



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																																																																																																																																							
Plant Pests and Diseases*	4620102085	Study Program Elective Courses	T=2 P=0 ECTS=3.18	6	April 27, 2023																																																																																																																																							
AUTHORIZATION		SP Developer	Course Cluster Coordinator	Study Program Coordinator																																																																																																																																								
		Dr.Yuliani,M.Si	Dr.Yuliani,M.Si	Dr. H. Sunu Kuntjoro, S.Si., M.Si.																																																																																																																																								
Learning model	Project Based Learning																																																																																																																																											
Program Learning Outcomes (PLO)	PLO study program which is charged to the course																																																																																																																																											
	PLO-5	Able to communicate scientific ideas, both orally and in writing using appropriate communication media according to the target, as a means of lifelong learning for academic self-development.																																																																																																																																										
	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.																																																																																																																																										
	Program Objectives (PO)																																																																																																																																											
	PO - 1	Mastering the concepts of plant pests and diseases and their applications (Knowledge)																																																																																																																																										
	PO - 2	Able to apply concepts or theories about plant pests, prevention and control methods that are mastered to solve problems in the environment procedurally according to their field of knowledge. (Knowledge)																																																																																																																																										
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	PO - 4	Able to design problem solutions by implementing transferable skills in the field of plant pests and diseases to develop ecopreneurship (eco-innovation, eco-opportunity, eco-commitment). (Special Competencies)																																																																																																																																										
	PO - 5	Able to communicate scientific ideas, both orally and in writing using appropriate communication media according to the target (general competencies)																																																																																																																																										
	PO - 6	Able to work independently, responsibly, both as an individual and in a group. (Altitude)																																																																																																																																										
	PLO-PO Matrix																																																																																																																																											
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Short Course Description	Plant Pests and Diseases study material about Pests and Diseases in plants and their control. The study covers the scope of plant pests and diseases, plant diseases which include biotic diseases (bacteria, viruses, fungi and nematodes) and abiotic diseases which include plant diseases due to lack of nutrients. Meanwhile, plant pests include the main pests on several productive plants along with their predators. Another study is how to control pests and plant diseases that takes into account the balance of the ecosystem and is environmentally friendly. The study of plant pests and diseases is accompanied by various process skills that will be used to solve problems in the field of plant physiology and its applications. Learning is delivered through presentations, discussions, practicums and assignments. The product produced in project-based learning is a book on plant disease pests on various cultivated plants.																																																																																																																																											
References	Main :																																																																																																																																											

1. Agrios, G. N. 1996. Ilmu Penyakit Tumbuhan. Diterjemahkan oleh Busnia M dan Toekijo M. Yogyakarta. Gadjah Mada University Press
2. Pracaya. 2008. Pengendalian Hama & Penyakit Tumbuhan Secara Organik. Yogyakarta : Kanisius.
3. Sastrahidayat. I.R. 2011. Fitoptologi (Ilmu Penyakit Tumbuhan). Malang. UB Press
4. Semangun, H. 1991. Penyakit-Penyakit Tanaman Hortikultura Di Indonesia. Yogyakarta. Gadjah Mada University Press
5. Sembel, T.D. 2010. Pengendalian Hayati Hama-hama Serangga Tropis dan gulma.Yogyakarta: Andi.
6. Yuliani, Yuni S.R, Evie Ratnasari,Mahanani T.A..2021.LKM Hama dan penyakit Tumbuhan. Surabaya: Jurusan biologi FMIPA Unesa

Supporters:

1. Dharam P.Abrol. 2013 Integrated Pest Management: Current Concepts and Ecological Perspective.Academic Press
2. Hagstrum D,w and Philips G.C.2012. Biological control: Insect pathogens, parasitoids, and predators.Kansas State University
3. Marcschner, H. 2012. Mineral nutrition of higher plants. London: Academic Press Pub.

