



BRAWIJAYA UNIVERSITY

FACULTY OF AGRICULTURE

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

SEMESTER COURSE PLAN

COURSES	CODE	CLUSTERS OF COURSES	CREDIT	SEMESTER	Date of Preparation
Entomophagous Arthropods	PTH82227	Agricultural Entomology	2 2,98 ECTS	Complete	8 June 2021
AUTHORIZATION	Course Developer Lecturer		Course Coordinator		Head of Study Program
Department of Plant Pests and Diseases	Dr. Ir. Sri Karindah, MS. Dr. Ir. Retno Dyah Puspitarini, MS.		Name Signature		Dr. Akhmad Rizali, SP.,M.Si. Signature
Learning Outcomes	ILO STUDY PROGRAM				
	1	Able to work together and have social sensitivity and high concern for society and the environment.			
	2	Mastering concepts, theories and methods in the field of agricultural entomology			

	3	Mastering the concept of integrated pest management in the context of sustainable agriculture
Course Learning Outcome		
	1	Students develop knowledge about the diversity, life and behavior of entomophagous insects , and are able to develop entomophagous insects as biological control agents
	2	Students are able to manage research on entomophagous insects as biological control agents
Brief Description of Course	This course is aimed at increasing and developing knowledge about parasitoid and predator biology, parasitoid and predator diversity, and propagation of entomophagous insects.	
Learning Material / Subject	<ol style="list-style-type: none"> 1) Introduction 2) Biological characteristics of parasitoids 3) Biological characteristics of parasitoids 4) Biological characteristics of parasitoids 5) Physiological interactions of parasitoids and their hosts 6) Physiological interactions of parasitoids and their hosts 7) Biological characteristics of predators 8) Biological characteristics of predators 9) Biological characteristics of predators 10) Diversity of entomophagous arthropods 11) Diversity of entomophagous arthropods 12) Diversity of entomophagous arthropods 13) Propagation of entomophagous insects 14) Intraguild predation 	

Relationship of CLO and ILO	<table border="1"> <thead> <tr> <th></th> <th>A1</th> <th>K1</th> <th>K2</th> <th>K3</th> <th>S1</th> <th>S2</th> <th>S3</th> </tr> </thead> <tbody> <tr> <td>CLO 1</td> <td>0.25</td> <td>0.25</td> <td>0.5</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>CLO 2</td> <td>0</td> <td>0.5</td> <td>0.5</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> </tbody> </table>								A1	K1	K2	K3	S1	S2	S3	CLO 1	0.25	0.25	0.5	0	0	0	0	CLO 2	0	0.5	0.5	0	0	0	0
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CLO 2	0	0.5	0.5	0	0	0	0																								
Reference	<p>Main</p> <ol style="list-style-type: none"> 1. Clausen CP. 1972. Entomophagous Insects. 2. DeBach P, Schlinger EI. 1973. Biological Control of Insects and Weeds. 3. Gerson U, Smiley RL, Ochoa R. 2003. Mites (Acari) for Pest Control. 4. Schneider JC. 2009. Principles and Procedures for Rearing High Quality Insect. 5. Quicke DLJ. 2014. The Braconid and Ichneumonid Parasitoid Wasps: Biology, Systematics, Evolution and Ecology. 6. Puspitarini RD, Fernando I. Bioecology of Entomo-Acariphage Insects and Mites. <p>Supporting References</p> <ol style="list-style-type: none"> 1. Dixon AFG. 2000. Insect Predator–Prey Dynamics. 2. Siswanto, J., Widjayanti, T., Karindah, S. 2021. Population of Lamprosema indicata and Their Parasitoid in Edamame Soybean Plant. Journal of Tropical Plant Protection, 2(2), 61-67. 																														
Learning Media	Software:				Hardware:																										
	Powerpoint				Computer, LCD																										
Team Teaching	<p>Dr. Ir. Sri Karindah, MS.</p> <p>Dr. Ir. Retno Dyah Puspitarini, MS.</p>																														
Required Courses	-																														

Week to -	Sub-CLO (as expected final capability)	Indicator	Criteria & Forms of Assessment	Learning Methods (Lectures / Assignments / other forms of learning)	Time (Duration)	Learning Materials / [References]	Proportion (%)
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1	Students are able to develop thoughts about the definition and scope of course material which includes the understanding and role of parasites, parasitoids and predators in the ecosystem	The ability to master learning materials systematically, and participate in learning activities and explain about entomophagous arthropods	<p>Criteria:</p> <p>The ability of students to understand parasites, parasitoids and predators</p> <p>Form of Assessment:</p> <p>ability to respond and argue in discussion</p>	<p>Method:</p> <p>Lectures and discussions</p> <p>Self-study</p>	<p>100 minutes</p> <p>Self-study (2x60 minutes)</p>	<p>Understanding and role of parasites, parasitoids and predators, the interrelationships of parasitoids and their hosts, as well as predators and preys.</p> <p>Book:</p>	5 %
2	Students are able to gain knowledge about the biological characteristics of preadult parasitoids	The ability to master learning materials, follow learning activities about parasitoid preadult development	<p>Criteria:</p> <p>The ability of students to gain knowledge about the preadult development of parasitoids</p>	<p>Method:</p> <p>Lectures and discussions</p> <p>Self-study</p>	<p>100 minutes</p> <p>Self-study (2x60 minutes)</p>	<p>Preadult development of parasitoids</p> <p>Book:</p>	5 %

