BRAWIJAYA UNIVERSITY

FACULTY OF AGRICULTURE

DEPARTMENT OF PLANT PESTS AND DISEASES / MASTER AGRICULTURAL ENTOMOLOGY STUDY PROGRAM

SEMESTER LEARNING PLAN

SUBJECT	CODE	COURSE CULTURE	CREDITS	SEMESTER	Date of Preparation
Relationship Climate Change and Pests	PTH81210	Agricultural Entomology	2 2,34 ECTS	Odd	8 June 2021

AUTHORIZATION	Lecturer	Course Coordinator	Head of Study Program
Department of Plant Pests and Diseases	Dr. Agr.Sc. Hagus Tarno SP., MP. Dr. Ir. Gatot Mudjiono	Name Signature	Dr. Akhmad Rizali, SP., M.Si. Signature

Learning Outcomes	ILO STUDY PROGRAM	
	S1	Able to work together and have social sensitivity and high concern for the community and the environment
	P1	Mastering concepts, theories and methods in the field of agricultural entomology
	P2	Mastering the concept of integrated pest management in the context of continued agriculture

<table>
<tr><td></td><td colspan="2">CLO</td></tr>
<tr><td></td><td>1</td><td>Students are expected to be able to understand climate change and its effects on plants, insect pests, agroecosystems and forests</td></tr>
<tr><td></td><td>2</td><td>Explain mitigation and adaptation efforts carried out in dealing with climate change</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Course Brief Description</td><td colspan="2">This course discusses climate change and variability, climate change and agroecosystem, case study about effect of climate change on pests in agroecosystem and management strategies</td></tr>
<tr><td>Learning Materials / Subjects</td><td colspan="2">1) Introduction
2) Climate change and variability
3) Plant response to climate change
4) Climate change and agroecosystems
5) Climate change and forests
6) Direct impact of climate change on insects
7) Indirect impact on insects
8) Some examples of cases in pests in production forests (Coleoptera)
9) Some examples of cases of pests in production forests (Homoptera)
10) Some examples of cases of pests in production forests (Hymenoptera)
11) Some examples of cases of pests in production forests (Lepidoptera)
12) Climate change and biological control in agricultural systems
13) Climate change and pest management strategies</td></tr>
<tr><td>Relationship of CLO and ILO</td><td colspan="2"><table>
<tr><th></th><th>ILO1</th><th>ILO2</th><th>ILO3</th><th>ILO4</th><th>ILO5</th><th>ILO6</th><th>ILO7</th></tr>
<tr><td>CLO1</td><td>0.50</td><td>0.25</td><td>0.25</td><td>0.00</td><td>0.00</td><td>0.00</td><td>0.00</td></tr>
<tr><td>CLO2</td><td>0.25</td><td>0.25</td><td>0.50</td><td>0.00</td><td>0.00</td><td>0.00</td><td>0.00</td></tr>
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References	**Main**	
	1. Lichtfouse E. 2009. Climate Change, Intercropping, Pest Control and Beneficial Microorganisms. 2. Björkman C, Niemala P. 2015. Climate Change and Insect Pest. 3. Jactel, H., Koricheva, J., & Castagneyrol, B. (2019). Responses of forest insect pests to climate change: not so simple. *Current opinion in insect science*, *35*, 103-108.	
	Supporting References	
	1. Leksono, A.M., Yanuwiadi, B., Afandhi. A., Farhan, M., Zairina, A. 2020. The Abundance and Diversity of Grasshopper Communities in Relation to Elevation and Land Use in Malang, Indonesia. Biodiveritas 21(12):5614-5620. E-ISSN: 2085-4722. 2. Rizali, A., Karindah, S., Windari, A., Rahardjo, B.T., Nurindah., Sahari, B. 2020. Ant and Termite Diversity in Indonesian Oil Palm Plantation: Investigating The Effect of Natural Habitat Existence. Biodiversity 21 (2): 1326-1331. E-ISSN: 2085-4722. 3. Oo, T.N., Hakim, L., Afandhi, A. 2022. The Distribution and Habitat Profiles of *Anaphalis* Spp. Outside Protected Forest In Poncokusumo District, Malang Regency. International Journal of Social and Management Studies (IJOSMAS) 3(2): 277-291. E-ISSN: 2775-0809. 4. Ikawati, S., Himawan, T., Abadi, A.L., Tarno, H. 2020. Thermostability, Photostability, and Toxicity of Clove Oil Nanoparticles Against *Cryptolestes ferrygineus* (Stephens) (Coleoptera: Laemophloeidae). Biodiversitas 21 (10):4764-4771. E-ISSN: 2085-4722.	
Instructional Media	**Software:**	**Hardware:**
		Computer, LCD
Teaching Team	Dr. Agr.Sc. Hagus Tarno SP., MP. Dr. Ir. Gatot Mudjiono	

Requirements Courses	1) 2)

