	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
Molecular Biology	4620102028		T=2	P=0	ECTS=3.18	4	July 17, 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

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

Short Course Description	Study the development of molecular biology, the structural relationships and roles of nuclear DNA molecules holistically starting from the function of DNA as an initiator to a regulator of all metabolic function mechanisms comprehensively with every phenotypic phenomenon that can be seen and felt. Examining gene expression related to transcription, translation and expression control at the molecular level in prokaryotes and eukaryotes; DNA replication mechanisms; gene regulatory mechanisms; extrachromosomal DNA; proteomics and genomics; and applications of molecular biology in various fields of life through theoretical studies and assignments.
References	**Main :**

1. Allison, Lizabeth. 2007. Fundamental Molecular Biology . Blackwell Publishing. Oxford.
2. Lodish, H., A. Berk, P. Matsudaira, C.A. Kaiser, M. Krieger, M.P. Scott, L. Zipursky, and J. Darnell. 2004. Molecular Cell Biology. WH Freeman. Boston.
3. Primrose, S.B. and R.M. Twyman. 2006. Principles of Gene Manipulation and Genomics . Blackwell Publishing. Oxford.
4. Rahayu, Dwi, A &Nugroho, Endik, D. 2015. Biologi Molekuler Dalam Perspektif Konservasi . Penerbit Plantaxia. Yogyakarta
5. Yuwono, T. 2006. Biologi Molekuler. Penerbit Erlangga. Jakarta.

Supporters:	
Supporting lecturer	Dr. Isnawati, M.Si. Lisa Lisdiana, S.Si., M.Si., Ph.D. Erlix Rakhmad Purnama, S.Si., M.Si. Dwi Anggorowati Rahayu, S.Si., 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 scope of molecular biology, its history and development, and its relationship with other scientific disciplines	1. Explain the scope of molecular biology and its relationship to other scientific disciplines 2. Describe chronologically its history and development 3. Demonstrate an honest and independent attitude in carrying out the tasks that are his responsibility	**Criteria:** The final NA is (participation value x2) (assignment value x 3) (UTS value x 2) UAS value (3) divided by 10	Lectures, discussions and digging up information from the 2 X 50 web			0%
2	Understand the organization/packaging and structure of genetic material in prokaryotic and eukaryotic cells	1. Explain the meaning and organization of genomes, chromosomes and genes in prokaryotic and eukaryotic cells 2. Describe the comparative structure of DNA and RNA 3. Demonstrate an honest and independent attitude in writing the results of his reflections on the complexity of DNA contained in God's creatures	**Criteria:** The final NA is (participation value x2) (assignment value x 3) (UTS value x 2) UAS value (3) divided by 10	Lectures and discussions, 2 X 50			0%
3	Understand the role of DNA and RNA molecules	1. Describe the various roles of DNA in living things 2. Describe the various roles of RNA in living creatures 3. Demonstrate the ability to apply the concepts they have learned regarding solving problems related to genetic disorders	**Criteria:** The final NA is (participation value x2) (assignment value x 3) (UTS value x 2) UAS value (3) divided by 10	Lectures and discussions as well as assignments to look for shows that visualize the 2 X 50 DNA replication process			0%

4	Understand the process of DNA replication in prokaryotic and eukaryotic cells	1. Inventory the components involved in the DNA replication process 2. Explain the role of each component involved in the DNA replication process 3. Demonstrate the ability to carry out self-evaluation of group work in looking for visualization displays of the components needed for DNA replication which are under their responsibility.	**Criteria:** The final NA is (participation value x2) (assignment value x 3) (UTS value x 2) UAS value (3) divided by 10	Lectures and discussions as well as assignments to look for shows that visualize the 2 X 50 DNA replication process			0%
5	Understand the process of DNA replication in prokaryotic and eukaryotic cells	1. Describe the process of DNA replication in prokaryotic cells 2. Describe the process of DNA replication in prokaryotic cells 3. Demonstrate the ability to carry out self-evaluation of group work in looking for visualization displays of DNA replication under their responsibility	**Criteria:** The final NA is (participation value x2) (assignment value x 3) (UTS value x 2) UAS value (3) divided by 10	Lectures and discussions as well as assignments to look for shows that visualize the 2 X 50 DNA replication process			0%
6	Understanding the process of gene expression in prokaryotic cells and eukaryotic cells (part 1: transcription)	1. Explain the definition of central dogma 2. Take an inventory of the components involved in the transcription process and the function of each component 3. Comparing the transcription process in prokaryotic cells and eukaryotic cells 4. Demonstrate an honest and independent attitude in carrying out the task of looking for DNA transcription visualization displays	**Criteria:** The final NA is (participation value x2) (assignment value x 3) (UTS value x 2) UAS value (3) divided by 10	Lectures and discussions as well as assignments look for displays that visualize the 2 X 50 DNA transcription process			0%

