

## Universitas Negeri Surabaya Faculty of Mathematics and Natural Sciences Biology Undergraduate Study Program

Document Code

## SEMESTER LEARNING PLAN CODE Credit Weight SEMESTER Compilation Date Courses **Course Family** Plant Pests and Diseases\* 4620102085 P=0 ECTS=3.18 April 27, 2023 Study Program Elective T=2 6 Courses AUTHORIZATION **Course Cluster Coordinator** Study Program Coordinator SP Developer Dr.Yuliani,M.Si Dr.Yuliani,M.Si Dr. H. Sunu Kuntjoro, S.Si., M.Si. Learning model Project Based Learning PLO study program which is charged to the course Program Learning 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-5 Outcomes (PLO) Able to work independently and collaboratively, as well as responsibly, in completing various tasks in class, in the laboratory and in the field. PLO-7 **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) PO - 3 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) 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 - 4 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 P.0 PLO-5 PLO-7 PO-1 PO-2 PO-3 PO-4 PO-5 PO-6 PO Matrix at the end of each learning stage (Sub-PO) ΡO Week 1 2 3 4 5 6 7 10 11 12 13 14 15 16 8 9 PO-1 PO-2 PO-3 PO-4 PO-5 PO-6

 

 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 :

		<ol> <li>Agrios, G</li> <li>Pracaya.</li> <li>Sastrahid</li> <li>Semangu</li> <li>Sembel, <sup>-</sup></li> <li>Yuliani, Y</li> </ol>	<ol> <li>Agrios, G. N. 1996. Ilmu Penyakit Tumbuhan. Diterjemahkan oleh Busnia M dan Toekijo M. Yogyakarta. Gadjah Mada University Press</li> <li>Pracaya. 2008. Pengendalian Hama &amp; Penyakit Tumbuhan Secara Organik. Yogyakarta : Kanisius.</li> <li>Sastrahidayat. I.R. 2011. Fitoptologi (Ilmu Penyakit Tumbuhan). Malang. UB Press</li> <li>Semangun, H. 1991. Penyakit-Penyakit Tanaman Hortikultura Di Indonesia. Yogyakarta. Gadjah Mada University Press</li> <li>Sembel, T.D. 2010. Pengendalian Hayati Hama-hama Serangga Tropis dan gulma. Yogyakarta: Andi.</li> <li>Yuliani, Yuni S.R, Evie Ratnasari,Mahanani T.A2021.LKM Hama dan penyakit Tumbuhan. Surabaya: Jurusan biologi FMIPA Unesa</li> </ol>								
		Supporters:									
		<ol> <li>Dharam F</li> <li>Hagstrum</li> <li>Marcshne</li> </ol>	P.Abrol. 2013 Integrate n D,w and Philips G.C. er, H. 2012. Mineral nu	ed Pest Management: Curr 2012. Biological control: In trition of higher plants. Lor	ent Concepts and sect pathogens, p ndon: Academic P	Ecological Perspective. arasitoids, and predators ress Pub.	cademic Press .Kansas State Univers	iity			
Support lecturer	ing	Dra. Evie Ratnasa Prof.Dr. Yuni Sri F Prof. Dr. Mahanar Prof. Dr. Yuliani, I	ari, M.Si. Rahayu, M.Si. ni Tri Asri, M.Si. M.Si.								
Week-	Final	l abilities of learning stage	Eva	aluation	Hel Learn Studen [Est	p Learning, ing methods, t Assignments, timated time]	Learning materials	Assessment Weight (%)			
	(Sub		Indicator	Criteria & Form	Offline( offline)	Online ( online )	[References]				
(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)			
1	Unc con pes and con bee exp eve	derstand the cepts related to scope of plant ts and diseases use the cepts that have n mastered to lain events in ryday life.	<ol> <li>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</li> <li>Form: Written Test Assignment Criteria: Indicators achieved through assignments in independent and structured tasks</li> </ol>	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 : Participatory Activities	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 Face to face: 2x50 minutes Independent : 2x50 minutes Read and underline important concepts of several productive plant pests and biotic and abiotic plant diseases 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		Material: Introduction:: Scope of plant pests and diseases Reference: Sastrahidayat. IR 2011. Phytoptology (Plant Disease Science). Poor. UB Press	5%			

