



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
Applied Genetics*	4620102084		T=2	P=0	ECTS=3.18	6	July 17, 2024
AUTHORIZATION	SP Developer		Course Cluster Coordinator			Study Program Coordinator	
	Dr. Isnawati, M.Si.		Dr. Isnawati, M.Si.			Dr. H. Sunu Kuntjoro, S.Si., M.Si.	

Learning model	Project Based Learning
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Program Learning Outcomes (PLO)	PLO study program which is charged to the course
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PLO-5	Able to communicate scientific ideas, both orally and in writing using appropriate communication media according to the target, as a means of lifelong learning for academic self-development.
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PLO-7	Able to work independently and collaboratively, as well as responsibly, in completing various tasks in class, in the laboratory and in the field.
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Program Objectives (PO)

PO - 1	Understand related concepts Introduction and scope of applied genetics
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PO - 2	Understand concepts related to the introduction of applied genetics in the health/medical field
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PO - 3	Understand concepts related to cancer genetics.
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PO - 4	Understand concepts related to the introduction of applied genetics in the field of conventional plant breeding
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PO - 5	Understand concepts related to the introduction of applied genetics in the field of modern plant breeding
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PO - 6	Understand concepts related to the introduction of applied genetics in the field of conventional animal breeding
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PO - 7	Understand concepts related to transgenic livestock and its implementation
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PO - 8	Understand concepts related to genetic engineering in microbes
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PO - 9	Understand concepts related to the benefits of genetics on human welfare
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PO - 10	Implementation of applied genetics in research
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PLO-PO Matrix

	<table border="1"> <thead> <tr> <th>P.O</th> <th>PLO-5</th> <th>PLO-7</th> </tr> </thead> <tbody> <tr><td>PO-1</td><td></td><td></td></tr> <tr><td>PO-2</td><td></td><td></td></tr> <tr><td>PO-3</td><td></td><td></td></tr> <tr><td>PO-4</td><td></td><td></td></tr> <tr><td>PO-5</td><td></td><td></td></tr> <tr><td>PO-6</td><td></td><td></td></tr> <tr><td>PO-7</td><td></td><td></td></tr> <tr><td>PO-8</td><td></td><td></td></tr> <tr><td>PO-9</td><td></td><td></td></tr> <tr><td>PO-10</td><td></td><td></td></tr> </tbody> </table>	P.O	PLO-5	PLO-7	PO-1			PO-2			PO-3			PO-4			PO-5			PO-6			PO-7			PO-8			PO-9			PO-10		
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PO Matrix at the end of each learning stage (Sub-PO)

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Short Course Description Covers the scope of understanding and scope of applied genetics and its branches, concepts related to applied genetics in the health sector, benefits and examples, concepts related to cancer genetics, causes, treatment or prevention, concepts related to healing or preventing hereditary diseases, descriptions, understanding of pharmacogenomics and examples , applied genetics in plant breeding and its methods, polyploidy production, methods and benefits, applied genetics in animal breeding, production and benefits, presentation is carried out in lectures and practicums (field and laboratory).

References

Main :

- Sobir dan Syukur, M., 2015, Genetika Tanaman, IPB Press, Bogor.
- Clarke dan Cyril, A. 1996, Genetika Manusia dan Kedokteran, (diterjemahkan oleh Sofro dan Abdul Salam), Widya Medika, Jakarta.
- S., Young, J.P.W., Wellington, E. M. H., and Saunders, J. R., 1995, Population Genetics of Bacteria, Cambridge University Press, New York.
- Crowder, L.V., 2016, Genetika Tumbuhan, UGM Press, Yogyakarta.
- Kor Oldenbroek en Liesbeth van der Waaij, 2014, Animal breeding and genetics for BSc students, Groen Kennisnet, Netherland.
- Barman, A. S., 2012, Cryopreservation of Fish Gametes, LAB Lambert Academic publishing, USA.

Supporters:

- Artikel dari jurnal

Supporting lecturer
 Dr. Isnawati, M.Si.
 Guntur Trimulyono, S.Si., M.Sc.
 Lisa Lisdiana, S.Si., M.Si., Ph.D.
 Ahmad Fudhaili, S.Si., M.Sc., Ph.D.
 Fitriari Izzatunnisa Muhaimin, B.Sc., M.Sc.