7	Understanding the process of gene expression in prokaryotic and eukaryotic cells (part 2: translation)	1. Take an inventory of the components involved in the translation process and the function of each component 2. Describe the translation process in prokaryotic and eukaryotic cells 3. Demonstrate the ability to apply Molecular Biology concepts in solving problems related to procedural translation errors for the development of molecular biology-based research	**Criteria:** The final NA is (participation value x2) (assignment value x 3) (UTS value x 2) UAS value (3) divided by 10	Lectures and discussions as well as assignments look for shows that visualize the 2 X 50 DNA translation process			0%
8	U.S.S	Meetings 1-7	**Criteria:** Meetings 1-7	Meetings 1-7 2 X 50			0%
9	Understand concepts related to the operon system	1. Describe the structure of various types of operons (e.g. lactose operon and tryptophan operon) 2. Explain the expression process of the lactose operon and tryptophan operon 3. Demonstrate an honest and independent attitude in discussing the potential utilization of expression regulation in operons	**Criteria:** The final NA is (participation grade") (assignment grade%2 3) (UTS grade%2 2) UAS grade (3) divided by 10	Lectures and discussions 2 X 50			0%
10	Understand concepts related to mutations	1. Describe various types of mutations in organisms 2. State the causes of mutations 3. State the consequences of mutations 4. Be able to create alternative problem solutions to design research related to artificial mutations by utilizing science and technology.	**Criteria:** The final NA is (participation grade") (assignment grade%2 3) (UTS grade%2 2) UAS grade (3) divided by 10	Lectures, discussions and assignments 2 X 50			0%

11		1. Mention the components involved in DNA repair and the function of each component 2. Describe the DNA repair process 3. Demonstrate an honest and independent attitude in writing the results of his reflections about God's mercy in granting DNA repair tools to his creatures.	**Criteria:** The final NA is (participation grade") (assignment grade%2 3) (UTS grade%2 2) UAS grade (3) divided by 10	Lectures and discussions 2 X 50			0%
12	Understand concepts and procedures related to molecular analysis (DNA and RNA and protein analysis)	1. Describe concepts and procedures related to Southern blott 2. Describe concepts and procedures related to Western blott 3. Describe concepts and procedures related to Northern blott 4. Demonstrate an honest and independent attitude in seeking information about the use of artificial mutations	**Criteria:** The final NA is (participation grade") (assignment grade%2 3) (UTS grade%2 2) UAS grade (3) divided by 10	Lectures and discussions 2 X 50			0%
13	Understand concepts related to genomes I and II and their roles	1. Compare the concepts of genomics and proteomics 2. Mention various types of genomic and proteomic analysis 3. Demonstrate the ability to carry out self-evaluation of group work in discussing the concepts of genomics and proteomics which are under their responsibility	**Criteria:** The final NA is (participation grade") (assignment grade%2 3) (UTS grade%2 2) UAS grade (3) divided by 10	Lectures and discussions 2 X 50			0%
14	Understand concepts related to extrachromosomal DNA	1. Describe the structure, properties and uses of mitochondrial DNA 2. Describe the structure, properties and uses of chloroplast DNA 3. Describe the structure, properties and uses of plasmid DNA 4. Demonstrate the ability to carry out self-evaluation of group work in discussing concepts related to extrachromosomal DNA under responsibility he answered	**Criteria:** The final NA is (participation grade") (assignment grade%2 3) (UTS grade%2 2) UAS grade (3) divided by 10	Presentation and discussion 2 X 50			0%

15	Examining the application of molecular biology to solve various problems in life	1. Explain the role of molecular biology in detecting the diversity of organisms 2. Explain the role of molecular biology in relation to medicine 3. Explain the application of molecular biology in bioinformatics 4. Be able to create alternative problem solutions in designing research into molecular biology applications in the food sector by utilizing science and technology	**Criteria:** The final NA is (participation grade") (assignment grade%2 3) (UTS grade%2 2) UAS grade (3) divided by 10	Discussions, assignments to find information from the web related to molecular biology applications and 2 X 50 presentations			0%
16							0%

Evaluation Percentage Recap: Project Based Learning

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.