	Universitas Negeri Surabaya **Faculty of Mathematics and Natural Sciences** **Bachelor of Science Education Study Program**	**Document Code**

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Cell Level Life	8420103067		T=3	P=0	ECTS=4.77	5	July 18, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	.....	.....	Prof. Dr. Erman, M.Pd.

Learning model	**Case Studies**	
Program Learning Outcomes (PLO)	**PLO study program that is charged to the course**	
	PLO-5	Demonstrate scientific, critical, and innovative attitudes in integrated science learning, laboratory activities, and professional-related tasks
	PLO-9	Work effectively both individually and in groups, and have entrepreneurial spirit and environmental awareness
	PLO-11	Design and conduct research about learning of integrated science, and acquire, analyze, and interpret the research data
	PLO-13	Demonstrate knowledge of integrated science (physics, chemistry, and biology)
	Program Objectives (PO)	
	PO - 1	Exploring data and information (principles/laws/theories) to explain cells and the processes that occur within them as well as solving problems related to cell-level life.
	PO - 2	Explains the concepts, principles and theories of cells, including: structure and function of cells and cell organelles, arrangement and function of the plasma membrane, structure and biological function of proteins and nucleic acids, mechanisms of protein synthesis, cell growth and proliferation, materials and chemical reactions involved supports functional roles and supports the structure of cell organelles, as well as differentiation
	PO - 3	Make strategic decisions based on analysis of information and data related to cellular level life in the context of being a prospective science teacher
	PO - 4	Able to work independently, work together in collaborative teams, demonstrate a responsible attitude for both individual and team tasks, and communicate ideas, opinions and arguments orally/in writing
	PLO-PO Matrix	

P.O	PLO-5	PLO-9	PLO-11	PLO-13
PO-1				
PO-2				
PO-3				
PO-4				

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
PO-1																
PO-2																
PO-3																
PO-4																

Short Course Description	The study of life at the cellular level includes the structure and function of cells and cell organelles, the structure and function of the plasma membrane, the structure and biological function of proteins and nucleic acids, the mechanisms of protein synthesis, cell growth and proliferation, as well as differentiation and determination which is carried out through theoretical studies and discussions.	
References	**Main :**	

1. Gatot, Suparno, Djoko Budiono, dan Sri Kencananingsih. 2014. Handout Kehidupan Tingkat Sel . Unesa.
2. Karp, Gerald. 2010. Cell Biology 6th Edition International Student Version . Wiley & Sons.
3. Wong, EV. 2009. Cells: Molecules And Mechanisms . Louisville: Axolotl Academic Publishing Company.
4. Sheeler, P. and D.E. Bianchi. 1987. Cell and Molecular Biology . Canada : John Wiley & Sons.5. Thorpe, N.O. 1984. Cell Biology . New York : John Wiley & Sons.

Supporters:	

Supporting lecturer	Prof. Dr. Erman, M.Pd. Guntur Trimulyono, S.Si., M.Sc. Ahmad Qosyim, S.Si., M.Pd. dr. Sonny Soebjanto, Sp. T.H.T.K.L

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	Explaining the structure and function of cells, cell theory and protoplasm	Utilizing ICT to conduct literature searches.	**Criteria:** 1.4 : Correct answer 2.1 : Wrong answer 3.0 : No answer **Form of Assessment** : Participatory Activities	Lectures, interactive discussions between lecturers and students, 3 X 50 literature study assignments		**Material:** Cell and Protoplasm Theory **References:** *Karp, Gerald. 2010. Cell Biology 6th Edition International Student Version. Wiley & Sons.*	2%
2	Explain the structure and function of the plasma membrane/cell membrane	Students can: Differentiate between the 4 models of plasma membrane.	**Criteria:** 1.4 : Correct answer 2.1 : Wrong answer 3.0 : No answer	Lectures, interactive discussions between lecturers and students Assignments Literature studies 3 X 50			0%
3	Describe the Cell Health System as a Unit of the Living Body, Includes the Body's Immune System	1.Students can: 2.Explain at least 3 functions of the plasma membrane in relation to its physical and chemical properties 3.Explain the process of plasma membrane restoration	**Criteria:** 1.4 : Correct answer 2.1 : Wrong answer 3.0 : No answer	Lectures, interactive discussions between lecturers and students Assignments Literature studies 3 X 50			0%
4	Describe Cell Cycle Events: Cell Division & Cell Metabolism	1.Students can: Explain the structure of cell walls 2.Explain the function of cell walls 3.Explain the process of forming primary walls and secondary walls. 4.Distinguish between primary wall and secondary wall structures	**Criteria:** 1.4 : Correct answer 2.1 : Wrong answer 3.0 : No answer	Lectures, interactive discussions between lecturers and students Assignments Literature studies 3 X 50			0%

