



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
Molecular Genetics	1234502011	Compulsory Study Program Subjects	T=2 P=0 ECTS=4.48	2	July 17, 2024
AUTHORIZATION	SP Developer		Course Cluster Coordinator		Study Program Coordinator
	Lisa Lisdiana, Ph.D.		Dr. Isnawati, M.Si.		Prof. Dr. Yuliani, M.Si.

Learning model	Case Studies
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Program Learning Outcomes (PLO)	PLO study program that is charged to the course																																																																																																																							
PLO-6	Able to show a responsible attitude towards work in their field of expertise by paying attention to academic ethics in carrying out their professional duties, and able to embody the character of faith, intelligence, independence, honesty, caring and toughness in daily behavior.																																																																																																																							
PLO-7	Applying the concept of eduecopreneurship based on local wisdom and having a leadership spirit to support community independence in the era of the Industrial Revolution.																																																																																																																							
	Program Objectives (PO)																																																																																																																							
PO - 1	CPMK 1: Mastering the theory and concepts related to molecular genetics and the process of molecular analysis and their application for various purposes																																																																																																																							
PO - 2	CPMK 2: Have a line of thinking and skills to make recommendations in the application of molecular genetics and its analysis in various areas of daily life																																																																																																																							
PO - 3	CPMK3: Have the ability to organize ideas, thoughts and scientific arguments responsibly in the field of molecular genetics and communicate them to the academic community and the wider community globally																																																																																																																							
PO - 4	CPMK 4: Developing the concept of bioecopreneurship in the field of molecular genetics																																																																																																																							
PO - 5	CPMK 5: Have a responsible, objective attitude, pay attention to ethics in applying concepts and analysis results related to molecular genetics																																																																																																																							
	PLO-PO Matrix																																																																																																																							
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Short Course Description	This course examines the basics of recombinant DNA technology, gene libraries, cloning vectors, PCR methods, DNA sequencing, and other molecular analysis, as well as transgenic organisms and the pros and cons of their use. Apart from that, it also discusses the implementation of genomics and biomolecules which supports strengthening the concept of utilizing natural resources based on local wisdom to improve life skills as a basis for laying the spirit of bioecopreneurship. This course is presented in theory and assignments.
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References	Main :
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1. Allison, L. 2007. *Fundamental Molecular Biology*. Blackwell Publishing. Oxford.
2. Kar, D.K., Halder, S. 2019. *Cell Biology, Genetics and Molecular Biology*. New Central Book Agency.
3. Lodish, H., Berk, A., Matsudaira, P., Kaiser, C.A., Krieger, M., Scott, M.P., Zipursky, L., Darnell, J. 2004. *Molecular Cell Biology*. W.H. Freeman. Boston.
4. Primrose, S.B. and R.M. Twyman. 2006. *Principles of Gene Manipulation and Genomics*. Blackwell Publishing. Oxford.
5. Yuwono, T. 2006. *Biologi Molekuler*. Penerbit Erlangga. Jakarta.

Supporters:

Supporting lecturer Dr. Isnawati, M.Si.
Lisa Lisdiana, S.Si., M.Si., Ph.D.

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	Analyze the history and scope of molecular genetics	1.Analyzing the historical development of the field of molecular genetics 2.Explain the scope of the field of molecular genetics		Presentation and discussion of the history and scope of molecular genetics 2 X 50		Material: Scope, history and development of the field of Molecular Genetics. References: <i>Allison, L. 2007. Fundamentals of Molecular Biology. Blackwell Publishing. Oxford.</i>	0%
2	Analyze nucleic acids and their role in cells	1.Analyzing DNA and RNA 2.Give examples of the role of DNA and RNA in cells		Presentation and discussion of nucleic acids and their role in 2 X 50 cells		Material: Structure of DNA and RNA, and their role in cells References: <i>Kar, DK, Halder, S. 2019. Cell Biology, Genetics and Molecular Biology. New Central Book Agency.</i>	0%
3	Analyze the structure and function of the genome and its relationship to certain genetic disorders	1.Analyze the structure and function of the genome 2.Describes changes in chromosomes that cause certain genetic disorders		Visiting the web for online lectures Presentation and discussion of genome structure and function (2 x 50 minutes) 2 X 50			0%
4	Analyzing central dogma	1.Analyzing central dogma 2.Analyze transcription and translation processes 3.Explain genetic disorders that can arise due to errors in the transcription process		Visiting the web for online lectures Discussing central dogma and genetic disorders that can arise due to errors in the transcription process (2x50 minutes) 2 X 50			0%
5	Mastering gene identification methods	1.Explains the process of identifying genes to detect certain genetic disorders 2.Explains the process of identifying genes for the detection of certain diseases		Visiting the web for online lectures Observing and discussing learning videos on gene identification methods (2x50 minutes) 2 X 50			0%

