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

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight	SEMESTER	Compilation Date
Ecophysiology	8420502079	Study Program Elective Courses	T=2 P=0 ECTS=3.18	7	April 27, 2023

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 ecophysiological concepts and their applications (Knowledge)
PO - 2	Able to apply Ecophysiological concepts and technology in efforts to solve natural resource and environmental problems (Knowledge)
PO - 3	Able to make the right decisions based on information and data analysis, and able to provide guidance in choosing various alternative solutions independently and in groups in the field of ecophysiology (Special Competencies)
PO - 4	Able to design problem solutions by implementing transferable skills in the field of ecophysiology to develop ecopreneurship (eco-innovation, eco-opportunity, eco-commitment). (Special Competencies)
PO - 5	Able to learn throughout life and work effectively both individually and in groups, have an entrepreneurial spirit and care about the environment (general competencies)
PO - 6	Able to work independently and responsibly, both as an individual and in a group in carrying out tasks related to Ecophysiology (Attitude) studies

PLO-PO Matrix

P.O
PO-1
PO-2
PO-3
PO-4
PO-5
PO-6

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																
PO-5																
PO-6																

Short Course Description: Ecophysiology studies the living activities and responses of animals and plants to environmental changes (stresses) in the form of biotic, climatic, edaphic factors and the toxicity of ions and gases. In learning activities, response strategies, physiological tactics and molecular adaptations carried out by animals and plants to changes in environmental quality are discussed. Ecophysiology 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 plant, animal responses and their applications. Learning is delivered through presentations, discussions through Case Studies

References

Main :

1. Gordon, 1977.Abimal Physiology: Principles and Adaptation. New York: Macmillan Pub. Co
2. Fitter A.H. and R.K.M. Hay. 1998. Fisiologi Lingkungan Tanaman (Sri Andani dan Purbayanti, Trans). Yogyakarta: Gadjah mada UP
3. Lambers, hans, F.Stuart Chapin dan Thys L.Pons. 2019 Plant Physiological Ecology. New York: Springer
4. Larcher, W. 2003. Physiological Plant Ecology.New York : Springer
5. Manuel, J.Regosa. 2001. Handbook of Plant Ecophysiology Techniques 2001st Edition. New York: Springer
6. Yuliani, Rahardjo, Sunu Kuntjoro.2019. Ekofisiologi 1: Ekofosiologi Tumbuhan. Surabaya: Unesa Press.
7. Bhatla, S.C and Manju A.L.2018. Plant Physiology, Development and Metabolism. Singapore: Springer
8. Carere, C. and Mastripieni, D. 2013. Animal Personalities Behavior, Physiology, and Evolution. Chicago: The University of Chicago Press
9. Rastogi, S.C. 2008. Essentials of Animal Physiology (Edisi 4). New Delhi: New Age International Publisher

Supporters:

1. Bligh, J. Cloudesley T dan McDonald, A. 1976. Enviromental Physiology Animal. London: Black well Scientific Pub
2. Fitter A.H. and R.K.M. Hay. 1998. Environmental Physiology of Plants. (Sri Andani and Purbayanti. Trans) Yogyakarta: Gadjah Mada
3. Gordon, 1977.Abimal Physiology: Principles and Adaptation. New York: Macmillan Pub. Co.
4. Larcher, W. 1991. Physiological Plant Ecology.New York : Springer