5	Describe the Body's Cellular Coordination System	1. Students can: Explain the structure and function of the endo-plasma reticulum 2. Explain the structure and function of the Golgi apparatus 3. Explain the structure and function of lysosomes	**Criteria:** 1. 4 : Correct answer 2. 1 : Wrong answer 3. 0 : No answer	Lectures, interactive discussions between lecturers and students Assignments Literature studies 3 X 50			0%
6	Describe the Function of the Nervous System (Neurology) in the Body	1. Students can explain the structure and function of micro bodies 2. Explain the structure and function of peroxisomes 3. Explain the functional relationships between organelles that are part of the inner membrane system	**Criteria:** 1. 4 : Correct answer 2. 1 : Wrong answer 3. 0 : No answer	Lectures, interactive discussions between lecturers and students Assignments Literature studies 3 X 50			0%
7	Describe the Function of the Hormonal System (Endricrinology) in the Body	1. Students can explain the structure and function of chloroplasts 2. Mention the types of chloroplasts 3. Explain the light reactions and dark reactions in chloroplasts	**Criteria:** 1. 4 : Correct answer 2. 1 : Wrong answer 3. 0 : No answer	Lectures, interactive discussions between lecturers and students Assignments Literature studies 3 X 50			0%
8	UTS	1. Students can: Explain the structure of mitochondria 2. Explain the entry and exit of materials to and from mitochondria along with processes in the outer membrane, matrix and inner membrane. 3. Explain the light and dark reactions that occur in each part of the mitochondria.	**Criteria:** 1. 4 : Correct answer 2. 1 : Wrong answer 3. 0 : No answer	Lectures, interactive discussions between lecturers and students Assignments Literature studies 3 X 50			0%

9	Explain the chemical composition and biochemical processes of each cell organelle	1. Explain the chemical aspects of cell organelles that support the structure and function of organelles/cells 2. Explain the factors that influence life at the cellular level	**Criteria:** 1. 4 if you can identify and explain the chemical aspects of cell organelles accurately and in detail 2. 3 if you can identify and explain some of the chemical aspects of cell organelles accurately and in detail 3. 2 if you can identify and explain some chemical aspects of cell organelles accurately but not in detail 4. 1 if unable to identify and explain chemical aspects of cell organelles. **Form of Assessment** : Portfolio Assessment	Presentation and discussion 3 X 50		**Material:** Cell level life **Readers:** *Gatot, Suparno, Djoko Budiono, and Sri Kencananingsih. 2014. Cell Level Life Handout. Unesa.* **Material:** Aspects of cell chemistry **References:** *Wong, EV. 2009. Cells: Molecules And Mechanisms. Louisville: Axolotl Academic Publishing Company.* **Material:** Aspects of cell chemistry **Reference:** *....Chapter 1 Biochemistry: From Atoms to Molecules to Cells*	5%
10	Identify factors that influence life at the cellular level in terms of components, structure, composition, biochemical processes and function of each cell organelle both independently and in groups	1. Identify the chemical aspects of each cell organelle 2. Explain the chemical processes that support the function of cell organelles 3. Explain the factors that influence the function of cell organelles	**Criteria:** 1. 4 : if you can explain the chemical aspects that support the structure and function of cell organelles completely 2. 3 : can explain most of the chemical aspects that support the structure and function of cell organelles. 3. 2 : if you can explain a small part of the chemical aspects that support the structure and function of cell organelles 4. 1 : if you cannot explain the chemical aspects that support the structure and function of cell organelles **Form of Assessment** : Project Results Assessment / Product Assessment	Case study 3 X 50		**Material:** Aspects of cell chemistry **References:** *Wong, EV. 2009. Cells: Molecules And Mechanisms. Louisville: Axolotl Academic Publishing Company.* **Material:** Chemical aspects of cells **References:** *....Chapter 1 Biochemistry: From Atoms to Molecules to Cells* **Material:** Chemical aspects of cells **References:** *....e-Biotechnology Module: Cell Biology*	5%

