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

SEMESTER LEARNING PLAN

Courses		CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Genetics		4620104081		**T=3**	**P=1**	**ECTS=6.36**	4	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
	Program Objectives (PO)
	PLO-PO Matrix
	P.O
	PO Matrix at the end of each learning stage (Sub-PO)

P.O	Week															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Short Course Description	Includes an introductory scope (introduction to terms used in studying genetics, genes, Mendel's ethics (Mendel's Laws I & II, crosses with various different traits, pseudo-deviations, Mendel's Laws, multiple alleles, multiple genes, probability theory, X2 test, linkage and crossing over , making chromosome maps, karyotypes in humans and their deviations, biochemical genetics and inborn errors of metabolism, basics of genetic engineering, basics of population genetics, genetic material and its expression, basics of gene & chromosome mutations. Presentation through lecture activities, assignments and practicum in the laboratory.

References	Main :	

1. ul>
2. Gardner, E.J., dkk. 1991. *Principles of Genetics.* New York: John Willey & Sons.
3. Sarin, C. 2002. *Genetics* . New Delhi: Tata McGraw-Hill Publishing Company Limited.
4. Susantini, E., Isnawati, Lisa L. 2012. *Penuntun Praktikum Genetika* . Surabaya: University Press
5. Susantini, E., Isnawati, Lisa L. 2012. *Genetika Berbasis Penemuan* . Surabaya: University Press
Klug, William S., Michael R. Cummings, et al. 2010. *Essentials of Genetics.* San Fransisco: Pearson Benjamin Cummings.

	Supporters:	

Supporting lecturer	Prof. Dr. Endang Susantini, M.Pd. Dr. Isnawati, M.Si. Guntur Trimulyono, S.Si., M.Sc. Lisa Lisdiana, S.Si., M.Si., Ph.D.

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 the concepts related to Mendel's Laws and their intersection with various different traits, develop these concepts and use the concepts that have been mastered to explain events in everyday life.	a. Describe the meaning of terms commonly used in genetics. b. Explain Mendel's Law I and Mendel's Law II. c. Discover the variations in gametes produced in various individual genotypes. d. Find genotype comparisons and phenotype comparisons in crosses with various different traits. e. Implementing a fast way to find genotype comparisons and phenotype comparisons in crosses with many different traits.	**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 4 X 50			0%
2	Communicate concepts related to the pseudo-deviation of Mendel's classical comparative numbers and use the concepts that have been mastered to explain events in everyday life.	a. Give examples of crosses where the results of the comparison of phenotype and genotype deviate from Mendel's classic comparison numbers. b. Calculating the phenotype and genotype ratios of several types of crosses whose phylia deviate from Mendel's classic ratio numbers. c. Explain the causes of deviations from Mendel's classic comparison numbers in several types of crosses d. Describe the meaning of pseudo deviation.	**Criteria:** The final NA is (participation grade") (assignment grade%2 3) (UTS grade%2 2) UAS grade (3) divided by 10 **Form of Assessment** : Project Results Assessment / Product Assessment	a. Discussion. b. Presentation 4 X 50			5%

3	Communicate concepts related to multiple alleles, develop these concepts and apply the concepts that have been mastered in everyday life.	a. Describe the position of genes and their alleles on the chromosome. b. Describe the meaning of multiple alleles. c. Examples of traits controlled by multiple alleles found in plants, animals and humans. d. Describes several crosses involving multiple alleles. e. Explain the meaning of biologically compatible and biologically incompatible marriages. f. Describe a suitable partner for himself in terms of ABO blood type.	**Criteria:** The final NA is (participation grade") (assignment grade%2 3) (UTS grade%2 2) UAS grade (3) divided by 10 **Form of Assessment** : Project Results Assessment / Product Assessment	a. Discussion b. presentation 4 X 50				5%
4	Communicate concepts related to multiple genes/polygenes, develop these concepts and apply them in everyday life.	a. Map in the form of a graph/bar diagram the distribution of phenotypes on traits controlled by multiple genes. b. Describe the meaning of multiple genes. c. Give examples of traits controlled by multiple genes. d. Describes several crosses involving multiple genes. e. Describe the characteristics of their partner so that they have offspring with certain characteristics controlled by multiple genes (for example in terms of skin color and body height)	**Criteria:** The final NA is (participation grade") (assignment grade%2 3) (UTS grade%2 2) UAS grade (3) divided by 10 **Form of Assessment** : Project Results Assessment / Product Assessment	a. Discussion b. presentation 4 X 50				5%
5	Mastering the principle of probability and Chi square in genetics	a. Applying the use of a binomial distribution to calculate the probability of an event occurring b. Applying the chi-square test to monohybrid, dihybrid crosses	**Criteria:** The final NA is (participation grade") (assignment grade%2 3) (UTS grade%2 2) UAS grade (3) divided by 10 **Form of Assessment** : Project Results Assessment / Product Assessment	a. Discussion b. Practice c. Presentation 4 X 50				5%