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3	Explain plant	1.a. Explain plant	Criteria:	PJBL learning	Material:	5%
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	them	nematodes b.	assessed as	students using	Symptoms c	
		explain now to	ASSIGNMENTS	the PJBL	Control and	
		control c	30%	learning model.	prevention d.	
		Explain the	2.USS/UTS weight	The resulting	Examples of	
		nematode	20%	product is a	nematodes References	
		extraction	<ol><li>Student activities</li></ol>	pocket book on	Semangun H	
		procedure d.	and responses	diseases in	1991. Horticultural	
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		observing plant	activities,	plants.	Indonesia.	
		uiseases anu	practicums are	1. The linst stage of P IBL	Yogyakaria. Gadiah Mada	
		2 Form: Written	assessed as	The lecturer	University Press	
		Test, Project	participation, with a	asks students		
		Assignment,	weight of 20%	basic questions		
		with Criteria:	4.US weight 30%	(authentic		
		Indicators	5.Essay and multiple	namely what		
		achieved	choice questions	pests and		
		assignments in	iointly on LISS and	diseases attack		
		independent.	US	various		
		structured and	6.Performance	nlants and		
		project	questions are	what are the		
		assignments	integrated during	symptoms and		
			learning	solutions for		
			Form of Assessment	controlling		
			Participatory Activities.	2. The second		
			Project Results	stage of PJBL:		
			Assessment / Product	Students are		
			Assessment	asked to		
				design and develop		
				products		
				starting from:		
				identifying		
				needs (topics,		
				book materials,		
				systematics,		
				observation		
				mechanisms,		
				pests.		
				diseases,		
				determining		
				cultivated		
				The second		
				stage of the		
				PJBL will be		
				presented by		
				next meeting		
				which includes		
				identifying		
				needs, project		
				development		
				implementation		
				and evaluation.		
				For further		
				lecturer uses		
				the HPT LKM		
				in groups,		
				discussing, to		
				concent of		
				Nematodes		
				and present		
				the results of		
				work		
				Face to face:		
				2x50 minutes,		
				Independent:		
				2X60 minutes		
				rediscover		
				concepts about		
				nematodes		
				Structured:		
				Make a resume		
				of nematode		
				extraction		
				2 X 50		

<u>,</u>	Lindonator		a :: ·	D 101 1		
4	diseases caused by	<ol> <li>1.a. Explain the</li> </ol>	Criteria:	PJBL learning	Material: Bacteria	5%
	bacteria	mechanism of	1.Practical reports	The lecturer	that cause plant	
		bacteria in	and products are	facilitates	uiseases a. Mochanism of	
		infecting plants	assessed as	acilitates	heatorial infaction	
		b. Explain	ASSIGNMENTS	continue the	b Examples of	
		several	with a weight of	activities	bacteria that cause	
		representative	30%	carried out in	disease c	
		examples of	2.USS/UTS weight	the PJBL	Symptoms,	
		bacteria that	20%	model, namely	prevention and	
		cause plant	3.Student activities	presenting	control	
		diseases c.	and responses	product design	Reference:	
		Identify the	during learning	and	Pracaya. 2008.	
		symptoms that	activities,	development,	Organic Control of	
		appear on	especially	which has been	Pests & Plant	
		plants infected	practicums, are	prepared, so	Diseases. Vogvakarta:	
		with bacteria d.	assessed as	net	Kanisius	
		Explain now to	weight of 20%	input from	Runsius.	
		prevent the	4 US weight 30%	other groups		
		nathogenic	5 Essay and multiple	and lecturers.		
		bacteria and	choice questions	At this meeting,		
		how to control	are assessed	it was also		
		them	jointly on USS and	agreed that		
		2.Form: Written	US	Stage 3 of the		
		Test, Project	6.Performance	r JDL WdS IU		
		Assignment,	questions are	schedule and		
		with Criteria:	integrated during	agree on a		
		Indicators	learning	schedule for		
		achieved		monitoring		
		through	Form of Assessment	product results.		
		assignments in	Project Results	Monitoring		
		independent,	Assessment / Product	was agreed at		
		structured and	Assessment	the 9th meeting		
		project		diseases in		
		assignments		nlants Using		
				LKM. students		
				are guided in		
				active		
				discussions to		
				discover the		
				concept of		
				bacteria and		
				The results of		
				the discussion		
				are presented		
				Face to face:		
				2x50 minutes		
				Independent:		
				2x60 minutes		
				2x60 minutos		
				Make a		
				discussion		
				report and read		
				references		
				related to		
				cases of plant		
				diseases		
				caused by		
				viruses 2 X 50		