			Form of assessment: Ability to respond and argue in discussion				
3	Students are able to gain knowledge about the biological characteristics of adult parasitoids	The ability to master learning materials systematically, follow learning activities about parasitoid mating behavior	Criteria: Students are able to gain knowledge about parasitoid mating behavior Form of assessment: Quiz	Method: Lectures and discussions Self-study	100 minutes Self-study (2x60 minutes)	Mating behavior of parasitoids Book:	5 %
4	Students are able to gain knowledge about the biological characteristics of adult parasitoids	The ability to master learning materials, participate in learning activities about oviposition behavior, and host selection	Criteria: Able to gain knowledge of oviposition behavior, and host selection Form of assessment:	Lectures and discussions Self-study	100 minutes Self-study (2x60 minutes)	Oviposition behavior, host selection Book:	5 %

			Tugas (presentation)				
5	Students are able to master knowledge about the physiological interactions of parasitoids and their hosts	The ability to master learning materials, follow learning activities about Venom, endocrine, encapsulation and parasitoid self-defense	Able to master knowledge of Venom, endocrine, encapsulation and parasitoid self-defense Form of assessment: Assignment	Method: Lectures and discussions Self-study	100 minutes Self-study (2x60 minutes)	Venom, endocrine, parasitoid encapsulation and self-defense Book:	5 %
6	Students are able to master knowledge about the physiological interactions of parasitoids and their hosts	The ability to master learning material, follow learning activities about symbionts	Able to master knowledge about Symbionts: parasitoids with viruses, bacteria, and yeast Form of assessment: Quiz	Lectures, and discussion	100 minutes Self-study (2x60 minutes)	Symbionts: parasitoids with viruses, bacteria, and yeast Book:	5 %

7	Students are able to master knowledge about the characteristics of predator biology	The ability to master learning materials, follow learning activities about the range of predator prey	Able to master knowledge of the range of predatory prey Form of assessment: assignment	Lectures, and discussion	100 minutes Self-study (2x60 minutes)	Range of predatory prey Book:	5 %
8	Mid-term Exam						15%
9	Students are able to master knowledge about the characteristics of predator biology	The ability to master learning materials, follow learning activities about prey selection behavior	Able to master knowledge about prey selection behavior Form of assessment: Practicum: observing prey selection behavior and making observation practicum reports	Lectures, and discussion	100 minutes Self-study (2x60 minutes)	Prey selection behavior Book:	5 %

10	Students are able to master knowledge about predator biology	The ability to master learning materials, follow learning activities about Cannibalism, roaming behavior	Able to master knowledge about Cannibalism, predatory cruising behavior Form of assessment: ability to respond and argue in discussions	Lectures, and discussion	100 minutes Self-study (2x60 minutes)	Cannibalism, cruising behavior Book:	5 %
11	Students are able to identify and provide examples of the diversity of entomophagous arthropods	The ability to master learning materials, follow learning activities about entomophagous arthropods from the Insecta class, Diptera Order and Strepsiptera	Able to identify entomophagous arthropods from the class Insecta, Order Diptera and Strepsiptera Form of assessment: identify and collect predatory insects/parasitoids	Lectures, discussion	100 minutes + 120 minutes self-study (2x60 minutes)	Kelas Insecta: Diptera, Strepsiptera Book:	5 %
12	Students are able to identify and provide examples of the	The ability to master learning materials, follow	Able to identify entomophagous arthropods from	Lectures, discussion	100 minutes + 120 minutes	Insect Class: Hymenoptera I	5 %

	diversity of entomophagous arthropods	learning activities about entomophagous from the Insecta class, Hymenoptera Order	the class Insecta, Order Hymenoptera Form of assessment: identify and collect parasitoids		Self-Study (2x60 minutes)	Book:	
13	Students are able to identify and provide examples of the diversity of entomophagous arthropods	The ability to master learning materials, follow learning activities about entomophagous from Class Insecta, Order Hymenoptera	Able to identify entomophagous arthropods from the class Insecta, Order Hymenoptera Form of assessment: identify and collect parasitoids/predators	Lectures, discussion	100 minutes + 120 minutes self-study (2x60 minutes)	Insecta Class: Hymenoptera II Book:	5 %
14	Students are able to identify and provide examples of the	Ability to master learning materials, follow learning	Able to identify entomophagous arthropods from	Lectures, discussion	100 minutes + 120 minutes	Insecta Class: Order Coleoptera	5 %

	diversity of entomophagous arthropods	activities and assignments about entomophagous from the Insecta class, Coleoptera Order and Arachnida Class	the class Insecta, Order Order Coleoptera, Class Arachnida: Subclass Araneae and Subclass Acari Form of assessment: Identify and collect predators		Self-study (2x60 minutes)	Class Arachnida: Subclass Araneae and Subclass Acari Book:	
15	Students are able to develop mass-rearing plans and management of rearing of entomophagous arthropods	Ability to master the plan and management of mass-rearing of entomophagous arthropods.	Present plans and management of mass-rearing of entomophagous arthropods. Form of assessment: Presentation	Lectures, presentations and discussions	100 minutes Self-study (2x60 minutes)	Parasitoid or predatory propagation Book:	5 %
16	Final Exam						15 %