Supporting lecturer	Dr. Raharjo, M.Si. Prof. Dr. Yuliani, M.Si. Dr. H. Sunu Kuntjoro, 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	Linking the concept of the physiological impact of an environmental factor with the response strategy carried out by the organism	1.Linking environmental changes to the physiological impact of a plant in the form of poisoning or fitness 2.Describe the speed of growth rate 3.Explain plant response strategies 4.Distinguish physiological tactics: avoidance, amelioration and tolerance 5.Demonstrate an honest and independent attitude during the learning process based on the observation sheet	**Criteria:** 1.Reports and practicum products are assessed as ASSIGNMENTS with a weight of 30%. performance is integrated during learning 2.Form: Written Test and Assignment (independent assignments and Practicum) Criteria: Indicators achieved through assignments in independent and structured assignments **Form of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Case method 1.Pre existing Material. The lecturer asks individual students to read references regarding environmental changes on the physiological impact of a plant in the form of poisoning or suitability, growth rate and response strategies. 2. Activities in groups. The lecturer provides problem cases regarding response strategies and physiological tactics of plants to environmental conditions. Students explore the references obtained to answer various cases of plant responses. In this activity, students can develop ideas or thoughts to solve problems. Individual students in groups can express their opinions 3. Class Room Discussion Lecturers facilitate students to discuss in class, present the results obtained in groups. and classically obtained mass solutions and conclusions from the experiments carried out. Students are asked to read further references regarding environmental checks. 2 X 50		**Material:** Organism response strategies: a) Physiological basics of ecology, b). Compatibility and toxicity, c). Meaning of growth rate speed, d) Physiological tactics **References:** *Yuliani, Rahardjo, Sunu Kuntjoro. 2019. Ecophysiology 1: Plant Ecophysiology. Surabaya: Unesa Press.*	10%

2	Analyze various environmental factors that influence plant growth and development and understand the mechanism of plant response to the influence of these environmental factors	1. Identify various environmental factors that influence growth and development 2. Relate the relationship between various environmental factors and plant growth 3. Explain plant responses related to the concepts of germination, morphogenesis, photoperiodism, nutrient supply and transport, rhizosphere conditions, water potential, transpiration, water movement throughout the plant 4. Skilled in observing the growth of shaded and exposed plants 5. Skilled in making experimental reports	**Criteria:** 1. Reports and practicum products are assessed as ASSIGNMENTS with a weight of 30%. performance is integrated during learning 2. Form: Written Test and Assignment Criteria: Indicators are achieved through assignments in independent and structured tasks **Form of Assessment** : Participatory Activities, Practical Assessment	Case method 1.Pre existing Material. The lecturer asks students to individually read references regarding various environmental factors that influence growth and development. Searching for references was assigned by the lecturer at the previous meeting, and was emphasized at the 2nd meeting. 2. Activities in groups. The lecturer provides problem cases regarding the influence of environmental factors: light, temperature, water and soil on plant growth and development. Students are asked to make observations to prove the morphological differences of plants that live in shaded and exposed conditions. This activity is supported by LKM. In this activity, students can develop ideas or thoughts to solve problems. Individual students in groups can express their opinions 3. Class Room Discussion Lecturers facilitate students to discuss in class, present the results obtained in groups. and classically obtained problem solving and conclusions from the practicum carried out. Students make practical reports in independent assignments. 2 X 50		**Material:** The influence of environmental factors: light, temperature, water and soil on plant growth and development (plant response) and interactions between organisms. **References:** *Lambers, Hans, F.Stuart Chapin and Thys L.Pons. 2019 Plant Physiological Ecology. New York: Springer*	10%

3	Understand the fundamental needs of an organism's cellular metabolism and relate them to the patterns of adaptation carried out	1. Describe the fundamental requirements of cellular metabolism 2. Identify basic strategies of biochemical adaptation 3. Explain the hierarchy of metabolite control related to the quality and quantity of enzymes 4. Differentiate the properties of metabolite control: versatility, speed and sensitivity 5. Explain the adaptation tools that plants must have to survive 6. Provide examples of adaptation patterns carried out by plants based on regional conditions	**Criteria:** 1. Reports and practicum products are assessed as ASSIGNMENTS with a weight of 30%. performance is integrated during learning 2. Form: Written Test and Assignment Criteria: Indicators are achieved through assignments in independent and structured tasks **Form of Assessment** : Participatory Activities	Case method 1.Pre existing Material. The lecturer asks students to individually read references from books and journals regarding the fundamental needs of an organism's cellular metabolism and relate them to the adaptation patterns carried out. This process is an assignment from a previous meeting which is reinforced by the lecturer. 2. Activities in groups. The lecturer provides problem cases regarding the adaptation of different organisms according to the adaptation tools they have. Students are asked to provide their ideas and opinions based on the references they read. In this activity, students can develop ideas to solve problems. Individual students in groups can express their opinions 3. Class Room Discussion Lecturers facilitate students to discuss in class, present the results obtained in groups. and classically obtained problem solving and conclusions from the activities carried out. Students are asked to make a report on the results of the discussion and read references for the next meeting 2 X 50		**Material:** Plant adaptations: metabolism and genetics; Fundamental requirements of cellular metabolism;Basic strategies of biochemical adaptation to the environment to achieve vectorial homeostasis;Hierarchy and nature of metabolic control Versatility, sensitivity and rate; Adaptation tools: genetic expression, enzyme diversity and metabolism; Adaptation patterns: compensatory and exploitative **References:** *Larcher, W. 2003. Physiological Plant Ecology. New York : Springer*	0%