Supporting lecturer

Dra. Evie Ratnasari, M.Si.
 Prof.Dr. Yuni Sri Rahayu, M.Si.
 Prof. Dr. Mahanani Tri Asri, M.Si.
 Prof. Dr. Yuliani, 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 concepts related to the scope of plant pests and diseases and use the concepts that have been mastered to explain events in everyday life.	<p>1.a. Explain the scope of the study of plant pests and diseases b. Explain the concepts of plant pests and diseases as applied to cases that occur in society c. Demonstrate an honest and independent attitude during the learning process based on the observation sheet</p> <p>2.Form: Written Test Assignment Criteria: Indicators achieved through assignments in independent and structured tasks</p>	<p>Criteria:</p> <p>1.Practical reports and products are assessed as ASSIGNMENTS with a weight of 30%</p> <p>2.USS/UTS weight 20%</p> <p>3.Student activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20%</p> <p>4.US weight 30%</p> <p>5.Essay and multiple choice questions are assessed jointly on USS and US</p> <p>6.Performance questions are integrated during learning</p> <p>Form of Assessment : Participatory Activities</p>	<p>The lecturer facilitates student-centred learning through group discussions and is responsible for finding concepts (based on literature review) regarding the scope of plant pests and diseases including several productive plant pests and biotic and abiotic plant diseases and presenting the results of their group work</p> <p>Face to face: 2x50 minutes Independent : 2x60 minutes Read and underline important concepts of several productive plant pests and biotic and abiotic plant diseases</p> <p>Structured: 2x60 minutes Read references and make a case resume involving pests and diseases in cultivated plants, the results will be used for the next meeting 2 X 50</p>		<p>Material: Introduction:: Scope of plant pests and diseases</p> <p>Reference: Sastrahidayat. IR 2011. <i>Phytopatology (Plant Disease Science)</i>. Poor. UB Press</p>	5%

