	Universitas Negeri Surabaya **Fakultas Matematika dan Ilmu Pengetahuan Alam** **Program Studi S1 Biologi**	**Kode Dokumen**

SEMESTER LEARNING PLAN

Course	KODE	Rumpun MataKuliah	Bobot Kredit			SEMESTER	Tanggal Penyusunan
Mikrobiologi Industri*	4620102130		T=1	P=1	ECTS=3.18	7	17 Juli 2024

OTORISASI	Pengembang S.P	Koordinator Rumpun matakuliah	Koordinator Program Studi
	.....	.....	Dr. H. Sunu Kuntjoro, S.Si., M.Si.

Model Pembelajaran	**Project Based Learning**

Program Learning Outcomes (PLO)

PLO program Studi yang dibebankan pada matakuliah

PLO-5	Mampu mengomunikasikan ide-ide ilmiah, baik secara lisan maupun tulisan dengan menggunakan media komunikasi yang tepat sesuai sasaran, sebagai bekal belajar sepanjang hayat untuk pengembangan diri secara akademik.
PLO-13	Mampu mendemonstrasikan pengetahuan dasar tentang biologi sel dan molekuler, biologi organisme, ekologi dan evolusi untuk menganalisis isu-isu biologi terkini

Program Objectives (PO)

Matrik PLO-PO

PO	PLO-5	PLO-13

Matrik PO pada Kemampuan akhir tiap tahapan belajar (Sub-PO)

PO	Minggu Ke															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Deskripsi Singkat Mata Kuliah	Matakuliah ini mengaji tentang penerapan konsep- konsep mikrobiologi pada bidang industri yang meliputi kriteria mikrobia yang dapat digunakan di bidang industri, optimasi pertumbuhan mikrobia untuk produksi, pengawasan produk industri secara mikrobiologis, bioreaktor, mikrobia yang berperan di dalam bidang industri dan produknya, serta Hazard Analysis Critical Control Point . Produksi makanan menggunakan jasa mikrobia. Mikrobia perusak makanan dan penyebab keracunan. Matakuliah ini disajikan dalam bentuk teori dan praktik.

Pustaka

Utama :

1. Adams MR, dan Moss MO, 2008. Food Microbiology . Cambridge: RSC Publishing.
2. Madigan MT, Martinko JM, Stahl DA, dan Clark DP, 2012. Biology of Microorganism . Boston: Pearson.
3. Tortora, GJ, Funke BR, dan Case CL, 2007. Microbiology An Introduction . San Fransisco: Addison Wesley Longman, Inc.

Pendukung :

Dosen Pengampu	Prof. Dr. Mahanani Tri Asri, M.Si. Guntur Trimulyono, S.Si., M.Sc. Lisa Lisdiana, S.Si., M.Si., Ph.D. Dr. Pramita Yakub, S.Pd., M.Pd.

Minggu Ke-	Kemampuan akhir tiap tahapan belajar (Sub-PO)	Penilaian		Bantuk Pembelajaran, Metode Pembelajaran, Penugasan Mahasiswa, [Estimasi Waktu]		Materi Pembelajaran [Pustaka]	Bobot Penilaian (%)
		Indikator	Kriteria & Bentuk	Luring (*offline*)	Daring (*online*)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

1	Memahami ruang lingkup mikrobiologi industri	Menjelaskan ruang lingkup mikrobiologi industri	**Kriteria:** Laporan dan produk praktikum dinilai sebagai TUGAS dengan bobot 30%USS dengan bobot 20%Kehadiran, aktivitas dan respon mhs selama kegiatan pembelajaran terutama praktikum dinilai sebagai PARTISIPASI dengan bobot 20%US bobot 30%Soal-soal essay diases secara bersama pada USS dan USSoal kinerja dilakukan terintegrasi selama pembelajaran **Bentuk Penilaian** : Aktifitas Partisipasif	Presentasi, Diskusi 2 X 50			5%
2	Memahami tentang konsep industri fermentasi	1. Menjelaskan defenisi industri fermentasi 2. Menjelaskan dasar-dasar fermentaasi 3. Menjelaskan biokimia fermentasi	**Kriteria:** Reports and practicum products are assessed as ASSIGNMENTS with a weight of 30%. carried out integrated during learning **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Presentation, discussion 2 X 50			5%
3	Understand the role of microbes in the fermentation industry	1. Identifying the role of microbes in the fermentation industry. 2. Explain microbial criteria for industry 3. Explain the types of microbes for the fermentation industry and examples of their products 4. Skilled in producing industrial commodities with the help of microbes	**Criteria:** Practical reports and products are assessed as ASSIGNMENTS with a weight of 30%. carried out integrated during learning **Forms of Assessment** : Project Results Assessment / Product Assessment, Practical Assessment	Presentation, discussion and practical work 2 X 50			5%
4	Understanding the kinetics of microbial growth	Explain the kinetics of microbial growth in batch culture, continuous culture and fed batch systems	**Criteria:** Practical reports and products are assessed as ASSIGNMENTS with a weight of 30%. carried out integrated during learning **Form of Assessment** : Assessment of Project Results / Product Assessment, Practices / Performance	Presentation, discussion 2 X 50			5%