4	Understand the activities of interacting organisms that influence plant life	1. explains the activities of interactions between organisms, namely competition, predation and parasites that affect plant growth 2. describe the nature/form of the attack 3. Explain the defenses possessed by plants 4. linking the symbiotic relationship between mycorrhiza, rhizobium and plants 5. distinguish primary and secondary metabolites in plants 6. explain the meaning and mechanism of resistance to allelopathy 7. analyze the role of allelopathy in agriculture 8. Skilled in conducting experiments on allelopathy	**Criteria:** 1. Reports and practicum products are assessed as ASSIGNMENTS with a weight of 30%. performance is integrated during learning 2. Form: Written Test and Assignment Criteria: Indicators are achieved through assignments in independent and structured tasks **Form of Assessment** : Participatory Activities, Practical Assessment	Presentation discussions, practicum Lecturers facilitate student-centered learning through group discussions and are responsible for finding concepts (based on literature reviews from textbooks and journals) regarding the activities of interacting organisms that influence plant life. Interactions include competition, predation, parasites, mutualism and allelopathy. Students then present the results of their group work. Lecturer and students conclude the concept of organism interactions. In independent activities, students carry out Allelopathy practicum activities guided by LKM. Students are asked to make a practicum report. Students are also asked to read references that will be used for the next meeting 2 X 50		**Material:** Interactions between organisms: Competence, Predation, Paracystism, beneficial associations, allelopathy, nature and forms of attack, plant defense **References:** *Bhatla, SC and Manju AL2018. Plant Physiology, Development and Metabolism. Singapore: Springer*	10%

5	Understand various plant responses to environmental stress and be able to relate this understanding to various mechanisms of plant resistance to toxicity	1. explains the effect of low and high temperatures on plants and the adaptation of plants to these conditions 2. describe the effect of anoxia on plant roots 3. Describe the effects of air pollution on plants 4. explains plant resistance to air pollution 5. Describe the properties and toxicity of saline, calcareous, acidic and heavy metal contaminated soils 6. provide examples of metal indicator plants and their coping mechanisms (phytochelatin) 7. skilled in carrying out experimental activities on the effects of heavy metals on plants	**Criteria:** 1. Reports and practicum products are assessed as ASSIGNMENTS with a weight of 30%. performance is integrated during learning 2. Form: Written Test and Assignment Criteria: Indicators are achieved through assignments in independent and structured tasks **Form of Assessment** : Participatory Activities	Case method 1.Pre existing Material. The lecturer asks students to individually read references regarding various plant responses to environmental stress and be able to relate this understanding to various mechanisms of plant resistance to toxicity. This process is an assignment from the previous meeting which is reinforced by the lecturer . 2. Activities in groups. The lecturer provides problem cases regarding the influence of various environmental factors such as low and high temperatures, anoxia, air pollution on plants and plant adaptation in these conditions. Students are asked to conduct discussions in groups to solve various cases given based on the references they read. In this activity, students can develop ideas or thoughts to solve problems. Individual students in groups can express their opinions 3. Class Room Discussion Lecturers facilitate students to discuss in class, present the results obtained in groups. and classically obtained problem solving and conclusions from the experiments carried out. Students make reports in independent assignments. 2 X 50		**Material:** Response to environmental stress **Reference:** *Fitter AH and RKM Hay. 1998. Environmental Physiology of Plants. (Sri Andani and Purbayanti. Trans) Yogyakarta: Gadjah Mada*	0%