				1		
5	Understand plant	1.a. Explain the	Criteria:	Case studies	Material: Virus a.	5%
	diseases caused by	mechanism of	1.Practical reports	Students carry	The mechanism of	
	viruses	viruooo in	and products are	out individual	viruses in infecting	
		viruses in	and products are	activities	nlants h	
		infecting plants	assessed as	hoforohond by	roprocentativo	
		b. Explain	ASSIGNMENTS	reading appa	overnles of	
		several	with a weight of	reading case	examples of	
		representative	30%	references	viruses that cause	
		examples of	2.USS/UTS weight	involving	plant diseases c.	
		viruses that	20%	viruses in	Symptoms that	
		viruses triat	2070 2 Chudent estivities	cultivated	appear on plants	
		cause plant	5.Student activities	plants which	infected with the	
		diseases c.	and responses	have been	virus d. How to	
		Identify the	during learning	carried out in a	prevent and control	
		symptoms that	activities,	structured	Library: Yuliani.	
		appear on	especially	manner (case	Yuni SR Evie	
		nlants infected	practicums are	studies) Then	Ratnasari	
		plants intected	assassed as	the lecturer	Mahanani	
		with viruses d.	assessed as	facilitataa	TA 2021 LKM Diopt	
		Understand	participation, with a	actudent	Docto and	
		and apply ways	weight of 20%	student-	Pesis anu	
		to prevent the	4.US weight 30%	centered	Diseases.	
		spread of	<ol><li>Essay and multiple</li></ol>	learning	Surabaya: Biology	
		pathogenic	choice questions	through group	Department,	
		viruses and	are assessed	discussions of	FMIPA Unesa	
		how to control	iointly on LISS and	students about		
		now to control	Jointly on 033 and	viruses that		
		them	US	cause diseases		
		2.Form: Written	6.Performance	in cultivated		
		Test	questions are	plants based		
		Assignment	integrated during	on reference		
		Criteria:	learning	analysis that		
		Indicators	0	has been		
		achieved	Form of Assessment :	carried out		
		achieveu	Project Results	Based on the		
		through	Assessment / Product	based on the		
		assignments in	Assessment	results of group		
		independent	Assessment	discussions,		
		and structured		students		
		tasks		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		
				in a colution to		
				is a solution to		
				the problem of		
				cases of		
				viruses in		
				cultivated		
				plants and the		
				solution		
				Face to face: 2		
				x 50 minutes,		
				Independent: 2		
				x 60 minutes.		
				Structured: 2 x		
				60 minutes		
				Make a		
				discussion		
				report		
				2 x 50		
				2 ^ 30		

