



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

Document Code

**SEMESTER LEARNING PLAN**

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Bioinformatics	4620102224		T=2	P=0	ECTS=3.18	6	July 17, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	.....	.....	Dr. H. Sunu Kuntjoro, S.Si., M.Si.

Learning model	Project Based Learning
----------------	------------------------

Program Learning Outcomes (PLO)	PLO study program that is charged to the course																																	
<b>PLO-10</b>	Able to design and conduct experiments in the field of biology, manage, analyze, interpret, document and store research data, to manage biological natural resources																																	
<b>Program Objectives (PO)</b>																																		
<b>PLO-PO Matrix</b>																																		
	<table border="1"> <tr> <td>P.O</td> <td>PLO-10</td> </tr> </table>	P.O	PLO-10																															
P.O	PLO-10																																	
<b>PO Matrix at the end of each learning stage (Sub-PO)</b>																																		
	<table border="1"> <tr> <td rowspan="2">P.O</td> <td colspan="16">Week</td> </tr> <tr> <td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td> </tr> </table>	P.O	Week																1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
P.O	Week																																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16																		

Short Course Description	This course discusses the basics of bioinformatics and its development, BLAST analysis, DNA primer and tracer construction, synthetic gene construction, nucleic acids both DNA and RNA, protein analysis related to the shape and arrangement of amino acids, protein topology analysis and molecular docking which is presented in a discussion manner. guided and practice carrying out computational analysis
--------------------------	---

References	<b>Main :</b> 1. 1. Xiong, Jin. 2006. Essential Bioinformatics. Cambridge University Press, New York 2. Claverie, J. & Notredame, C., 2007. Bioinformatics for Dummies 2nd Ed. Wiley Publishing, Inc.. Gruber, A., Durham, A.M., Huynh, C., del Portillo, H.A. 2008. Bioinformatics in Tropical Disease Research: A Practical and Case-Study Approach. National Center for Biotechnology Information <b>Supporters:</b>
------------	---

Supporting lecturer	Dr. Novita Kartika Indah, S.Pd., M.Si. Lisa Lisdiana, S.Si., M.Si., Ph.D. Erlis Rakhmad Purnama, S.Si., M.Si.
---------------------	---

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	Communicate the basics of bioinformatics, its development and role	Communicate the basics of bioinformatics, its development and role	<p><b>Criteria:</b></p> <ol style="list-style-type: none"> <li>1. Criteria</li> <li>2. According to the answer key, get the maximum score</li> <li>3. Many matches with the answer key get 50% or more of the maximum score</li> <li>4. Slight conformity with the answer key gets less than 50% to 10% of the maximum score</li> <li>5. Answering incorrectly gets a maximum of 9% of the maximum score</li> <li>6. Not answering gets a score of 0</li> <li>7. Form: test</li> </ol> <p><b>Form of Assessment</b> : Participatory Activities</p>	a. Discussion b. Guided discovery 2 X 50			5%
2	Exploring various databases	Describe various types of databases. Utilize data in databases for various purposes	<p><b>Criteria:</b></p> <ol style="list-style-type: none"> <li>1. Criteria</li> <li>2. According to the answer key, get the maximum score</li> <li>3. Many matches with the answer key get 50% or more of the maximum score</li> <li>4. Slight conformity with the answer key gets less than 50% to 10% of the maximum score</li> <li>5. Answering incorrectly gets a maximum of 9% of the maximum score</li> <li>6. Not answering gets a score of 0</li> <li>7. Form: test</li> </ol> <p><b>Form of Assessment</b> : Project Results Assessment / Product Assessment</p>	practice discussion 2 X 50			6%

3	Applying BLAST analysis	Describe declarative knowledge BLAST analysis Perform BLAST analysis	<p><b>Criteria:</b></p> <ol style="list-style-type: none"> <li>1. Criteria</li> <li>2. According to the answer key, get the maximum score</li> <li>3. Many matches with the answer key get 50% or more of the maximum score</li> <li>4. Slight conformity with the answer key gets less than 50% to 10% of the maximum score</li> <li>5. Answering incorrectly gets a maximum of 9% of the maximum score</li> <li>6. Not answering gets a score of 0</li> <li>7. Form: tests and assignments</li> </ol> <p><b>Form of Assessment :</b> Project Results Assessment / Product Assessment</p>	discussion presentation 2 X 50			5%
4	Perform alignment and create phylogenetic trees	Practicing alignment Create a phylogenetic tree	<p><b>Criteria:</b></p> <ol style="list-style-type: none"> <li>1. Criteria</li> <li>2. According to the answer key, get the maximum score</li> <li>3. Many matches with the answer key get 50% or more of the maximum score</li> <li>4. Slight conformity with the answer key gets less than 50% to 10% of the maximum score</li> <li>5. Answering incorrectly gets a maximum of 9% of the maximum score</li> <li>6. Not answering gets a score of 0</li> <li>7. Form: tests and assignments</li> </ol> <p><b>Form of Assessment :</b> Project Results Assessment / Product Assessment</p>	2 X 50 phylogenetic tree alignment			4%

