

**SEMESTER COURSE OUTLINE
& LESSON PLANS
SECOND SEMESTER
2022/2023**



Agricultural Microbiology Major
Department of Agricultural Microbiology
Agroindustrial Microbiology
PNM20192212

Team Teaching:
Prof. Ir. Triwibowo Yuwono, Ph.D.
Ir. Donny Widiyanto, Ph.D.
Dr. Ir. Sri Wedhastri, M.S.

**UNIVERSITAS GADJAH MADA
FACULTY OF AGRICULTURE
2023**

	Universitas Gadjah Mada Faculty of Agriculture Department of Agricultural Microbiology Second Semester of 2022/2023					Document Code:
RENCANA PROGRAM DAN KEGIATAN PEMBELAJARAN SEMESTER (RPKPS) SEMESTER COURSE OUTLINE & LESSON PLANS						
Kode Mata Kuliah Course Code	Nama Mata Kuliah Course Name	Bobot (sks) Credits		Semester Semester	Status Mata Kuliah Course Status	Mata Kuliah Prasyarat Prerequisite Courses
PNM20192212	Mikrobiologi Agroindustri Agroindustrial Microbiology	T: 2	P: 1	Second semester	Wajib Compulsory	Biologi Mikroorganisme Biology of Microorganisms
Deskripsi Singkat Mata Kuliah	Mata kuliah Mikrobiologi Agroindustri merupakan mata kuliah yang dikhususkan bagi mahasiswa program studi Mikrobiologi Pertanian, Departemen Mikrobiologi Pertanian, Fakultas Pertanian. Mata Kuliah ini membahas tentang konsep dasar Mikrobiologi Agroindustri dan aplikasi mikrobiologi dalam bidang agroindustri. Mata kuliah ini juga membahas tentang teknologi yang digunakan dalam industri yang berbasis mikroorganisme					
Course Overview	Agroindustrial microbiology is a course designed specifically for students from Agricultural Microbiology study program, Department of Agricultural Microbiology, Faculty of Agriculture. This course focuses on the fundamentals of agroindustrial microbiology and how it applies to the agroindustrial field. The technology used in the industry based on microorganisms is also covered in this course.					
Capaian Pembelajaran Lulusan Program Studi (CPL) Program Learning Outcome (PLO)	CPL1 PLO1	Mampu menjelaskan konsep teoritis biologi mikroorganisme serta mengembangkan teknologi berbasis mikroba untuk meningkatkan produksi tanaman dan layanan lingkungan (P2) Able to explain theoretical concepts of biology microorganism and develop microbial-based technology to increase plant production and environmental services (K2).				
	CPL2 PLO2	Mampu menguraikan metodologi mutakhir di bidang mikrobiologi untuk mewujudkan pembangunan pertanian yang ramah lingkungan dan berkelanjutan (P3) Able to describe the latest methodology in the field of microbiology to create environmentally friendly and sustainable agricultural development (K3).				
	CPL3 PLO3	Mampu memilih, memanfaatkan, dan mengelola potensi mikroba dan mikrobioma untuk membangun sistem industri dan pertanian (KK3) Able to select, utilize and manage the potential of microbes and microbiomes to build industrial and agricultural systems (S3).				
Capaian Pembelajaran Mata Kuliah (CPMK)	Setelah menyelesaikan pembelajaran mata kuliah ini, mahasiswa diharapkan mampu: After completing this course, students are expected to be able:					
	CPMK1	Mahasiswa mampu menjelaskan mengenai konsep dasar Mikrobiologi Agroindustri [CPL 1]				

Course Learning Outcomes (CLO)	CLO1	<i>Students can explain the fundamental concepts of Agroindustrial Microbiology [PLO 1] □ K2</i>		
	CPMK2	Mahasiswa mampu menjelaskan mengenai industri berbasis mikroorganisme dan produk yang dihasilkan [CPL 2]		
	CLO2	<i>Students can explain about the microorganism-based industries and their products [PLO 2] □ K3</i>		
	CPMK 3	Mahasiswa mampu menjelaskan dan menggunakan teknologi yang digunakan dalam industri berbasis mikroorganisme [CPL 3]		
	CLO3	<i>Students can explain and use the technology used in microorganism-based industries [PLO 3] □ S3</i>		
Kaitan CPMK dengan Materi dan Bentuk Pembelajaran, serta Alokasi Waktu <i>Correlation among CLO, the material, learning method and estimated time</i>		Materi Pembelajaran <i>Course Materials</i>	Bentuk Pembelajaran (Luring/Daring) <i>Course Methos (Offline/Online)</i>	Alokasi Waktu <i>Estimated Time</i>
	CPMK1 CLO1	1. Pengantar Mikrobiologi Agroindustri <i>1. Introduction to Agroindustrial Microbiology</i>	Kuliah Interaktif Praktikum <i>Interactive lectures</i> <i>Labwork</i>	2 x 50 menit kuliah sinkron 2 x 50 menit praktikum <i>2 x 50 minutes of synchronous lectures</i> <i>2 x 50 minutes labwork</i>
	CPMK1 CLO1	2. Mikroorganisme yang digunakan dalam industri <i>2. Microbes used in industrial field</i>	Kuliah Interaktif Praktikum <i>Interactive lectures</i> <i>Labwork</i>	2 x 50 menit kuliah sinkron 2 x 50 menit praktikum <i>2 x 50 minutes of synchronous lectures</i> <i>2 x 50 minutes labwork</i>
	CPMK1 CLO1	3. Media untuk industri berbasis mikroorganisme	Kuliah Interaktif dan kuis Praktikum	2 x 45 menit kuliah sinkron 10 menit kuis