11	Present the structure, composition, and biochemical processes as well as cell function disorders according to the task, both independently and in groups		**Criteria:** 1.4: if you can identify and explain the factors that cause cell organelle disorders accurately and completely 2.3: if you can identify and explain some of the factors that cause cell organelle disorders correctly. 3.2: if you can identify but cannot completely explain the factors that cause cell organelle disorders **Form of Assessment** : Project Results Assessment / Product Assessment		Case study of cell organelle function disorders 150 minutes	**Material:** Aspects of cell chemistry **References:** *Wong, EV. 2009. Cells: Molecules And Mechanisms. Louisville: Axolotl Academic Publishing Company.* **Material:** Aspects of cell chemistry **Reference:** *....Chapter 1 Biochemistry: From Atoms to Molecules to Cells* **Material:** Aspects of cell chemistry **Library:** *....e-Biotechnology Module: Cell Biology*	0%
12	Present the structure, composition, and biochemical processes as well as cell function disorders according to the task, both independently and in groups	1.Explain the chemical aspects that cause disruption of cell organelle function 2.Explain how to prevent or overcome disorders of cell organelle function from a chemical aspect.	**Criteria:** 1.4: if you can explain the chemical aspects that trigger cell organelle function disorders precisely and in detail 2.3: if you can explain some of the chemical aspects that trigger cell organelle function disorders accurately and in detail 3.2 : if you can explain the chemical aspects that trigger cell organelle function disorders but some of them are not precise 4.1 : if you cannot explain the chemical aspects that trigger cell organelle function disorders. **Form of Assessment** : Project Results Assessment / Product Assessment		Case study 150 minutes	**Material:** Aspects of cell chemistry **References:** *Wong, EV. 2009. Cells: Molecules And Mechanisms. Louisville: Axolotl Academic Publishing Company.* **Material:** Aspects of cell chemistry **References:** *Wong, EV. 2009. Cells: Molecules And Mechanisms. Louisville: Axolotl Academic Publishing Company.* **Material:** Aspects of cell chemistry **Reference:** *....Chapter 1 Biochemistry: From Atoms to Molecules to Cells*	5%

13	Describe Protein Synthesis	1. Students can: Differentiate the structure of ribosomes in pro and eukaryotes 2. Explain the function of the two ribosome particles 3. Explain the synthesis of both ribosome particles in both types of cells 4. Make a complete scheme of the types of cytoskeleton 5. Explain the function of the 6 types of cytoskeleton	**Criteria:** 1. 4 : Correct answer 2. 1 : Wrong answer 3. 0 : No answer	Lectures, interactive discussions between lecturers and students Assignments Literature studies 3 X 50			0%
14	Describing Nucleic Acids, DNA RNA Synthesis in gene expression studies	1. Students can: Explain the characteristics of the 5 phases of mitosis 2. Explain the characteristics of the 5 subphases in prophase I of meiosis 3. Distinguish mitosis from meiosis	**Criteria:** 1. 4 : Correct answer 2. 1 : Wrong answer 3. 0 : No answer	Lectures, interactive discussions between lecturers and students Assignments Literature studies 3 X 50			0%
15	Describe the Mechanism of Gene Expression	1. Students can: Explain the process of determination 2. Explain the 3 stages of gene expression regulation with examples	**Criteria:** 1. 4 : Correct answer 2. 1 : Wrong answer 3. 0 : No answer	Lectures, interactive discussions between lecturers and students Assignments Literature studies 3 X 50			0%
16	UAS					**Material:** Protein Synthesis and Gene Expression Mechanisms **References:** *Sheeler, P. and DE Bianchi. 1987. Cell and Molecular Biology. Canada : John Wiley & Sons.5. Thorpe, NO 1984. Cell Biology . New York : John Wiley & Sons.*	0%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
1.	Participatory Activities	2%
2.	Project Results Assessment / Product Assessment	10%
3.	Portfolio Assessment	5%
		17%

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.