	Universitas Negeri Surabaya Faculty of Mathematics and Natural Sciences Physics Education Undergraduate Study Program	Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
GENERAL BIOLOGY	8420302030		T=2	P=0	ECTS=3.18	1	July 17, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
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Learning model	**Project Based Learning**

Program Learning Outcomes (PLO)

PLO study program that is charged to the course

Program Objectives (PO)

PO - 1	Mastering the basic concepts of biology, namely Biology as a science, cell structure and function, cell division, metabolism which includes transport, photosynthesis and respiration, genetics, diversity of living things, evolution, structure and function of plant and animal organ tissues, ecology, growth and development microbes, biotechnology, and practice solving problems through scientific methods

PLO-PO Matrix

P.O
PO-1

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																

Short Course Description	Understand the basic concepts of Biology as a science, structure and function of cells, metabolism which includes transport, photosynthesis and respiration, genetics, diversity of living things and nomenclature, origins of life, evolution, structure and function of plant and animal organ tissues, ecology, organism behavior and biotechnology, and practice solving problems using scientific methods. General Biology studies are accompanied by various process skills (minds on activity and hands on activity) which will be used to solve problems in the field of Biology and its applications. Learning is delivered through presentations, discussions and practicums.

References

Main :

1. Campbell, Neil A, Jane B.Reece dan Lawrence G.Mitchell. 2003. Biologi . California: Benjamin Cummings.
2. Kimball, J.W. 1989. Biologi Jilid I, II, III . Edisi Kelima. Cetakan Kedua. Jakarta: Penerbit Erlangga.
3. Rachmadiarti, F.,Yuliani, Widowati B., Rinie P, Mahanani T.A, Dyah H.,Herlina F.2007. Biologi Umum . Surabaya: UNESA Press.
4. Luria. 1981. A View of Life . California: Benyamin Cumming.

Supporters:

Supporting lecturer	Dra. Winarsih, M.Kes. Dr. Tarzan Purnomo, M.Si. Dr. Widowati Budijastuti, M.Si. Dr. Nur Ducha, S.Si., M.Si. Ahmad Bashri, S.Pd., M.Si. Lisa Lisdiana, S.Si., M.Si., Ph.D. dr. Hanifiya Samha Wardhani, M.Kes.

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 steps of the scientific method in experimental research independently and honestly	1. Explain the steps of the scientific method • • • 2. Apply the steps of the scientific method in a simple experiment 3. Skilled in applying biological concepts in solving biologist problems 4. Demonstrate an honest and independent attitude during the learning process using observation instruments	**Criteria:** 1. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30%, 2. Student activities and responses during learning activities, especially practicums, are assessed as PARTICIPATION with a weight of 20% 3. USS weight 20% 4. US weight 30% **Form of Assessment** : Participatory Activities, Practical Assessment	Practical Assignment Discussion Lecture		**Material:** Biology as a science: Scientific method Problem formulation, hypothesis, research variables, operational definition of research variables, research design, research steps, **Library:** *Rachmadiarti, F., Yuliani, Widowati B., Rinie P, Mahanani TA, Dyah H ., Herlina F. 2007. General biology . Surabaya: UNESA Press.*	5%
2	Explain the structure of organism cells and relate them to their functions independently and honestly	1. • Describe the structure of cells 2. • Explain the chemistry of life 3. • Demonstrate an honest and independent attitude during the learning process using observation instruments 4. • Describe the structure of genes and chromosomes and relate it to the mutation process in organisms 5. • Distinguish between the structures of DNA and RNA, and relate them to the process of DNA replication 6. • Explain the process of protein synthesis	**Criteria:** 1. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30%, 2. Student activities and responses during learning activities are assessed as PARTICIPATION with a weight of 20%, 3. US weight 30% 4. USS weight 20% **Form of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	1. Discuss the differences between plant and animal cells based on PPT-02 and source books 1,2,3,4 2. Carry out activities a. Introduction to the microscope b. Observation of plant and animal cells 3. Make an activity report 4. Discussion and questions and answers about genes, chromosomes, nucleic acids and protein synthesis 5. Video Observation		**Material:** • Cells: structure and function • Genes and chromosomes • Structure of genes and chromosomes in prokaryotes and eukaryotes • Genetic expression • Nucleic acids • Protein synthesis **References:** *Rachmadiarti, F., Yuliani, Widowati B., Rinie P, Mahanani TA, Dyah H., Herlina F. 2007. General biology . Surabaya: UNESA Press.*	5%