		3. <i>Media for microorganism-based industries</i>	<i>Interactive lectures and quiz</i> <i>Labwork</i>	2 x 50 menit praktikum <i>2 x 45 minutes of synchronous lectures</i> <i>10 minutes quiz</i> <i>2 x 50 minutes labwork</i>
	CPMK2 CLO2	4. Produk-produk industri mikrobial <i>4. Microbial industrial products</i>	Kuliah Interaktif dan tugas individu Praktik dilakukan pada kegiatan praktikum <i>Interactive lectures and individual assignment</i> <i>Labwork</i>	2 x 50 menit kuliah sinkron 2 x 50 menit praktikum <i>2 x 50 minutes of synchronous lectures</i> <i>2 x 50 minutes labwork</i>
	CPMK2 CLO2	5. Teknik dan Manajemen Kultur <i>5. Culture Technique and Management</i>	Kuliah Interaktif Praktik dilakukan pada kegiatan praktikum <i>Interactive lectures</i> <i>Labwork</i>	2 x 50 menit kuliah sinkron 2 x 50 menit praktikum <i>2 x 50 minutes of synchronous lectures</i> <i>2 x 50 minutes labwork</i>
	CPMK2 CLO2	6. Industri Fermentasi Pangan	Kuliah Interaktif Praktik dilakukan pada kegiatan praktikum	2 x 50 menit kuliah sinkron 2 x 50 menit praktikum

		6. <i>Food Fermentation Industry</i>	<i>Interactive lectures</i> <i>Labwork</i>	<i>2 x 50 minutes of synchronous lectures</i> <i>2 x 50 minutes labwork</i>
	CPMK2 CLO2	7. Produksi Pupuk Hayati dan pestisida hayati 7. <i>Biofertilizer and Biopesticide Production</i>	Kuliah Interaktif Praktik dilakukan pada kegiatan praktikum <i>Interactive lectures</i> <i>Labwork</i>	2 x 50 menit kuliah sinkron 2 x 50 menit praktikum <i>2 x 50 minutes of synchronous lectures</i> <i>2 x 50 minutes labwork</i>
UTS/Hasil Tugas Project/Hasil Analisis Kasus Mid Exam/Project Results/Case Study Results				
	CPMK2 CLO2	8. Produk fermentasi berbasis khamir (<i>yeast</i>) 8. <i>Yeast-based fermented products</i>	Kuliah Interaktif <i>Interactive lectures</i>	2 x 50 menit kuliah sinkron <i>2 x 50 minutes of synchronous lectures</i>
	CPMK2 CLO2	9. Produksi Inokulum Pelarut Fosfat dan Penghasil Zat Tumbuh 9. <i>Production of Phosphate Solubilizing and Growth Promoting Inoculum</i>	Kuliah Interaktif Praktik dilakukan pada kegiatan praktikum <i>Interactive lectures</i> <i>Labwork</i>	2 x 50 menit kuliah sinkron <i>2 x 50 minutes of synchronous lectures</i>
	CPMK3 CLO3	10. Produksi Enzim Mikrobia	Kuliah Interaktif	2 x 50 menit kuliah sinkron