5	Designing DNA Primers and Tracers	Designing Primers for gene amplification of various organisms Designing DNA tracers	<p><b>Criteria:</b></p> <ol style="list-style-type: none"> <li>1. Criteria</li> <li>2. According to the answer key, get the maximum score</li> <li>3. Many matches with the answer key get 50% or more of the maximum score</li> <li>4. Slight conformity with the answer key gets less than 50% to 10% of the maximum score</li> <li>5. Answering incorrectly gets a maximum of 9% of the maximum score</li> <li>6. Not answering gets a score of 0</li> <li>7. Form: tests and assignments</li> </ol> <p><b>Form of Assessment</b> :</p> <p>Project Results Assessment / Product Assessment</p>	discussion presentation of results 2 X 50			0%
6	Understand declarative and procedural knowledge related to restriction enzyme maps	Describe restriction enzyme maps Demonstrate the steps to search for restriction enzyme maps online	<p><b>Criteria:</b></p> <ol style="list-style-type: none"> <li>1. Criteria</li> <li>2. According to the answer key, get the maximum score</li> <li>3. Many matches with the answer key get 50% or more of the maximum score</li> <li>4. Slight conformity with the answer key gets less than 50% to 10% of the maximum score</li> <li>5. Answering incorrectly gets a maximum of 9% of the maximum score</li> <li>6. Not answering gets a score of 0</li> <li>7. Form: tests and assignments</li> </ol> <p><b>Form of Assessment</b> :</p> <p>Project Results Assessment / Product Assessment</p>	practice discussion 2 X 50			0%

7	constructing synthetic genes	constructing synthetic genes	<p><b>Criteria:</b></p> <ol style="list-style-type: none"> <li>1. According to the answer key, get the maximum score</li> <li>2. Many matches with the answer key get 50% or more of the maximum score</li> <li>3. Slight conformity with the answer key gets less than 50% to 10% of the maximum score</li> <li>4. Answering incorrectly gets a maximum of 9% of the maximum score</li> <li>5. Not answering gets a score of 0</li> <li>6. Form: tests and assignments</li> </ol> <p><b>Form of Assessment</b> :</p> <p>Project Results Assessment / Product Assessment</p>	discussion presentation 2 X 50		0%
8	Midterm exam		<p><b>Form of Assessment</b> :</p> <p>Participatory Activities</p>	2 X 50		10%
9	Understand the concept of DNA sequence assembly and gene annotation	Describe various DNA sequence assembly tools along with the advantages and disadvantages of each. Carrying out DNA sequence assembly online. Describe various software for determining genetic function annotations. Demonstrate the use of certain software to determine genetic function annotations for certain sequences. Describe various software for determining genetic function annotations. Demonstrate the use of software to determine the annotation of the genetic function of a particular sequence	<p><b>Criteria:</b></p> <ol style="list-style-type: none"> <li>1. Criteria</li> <li>2. According to the answer key, get the maximum score</li> <li>3. Many matches with the answer key get 50% or more of the maximum score</li> <li>4. Slight conformity with the answer key gets less than 50% to 10% of the maximum score</li> <li>5. Answering incorrectly gets a maximum of 9% of the maximum score</li> <li>6. Not answering gets a score of 0</li> <li>7. Form: tests and assignments</li> </ol> <p><b>Form of Assessment</b> :</p> <p>Project Results Assessment / Product Assessment</p>	discussion guided discovery practice 2 X 50		5%