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	Understand related concepts introduction and scope of applied genetics.	1.Explain the meaning of applied genetics. 2.Explain the scope of applied genetics. 3.Describe the branches of applied genetics. 4.Demonstrate an honest and independent attitude during the learning process.	Criteria: The final NA is (participation grade") (assignment grade%2 3) (UTS grade%2 2) UAS grade (3) divided by 10 Form of Assessment : Participatory Activities	a. Discussion b. Guided discovery 2 X 50		Material: Introduction and scope of applied genetics. References: Lamb, BC 2013. The Applied Genetics of Plans, Animals, Humans and Fungi, Canada: Imperial College Press. Material: Introduction and scope of applied genetics. Bibliography: Articles from journals	0%

2	Understand concepts related to the introduction of applied genetics in the health/medical field.	Explain the scope of applied genetics in the health/medical field. Explain the benefits of applied genetics in the field of crossbreeding culture/health. Demonstrate an honest and independent attitude during the learning process.	<p>Criteria: The final NA is (participation grade") (assignment grade%2 3) (UTS grade%2 2) UAS grade (3) divided by 10</p> <p>Forms of Assessment : Participatory Activities, Project Results Assessment / Product Assessment</p>	a. Guided meeting b. Discussion c. The task of looking for phenomena in the application of applied genetics in the health sector 2 X 50		<p>Material: introduction to applied genetics in the health/medical field.</p> <p>References: <i>Clarke and Cyril, A. 1996, Human Genetics and Medicine, (translated by Sofro and Abdul Salam), Widya Medika, Jakarta.</i></p> <hr/> <p>Material: introduction to applied genetics in the health/medical field.</p> <p>References: <i>Scherman, D. 2019. Advanced Texbook of Gene Transfer, Gene Therapy and Genetics Pharmacology. New Jersey: Word Scientific.</i></p> <hr/> <p>Material: introduction to applied genetics in the health/medical field.</p> <p>References: <i>Lamb, BC 2013. The Applied Genetics of Plans, Animals, Humans and Fungi, Canada: Imperial College Press.</i></p> <hr/> <p>Material: introduction to applied genetics in the health/medical field.</p> <p>Bibliography: <i>Articles from journals</i></p>	5%
3	Understand concepts related to cancer genetics.	Describe the basic principles of cancer. Describe the causes of cancer. Describe various methods of curing cancer. Demonstrate an honest and independent attitude during the learning process.	<p>Criteria: The final NA is (participation grade") (assignment grade%2 3) (UTS grade%2 2) UAS grade (3) divided by 10</p> <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	a. Guided meeting b. Discussion c. Looking for the concept of pharmacogenomics and pharmacogenetics 2 X 50		<p>Material: pharmacogenomics and pharmacogenetics</p> <p>References: <i>Clarke and Cyril, A. 1996, Human Genetics and Medicine, (translated by Sofro and Abdul Salam), Widya Medika, Jakarta.</i></p> <hr/> <p>Material: pharmacogenomics and pharmacogenetics</p> <p>References: <i>Scherman, D. 2019. Advanced Texbook of Gene Transfer, Gene Therapy and Genetics Pharmacology. New Jersey: Word Scientific.</i></p> <hr/> <p>Material: pharmacogenomics and pharmacogenetics</p> <p>References: <i>Articles from journals</i></p>	5%

4	Understand concepts related to healing hereditary diseases.	Explain the principles of hereditary diseases. Explains various methods of curing hereditary diseases. Give examples of various hereditary diseases and how to cure them. Demonstrate an honest and independent attitude during the learning process.	<p>Criteria: The final NA is (participation grade") (assignment grade%2 3) (UTS grade%2 2) UAS grade (3) divided by 10</p> <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	a. Guided meeting b. Discussion 2 X 50		<p>Material: conventional plant breeding Reference: <i>Sobir and Syukur, M., 2015, Plant Genetics, IPB Press, Bogor.</i></p> <hr/> <p>Material: conventional plant breeding Reference: <i>Lamb, BC 2013. The Applied Genetics of Plans, Animals, Humans and Fungi, Canada: Imperial College Press.</i></p> <hr/> <p>Material: conventional plant breeding Reference: <i>Crowder, LV, 2016, Plant Genetics, UGM Press, Yogyakarta.</i></p> <hr/> <p>Material: conventional plant breeding Reference: <i>Articles from journals</i></p>	5%
5	Understand concepts related to pharmacogenomics.	Explain the meaning of pharmacogenomics. Give examples of pharmacogenomic cases/phenomena. Demonstrate an honest and independent attitude during the learning process.	<p>Criteria: The final NA is (participation grade") (assignment grade%2 3) (UTS grade%2 2) UAS grade (3) divided by 10</p> <p>Form of Assessment : Participatory Activities</p>	a. Guided meeting b. Discussion 2 X 50		<p>Material: modern plant breeding Reference: <i>Sobir and Syukur, M., 2015, Plant Genetics, IPB Press, Bogor.</i></p> <hr/> <p>Material: modern plant breeding Reference: <i>Lamb, BC 2013. The Applied Genetics of Plans, Animals, Humans and Fungi, Canada: Imperial College Press.</i></p> <hr/> <p>Material: modern plant breeding Reference: <i>Crowder, LV, 2016, Plant Genetics, UGM Press, Yogyakarta.</i></p> <hr/> <p>Material: modern plant breeding Reference: <i>Articles from journals</i></p>	0%

