



**Universitas Negeri Surabaya**  
**Faculty of Mathematics and Natural Sciences Natural**  
**Sciences**  
**Education Undergraduate Study Program**

Document  
Code

## SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Biotechnology	8420102026	Study Program Elective Courses	T=2	P=0	ECTS=3.18	6	January 2, 2024
AUTHORIZATION	SP Developer		Course Cluster Coordinator			Study Program Coordinator	
	Dr. Hasan Subekti, S.Pd., M.Pd., Dr. Dyah Astriani, S.Pd., M.Pd., Aris Rudi Purnomo, S.Si., M.Pd., M.Sc., Fasih Bintang Ilhami, S.Kep., M.T., Ph.D., dr. Sonny Soebjanto, Sp. T.H.T.K.L		Dr. Hasan Subekti, S.Pd., M.Pd.			Prof. Dr. Erman, M.Pd.	

<b>Learning model</b>	<b>Project Based Learning</b>
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<b>Program Learning Outcomes (PLO)</b>	<b>PLO study program that is charged to the course</b>																																																
	<b>PLO-1</b>	Able to demonstrate religious, national and cultural values, as well as academic ethics in carrying out their duties																																															
	<b>PLO-2</b>	Demonstrate the character of being tough, collaborative, adaptive, innovative, inclusive, lifelong learning and entrepreneurial spirit																																															
	<b>PLO-3</b>	Develop logical, critical, systematic and creative thinking in carrying out specific work in their field of expertise and in accordance with work competency standards in the field concerned																																															
	<b>PLO-4</b>	Develop yourself continuously and collaborate.																																															
	<b>Program Objectives (PO)</b>																																																
	<b>PLO-PO Matrix</b>																																																
		<table border="1" style="margin: auto;"> <tr> <td>P.O</td> <td>PLO-1</td> <td>PLO-2</td> <td>PLO-3</td> <td>PLO-4</td> </tr> </table>				P.O	PLO-1	PLO-2	PLO-3	PLO-4																																							
	P.O	PLO-1	PLO-2	PLO-3	PLO-4																																												
	<b>PO Matrix at the end of each learning stage (Sub-PO)</b>																																																
	<table border="1" style="margin: auto;"> <tr> <td rowspan="2" style="width: 5%;">P.O</td> <td colspan="16" style="text-align: center;">Week</td> </tr> <tr> <td style="width: 2%;">1</td> <td style="width: 2%;">2</td> <td style="width: 2%;">3</td> <td style="width: 2%;">4</td> <td style="width: 2%;">5</td> <td style="width: 2%;">6</td> <td style="width: 2%;">7</td> <td style="width: 2%;">8</td> <td style="width: 2%;">9</td> <td style="width: 2%;">10</td> <td style="width: 2%;">11</td> <td style="width: 2%;">12</td> <td style="width: 2%;">13</td> <td style="width: 2%;">14</td> <td style="width: 2%;">15</td> <td style="width: 2%;">16</td> </tr> </table>																P.O	Week																1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
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<b>Short Course Description</b>	This course studies the use of biological sciences in living creatures, including food, agricultural, environmental and health biotechnology in the production process to produce goods and services that can be used by living creatures. In its development, biotechnology is not only based on biology alone, but also begins to spread to applied and pure sciences, such as biochemistry, computers, molecular biology, microbiology, genetics, chemistry, mathematics, and so on, in other words, biotechnology is a science. applied which combines various branches of science in the process of producing goods and services. Lectures are carried out with modeling, presentations, discussions and practicums.
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<b>References</b>	<b>Main :</b>
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2. Agbon Eddy C., 2012. Innovations in Biotechnology . Washington DC: InTech
3. Becker, M. J., Caldwell, G. A., Zachgo, E. A. 2005. Biotechnology: a Laboratory Course . 2nd Edition
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6. Rai, R. V (Ed). 2016. Advances in Food Biotechnology. India: Wiley Blackwell
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12. Jonatan, M, W, S. 2018. The Science Stem Cells. Wiley
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14. Subekti, H., Handriyan, A., Purnomo, A. R., Wulandari, F. E., & Widiannyah, A. T. (2019). Bioteknologi: Sebuah Pembelajaran Terintegrasi STEM pada Mata Kuliah Bioteknologi bagi Mahasiswa Calon Guru IPA. Graniti