6	Understanding gender differences	a. Distinguish between X chromosome linked genes and holoandric genes. b. Make a cross chart for the inheritance of genes linked to sex chromosomes.	**Criteria:** The final NA is (participation grade") (assignment grade%2 3) (UTS grade%2 2) UAS grade (3) divided by 10 **Form of Assessment** : Project Results Assessment / Product Assessment	a. Discussion. b. Practice 4 X 50			5%
7	Understanding gender determination	a. Explain the various methods of determining sex in various living creatures. b. Apply the method of determining sex to various living creatures	**Criteria:** The final NA is (participation grade") (assignment grade%2 3) (UTS grade%2 2) UAS grade (3) divided by 10 **Form of Assessment** : Project Results Assessment / Product Assessment	a. Discussion b. presentation 4 X 50			5%
8	UTS	UTS	**Criteria:** UTS **Form of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	UTS 4 X 50			10%
9	Understanding the nature of genetic material	a. Explain the structure and function of DNA b. Explain the structure and function of chromosomes	**Criteria:** The final NA is (participation grade") (assignment grade%2 3) (UTS grade%2 2) UAS grade (3) divided by 10 **Form of Assessment** : Project Results Assessment / Product Assessment	a. Discussion b. practice 4 X 50			5%
10	Understanding polyploidy events in living creatures	a. Explain the mechanism for the formation of polyploidy organisms. b. Explain the effect of substances that can cause polyploidy on various living creatures. c. Describe the benefits of polyploidy organisms for the quality and quantity of food.	**Criteria:** The final NA is (participation grade") (assignment grade%2 3) (UTS grade%2 2) UAS grade (3) divided by 10 **Form of Assessment** : Project Results Assessment / Product Assessment	a. Discussion b. practice 4 X 50			5%

11	Communicate understanding about sequenced genes (gene linkage) and crossing over	a. Explain the meaning of sequenced genes. b. Make a crossover chart for genes that sequence perfectly and imperfectly in c. Calculate the crossover value.	**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, Project Results Assessment / Product Assessment	a. Discussion. b. Presentation 4 X 50			8%
12	Mastering the chromosome map	a. Determining the distance between genes. b. Draw a relative chromosome map with sequential steps. c. Calculate the interference value.	**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, Project Results Assessment / Product Assessment	a. Discussion b. Presentation 4 X 50			8%
13	Biochemical Genetics Describes disorders caused by inborn errors of metabolism in humans.	a. Explain the metabolic pathway of Phe-Tir. b. Estimating biochemical reaction pathways that influence bacterial growth.	**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. Presentation 4 X 50			8%
14	Population genetics Understand the Hardy-Weinberg balance law and the assumptions used and its application in calculating allele frequencies in populations	a. Explain the assumptions used in the Hardy-Weinberg Law. b. Calculating the frequency of multiple alleles in the ABO blood group system.	**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. Practice 4 X 50			8%
15	DNA Isolation and PCR (Polymerization Chain Reaction)	a. Explain resistance to DNA isolation and PCR b. Explain the stages of genetic engineering. c. Describes a chart of genetically engineered genes.	**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. Presentation 4 X 50			8%
16			**Form of Assessment** : Participatory Activities				10%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	47%
2.	Project Results Assessment / Product Assessment	53%
		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.