3	Understand the concept of gene and chromosome structure, DNA, RNA, protein synthesis independently and honestly	1.• Describe the structure of genes and chromosomes and relate it to the mutation process in organisms 2.• Distinguish between the structures of DNA and RNA, and relate them to the process of DNA replication 3.• Explain the process of protein synthesis 4.• Demonstrate an honest and independent attitude during the learning process using observation instrument sheets	**Criteria:** 1.Practical reports and products are assessed as ASSIGNMENTS with a weight of 30%, 2.Student activities and responses during learning activities, especially practicums, are assessed as PARTICIPATION with a weight of 20% 3.USS weight 20%, 4.US weight 30% **Form of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	1. Discussion and questions and answers regarding the structure of genes, chromosomes, DNA, RNA, protein synthesis 2. Make cell organelle infographics as an assignment		**Material:** Structure and function 1. Structure and function of animal tissue and organs 2. Structure and function of plant tissue and organ **References:** *Rachmadiarti, F., Yuliani, Widowati B., Rinie P, Mahanani TA, Dyah H., Herlina F. 2007. General biology . Surabaya: UNESA Press.*	5%
4	Understand the concept of cell division	1.• Explain the stages of cell division 2.• Differentiate between mitotic and meiotic cell division 3.• Explain the stages of cell division • Differentiate between mitotic and meiotic cell division • Demonstrate an honest and independent attitude during the learning process using observation instruments	**Criteria:** 1.Practical reports and products are assessed as ASSIGNMENTS with a weight of 30%, 2.Student activities and responses during learning activities, especially practicums, are assessed as PARTICIPATION with a weight of 20% 3.USS weight 20% 4.US weight 30% **Form of Assessment** : Participatory Activities, Practical Assessment	1. Discussion and questions and answers on cell division . 2. Carrying out video observation activities on cell division		**Material:** Cell Division: Mitosis and Meosis **References:** *Rachmadiarti, F., Yuliani, Widowati B., Rinie P, Mahanani TA, Dyah H., Herlina F. 2007. General biology . Surabaya: UNESA Press.*	3%
5	Distinguish between various types of cell transport used in everyday life independently and honestly	1.• Explain the concept of cell transport 2.• Differentiate between passive and active transport 3.• Skilled in carrying out practical activities observing cell plasmolysis 4.• Explain the role of physics (fluids) in the human circulatory system	**Criteria:** 1.Practical reports and products are assessed as ASSIGNMENTS with a weight of 30%, 2.Student activities and responses during learning activities, especially practicums, are assessed as PARTICIPATION, weight 20% 3.USS weight 20% **Form of Assessment** : Participatory Activities	1. Discussion and questions and answers regarding cell transport 2. Video Observation 3. Carrying out Plasmolysis and deplasmolysis Practicum 4. Making a practical report independently and honestly		**Material:** Metabolism: Cell Transport, Implementation of physics (fluids) in the blood transport system (circulatory system) **References:** *Kimball, JW 1989. Biology Volumes I, II, III. Fifth Edition. Second printing. Jakarta: Erlangga Publishers.*	2%