6	Understand plant diseases caused by fungi	<ol> <li>A. Explain the mechanism of fungi in infecting plants</li> <li>Explain several representative examples of fungi that cause plant diseases c. Identify the symptoms that appear on plants infected with fungi d. Understand and apply ways to prevent the spread of pathogenic fungi and how to control them</li> <li>Form: Written Test Assignment Criteria: Indicators achieved through assignments in independent and structured tasks</li> </ol>	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	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 Make a discussion report 2 x 50	Material: Mushrooms 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 <b>Reference:</b> Sastrahidayat. IR 2011. Phytoptology (Plant Disease Science). Poor. UB Press	5%
	diseases caused by abiotic symptoms (nutrient deficiencies)	<ol> <li>a. Explain the meaning and symptoms of plant diseases caused by nutrient deficiencies b. Explain the mechanism of nutrient deficiency in the emergence of disease</li> <li>Form: Written Test Assignment Criteria: Indicators achieved through assignments in independent and structured tasks</li> </ol>	<ul> <li>Criteria:</li> <li>1. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30%</li> <li>2. USS/UTS weight 20%</li> <li>3. Student activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20%</li> <li>4. US weight 30%</li> <li>5. Essay and multiple choice questions are assessed jointly on USS and US</li> <li>6. Performance questions are integrated during learning</li> <li>Form of Assessment : Project Results Assessment / Product Assessment</li> </ul>	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 Make a discussion report 2 X 50	Materia: Nutrient deficiencies and environmental factors that cause disease <b>Reference:</b> Marcshner, H. 2012. Mineral nutrition of higher plants. London: Academic Press Pub.	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	<ul> <li>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</li> <li>2.Form: Written Test, Assignment and Project, with Criteria: Indicators achieved through assignments in independent, structured assignments and project assignments</li> </ul>	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 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: 2x60 minutes, Structured: 2x60 minutes Students an goybean plants 2 X 50	Material: Plant pests: definition, examples of pests, natural enemies, pest attacks. <b>Reference:</b> Hagstrum D,w and Philips 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	<ol> <li>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</li> <li>Form: Written Test Assignment Criteria: Indicators achieved through assignments in independent and structured tasks</li> </ol>	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	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 Structured: 2x60 minutes Structured: 2x60 minutes Structured: 2x50	Material: Predators and parasitoids <b>Reference:</b> Hagstrum D,w and Philips GC2012. Biological control: Insect pathogens, parasitoids, and predators. Kansas State University	5%
11	oncerstand the concepts related to integrated pest management	<ol> <li>Explain pest control in plants using technical, chemical and biological culture</li> <li>Form: Written Test Assignment Criteria: Indicators achieved through assignments in independent and structured tasks</li> </ol>	<ol> <li>Criteria:</li> <li>Practical reports and products are assessed as ASSIGNMENTS with a weight of 30%</li> <li>USS/UTS weight 20%</li> <li>Student activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20%</li> <li>US weight 30%</li> <li>Essay and multiple choice questions are assessed jointly on USS and US</li> <li>Performance questions are integrated during learning</li> <li>Form of Assessment : Participatory Activities</li> </ol>	Presentations, discussions. Lecturer assignments facilitate student- centered learning, through searching articles and guiding active discover concepts related to control with mechanical, 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	materiai: Technical, chemical, biological/biological cultural control. <b>Reference:</b> Dharam P. Abrol. 2013 Integrated Pest Management: Current Concepts and Ecological Perspective. Academic Press	5%

12	Understand the concepts related to integrated pest management	<ol> <li>a. Explain the meaning of integrated pest management b. Explain the application of integrated pest management</li> <li>Form: Written Test Assignment Criteria: Indicators achieved through assignments in independent and structured tasks</li> </ol>	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 : Participatory Activities	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, Structured: 2x60 minutes, Structured: 2x60 minutes, Structured: 2x60 minutes, Structured: 2x60 minutes adiscussion report and search for related literature from the internet	Material: Integrated pest management Reference: Dharam P. Abrol. 2013 Integrated Pest Management: Current Concepts and Ecological Perspective. Academic Press	5%
	environmental factors (ecosystem balance) that cause pests and diseases in plants	<ul> <li>I.Anayang the relationship between plant pests and diseases and environmental factors (ecosystem balance)</li> <li>2.Form: Written Test Assignment Criteria: Indicators achieved through assignments in independent and structured tasks</li> </ul>	<ol> <li>Practical reports and products are assessed as ASSIGNMENTS with a weight of 30%</li> <li>USS/UTS weight 20%</li> <li>Student activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20%</li> <li>US weight 30%</li> <li>Essay and multiple choice questions are assessed jointly on USS and US</li> <li>Performance questions are integrated during learning</li> <li>Form of Assessment : Participatory Activities</li> </ol>	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	General characteristics, diagnosis and control of plant diseases due to factors such as temperature, humidity, light, pollutants, oxygen and plant stress b. Ecosystem balance <b>Bibliography:</b> Sembel, TD 2010. Biological control of tropical insect pests and weeds. Yogyakarta: Andi.	

