

Bachelor of BiologyEmail: biologi.fmipa@um.ac.idWebsite: <http://biologi.fmipa.um.ac.id/>**MODULE HANDBOOK**

Module designation	Biological Control
Module level, if applicable	Undergraduate
Code, if applicable	NBIOUM6367
Subtitle, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	Even semester
Person responsible for the module	Prof. Dr. Drs. Fatchur Rohman, M.Si
Lecturer	Prof. Dr. Drs. Fatchur Rohman, M.Si Sofia Ery Rahayu, S.Pd., M.Si
Language	Bahasa Indonesia
Relation to curriculum	Undergraduate program, elective, 6 th semester
Type of teaching, contact hours	Undergraduate degree program: cooperative learning, presentation, discussion, laboratory work, 2 x 50 = 100 minutes and 1 x 170 minutes
Workload	1. Lectures: 2 x 50 = 100 minutes (1.67 hours) per week. 2. Exercises and Assignments: 2 x 60 = 120 minutes (2 hours) per week. 3. Laboratory work: 1 x 170 minutes (2.83 hours) per week. 4. Private study: 2 x 60 = 120 minutes (2 hours) per week.
Credit points	3 credit points (~5 ECTS-eq)
Requirements according to the examination regulations	A student must have attended at least 80% of the lectures to be eligible for the final examination.
Recommended prerequisites	NBIOUM6109 (<i>Animal Structure and Development 1</i>) NBIOUM6116 (<i>Animal/Human Physiology</i>) NBIOUM6118 (<i>Animal Diversity</i>) NBIOUM6121 (<i>Genetics 2</i>) NBIOUM6122 (<i>Ecology</i>)
Module objectives/intended learning outcomes	Students are able to: (LO4) Apply basic concepts, principles and procedures of biology to design investigations as an effort to solve problems in the health, food and environment sectors using technological applications

Course Learning Outcomes	1. Understanding the philosophy, concepts, principles and procedures in biological control research. 2. Being skilled at mastering methods and techniques in biological control 3. Being skilled at collecting, processing, and analyzing biological control data 4. Being skilled at solving biological control problems	
Content	This course covers the following main topics: ● Scope and importance of biological control, nature and history of biological control ● Empirical data on biological control, Systematic relationships of arthropods in biological control ● Samples of organisms with biological agents that play a role in biological control. Identification of organisms that play a role in biological control ● Predatory "rearing" (biological agent culture), parasitoids and antagonistic fungi in biological control, the role of predators as natural enemies in biological control ● The role of parasitoids as natural enemies in biological control, the role of microbes as natural enemies in biological control ● Efforts to preserve the existence of natural enemies in biological control, and the Role of Integrated Pest Management in solving biological control problems.	
Learning activity	Week 1:	1. Explaining the definition, scope and importance of biological control 2. Schematic of control linkage with other sciences.
	Week 2:	1. Analyzing the Nature and History of Biological Control 2. Online interactive discussion on the topic The Nature and History of Biological Control
	Week 3:	Analyzing empirical data on biological control
	Week 4:	Analyzing the systematic relationship of arthropods (insects, spiders, etc.) in biological control
	Week 5:	Identification and classification of samples obtained from the field
	Week 6:	Identification and classification of samples obtained from the field
	Week 7:	Practicum: identification of biological agent organisms that play a role in biological control

	Week 8:	Practicum: identification of biological agent organisms that play a role in biological control
	Week 9:	MIDTERM EXAMINATION
	Week 10:	Conducting “rearing” (biological agent culture) practicum for predators, parasitoids and antagonist molds in biological control
	Week 11:	Conducting “rearing” (biological agent culture) practicum for predators, parasitoids and antagonist molds in biological control
	Week 12:	Analyzing the role of predators as natural enemies in biological control
	Week 13:	Analyzing the role of parasitoids as natural enemies in biological control
	Week 14:	Analyzing the role of microbes as natural enemies in biological control
	Week 15:	- Analyzing efforts to preserve the presence of natural enemies in biological control - Analyzing the role of Integrated Pest Management in solving biological control problems
	Week 16:	FINAL EXAMINATION
Study and examination requirements and forms of examination	- Concept understanding (35%) : written test - Assignments (papers, individual assignments, practicum reports) (25%) : portofolio - Performance (presentation) (25%) : Observation - Activities (attendance, discussion) (15%) : Observation	
Media employed	LCD, blackboard, and Sipejar.	

Reading list	1. Altieri, M.A., and Nichols, C.I., 2004., Biodiversity and Pest Management I Agroecosystem. Food Product PressAn Imprintof The Haworth Press, Inc. New York. London. Oxford 2. Huffaker & Messenger, 1989. Teori dan Praktek Pengendalian Biologis 3. Faperta. Definisi dan Ruang Lingkup Pengendalian Hayati 4. Korlin, Ell 2011. Pengembangan dan Pemanfaatan Agen Pengendali Hayati 5. Warspoil, 2012. Sejarah Pengendalian Hayati Relevant Articles 6. Rohman. F, 2012, Refugee Plants Increased Generalist Predator In Tea Plantation At Wonosari, Malang Indonesia, American-Eurasian Journal of Sustainable Agriculture, 6(1): 51-54, 2012 ISSN 1995-0748 7. Geoff M. Gurr, Steve D. Wratten, Douglas A. Landis, and Minsheng You, 2016, Habitat Management to Suppress Pest Populations: Progress and Prospects, Annual Review of Entomology, 62 :91-109. 8. Tefera. Tadele, Gofishu. Muluken, 2019. A Guide to Biological Control of Fall Armyworm in Africa Using Egg Parasitoids, ICIPE. 9. Shanker. Chitra, Katti. Gururaj. Padmakumari. Ayyagari, Padmavathi. Chintalapati, Sampathkumar. Muthusamy, 2011, Biological Control, Functional Biodiversity and Ecosystem Services in Insect Pest Management, Crop Stress and its Management: Perspectives and Strategies, 472-495. 10. Hajek. Ann, Delaliber. Italo, 2010, Fungal pathogens as classical biological control agents against arthropods, Journal of the International Organization for Biological Control. 55 (1): 147-158 11. Sampaio. M.V, Bueno. V.H.O, Silveira. L.C.P, Auad. A.M, 2010, Biological Control Of Insect Pests in The Tropics, 3, TROPICAL BIOLOGY AND CONSERVATION MANAGEMENT. 12. Tscharntke. Teja, Bommarco. Riccardo, dkk, 2007, Conservation biological control and enemy diversity on a landscape scale, 43 (294–309)
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Date of last amendment made	January, 2022
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