2	Understand the basic meaning of plant diseases, symptoms, and mechanisms for the emergence of plant diseases as well as plant defenses against disease	<p>1.a. Explain the basic meaning of plant diseases, symptoms and mechanisms for the emergence of plant diseases</p> <p>b. Explain the defense mechanisms of plants against disease</p> <p>2. Form: Written Test</p> <p>Assignment Criteria:</p> <p>Indicators achieved through assignments in independent and structured tasks</p>	<p>Criteria:</p> <ol style="list-style-type: none"> 1. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 2. USS/UTS weight 20% 3. Student activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20% 4. US weight 30% 5. Essay and multiple choice questions are assessed jointly on USS and US 6. Performance questions are integrated during learning <p>Form of Assessment : Participatory Activities, Project Results Assessment / Product Assessment</p>	<p>Case studies</p> <p>Students carry out individual activities beforehand by reading case references involving pests and diseases in cultivated plants which have been carried out in a structured manner (case studies). Then the lecturer facilitates student-centered learning through student group discussions about the concept of plant diseases based on reference analysis that has been carried out. Based on the results of group discussions, students convey ideas and solutions and present the results of discussions to solve daily life problems in the field of plant diseases and then carry out class discussions related to problems and resulting problem solving from cases of pests and diseases in cultivated plants.</p> <p>Face to face: 2x50 minutes Independent: 2x60 minutes Discussion of problem solving on plant defense mechanisms against disease and reporting the results in writing in groups. Structured: 2x60 minutes, Make 2 X 50 discussion reports</p>	<p>Material: Definition of plant diseases, symptoms and mechanisms of entry of plant diseases and plant defense mechanisms against disease.</p> <p>Reference: <i>Agrios, GN 1996. Science of Plant Diseases. Translated by Busnia M and Toekijo M. Yogyakarta. Gadjah Mada University Press</i></p>	5%
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3	Explain plant diseases caused by nematodes, how to prevent and control them	<p>1.a. Explain plant diseases caused by nematodes b. explain how to prevent and control c. Explain the nematode extraction procedure d. Skilled in observing plant diseases and pests d.</p> <p>2. Form: Written Test, Project Assignment, with Criteria: Indicators achieved through assignments in independent, structured and project assignments</p>	<p>Criteria:</p> <ol style="list-style-type: none"> 1. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 2. USS/UTS weight 20% 3. Student activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20% 4. US weight 30% 5. Essay and multiple choice questions are assessed jointly on USS and US 6. Performance questions are integrated during learning <p>Form of Assessment : Participatory Activities, Project Results Assessment / Product Assessment</p>	<p>PJBL learning model Lecturers facilitate students using the PJBL learning model. The resulting product is a pocket book on pests and diseases in cultivated plants.</p> <p>1. The first stage of PJBL: The lecturer asks students basic questions (authentic problems), namely what pests and diseases attack various cultivated plants and what are the symptoms and solutions for controlling them</p> <p>2. The second stage of PJBL: Students are asked to design and develop products starting from: identifying needs (topics, book materials, book systematics, observation mechanisms, determining pests, diseases, determining cultivated plants)</p> <p>The second stage of the PJBL will be presented by students at the next meeting which includes identifying needs, project design, development, implementation and evaluation. For further learning, the lecturer uses the HPT LKM in groups, discussing, to discover the concept of Nematodes and present the results of their group work</p> <p>Face to face: 2x50 minutes, Independent: 2x60 minutes To read and rediscover concepts about nematodes Structured: 3x60 minutes Make a resume of nematode extraction 2 X 50</p>	<p>Material: Nematodes a. Mechanism of infection b. Symptoms c. Control and prevention d. Examples of nematodes</p> <p>Reference: <i>Semangun, H. 1991. Horticultural Plant Diseases in Indonesia. Yogyakarta. Gadjah Mada University Press</i></p>	5%
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4	Understand plant diseases caused by bacteria	<p>1.a. Explain the mechanism of bacteria in infecting plants</p> <p>b. Explain several representative examples of bacteria that cause plant diseases</p> <p>c. Identify the symptoms that appear on plants infected with bacteria</p> <p>d. Explain how to prevent the spread of pathogenic bacteria and how to control them</p> <p>2. Form: Written Test, Project Assignment, with Criteria: Indicators achieved through assignments in independent, structured and project assignments</p>	<p>Criteria:</p> <ol style="list-style-type: none"> 1. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 2. USS/UTS weight 20% 3. Student activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20% 4. US weight 30% 5. Essay and multiple choice questions are assessed jointly on USS and US 6. Performance questions are integrated during learning <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	<p>PJBL learning model</p> <p>The lecturer facilitates students to continue the activities carried out in the PJBL model, namely presenting product design and development, which has been prepared, so that students get input from other groups and lecturers. At this meeting, it was also agreed that Stage 3 of the PJBL was to prepare a schedule and agree on a schedule for monitoring product results. Monitoring was agreed at the 9th meeting after UTS. diseases in plants. Using LKM, students are guided in active discussions to discover the concept of bacteria and their control. The results of the discussion are presented</p> <p>Face to face: 2x50 minutes Independent: 2x60 minutes Structured: 2x60 minutes</p> <p>Make a discussion report and read references related to cases of plant diseases caused by viruses 2 X 50</p>		<p>Material: Bacteria that cause plant diseases</p> <p>a. Mechanism of bacterial infection</p> <p>b. Examples of bacteria that cause disease</p> <p>c. Symptoms, prevention and control</p> <p>Reference: <i>Pracaya. 2008. Organic Control of Pests & Plant Diseases. Yogyakarta: Kanisius.</i></p>	5%
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5	Understand plant diseases caused by viruses	<p>1.a. Explain the mechanism of viruses in infecting plants</p> <p>b. Explain several representative examples of viruses that cause plant diseases</p> <p>c. Identify the symptoms that appear on plants infected with viruses</p> <p>d. Understand and apply ways to prevent the spread of pathogenic viruses and how to control them</p> <p>2. Form: Written Test Assignment</p> <p>Criteria: Indicators achieved through assignments in independent and structured tasks</p>	<p>Criteria:</p> <ol style="list-style-type: none"> 1. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 2. USS/UTS weight 20% 3. Student activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20% 4. US weight 30% 5. Essay and multiple choice questions are assessed jointly on USS and US 6. Performance questions are integrated during learning <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	<p>Case studies</p> <p>Students carry out individual activities beforehand by reading case references involving viruses in cultivated plants which have been carried out in a structured manner (case studies). Then the lecturer facilitates student-centered learning through group discussions of students about viruses that cause diseases in cultivated plants based on reference analysis that has been carried out. Based on the results of group discussions, students convey ideas and solutions and present the results of discussions for solving daily life problems in the field of viruses as plant diseases then a class discussion is held related to the problem and the result is a solution to the problem of cases of viruses in cultivated plants and the solution</p> <p>Face to face: 2 x 50 minutes, Independent: 2 x 60 minutes, Structured: 2 x 60 minutes</p> <p>Make a discussion report 2 x 50</p>	<p>Material: Virus a. The mechanism of viruses in infecting plants</p> <p>b. representative examples of viruses that cause plant diseases</p> <p>c. Symptoms that appear on plants infected with the virus</p> <p>d. How to prevent and control</p> <p>Library: Yuliani, Yuni SR, Evie Ratnasari, Mahanani TA.2021.LKM Plant Pests and Diseases. Surabaya: Biology Department, FMIPA Unesa</p>	5%
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6	Understand plant diseases caused by fungi	<p>1.a. Explain the mechanism of fungi in infecting plants</p> <p>b. Explain several representative examples of fungi that cause plant diseases</p> <p>c. Identify the symptoms that appear on plants infected with fungi</p> <p>d. Understand and apply ways to prevent the spread of pathogenic fungi and how to control them</p> <p>2. Form: Written Test</p> <p>Assignment Criteria: Indicators achieved through assignments in independent and structured tasks</p>	<p>Criteria:</p> <ol style="list-style-type: none"> 1. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 2. USS/UTS weight 20% 3. Student activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20% 4. US weight 30% 5. Essay and multiple choice questions are assessed jointly on USS and US 6. Performance questions are integrated during learning <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	Lecturers facilitate student-centered learning, through images and videos. Active discussions are held in groups and classes to discover concepts related to fungi that cause disease in plants and their control. Students make a resume Face to face: 2x50 minutes, Independent: 2x60 minutes, Structured: 2x60 minutes Make a discussion report 2 x 50		<p>Material: Mushrooms</p> <ol style="list-style-type: none"> a. Mechanism of fungus in infecting plants b. representative examples of fungi that cause plant diseases c. Symptoms that appear on plants infected with fungi d. How to prevent the spread of pathogenic fungi and how to control them <p>Reference: <i>Sastrahidayat. IR 2011. Phytopatology (Plant Disease Science). Poor. UB Press</i></p>	5%
7	Understanding plant diseases caused by abiotic symptoms (nutrient deficiencies)	<p>1.a. Explain the meaning and symptoms of plant diseases caused by nutrient deficiencies</p> <p>b. Explain the mechanism of nutrient deficiency in the emergence of disease</p> <p>2. Form: Written Test</p> <p>Assignment Criteria: Indicators achieved through assignments in independent and structured tasks</p>	<p>Criteria:</p> <ol style="list-style-type: none"> 1. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 2. USS/UTS weight 20% 3. Student activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20% 4. US weight 30% 5. Essay and multiple choice questions are assessed jointly on USS and US 6. Performance questions are integrated during learning <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	Lecturers facilitate student-centered learning, through image and video observations. Active discussions were held in groups and classes to find concepts related to nutrient deficiencies and abiotic factors that cause disease and their solutions. Students make a resume Face to face: 2x50 minutes Independent: 2x60 minutes Structured: 2x60 minutes Make a discussion report 2 X 50		<p>Material: Nutrient deficiencies and environmental factors that cause disease</p> <p>Reference: <i>Marcshner, H. 2012. Mineral nutrition of higher plants. London: Academic Press Pub.</i></p>	5%