6	Understand the relationship between oxygen availability and animal physiology	1. Explain the composition of the ancient atmosphere 2. Identify biochemical reactions involving oxygen 3. Classifying the way living creatures adapt is related to the availability of oxygen 4. Skilled in carrying out practical activities on plant responses to electromagnetics	**Criteria:** 1. Reports and practicum products are assessed as ASSIGNMENTS with a weight of 30%. performance is integrated during learning 2. Form: Written Test and Assignment Criteria: Indicators are achieved through assignments in independent and structured tasks **Form of Assessment** : Participatory Activities	Discussion, analysis of presentation articles Lecturers facilitate student-centred learning through group discussions and are responsible for finding concepts (based on literature reviews from textbooks and journals) regarding the relationship between oxygen availability and animal physiology. Students then present the results of their group work. Lecturer and students conclude the concept of how living creatures adapt is related to the availability of oxygen. Students are asked to read references for the next meeting 2 X 50		**Material:** Cell biochemical reactions involving oxygen, classification of living creatures' strategies. **Reference:** *Carere, C. and Mastripieni, D. 2013. Animal Personalities Behavior, Physiology, and Evolution. Chicago: The University of Chicago Press*	0%

7	Analyzing animal activities regarding the influence of temperature and environment	1. Explain the effect of water temperature on animal O2 consumption 2. Distinguish between the activities of ectothermic and endothermic animals under conditions of changes in environmental temperature 3. Describe various winter animal activities 4. explain hibernation activity 5. Skilled in carrying out experimental activities on the effect of water temperature on fish activity	**Criteria:** Reports and practicum products are assessed as ASSIGNMENTS with a weight of 30%. performance is integrated during learning **Form of Assessment** : Participatory Activities, Practical Assessment	Case method 1.Pre existing Material. The lecturer asks students to individually read references regarding animal activity on the influence of temperature and the environment. This process is an assignment from the previous meeting which is reinforced by the lecturer. 2. Activities in groups. The lecturer provides problem cases regarding the influence of animal activities on temperature and environmental influences. Students are asked to carry out a simple experiment to prove the effect of water temperature on animal O2 consumption based on the LKM guide and the references they read. In this activity, students can develop ideas or thoughts to solve problems. Individual students in groups can express their opinions 3. Class Room Discussion Lecturers facilitate students to discuss in class, present the results obtained in groups. and classically obtained problem solving and conclusions from the experiments carried out. Students make practical reports in independent assignments. 2 X 50		**Material:** Effect of temperature (air, soil) and environment on animal activity; hibernation activity **Bibliography:** *Rastogi, SC 2008. Essentials of Animal Physiology (4th Edition). New Delhi: New Age International Publishers*	10%
8	UTS	Form: Written Test and Assignment Criteria: Indicators are achieved through assignments in independent and structured tasks	**Criteria:** Reports and practicum products are assessed as ASSIGNMENTS with a weight of 30%. USPerformance questions are integrated during learning. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% **Form of Assessment** : Test	2 X 50		**Material:** Materials 1 to 7 **References:**	10%

9	Analyze the effect of ammonia toxicity on animal life	1. Explain the reactions of protein metabolism in the bodies of aquatic and land animals 2. Explain the body's mechanism for reducing ammonia toxicity. 3. Comparing the mechanisms of ammonia removal in cartilaginous and bony fish. 4. Explain the mechanism of ammonia disposal in land animals.	**Criteria:** Reports and practicum products are assessed as ASSIGNMENTS with a weight of 30%. performance is integrated during learning **Form of Assessment** : Participatory Activities	Presentation discussion The lecturer facilitates student-centered learning through group discussions and is responsible for finding concepts (based on literature review) regarding the effect of ammonia toxicity on aquatic animal life with LKM. Students then present the results of their group work. Lecturer and students conclude the concept of ammonia toxicity. Students are asked to read references that will be used for the next meeting 2 X 50		**Material:** Ammonia toxicity in animal life (protein metabolism reactions in aquatic animals; ammonia removal mechanisms and mechanisms for reducing the toxicity of aquatic animals. **Reference:** *Gordon, 1977. Abimal Physiology: Principles and Adaptation. New York: Macmillan Pub. Co*	5%