		10. <i>Production of Microbial Enzymes</i>	<i>Interactive lectures</i>	2 x 50 minutes of synchronous lectures
	CPMK3 CLO3	11. Pengelolaan Limbah Padat <i>11. Solid Waste Management</i>	Kuliah Interaktif <i>Interactive lectures</i>	2 x 50 menit kuliah sinkron <i>2 x 50 minutes of synchronous lectures</i>
	CPMK3 CLO3	12. Fermentasi Antibiotik <i>12. Antibiotic Fermentation</i>	Kuliah Interaktif <i>Interactive lectures</i>	2 x 50 menit kuliah sinkron <i>2 x 50 minutes of synchronous lectures</i>
	UAS/ Hasil Tugas Project/Hasil Analisis Kasus <i>Final Exam/Project Results/Case Study Results</i>			
Metode Pembelajaran <i>Learning Method</i>	SCL: Pembelajaran berbasis <i>Case based and Project based</i> <i>SCL (Student Center Learning): Case based and Project based learning</i>			
Pengalaman Belajar Mahasiswa <i>Student Learning Experience</i>	Saat Sinkron : Melakukan diskusi terkait dengan topik kuliah serta kaitan dan potensi penerapannya dalam bidang mikrobiologi pertanian atau pertanian secara umum Saat Asinkron: 1. Mendapatkan informasi mengenai pemanfaatan mikroorganisme kegiatan agroindustri 2. Mendapatkan keterampilan dalam penggunaan alat laboratorium yang dibutuhkan dalam kegiatan mikrobiologi agroindustri 3. Memperoleh pengalaman dalam kerja sama tim melalui tugas kelompok 4. Mendapatkan teknik mengenai cara mempresentasikan data melalui tugas presentasi <i>Synchronous lectures: conducting discussions related to lecture topics and their relationships and potential applications in the field of agricultural microbiology or agriculture in general</i> <i>Asynchronous lectures:</i> 1. <i>Obtain information regarding the use of microorganisms in agroindustrial activities</i> 2. <i>Obtain laboratory equipment skills required in agroindustrial microbiology activities</i>			

	3. <i>Gain teamwork experiences through group assignments</i> 4. <i>Obtain techniques on how to present data through presentation assignments.</i>					
Akses Media Pembelajaran/ LMS dan Persentase Luring & Daring <i>Learning Media and Course Method Percentage</i>	https://elok.ugm.ac.id Luring 100% <i>(Offline 100%)</i>					
Metode Penilaian dan Keselarasan dengan CPMK <i>Methods of assessment in accordance with course learning outcome</i>	Basis Evaluasi <i>Evaluation Basis</i>	Komponen Evaluasi <i>Evaluation Components</i>	Bobot <i>Percentage</i>	CPMK 1 <i>CLO1</i>	CPMK 2 <i>CLO2</i>	CPMK 3 <i>CL3</i>
	A. Aktivitas Partisipatif^{*)} <i>Participatory Activity</i>	Tugas Individu <i>Individual Assignment</i>	10%		V	
		Kuis <i>Quiz</i>	10%	V		
	B. Hasil Project/Hasil Studi Kasus/ Hasil PBL^{*)} <i>Project results/case study results</i>	Praktikum <i>Labwork</i>	30%		V	
	C. Kognitif <i>Cognitive</i>	UTS <i>Mid Exam</i>	25%		V	
		UAS <i>Final Exam</i>	25%			v
		Total <i>Total</i>	100%			
	^{*)} Sesuai IKU 7, jumlah persentase aktivitas partisipatif (A) dan hasil project/studi kasus/hasil PBL (B) adalah minimal 50%. ^{*)} <i>In accordance with IKU 7, the total percentage of participatory activities (A) and project results/case studies/PBL results (B) is at least 50%.</i>					

Daftar Referensi <i>References</i>	Utama: <i>Main references:</i> 1. Farshad Darvishi Harzevili and Hongzhang Chen (Eds.). 2015. Microbial Biotechnology. Progress and Trends. CRC Press, Taylor and Francis Group. 2. Nduka Okafor and Benedict C. Okeke. 2018. Modern Industrial Microbiology and Biotechnology. Second edition. Taylor and Francis. 3. Peter F. Stanbury, Allan Whitaker, and Stephen J. Hall. 2017. Principles of Fermentation Technology. Third edition. Elsevier. 4. Wilson, D. B., H. Sahm, K. P. Stahmann, and M. Koffas. 2020. Industrial Microbiology. Wiley, Germany. 5. Koubaa, M., F. J. Barba, and S. Roohinejad. 2021. Fermentation Processes: Emerging and Conventional Technologies. Wiley, United Kingdom. Tambahan: 1. Referensi jurnal ilmiah mengenai ekologi mikrobia dan pemanfaatannya bagi lingkungan 2. Buku Panduan Praktikum Mikrobiologi Agroindustri <i>Additional references:</i> 1. <i>Scientific journals related to microbial ecology and their applications for environment</i> 2. <i>Laboratory Classes in Agroindustrial Microbiology Handbook</i>			
Nama Dosen Pengampu <i>Team Teaching</i>	1. Prof. Ir. Triwibowo Yuwono, Ph.D. 2. Ir. Donny Widiyanto, Ph.D. 3. Dr. Ir. Sri Wedhastri, M.S.			
Otorisasi <i>Authorization</i>	Tanggal Penyusunan <i>Date of Authorization</i>	Koordinator Mata Kuliah <i>Course Coordinator</i>	Koordinator Bidang Keahlian (Jika Ada) <i>Expertise Coordinator (if any)</i>	Ketua Program Studi <i>Head of the Study Program</i>
	<i>January 20, 2023</i>	<i>Prof. Ir. Triwibowo Yuwono, Ph.D.</i>		<i>Ir. Ngadiman, M.Si., Ph.D.</i>