6	Understand concepts related to pharmacogenetics.	Explain the meaning of pharmacogenetics. Give examples of pharmacogenetic cases/phenomena. Demonstrate an honest and independent attitude during the learning process.	<p>Criteria: The final NA is (participation grade") (assignment grade%2 3) (UTS grade%2 2) UAS grade (3) divided by 10</p> <p>Form of Assessment : Participatory Activities</p>	a. Guided meeting b. Discussion 2 X 50		<p>Material: conventional animal breeding Reference: <i>Clarke and Cyril, A. 1996, Human Genetics and Medicine, (translated by Sofro and Abdul Salam), Widya Medika, Jakarta.</i></p> <hr/> <p>Material: conventional animal breeding Reference: <i>Lamb, BC 2013. The Applied Genetics of Plans, Animals, Humans and Fungi, Canada: Imperial College Press.</i></p> <hr/> <p>Material: conventional animal breeding Reference: <i>Kor Oldenbroek en Liesbeth van der Waaij, 2014, Animal breeding and genetics for BSc students, Groen Kennisnet, Netherland.</i></p> <hr/> <p>Material: conventional animal breeding Reference: <i>Articles from journals</i></p> <hr/> <p>Material: conventional animal breeding Reference: <i>Scherman, D. 2019. Advanced Texbook of Gene Transfer, Gene Therapy and Genetics Pharmacology. New Jersey: Word Scientific.</i></p>	0%
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7	Understand concepts related to the introduction of applied genetics in the field of plant breeding	Describe the meaning of plant breeding. Describe the history of the development of plant breeding. Describe methods in plant breeding.	<p>Criteria: The final NA is (participation grade") (assignment grade%2 3) (UTS grade%2 2) UAS grade (3) divided by 10</p> <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	a. Guided meeting b. Discussion 2 X 50		<p>Material: conventional animal breeding Reference: <i>Articles from journals</i></p> <p>Material: modern animal breeding Reference: <i>Clarke and Cyril, A. 1996, Human Genetics and Medicine, (translated by Sofro and Abdul Salam), Widya Medika, Jakarta.</i></p> <p>Material: modern animal breeding Reference: <i>Lamb, BC 2013. The Applied Genetics of Plans, Animals, Humans and Fungi, Canada: Imperial College Press.</i></p> <p>Material: modern animal breeding Reference: <i>Kor Oldenbroek en Liesbeth van der Waaij, 2014, Animal breeding and genetics for BSc students, Groen Kennisnet, Netherland.</i></p> <p>Material: modern animal breeding Reference: <i>Scherman, D. 2019. Advanced Texbook of Gene Transfer, Gene Therapy and Genetics Pharmacology. New Jersey: Word Scientific.</i></p> <p>Material: modern animal breeding Bibliography: <i>Articles from journals</i></p>	5%
8	UTS	UTS	<p>Criteria: UTS</p> <p>Form of Assessment : Participatory Activities</p>	UTS 2 X 50			10%
9	Understand the concepts related to making polyploidy plants	Explain the meaning of polyploidy. Explain the methods of creating polyploidy plants. Give examples of polyploidy plants that have been used. Demonstrate an honest and independent attitude during the learning process.	<p>Criteria: The final NA is (participation grade") (assignment grade%2 3) (UTS grade%2 2) UAS grade (3) divided by 10</p> <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	a. Discussion b. Guided discovery 2 X 50		<p>Material: use of microorganisms through genetic modification References: <i>Lamb, BC 2013. The Applied Genetics of Plans, Animals, Humans and Fungi, Canada: Imperial College Press.</i></p> <p>Material: use of microorganisms through genetic modification Reference: <i>Scherman, D. 2019. Advanced Texbook of Gene Transfer, Gene Therapy and Genetics Pharmacology. New Jersey: Word Scientific.</i></p> <p>Material: use of microorganisms through genetic modification References: <i>Articles from journals</i></p>	5%