14	Analyzing the	1 Analyze the	Criteria:	PJBL Learning		Material: Effects of	5%
	influence of	influence of	1 Practical reports	Model		nathogens on	
	pathogens on plant	inituence of		Stage 5 D 1BI		photosynthesis	
	physiological	pathogens on	and products are	Stage 5 F JDL		priotosynthesis,	
	functions	photosynthesis,	assessed as			nument	
		nutrient	ASSIGNMENTS	reflection.		translocation,	
		translocation.	with a weight of	Stage 6 PJBL		respiration and	
		respiration and	30%	Product		genetic expression	
		genetic	2 LISS/LITS weight	publication.		systems	
		genetic	2.003/010 Weight	Stages 4 and 6		References:	
		expression	20%	were carried		Pracaya. 2008.	
		systems	3.Student activities	out at the 14th		Organic Control of	
		2.Form: Written	and responses	and 15th		Pests & Plant	
		Test,	during learning	meetings.		Diseases.	
		Assignment	activities,	Evaluation and		Yoqyakarta:	
		and Project,	especially	reflection on		Kanisius.	
		with Criteria	practicums, are	book products			
		Indicators	assessed as	Plant pests and			
		achieved	narticination with a	diseases			
		through	woight of 2006	produced by			
		unougn	A US weight 20%	each group			
		assignments in		Each group of			
		independent,	5.Essay and multiple	students will			
		structured	choice questions	also nublish			
		assignments	are assessed	the results of			
		and project	jointly on USS and	their hook			
		assignments	US	nreducto			
			6.Performance	(otogo 6 D IDL)			
			questions are	(staye o PJBL)			
			integrated during	Activities			
			learning	carrieu out,			
			learning	each group			
			Form of Assossment	presented the			
			Point of Assessment .	results of the			
			Appagement / Droduct	product books			
			Assessment / Product	obtained and			
			Assessment	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			
				Eace to face			
				2x50 minutes			
				Independent			
				2v60 minutes			
				∠xou minutes,			
				Siruciured:			
				∠x60 minutes			
				∠ X 50			

15	Understand the mechanisms of plants in defending themselves from pathogen attacks	<ol> <li>Explain the mechanisms of structural defense and metabolic defense</li> <li>Form: Written Test, Assignment and Project, with Criteria: Indicators achieved through assignments in independent, structured assignments and project assignments</li> </ol>	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 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 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 discover the concepts of structural defense and secondary metabolite defense. Face to face: 2x50 minutes, 2x60 minutes, 2x60 minutes, 2x50 minutes	Material: Structural defense and secondary metabolite defense Library: Sastrahidayat. IR 2011. Phytoptology (Plant Disease Science). Poor. UB Press	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	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% Form of Assessment : Test	Writing test	Material: Materials 9 to 15 References: Yuliani, Yuni SR, Evie Ratnasari, Mahanani TA.2021.LKM Plant Pests and Diseases. Surabaya: Biology Department, FMIPA Unesa	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

- 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.
- 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.
   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
- 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.
   Indicators for assessing ability in the process and student learning outcomes are specific and measurable statements that identify the
- 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.
- 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.
- 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.
- Learning materials are details or descriptions of study materials which can be presented in the form of several main points and subtopics.
- 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.