8	U.S.S	Form: Written Test, Assignment and Project, with Criteria: Indicators achieved through assignments in independent, structured assignments and project assignments	Criteria: 1. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 2. USS/UTS weight 20% 3. Student activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20% 4. US weight 30% 5. Essay and multiple choice questions are assessed jointly on USS and US 6. Performance questions are integrated during learning Form of Assessment : Test	2 X 50		Material: Materials 1 to 7 References:	10%
9	Understand the basic meaning of plant pests, and the various types of pests that attack productive plants	1.a. Explain the meaning of plant pests b. Explain about natural enemies c. Identify various representative pests that attack productive crops d. Explain the effect of pest attacks on the productivity of economically valuable plants 2. Form: Written Test, Assignment and Project, with Criteria: Indicators achieved through assignments in independent, structured assignments and project assignments	Criteria: 1. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 2. USS/UTS weight 20% 3. Student activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20% 4. US weight 30% 5. Essay and multiple choice questions are assessed jointly on USS and US 6. Performance questions are integrated during learning Form of Assessment : Project Results Assessment / Product Assessment	PJBL Learning Model Continuing the 4th PJBL stage, namely the Monitoring Stage. Students through their groups were asked to present the progress of the pest and disease book product which had been completed > 75%. Based on the progress presentation, lecturers and other students will provide input for improving and developing the book products produced. In addition, it was agreed that the product would be produced at the 14th and 15th meetings and evaluation and reflection and publication of the product would be carried out. The lecturer then facilitates students in groups and discussions, to discover the concept of plant pests, and various examples of pests Face to face: 2x50 minutes, Independent: 2x60 minutes, Structured: 2x60 minutes Make a report about pests on soybean plants 2 X 50		Material: Plant pests: definition, examples of pests, natural enemies, pest attacks. Reference: Hagstrum D,w and Phillips GC2012. Biological control: Insect pathogens, parasitoids, and predators. Kansas State University	5%