**Supporters:**

1. Subekti, H., Handriyan, A., Purnomo, A. R., Wulandari, F. E., & Widiannyah, A. T. (2019). Bioteknologi: Sebuah Pembelajaran Terintegrasi STEM pada Mata Kuliah Bioteknologi bagi Mahasiswa Calon Guru IPA. Graniti

**Supporting lecturer**

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Week-	Final abilities of each learning stage (Sub-PO)	Evaluation		Help Learning, Learning methods, Student Assignments, [ Estimated time]		Learning materials [References]	Assessment Weight (%)
		Indicator	Criteria & Form	Offline ( offline )	Online ( online )		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1		1.o Define biotechnology in general 2.o Modeling product biotechnology 3.o Represent the role of biotechnology in improving the quality of human life and its history	<b>Form of Assessment :</b> Participatory Activities	2			5%

2		<p>1.o Define environmental and agricultural biotechnology</p> <p>2.o Represents the relationship between environmental and agricultural biotechnology</p> <p>3.o Represents methods used in environmental and agricultural biotechnology (can contain current research) for example fermentation</p> <p>4.o Represents environmental and agricultural biotechnology applications in everyday life, for example transgenic plants, composting, biomaterials</p>	<p><b>Form of Assessment :</b> Participatory Activities</p>	<p>Offline / Offline</p>			0%
3		<p>o Implementing case studies regarding problems in the environmental and agricultural biotechnology sphere (can utilize online databases (references or data banks) and/or virtual labs, the product can be in the form of literature study articles)</p>	<p><b>Forms of Assessment :</b> Participatory Activities, Portfolio Assessment, Tests</p>				0%
4			<p><b>Form of Assessment :</b> Portfolio Assessment</p>				0%

5		<p>1.o Define and scope of food biotechnology</p> <p>2.o Give examples of processed products resulting from biotechnology</p> <p>3.o Explain the methods used in the scope of food biotechnology (can contain the latest research) for example: fermentation.</p> <p>4.o Presenting the delivery of case studies</p>	<p><b>Form of Assessment :</b> Participatory Activities, Portfolio Assessment</p>				0%
6		<p>o Represent case-studies in the tempe, mushroom and so on manufacturing industry</p>					5%
7		<p>o Represent Case-study results</p>					5%
8			<p><b>Form of Assessment :</b> Portfolio Assessment, Test</p>				0%

9		<p>1.o Define and scope of health biotechnology</p> <p>2.o Give examples of health products resulting from biotechnology in the health sector</p> <p>3.o Represent methods used in the scope of health biotechnology (can contain the latest research) for example gene therapy, stem cells, vaccine production</p> <p>4.o Submit case studies</p> <p>5.o Define bioethics</p> <p>6.o Represent Bioethics on topics or issues of biotechnology and its potential impact on society (discussion of socioscientific issues, for example genetic engineering)</p> <p>7.o Represent Bioinformatics in the scope of health biotechnology</p>	<p><b>Form of Assessment :</b> Participatory Activities, Tests</p>				0%
10		<p>1.o Define bioinformatics</p> <p>2.o Represent bioinformatics within the scope of health biotechnology</p>	<p><b>Form of Assessment :</b> Participatory Activities, Tests</p>				5%
11		<p>1.o Representing case studies regarding problems in the scope of health biotechnology (can utilize online databases (references or data banks) and/or virtual labs, the product can be in the form of literature study articles)</p> <p>2.o Represent case studies using digital posters</p>	<p><b>Forms of Assessment :</b> Participatory Activities, Practical Assessment, Tests</p>				0%

12		o Carrying out practical work on making VCO and DNA isolation techniques (papaya; A, mango; B, watermelon; C, melon; D, dragon; I) in a simple manner (practicum II)	<b>Form of Assessment :</b> Portfolio Assessment, Practical Assessment				0%
13		o Present the results of the practicum	<b>Criteria:</b> 9 <b>Form of Assessment :</b> Practical Assessment				9%
14		o Representing Scientific Dissemination	<b>Form of Assessment :</b> Practical Assessment				5%
15		o Representing Scientific Dissemination	<b>Criteria:</b> 20 <b>Form of Assessment :</b> Practical Assessment				5%
16			<b>Form of Assessment :</b> Project Results Assessment / Product Assessment				15%

#### Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	7.5%
2.	Project Results Assessment / Product Assessment	15%
3.	Practical Assessment	19%
4.	Test	2.5%
		44%

#### Notes

- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- Forms of assessment:** test and non-test.
- 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.
- 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.
- Learning materials** are details or descriptions of study materials which can be presented in the form of several main points and sub-topics.
- 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.