10	Understand the concept of DNA sequence assembly and gene annotation	Describe various DNA sequence assembly tools along with the advantages and disadvantages of each. Carrying out DNA sequence assembly online. Describe various software for determining genetic function annotations. Demonstrate the use of certain software to determine genetic function annotations for certain sequences. Describe various software for determining genetic function annotations. Demonstrate the use of software. to determine the annotation of the genetic function of a particular sequence	<p><b>Criteria:</b></p> <ol style="list-style-type: none"> <li>1. Criteria</li> <li>2. According to the answer key, get the maximum score</li> <li>3. Many matches with the answer key get 50% or more of the maximum score</li> <li>4. Slight conformity with the answer key gets less than 50% to 10% of the maximum score</li> <li>5. Answering incorrectly gets a maximum of 9% of the maximum score</li> <li>6. Not answering gets a score of 0</li> <li>7. Form: tests and assignments</li> </ol> <p><b>Form of Assessment :</b> Project Results Assessment / Product Assessment</p>	discussionguided discoverypractice 2 X 50			0%
11	Analyzing protein topology	Applying Knot theory Applying circuit topology	<p><b>Criteria:</b></p> <ol style="list-style-type: none"> <li>1. According to the answer key, get the maximum score</li> <li>2. Many matches with the answer key get 50% or more of the maximum score</li> <li>3. Slight conformity with the answer key gets less than 50% to 10% of the maximum score</li> <li>4. Answering incorrectly gets a maximum of 9% of the maximum score</li> <li>5. Not answering gets a score of 0</li> <li>6. Form: tests and assignments</li> </ol> <p><b>Form of Assessment :</b> Project Results Assessment / Product Assessment</p>	discussion presentation 2 X 50			0%

12	Analyzing protein topology	Applying Knot theory Applying circuit topology	<p><b>Criteria:</b></p> <ol style="list-style-type: none"> <li>1. According to the answer key, get the maximum score</li> <li>2. Many matches with the answer key get 50% or more of the maximum score</li> <li>3. Slight conformity with the answer key gets less than 50% to 10% of the maximum score</li> <li>4. Answering incorrectly gets a maximum of 9% of the maximum score</li> <li>5. Not answering gets a score of 0</li> <li>6. Form: tests and assignments</li> </ol> <p><b>Form of Assessment</b> : Project Results Assessment / Product Assessment</p>	discussion presentation 2 X 50			0%
13	perform molecular docking	Demonstrating molecular docking Interpretation of molecular docking results	<p><b>Criteria:</b></p> <ol style="list-style-type: none"> <li>1. According to the answer key, get the maximum score</li> <li>2. Many matches with the answer key get 50% or more of the maximum score</li> <li>3. Slight conformity with the answer key gets less than 50% to 10% of the maximum score</li> <li>4. Answering incorrectly gets a maximum of 9% of the maximum score</li> <li>5. Not answering gets a score of 0</li> <li>6. Form: tests and assignments</li> </ol> <p><b>Form of Assessment</b> : Project Results Assessment / Product Assessment</p>	discussion presentation 2 X 50			5%

14	perform molecular docking	Demonstrating molecular docking Interpretation of molecular docking results	<p><b>Criteria:</b></p> <ol style="list-style-type: none"> <li>1. According to the answer key, get the maximum score</li> <li>2. Many matches with the answer key get 50% or more of the maximum score</li> <li>3. Slight conformity with the answer key gets less than 50% to 10% of the maximum score</li> <li>4. Answering incorrectly gets a maximum of 9% of the maximum score</li> <li>5. Not answering gets a score of 0</li> <li>6. Form: tests and assignments</li> </ol> <p><b>Form of Assessment</b> : Participatory Activities</p>	discussion presentation 2 X 50			10%
15	Applying bioinformatics in research activities and solving problems in everyday life	Applying bioinformatics in research activities Applying bioinformatics in everyday life	<p><b>Criteria:</b></p> <ol style="list-style-type: none"> <li>1. According to the answer key, get the maximum score</li> <li>2. Many matches with the answer key get 50% or more of the maximum score</li> <li>3. Slight conformity with the answer key gets less than 50% to 10% of the maximum score</li> <li>4. Answering incorrectly gets a maximum of 9% of the maximum score</li> <li>5. Not answering gets a score of 0</li> <li>6. Form: test</li> </ol> <p><b>Form of Assessment</b> : Participatory Activities</p>	Guided discovery discussion 2 X 50			10%
16	Final exams		<p><b>Form of Assessment</b> : Participatory Activities</p>	2 X 50			10%

**Evaluation Percentage Recap: Project Based Learning**

No	Evaluation	Percentage
1.	Participatory Activities	45%
2.	Project Results Assessment / Product Assessment	25%
		70%

**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.