internalization of attitudes, mastery of knowledge and skills according to the level of their study program obtained through the learning process.
2. **The PLO imposed on courses** are several learning outcomes of study program graduates (CPL-Study Program) which are used for the formation/development of a course consisting of aspects of attitude, general skills, special skills and knowledge.
3. **Program Objectives (PO)** are abilities that are specifically described from the PLO assigned to a course, and are specific to the study material or learning materials for that course.
4. **Subject Sub-PO (Sub-PO)** is a capability that is specifically described from the PO that can be measured or observed and is the final ability that is planned at each learning stage, and is specific to the learning material of the course.
5. **Indicators for assessing** ability in the process and student learning outcomes are specific and measurable statements that identify the ability or performance of student learning outcomes accompanied by evidence.
6. **Assessment Criteria** are benchmarks used as a measure or measure of learning achievement in assessments based on predetermined indicators. Assessment criteria are guidelines for assessors so that assessments are consistent and unbiased. Criteria can be quantitative or qualitative.
7. **Forms of assessment:** test and non-test.
8. **Forms of learning:** Lecture, Response, Tutorial, Seminar or equivalent, Practicum, Studio Practice, Workshop Practice, Field Practice, Research, Community Service and/or other equivalent forms of learning.
9. **Learning Methods:** Small Group Discussion, Role-Play & Simulation, Discovery Learning, Self-Directed Learning, Cooperative Learning, Collaborative Learning, Contextual Learning, Project Based Learning, and other equivalent methods.
10. **Learning materials** are details or descriptions of study materials which can be presented in the form of several main points and sub-topics.
11. **The assessment weight** is the percentage of assessment of each sub-PO achievement whose size is proportional to the level of difficulty of achieving that sub-PO, and the total is 100%.
12. TM=Face to face, PT=Structured assignments, BM=Independent study.