	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
Cell and Molecular Biology	4620103209		T=3 P=0 ECTS=4.77	3	July 17, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	.....	.....	Dr. H. Sunu Kuntjoro, S.Si., M.Si.

Learning model	**Case Studies**	
Program Learning Outcomes (PLO)	**PLO study program that is charged to the course**	
	PLO-6	Able to apply logical, critical, systematic and innovative thinking in the context of developing or implementing science and/or technology according to their field of expertise.
	PLO-7	Able to work independently and collaboratively, as well as responsibly, in completing various tasks in class, in the laboratory and in the field.
	PLO-11	Able to apply transferable skills in biology to develop ecopreneurship (eco-innovation, eco-opportunity, eco-commitment)
	Program Objectives (PO)	
	PLO-PO Matrix	

P.O	PLO-6	PLO-7	PLO-11

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	This course studies the scope of Cell and Molecular Biology, techniques for studying cells, prokaryotic and eukaryotic cells (characteristics and differences), structure and function of the plasma membrane (composition, structure and function of membrane proteins, membrane lipids and fluidity, membrane transport), aerobic and mitochondrial respiration (mitochondrial structure and function, role of mitochondria in the formation of ATP, proton translocation and proton motive force, oxidative metabolism in mitochondria, peroxisomes), structure and function of endomembranes (nucleus, endoplasmic reticulum, Golgi apparatus, vesicles, lysosomes, vacuoles) , cytoskeleton and cell movement (microtubules, intermediate filaments, microfilaments, cell movement), photosynthesis and chloroplasts (chloroplast structure and function, photosynthetic metabolism, photosynthetic units, photophosphorylation), cell interactions with the environment (extracellular matrix and cell junctions), cell genetic substance (genes, genome, DNA and chromosomes, RNA and transcriptome, protein and proteome), gene expression (transcription, post transcriptional process, translation, post-translational process, gene expression in eukaryotic and prokaryotic cells), regulation of gene expression, cell signaling and signal transduction, cell cycle and cell death (cell cycle, mitosis, meiosis, apoptosis, and necrosis), proliferation and cancer cells, as well as Cell and Molecular Biology applications in various fields. This material is delivered through lectures, presentations and assignments.
References	**Main :**
	1. Albert B et al. 2015. Molecular Biology of the Cell Sixth edition. New York: Garland Science. 2. Lodish H et al. 2016. Molecular Cell Biology Eighth edition. New York: WH Freeman.
	Supporters:
Supporting lecturer	Prof. Dr. Mahanani Tri Asri, M.Si. Dr. Isnawati, M.Si. Lisa Lisdiana, S.Si., M.Si., Ph.D. Erlix Rakhmad Purnama, S.Si., M.Si. Eva Kristinawati Putri, S.Pd., 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 concept of cells and their position in an organism	1.Explain the scope of cell and molecular biology and its relationship to other scientific disciplines 2.Understand techniques for studying cells 3.Analyze the similarities and differences between the structure and function of prokaryotic and eukaryotic cells	**Criteria:** UTS	Lectures and discussions 3 X 50			0%
2	Understand the structure and function of the plasma membrane as well as membrane transport mechanisms	1.Details the components that make up the plasma membrane 2.Explain the structure, function and properties of the plasma membrane 3.Comparing plasma membrane models 4.Explain the function and types of membrane transport 5.Explain the mechanism of membrane transport	**Criteria:** UTS	Lectures and discussions 3 X 50			0%
3	Understand the structure and function of mitochondria, as well as the mechanisms of aerobic respiration	1.Explain the theory of endosymbiosis for mitochondria 2.Explain the structure and function of the parts of mitochondria 3.Explain proton translocation, proton motive force, and ATP formation	**Criteria:** UTS	Lectures and discussions 3 X 50			0%
4	Understand the structure and function of the endomembrane system	1.Explain the structure and function of the endomembrane system 2.Examples of cell organelles that have an endomembrane system 3.Explain the structure, function and role of cell organelles	**Criteria:** UTS	Lectures and discussions 3 X 50			0%

5	Understand the structure and function of the cytoskeleton	1. Distinguish between various components that make up the cytoskeleton 2. Explain the structure and function of each type of cytoskeleton 3. Explain the mechanism of cell movement	**Criteria:** UTS	Lectures and discussions 3 X 50			0%
6	Understand the structure and function of chloroplasts, as well as the mechanism of photosynthesis	1. Explain the theory of endosymbiosis for chloroplasts 2. Explain the structure and function of the parts of chloroplasts 3. Explain the mechanism of phosphorylation	**Criteria:** UTS	Lectures and discussions 3 X 50			0%
7	Understand the extracellular matrix and cell junctions	1. Explain the meaning of extracellular matrix and cell junctions 2. Explain the structure of the extracellular matrix and cell junctions 3. Explain the function of the extracellular matrix and cell junctions 4. Details the various types of extracellular matrix and cell junctions	**Criteria:** UTS	Lectures and discussions 3 X 50			0%
8				3 X 50 test			0%
9	Understand the genetic substances contained in cells	1. Explain the structure and function of each genetic substance 2. Explain the meaning of genome, transcriptome, and proteome and their applications 3. Compare gene organization in eukaryotes and prokaryotes	**Criteria:** UAS	Lectures and discussions 3 X 50			0%

10	Understand the process of gene expression in prokaryotic and eukaryotic cells	1. Details the stages of transcription 2. Explain the function of each transcription component 3. Detailing the stages of translation 4. Explain the function of each translation component 5. Comparing the process of gene expression in prokaryotic cells and eukaryotic cells	**Criteria:** UAS	Lectures and discussions 3 X 50			0%
11	Understanding gene regulation in eukaryotes and prokaryotes	1. Describe the regulatory sequence in the structure of prokaryotic and eukaryotic genes 2. Explain the mechanisms of gene expression and regulation in prokaryotes and eukaryotes	**Criteria:** UAS	Lectures, presentations and discussions 3 X 50			0%
12	Understand the concepts and mechanisms of communication between cells	1. Explain the concept of communication between cells 2. Explain the types of communication between cells 3. Analyzing the mechanism of a cellular process based on cell level communication	**Criteria:** UAS	Lectures and discussions 3 X 50			0%
13	Understand concepts related to the cell cycle and cell death	1. Explain the cell cycle 2. Distinguish between mitosis and meiosis 3. Explain cell death 4. Differentiate between apoptosis and necrosis	**Criteria:** UAS	Lectures and discussions 3 X 50			0%
14	Understand the concept of proliferation and cancer cells	1. Explain the concept of cell proliferation 2. Explain the meaning of cancer 3. Explain angiogenesis, invasion and metastasis of cancer	**Criteria:** UAS	Lectures and discussions 3 X 50			0%

15	Understand the applications of Cell and Molecular Biology in various fields	1. Explain the role of Cell and Molecular Biology in various fields 2. Provide examples of research in the field of Cell and Molecular Biology	**Criteria:** Task	Presentation and discussion 3 X 50			0%
16				3 X 50 test			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.