5	Understanding microbial growth optimization for industry	Explains microbial growth optimization for industry	**Criteria:** Practical reports and products are assessed as ASSIGNMENTS with a weight of 30%. carried out integrated during learning **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Presentation, discussion 2 X 50			5%
6	Understanding microbial growth optimization for industry in bioreactors	1. Explain the function of a bioreactor 2. Explain the optimization of microbial growth in a bioreactor 3. Explain the factors that influence microbial growth in bioreactors	**Criteria:** Practical reports and products are assessed as ASSIGNMENTS with a weight of 30%. carried out integrated during learning **Forms of Assessment** : Project Results Assessment / Product Assessment, Practical Assessment	Presentation, discussion 2 X 50			5%
7	Understand the process of producing fermented industrial products	Explain the process of producing fermentation industrial products	**Criteria:** Practical reports and products are assessed as ASSIGNMENTS with a weight of 30%. carried out integrated during learning **Form of Assessment** : Project Results Assessment / Product Assessment	Presentation, discussion 2 X 50			5%
8			**Criteria:** USS weight 20% **Form of Assessment** : Participatory Activities	2 X 50			10%
9	Understand the products resulting from the food fermentation industry	1. Explain the products resulting from the food fermentation industry 2. Skilled in processing food ingredients with the help of microbes	**Criteria:** Practical reports and products are assessed as ASSIGNMENTS with a weight of 30%. carried out integrated during learning **Form of Assessment** : Project Results Assessment / Product Assessment	Presentation, discussion and practical work 2 X 50			5%
10	Understand the products resulting from the food fermentation industry	1. Explain the products resulting from the food fermentation industry 2. Skilled in producing alcohol with the help of microbes	**Criteria:** Practical reports and products are assessed as ASSIGNMENTS with a weight of 30%. carried out integrated during learning **Form of Assessment** : Project Results Assessment / Product Assessment	Presentation, Discussion and Practical Work 2 X 50			5%

11	Understand the role of microbes in producing industrial products for health	Explain the role of microbes in producing industrial products	**Criteria:** Practical reports and products are assessed as ASSIGNMENTS with a weight of 30%. carried out integrated during learning **Form of Assessment** : Project Results Assessment / Product Assessment	Presentation, Discussion and Practical Work 2 X 50			5%
12	Understand the role of genetically modified microbes in producing industrial products	Explain the role of genetically engineered microbes in producing industrial products	**Criteria:** Practical reports and products are assessed as ASSIGNMENTS with a weight of 30%. carried out integrated during learning **Form of Assessment** : Project Results Assessment / Product Assessment	Presentation, Discussion and Practical work 2 X 50			5%
13	Understand the role of microbes in the deterioration of agricultural industrial materials and products	Explain the role of microbes in the deterioration of agricultural industrial materials and products	**Criteria:** Practical reports and products are assessed as ASSIGNMENTS with a weight of 30%. carried out integrated during learning **Form of Assessment** : Participatory Activities	Presentation, Discussion 2 X 50			5%
14	Understand the control of industrial products produced by microbes	Explains the control of industrial products produced by microbes	**Criteria:** Practical reports and products are assessed as ASSIGNMENTS with a weight of 30%. carried out integrated during learning **Forms of Assessment** : Project Results Assessment / Product Assessment, Practical Assessment	Presentation, Discussion and Practical Work 2 X 50			10%
15	Understand the concept of Hazard Analysis Critical Control Points (HACCP)	Explain the concept of Hazard Analysis Critical Control Points (HACCP)	**Criteria:** Practical reports and products are assessed as ASSIGNMENTS with a weight of 30%. carried out integrated during learning **Form of Assessment** : Project Results Assessment / Product Assessment	Presentation, Discussion 2 X 50			10%
16			**Form of Assessment** : Participatory Activities				10%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	35%
2.	Project Results Assessment / Product Assessment	52.5%
3.	Practical Assessment	10%
4.	Practice / Performance	2.5%
		100%

Notes

1. **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.
3. **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.
4. **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.
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.
6. **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.
9. **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.
10. **Learning materials** are details or descriptions of study materials which can be presented in the form of several main points and sub-topics.
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.