6	Understand the concept of photosynthesis and relate it to the physiological processes of plants and their benefits to other organisms independently and honestly	1.• Explain the concept of photosynthesis and relate it to the physiological processes of plants and its benefits for other organisms 2.• Demonstrate an honest and independent attitude during the learning process using observation instrument sheets	**Criteria:** 1.Practical reports and products are assessed as ASSIGNMENTS with a weight of 30%, 2.Student activities and responses during learning activities, especially practicums, are assessed as PARTICIPATION with a weight of 20% 3.USS weight 20% 4.US weight 30% **Form of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	1. Discuss the concept of photosynthesis and its benefits for other organisms based on PPT 05 and textbook no. 1.3 2. Video Observation of photosynthesis		**Material:** Metabolism: Photosynthesis **Bibliography:** *Campbell, Neil A, Jane B. Reece and Lawrence G. Mitchell. 2003. Biology. California: Benjamin Cummings.*	5%
7	Understand the concept of respiration and relate it to physiological processes and its benefits for other organisms independently and honestly	1.• Explain the concept of respiration and relate it to physiological processes and its benefits for other organisms 2.• Demonstrate an honest and independent attitude during the learning process using observation instrument sheets	**Criteria:** 1.Practical reports and products are assessed as ASSIGNMENTS with a weight of 30%, 2.Student activities and responses during learning activities, especially practicums, are assessed as PARTICIPATION with a weight of 20% 3.USS weight 20% 4.US weight 30% **Form of Assessment** : Participatory Activities, Practical Assessment	1. Discussion and questions and answers regarding the concept of respiration and its role in organism metabolism based on PPT 06 sources 2. Video observations of the stages of respiration 4. Make a report		**Material:** Respiratory Metabolism **Bibliography:** *Campbell, Neil A, Jane B. Reece and Lawrence G. Mitchell. 2003. Biology. California: Benjamin Cummings.*	5%
8	Understand General Biology material from meetings 1 to seven	Students can do UTS questions well	**Criteria:** Written exam **Form of Assessment** : Test	Midterm exam			20%
9	Understand the structure of tissues and organs and relate to their functions independently and honestly	Describe the structure of tissues and organs (plants and animals) and relate their functions	**Criteria:** 1.Practical reports and products are assessed as ASSIGNMENTS with a weight of 30%, 2.Student activities and responses during learning activities, especially practicums, are assessed as PARTICIPATION with a weight of 20% 3.USS weight 20% 4.US weight 30%, **Form of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	1. Discussion and questions and answers regarding the structure of plant/animal tissues and organs. 2. Carrying out the task of making a table of organs that make up the body of animals and plants		**Material:** Structure and function 1. Structure and function of animal tissue and organs 2. Structure and function of plant tissue and organ **References:** *Rachmadiarti, F., Yuliani, Widowati B., Rinie P, Mahanani TA, Dyah H., Herlina F. 2007. General biology . Surabaya: UNESA Press.*	2%

10	Understand Mendel's laws and relate them to the process of inheritance of traits and the balance of gene frequencies in organisms independently and honestly	Describe Mendel's laws and relate them to the process of inheritance of traits and the balance of gene frequencies in organisms	**Criteria:** 1. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 2. Student activities and responses during learning activities, especially practicums, are assessed as PARTICIPATION with a weight of 20% 3. USS weight 20% 4. US weight 30% **Form of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	1. Discussion and questions and answers about genetic models based on PPT08 and textbooks 1,2,3,4 2. Carrying out assignment activities regarding		**Material:** Inheritance and Mendel's Laws **Bibliography:** *Campbell, Neil A, Jane B. Reece and Lawrence G. Mitchell. 2003. Biology. California: Benjamin Cummings.*	3%
11	Classify various living things based on a classification system independently and honestly	1. • Classify various living things based on classification systems 2. • Explain the occurrence of variations 3. • Demonstrate an honest and independent attitude during the learning process using observation instrument sheets	**Criteria:** 1. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 2. Student activities and responses during learning activities, especially practicums, are assessed as PARTICIPATION with a weight of 20% 3. USS weight 20% 4. US weight 30% **Form of Assessment** : Participatory Activities	1. Discussion and questions and answers regarding classification, variation and dichotomy keys 2. Create a key to identify living things based on the morphology of various types of plants		**Material:** Biodiversity **Bibliography:** *Campbell, Neil A, Jane B. Reece and Lawrence G. Mitchell. 2003. Biology. California: Benjamin Cummings.* **Material:** Biodiversity **References:** *Rachmadiarti, F., Yuliani, Widowati B., Rinie P, Mahanani TA, Dyah H., Herlina F. 2007. General biology . Surabaya: UNESA Press.* **Material:** Biodiversity and Classification of Living Creatures **Literature:**	3%