10	Understand concepts related to making plants resistant to pests and diseases.	Describe how to make plants resistant to pests and diseases. Give examples of plants that are resistant to pests and diseases that are already popular in the community. Demonstrate an honest and independent attitude during the learning process.	<p>Criteria: The final NA is (participation grade") (assignment grade%2 3) (UTS grade%2 2) UAS grade (3) divided by 10</p> <p>Form of Assessment : Participatory Activities</p>	a. Discussion b. Guided discovery 2 X 50		<p>Material: application of genetics to support human welfare References: <i>Lamb, BC 2013. The Applied Genetics of Plans, Animals, Humans and Fungi, Canada: Imperial College Press.</i></p> <hr/> <p>Material: application of genetics to support human welfare Reference: <i>Kor Oldenbroek en Liesbeth van der Waaij, 2014, Animal breeding and genetics for BSc students, Groen Kennisnet, Netherland.</i></p> <hr/> <p>Material: application of genetics to support human welfare References: <i>Articles from journals</i></p>	0%
11	Understand the concepts related to making plants that can nourish themselves.	Describe how to make plants that can fertilize themselves. Give examples of plants that can self-fertilize and are already popular in the community. Demonstrate an honest and independent attitude during the learning process.	<p>Criteria: The final NA is (participation grade") (assignment grade%2 3) (UTS grade%2 2) UAS grade (3) divided by 10</p> <p>Forms of Assessment : Participatory Activities, Project Results Assessment / Product Assessment</p>	a. Discussion b. Guided discovery c. PjBL: • determining the topics to be addressed regarding the application of applied genetics to animals, plants and microorganisms • Product planning design: Compiling the contents of a systematical review 2 X 50		<p>Material: applications related to applied genetics in animals, plants and microorganisms References: <i>Articles from journals</i></p>	10%
12	Understand the concepts related to making plants that can nourish themselves.	Describe how to make plants that can fertilize themselves. Give examples of plants that can self-fertilize and are already popular in the community. Demonstrate an honest and independent attitude during the learning process.	<p>Criteria: The final NA is (participation grade") (assignment grade%2 3) (UTS grade%2 2) UAS grade (3) divided by 10</p> <p>Forms of Assessment : Participatory Activities, Project Results Assessment / Product Assessment</p>	a. Discussion b. Guided discovery c. PjBL: • Product planning design: Preparing the contents of the systematical review • Activity schedule and article submission deadline: schedule for compiling and monitoring, presentation, and article submission deadline 2 X 50		<p>Material: applications related to applied genetics in animals, plants and microorganisms References: <i>Articles from journals</i></p>	10%
13	Understand the concepts related to making plants that can nourish themselves.	Describe how to make plants that can fertilize themselves. Give examples of plants that can self-fertilize and are already popular in the community. Demonstrate an honest and independent attitude during the learning process.	<p>Criteria: The final NA is (participation grade") (assignment grade%2 3) (UTS grade%2 2) UAS grade (3) divided by 10</p> <p>Forms of Assessment : Participatory Activities, Project Results Assessment / Product Assessment</p>	a. Discussion b. Guided discovery c. PjBL: • Monitor the progress of article preparation and peer-review 2 X 50		<p>Material: applications related to applied genetics in animals, plants and microorganisms References: <i>Articles from journals</i></p>	10%

14	Understand the concepts related to making plants that can nourish themselves.	Describe how to make plants that can fertilize themselves. Give examples of plants that can self-fertilize and are already popular in the community. Demonstrate an honest and independent attitude during the learning process.	Criteria: The final NA is (participation grade") (assignment grade%2 3) (UTS grade%2 2) UAS grade (3) divided by 10 Forms of Assessment : Participatory Activities, Project Results Assessment / Product Assessment	a. Discussion b. Guided discovery c. PjBL: • Monitor the progress of article preparation and peer-review 2 X 50		Material: applications related to applied genetics in animals, plants and microorganisms References: Articles from journals	10%
15	Understand the concepts related to making plants that can nourish themselves.	Describe how to make plants that can fertilize themselves. Give examples of plants that can self-fertilize and are already popular in the community. Demonstrate an honest and independent attitude during the learning process.	Criteria: The final NA is (participation grade") (assignment grade%2 3) (UTS grade%2 2) UAS grade (3) divided by 10 Forms of Assessment : Participatory Activities, Project Results Assessment / Product Assessment	a. Discussion b. Guided discovery c. PjBL: • Monitor the progress of article preparation and peer-review 2 X 50		Material: applications related to applied genetics in animals, plants and microorganisms References: Articles from journals	10%
16	Understand the concepts related to making plants that can nourish themselves.	Describe how to make plants that can fertilize themselves. Give examples of plants that can self-fertilize and are already popular in the community. Demonstrate an honest and independent attitude during the learning process.	Criteria: The final NA is (participation grade") (assignment grade%2 3) (UTS grade%2 2) UAS grade (3) divided by 10 Forms of Assessment : Participatory Activities, Project Results Assessment / Product Assessment, Tests	a. Discussion b. Guided discovery c. PjBL: • Evaluation of article preparation and peer-review 2 X 50		Material: applications related to applied genetics in animals, plants and microorganisms References: Articles from journals	15%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	42.5%
2.	Project Results Assessment / Product Assessment	52.5%
3.	Test	5%
		100%

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%.
- TM=Face to face, PT=Structured assignments, BM=Independent study.