6	Analyze the basics of recombinant DNA technology	<ol style="list-style-type: none"> 1. Analyze the history of the development of recombinant DNA technology 2. Explain the basics of recombinant DNA technology 3. Provide examples of the results of recombinant technology 		<p>Visit the website for online lectures Observe and discuss learning videos on the basics of recombinant DNA technology (2x50 minutes) 2 X 50</p>			0%
7	Able to compile gene libraries and cloning vectors	<ol style="list-style-type: none"> 1. Analyzing gene libraries (gene libraries) 2. Explain the criteria for cloning vectors 		<p>Visiting the web for online lectures Observing and discussing learning videos on gene libraries and cloning vectors (2x50 minutes) 2 X 50</p>			0%
8	Midterm exam			2 X 50			0%
9	Analyzing PCR and DNA sequencing methods	<ol style="list-style-type: none"> 1. Analyze the principles of PCR and DNA sequencing methods 2. Explain the steps in the PCR and DNA sequencing methods 3. Provide examples of various PCR and DNA sequencing methods, as well as their applications in everyday life 		<p>Visiting the website for online lectures Observing learning videos on the PCR method and DNA sequencing Discussing the application of molecular analysis techniques using the PCR method and DNA sequencing in everyday life (2x50 minutes) 2 X 50</p>			0%
10	Identify molecular analysis techniques and their applications in everyday life	<ol style="list-style-type: none"> 1. Analyze analytical techniques in the field of molecular genetics 2. Explain the application of molecular analysis techniques in everyday life 		<p>Visiting the web for online lectures Observing learning videos on molecular analysis techniques Discussing the application of molecular analysis techniques in everyday life (2x50 minutes) 2 X 50</p>			0%
11	Analyzing transgenic organisms and the pros and cons of their use.	<ol style="list-style-type: none"> 1. Describe transgenic organisms 2. Analyze the pros and cons related to the use of transgenic organisms 		<p>Visiting the web for online lectures Presentation and discussion of transgenic organisms and the pros and cons of their use (2x50 minutes) 2 X 50</p>			0%
12	Identifying the implementation of genomics and biomolecules as a basis for utilizing natural resources based on local wisdom	<ol style="list-style-type: none"> 1. Describe the implementation of genomics and biomolecular studies in the field of biosystematics 2. Describes the implementation of genomics and biomolecular studies to understand evolutionary processes 		<p>Visiting the web for online lectures Presentation and discussion of the implementation of genomics and biomolecules as a basis for utilizing natural resources based on local wisdom (2x50 minutes) 2 X 50</p>			0%
13	Implementing knowledge in the field of genomics and biomolecules as a basis for responsible use of natural resources based on local wisdom	<ol style="list-style-type: none"> 1. Explain the role of knowledge about genomics and molecular biology for the utilization of natural resources based on local wisdom 2. Exemplifying the use of natural resources based on local wisdom with the implementation of knowledge about genomics and molecular biology 		<p>Visiting the web for online lectures Discussion and presentation on the role of knowledge about genomics and molecular biology for the utilization of natural resources based on local wisdom (2x50 minutes) 2 X 50</p>			0%

14	Designing bioecopreneurship activities in the field of molecular genetics	1.Describing molecular genetics from a bioecopreneurship perspective 2.Exemplifying the prospects of bioecopreneurship in the field of molecular genetics		Visiting the web for online lectures Discussion of molecular genetics from a bioecopreneurship perspective (2x50 minutes) 2 X 50			0%
15	Designing bioecopreneurship activities in the field of molecular genetics	Designing a start-up in the field of molecular genetics		Visiting the web for online lectures Communicating/presenting start-up plans in the field of molecular genetics (2x50 minutes) 2 X 50			0%
16	Final exams			2 X 50			0%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
		0%

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.