10	Analyzing the structure and sensitivity of vertebrate receptor organs	1. Identify the arrangement of receptor organs 2. Explain the function of receptor organs 3. Distinguish temperature, mechanical and chemical receptor organs in vertebrates	**Criteria:** 1. Reports and practicum products are assessed as ASSIGNMENTS with a weight of 30%. performance is integrated during learning 2. Form: Written Test and Assignment Criteria: Indicators are achieved through assignments in independent and structured tasks **Form of Assessment** : Participatory Activities	Case method 1.Pre existing Material. The lecturer asks students to individually read references regarding the structure of vertebrate receptor organs, sensitivity and c. Distinguish between temperature, mechanical and chemical receptor organs in vertebrates. This process is an assignment from the previous meeting which is reinforced by the lecturer. 2. Activities in the group. The lecturer provides problem cases regarding the analysis of the structure and sensitivity of vertebrate receptor organs. Students are asked to solve problems based on the references they read. In this activity, students can develop ideas or thoughts to solve problems. Individual students in groups can express their opinions 3. Class Room Discussion Lecturers facilitate students to discuss in class, present the results obtained in groups. and classically obtained problem solving and conclusions from the experiments carried out. Students make reports in independent assignments. 2 X 50		**Material:** Structure and function of temperature receptors, mechanics and chemistry in vertebrates **References:** *Carere, C. and Mastripieni, D. 2013. Animal Personalities Behavior, Physiology, and Evolution. Chicago: The University of Chicago Press*	5%

11	Analyzing animal activities regarding the influence of temperature and environment	1. Explain the effect of water temperature on O2 consumption by fish 2. Distinguish between the activities of ectothermic and endothermic animals under conditions of changes in environmental temperature 3. Describe various winter animal activities 4. explain hibernation activity 5. Skilled in carrying out experimental activities on the effect of water temperature on fish activity	**Criteria:** Reports and practicum products are assessed as ASSIGNMENTS with a weight of 30%. performance is integrated during learning **Forms of Assessment** : Participatory Activities, Practical Assessment, Practical / Performance	Case method 1.Pre existing Material. The lecturer asked students to individually read references regarding the concept of temperature which influences the life of fish. This process is an assignment from the previous meeting which is reinforced by the lecturer. 2. Activities in the group. The lecturer gave a case of the problem of the influence of temperature on the life of fish (water animals). Students are asked to carry out simple experiments to solve problems. In this activity, students can develop ideas or thoughts to solve problems. Individual students in groups can express their opinions 3. Class Room Discussion Lecturers facilitate students to discuss in class, present the results obtained in groups. and classically obtained problem solving and conclusions from the experiments carried out. Students make practical reports in independent assignments. 2 X 50		**Material:** Water quality (pH, dissolved oxygen levels, NH3 and heavy metals) and animal survival. **Reference:** *Rastogi, SC 2008. Essentials of Animal Physiology (4th Edition). New Delhi: New Age International Publishers*	15%
12	Understanding the potential of aquatic biota as environmental bioindicators	1. Explain the aspects of indicators in aquatic biota. 2. Explain the important role of aquatic biota as environmental bioindicators	**Criteria:** 1. Reports and practicum products are assessed as ASSIGNMENTS with a weight of 30%. performance is integrated during learning 2. Form: Written Test and Assignment Criteria: Indicators are achieved through assignments in independent and structured tasks **Form of Assessment** : Participatory Activities	Lecturers facilitate student-centered learning through group discussions and are responsible for finding concepts (based on literature reviews) regarding the potential of aquatic biota as environmental bioindicators. Students then present the results of their group work. Lecturer and students conclude the concept of the potential of aquatic biota as environmental bioindicators. Students are asked to read references that will be used for the next meeting 2 X 50		**Material:** Aquatic biota as bioindicators **References:** *Bligh, J. Cloudesley T and McDonald, A. 1976. Environmental Animal Physiology. London: Black well Scientific Pub*	5%