Week-	Sub-CLO	Indicator	Assessment Criteria & Forms	Learning methods	Duration (minutes)	Learning Materials [References]	Proportion (%)
1	Students are able to understand the definition and scope of Ecology-Based Management course material	Ability to respond to learning materials, participate in learning activities and skills to explain agroecosystems and carry out tasks	Criteria: The ability of students to explain the understanding and Ecology-Based Management in Indonesia Form of Assessment: reviewing journals on	Method: Contextual Instruction Lectures and discussions Self-task	100 minutes Quiz and Task 1 (2x60 minutes):	Understanding agroecosystems and discussion of agroecosystem problems in Indonesia: (land and water, hpt, emissions, impacts on crop production)	5 %

			Ecology-Based Management problems that occur in Indonesia				
2	Students are able to explain the function and role of each component of the agroecosystem, the relationship of chains and feeding & energy webs with the stability of the agroecosystem. Able to analyze the importance of agroecosystem stability in relation to sustainable agriculture.	Ability to respond to learning materials, participate in learning activities and skills to identify OPT and carry out tasks	Criteria: The ability of students to explain the functions and roles of agroecosystem components, as well as analyze the importance of agroecosystem stability Assessment form: Quizzes and assignments	Lectures and discussions Self-study Method : Contextual Instruction	100 minutes Self-study (2x60 minutes)	The function of agroecosystems, hierarchy (food &; energy chain) in agroecosystems, and the economic value of agroecosystems	
3	Students are able to identify, measure and compile criteria about	Ability to respond to learning materials,	Criteria:	Lectures and discussions	100 minutes	Criteria and indicators of soil aspects, including:	

	what soil and water components are needed to support sustainable agriculture	participate in learning activities and skills to identify OPT and carry out tasks	Students are able to explain the criteria and indicators of soil aspects in relation to soil fertility Form of assessment: Quizzes and assignments	Self-study	Self-study (2x60 minutes):	soil organic matter, soil density, nutrient availability, population dynamics in relation to soil fertility	
4	Students are able to identify, measure and compile criteria about what components of pests and diseases are needed to support sustainable agriculture	Ability to respond to learning materials, participate in learning activities and skills to identify OPT and carry out tasks	Criteria: Able to measure and compile criteria and indicators of HPT aspects, including: population dynamics of microflora and mesofauna in relation to pest	Lectures and discussions Self-study	100 minutes Self-study (2x60 minutes): soil formation process	Criteria and indicators of HPT aspects, including: population dynamics of microflora and mesofauna in relation to pest and disease management	

			and disease management Form of assessment: Quizzes and assigment				
5	Students are able to identify, measure and compile criteria about the components of the crop production process that are needed to support sustainable agriculture	Ability to respond to learning materials, participate in learning activities and skills to identify OPT and carry out tasks	Able to identify, measure and compile criteria about plant production process components and plant aspect indicators Form of assessment: Quizzes and assignments	Lectures and discussions Self-study Method: Contextual Instruction	100 minutes Self-study (2x60 minutes):	Criteria and indicators of plant aspects, including: plant growth patterns, plant biodiversity, planting patterns, and crop production	

6-7	Students are able to develop agroecosystem planning and management, especially in the aspects of land and water and risk mitigation towards a sustainable agricultural system	Ability to respond to learning materials, participate in learning activities and skills to identify OPT and carry out tasks	Able to plan and manage environmental factors biotic and abiotic Form of assessment: Quizzes and assignments	Lectures, field surveys, and discussions	560 minutes	Management of biotic environmental factors – abiotic (understanding, problems and management), especially Land and Water Management (dry and wet land)	
8	Final Exam						
9-13	Students are able to compile agroecosystem planning and management, especially in the aspects of crop cultivation management and risk mitigation towards a sustainable agricultural system	Ability to respond to learning materials, participate in learning activities and to identifyOPT skills and carry out tasks	Able to plan and manage biotic and abiotic environmental factors Form of assessment: Quizzes and assignments	Lectures, field surveys, and discussions	560 minutes	Management of biotic environmental factors – abiotis (understanding, problems and management), especially Land and Water Management (dry and wet land)	

14	Students are able to compile agroecosystem planning and management, especially in the aspects of managing crop cultivation and mitigating risks towards a sustainable agricultural system	Ability to respond to learning materials, participate in learning activities and skills to identify OPT and carry out tasks	Able to plan and manage biotic and abiotic environmental factors Form of assessment: Quizzes and assignments	Lectures, field surveys, and discussions	560 minutes	Analysis of management success from social, environmental and economic aspects	
15	Students are able to compile agroecosystem planning and management, especially in the aspects of crop cultivation management and risk mitigation towards a sustainable agricultural system.	Ability to respond to learning materials, participate in learning activities and skills to identify OPT and carry out tasks	Able to plan and manage biotic and abiotic environmental factors Form of assessment: Quizzes and assignments	Lectures, field surveys, and discussions	560 minutes	Case studies of failed agroecosystems include: integrated crop management, integrated pest management, and integrated soil fertility management	