12		• Explain the growth and development of bacteria, viruses, fungi	**Criteria:** 1.Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 2.Student activities and responses during learning activities, especially practicums, are assessed as PARTICIPATION with a weight of 20% 3.USS weight 20% 4.US weight 30% **Form of Assessment** : Participatory Activities, Practical Assessment	Discuss the concepts of structure, nature and function as well as growth and development of microbes		**Material:** Biodiversity **Bibliography:** *Campbell, Neil A, Jane B. Reece and Lawrence G. Mitchell. 2003. Biology. California: Benjamin Cummings.* **Material:** Biodiversity **References:** *Rachmadiarti, F., Yuliani, Widowati B., Rinie P, Mahanani TA, Dyah H., Herlina F. 2007. General biology . Surabaya: UNESA Press.* **Material:** Growth and Development of Microbes **References:** *Campbell, Neil A, Jane B. Reece and Lawrence G. Mitchell. 2003. Biology. California: Benjamin Cummings.*	2%
13	Distinguish between the theories of abiogenesis and biogenesis and understand genetic populations independently and honestly	1.• Distinguish between the theories of abiogenesis and biogenesis and understand population genetics 2.• Demonstrate an honest and independent attitude during the learning process using observation instrument sheets	**Criteria:** 1.Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 2.Student activities and responses during learning activities, especially practicums, are assessed as PARTICIPATION with a weight of 20% 3.USS weight 20% 4.US weight 30% **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Practical Assessment	Discuss the concept of evolution and the origin of life		**Material:** Biogenesis, Abiogenesis and Evolution Theory. **References:** *Campbell, Neil A, Jane B. Reece and Lawrence G. Mitchell. 2003. Biology. California: Benjamin Cummings.*	3%
14	Understand ecological concepts and apply them in daily life independently and honestly	1.• Explain ecology 2.• Conduct investigations related to ecosystems 3.• Communicate the results of investigations and apply them in everyday life. 4.• Demonstrate an honest and independent attitude during the learning process using observation instrument sheets	**Criteria:** 1.Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 2.Student activities and responses during learning activities, especially practicums, are assessed as PARTICIPATION with a weight of 20% 3.USS weight 20% 4.US weight 30% **Form of Assessment** : Participatory Activities	1. Discussion and questions and answers about ecology and ecosystem components 2. Making an ecological LKM report		**Material:** Ecology **Literature:** *Rachmadiarti, F., Yuliani, Widowati B., Rinie P, Mahanani TA, Dyah H., Herlina F. 2007. General biology . Surabaya: UNESA Press.*	2%

15	Understand biotechnology and apply it in daily life independently and honestly	1.• differentiate between traditional and modern biotechnology 2.• Analyze the role of Biotechnology in human life in the future 3.• apply biotechnology in everyday life 4.• Demonstrate an honest and independent attitude during the learning process using observation instrument sheets	**Criteria:** 1.Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 2.Student activities and responses during learning activities, especially practicums, are assessed as PARTICIPATION with a weight of 20% 3.USS weight 20% 4.US weight 30% **Form of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	1. Discussion and questions and answers regarding Biotechnology 2. Observing videos of biotechnology products 3. Making Biotechnology Observation Reports (yogurt, soy sauce, cheese)		**Material:** Biotechnology **Bibliography:** *Campbell, Neil A, Jane B. Reece and Lawrence G. Mitchell. 2003. Biology. California: Benjamin Cummings.*	5%
16		Skilled in applying basic Biological concepts and principles responsibly	**Criteria:** Written exam **Form of Assessment** : Test	Written exam			30%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	28%
2.	Project Results Assessment / Product Assessment	13.5%
3.	Practical Assessment	8.5%
4.	Test	50%
		100%

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.