10	Describe various types of predators/parasitoids that are beneficial to the balance of the agroecosystem environment	<p>1.a. Explain the meaning of predators and parasitoids b. Provide several representative examples of predators and parasitoid pests of several productive plants c. Explain the influence of predators and parasitoids in ecological balance</p> <p>2. Form: Written Test Assignment Criteria: Indicators achieved through assignments in independent and structured tasks</p>	<p>Criteria:</p> <ol style="list-style-type: none"> 1. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 2. USS/UTS weight 20% 3. Student activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20% 4. US weight 30% 5. Essay and multiple choice questions are assessed jointly on USS and US 6. Performance questions are integrated during learning <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	Presentation, discussion Lecturer facilitates students in groups and discussions, to discover the concept of predators and parasitoids from searching literature on the internet Face to face: 2x50 minutes, Independent: 2x60 minutes Structured: 2x60 minutes, Make a report 2 x 50		<p>Material: Predators and parasitoids Reference: <i>Hagstrum D,w and Phillips GC2012.</i> <i>Biological control: Insect pathogens, parasitoids, and predators. Kansas State University</i></p>	5%
11	Understand the concepts related to integrated pest management	<p>1. Explain pest control in plants using technical, chemical and biological culture</p> <p>2. Form: Written Test Assignment Criteria: Indicators achieved through assignments in independent and structured tasks</p>	<p>Criteria:</p> <ol style="list-style-type: none"> 1. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 2. USS/UTS weight 20% 3. Student activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20% 4. US weight 30% 5. Essay and multiple choice questions are assessed jointly on USS and US 6. Performance questions are integrated during learning <p>Form of Assessment : Participatory Activities</p>	Presentations, discussions. Lecturer assignments facilitate student-centered learning, through searching articles and guiding active discussions to discover concepts related to control with mechanical, chemical, technical, biological culture Face to face: 2x50 minutes Independent: 2x60 minutes Structured: 2x60 minutes Make a discussion report comparing various types of control techniques 2 X 50		<p>Material: Technical, chemical, biological/biological cultural control. Reference: <i>Dharam P. Abrol. 2013 Integrated Pest Management: Current Concepts and Ecological Perspective. Academic Press</i></p>	5%

12	Understand the concepts related to integrated pest management	<p>1.a. Explain the meaning of integrated pest management b. Explain the application of integrated pest management</p> <p>2. Form: Written Test Assignment Criteria: Indicators achieved through assignments in independent and structured tasks</p>	<p>Criteria:</p> <ol style="list-style-type: none"> 1. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 2. USS/UTS weight 20% 3. Student activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20% 4. US weight 30% 5. Essay and multiple choice questions are assessed jointly on USS and US 6. Performance questions are integrated during learning <p>Form of Assessment : Participatory Activities</p>	<p>Group discussions and class discussions, assignments Lecturer facilitates student-centered learning, through videos and ppts on integrated pest control and guides active discussions to discover concepts related to integrated pest control Face to face: 2x50 minutes, Independent: 2x60 minutes, Structured: 2x60 minutes Make a discussion report and search for related literature from the internet 2 X 50</p>		<p>Material: Integrated pest management Reference: <i>Dharam P. Abrol. 2013 Integrated Pest Management: Current Concepts and Ecological Perspective. Academic Press</i></p>	5%
13	Analyze environmental factors (ecosystem balance) that cause pests and diseases in plants	<p>1. Analyzing the relationship between plant pests and diseases and environmental factors (ecosystem balance)</p> <p>2. Form: Written Test Assignment Criteria: Indicators achieved through assignments in independent and structured tasks</p>	<p>Criteria:</p> <ol style="list-style-type: none"> 1. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 2. USS/UTS weight 20% 3. Student activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20% 4. US weight 30% 5. Essay and multiple choice questions are assessed jointly on USS and US 6. Performance questions are integrated during learning <p>Form of Assessment : Participatory Activities</p>	<p>The lecturer facilitates student-centered learning, through articles and guiding active discussions to discover the concept of plant control due to environmental factors Face to face: 2x50 minutes, Independent: 2x60 minutes, Structured: 2x60 minutes Make a discussion report related to the topic 2 X 50</p>		<p>Material: a. General characteristics, diagnosis and control of plant diseases due to factors such as temperature, humidity, light, pollutants, oxygen and plant stress b. Ecosystem balance Bibliography: <i>Sembel, TD 2010. Biological control of tropical insect pests and weeds. Yogyakarta: Andi.</i></p>	5%