13	Students are able to generalize that water quality affects the life of fish (water animals)	1. explain the effect of acid on gill damage 2. relate the effect of DO ppm on fish respiration and metabolism 3. explains the effect of NH3 and heavy metal levels on fish activity 4. provide examples of cases of toxicity by heavy metals and other pollutants 5. Skilled in conducting experiments on the effect of dissolved O2 levels on fish activity	**Criteria:** Reports and practicum products are assessed as ASSIGNMENTS with a weight of 30%. performance is integrated during learning **Form of Assessment** : Participatory Activities, Practical Assessment	Case method 1.Pre existing Material. The lecturer asked students to individually read references regarding the concept of water quality which affects the life of fish (water animals). This process is an assignment from the previous meeting which is reinforced by the lecturer. 2. Activities in the group. The lecturer gave a case of water quality problems, namely dissolved oxygen levels which affect the life of fish (water animals). Students are asked to carry out simple experiments to solve problems. In this activity, students can develop ideas or thoughts to solve problems. Individual students in groups can express their opinions 3. Class Room Discussion Lecturers facilitate students to discuss in class, present the results obtained in groups. and classically obtained problem solving and conclusions from the experiments carried out. Students make practical reports in independent assignments. 2 X 50		**Material:** Water quality (pH, dissolved oxygen levels, NH3 and heavy metals) and animal survival. **Reference:** *Carere, C. and Mastripieni, D. 2013. Animal Personalities Behavior, Physiology, and Evolution. Chicago: The University of Chicago Press*	10%
14	Understanding the diversity of estuarine biota	1. explain the physical properties of estuaries 2. Explain the characteristics of estuary biota 3. Explain the types of estuary biota 4. Explain the behavior of estuarine biota	**Criteria:** Reports and practicum products are assessed as ASSIGNMENTS with a weight of 30%. performance is integrated during learning **Form of Assessment** : Participatory Activities	Presentation and discussion Lecturers facilitate student-centered learning through group discussions and are responsible for finding concepts (based on literature review) regarding the diversity of estuarine biota. Students then present the results of their group work. Lecturer and students conclude the concept of estuary biota. Students are asked to read the references that will be used for the next meeting 2 X 50		**Material:** Diversity of Estuarine Biota **References:** *Yuliani, Rahardjo, Sunu Kuntjoro.2019. Ecophysiology 1: Plant Ecophysiology. Surabaya: Unesa Press.*	0%

15	Understand ecophysiological concepts in the fields of animal husbandry, agriculture and fisheries	explains the influence of the environment on animal husbandry, agriculture and fisheries	**Criteria:** 1. Reports and practicum products are assessed as ASSIGNMENTS with a weight of 30%. performance is integrated during learning 2. Form: Written Test and Assignment Criteria: Indicators are achieved through assignments in independent and structured tasks **Form of Assessment** : Participatory Activities	Presentations, discussions, questions and answers Lecturers facilitate student-centered learning through group discussions and are responsible for finding concepts (based on literature reviews) regarding ecophysiological concepts in the fields of animal husbandry, agriculture and fisheries. Students then present the results of their group work. Lecturers and students summarize the concepts of ecophysiology in the fields of animal husbandry, agriculture and fisheries. 2 X 50		**Material:** Ecophysiological concepts in the fields of animal husbandry, fisheries and agriculture. **Reference:** *Manuel, J.Regosa. 2001. Handbook of Plant Ecophysiology Techniques 2001st Edition. New York: Springer*	0%
16	Students are able to understand ecophysiology material and implement it to solve problems	Form: Written Test and Assignment Criteria: Indicators are achieved through assignments in independent and structured tasks	**Criteria:** Performance reports/assessments are assessed as ASSIGNMENTS with a weight of 30%, UTS with a weight of 20%, Student activities and responses during learning activities are assessed as participation, a weight of 20%, UAS with a weight of 30%. Essay and multiple choice questions are accessed together on UTS and UAS. Performance questions are integrated during learning **Form of Assessment** : Participatory Activities, Tests	Test method		**Material:** Materials 9 to 15 **References:** *Yuliani, Rahardjo, Sunu Kuntjoro. 2019. Ecophysiology 1: Plant Ecophysiology. Surabaya: Unesa Press.*	10%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	50%
2.	Project Results Assessment / Product Assessment	5%
3.	Practical Assessment	25%
4.	Practice / Performance	5%
5.	Test	15%
		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.