14	Analyzing the influence of pathogens on plant physiological functions	<p>1. Analyze the influence of pathogens on photosynthesis, nutrient translocation, respiration and genetic expression systems</p> <p>2. Form: Written Test, Assignment and Project, with Criteria: Indicators achieved through assignments in independent, structured assignments and project assignments</p>	<p>Criteria:</p> <ol style="list-style-type: none"> 1. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 2. USS/UTS weight 20% 3. Student activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20% 4. US weight 30% 5. Essay and multiple choice questions are assessed jointly on USS and US 6. Performance questions are integrated during learning <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	<p>PJBL Learning Model Stage 5 PJBL Evaluation and reflection. Stage 6 PJBL Product publication. Stages 4 and 6 were carried out at the 14th and 15th meetings. Evaluation and reflection on book products Plant pests and diseases produced by each group. Each group of students will also publish the results of their book products (stage 6 PJBL) Activities carried out, each group presented the results of the product books obtained and showing off his work to his friends. The resulting book product is then given an assessment by the lecturer and students (through an assessment instrument) and a reflection is given on the product obtained. Apart from the KBM above, the lecturer also facilitates students in groups and discussions, to discover the concept of the effect of pathogens on photosynthesis, nutrient translocation, respiration and genetic expression systems and solutions for prevention or control. Face to face: 2x50 minutes, Independent: 2x60 minutes, Structured: 2x60 minutes 2 X 50</p>	<p>Material: Effects of pathogens on photosynthesis, nutrient translocation, respiration and genetic expression systems References: <i>Pracaya. 2008. Organic Control of Pests & Plant Diseases. Yogyakarta: Kanisius.</i></p>	5%
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15	Understand the mechanisms of plants in defending themselves from pathogen attacks	<p>1.Explain the mechanisms of structural defense and metabolic defense</p> <p>2.Form: Written Test, Assignment and Project, with Criteria: Indicators achieved through assignments in independent, structured assignments and project assignments</p>	<p>Criteria:</p> <ol style="list-style-type: none"> 1.Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 2.USS/UTS weight 20% 3.Student activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20% 4.US weight 30% 5.Essay and multiple choice questions are assessed jointly on USS and US 6.Performance questions are integrated during learning <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	<p>PJBL learning model Stage 5 PJBL Evaluation and reflection. Stage 6 PJBL Product publication. Stages 4 and 6 were carried out at the 14th and 15th meetings. Evaluation and reflection on book products Plant pests and diseases produced by each group. Each group of students will also publish the results of their book products (stage 6 PJBL) Activities carried out, each group presented the results of the product books obtained and showing off his work to his friends. The resulting book product is then given an assessment by the lecturer and students (through an assessment instrument) and a reflection is given on the product obtained. The resulting book product will then go through a validation stage so that it can be copyrighted. In addition to the KBM above, the lecturer facilitates student-centered learning, and guides active discussions to discover the concepts of structural defense and secondary metabolite defense. Face to face: 2x50 minutes, Independent: 2x60 minutes, Structured: 2x60 minutes 2 X 50</p>	<p>Material: Structural defense and secondary metabolite defense Library: <i>Sastrahidayat. IR 2011. Phytopatology (Plant Disease Science). Poor. UB Press</i></p>	10%
16	able to understand HPT concepts and solve problems in their environment based on the concepts they have	Form: Written Test and Assignment Criteria: Indicators are achieved through assignments in independent and structured tasks	<p>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 or Products from projects with a weight of 30%</p> <p>Form of Assessment : Test</p>	Writing test	<p>Material: Materials 9 to 15 References: <i>Yuliani, Yuni SR, Evie Ratnasari, Mahanani TA.2021.LKM Plant Pests and Diseases. Surabaya: Biology Department, FMIPA Unesa</i></p>	15%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	25%
2.	Project Results Assessment / Product Assessment	50%
3.	Test	25%
		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.