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Module designation	Genetics I
Module level, if applicable	Undergraduate
Code, if applicable	PBIOUM6121
Subtitle, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	Even semester
Person responsible for the module	Prof. Dr. Siti Zubaidah, M. Pd
Lecturer	Prof. Dr. Siti Zubaidah, M. Pd Deny Setiawan, M.Pd
Language	Bahasa Indonesia
Relation to curriculum	Undergraduate program, compulsory, 4th semester
Type of teaching, contact hours	Undergraduate degree program: cooperative learning, presentation, discussion, laboratory work, practice report, 2 x 50 = 100 minutes and 1 x 170 minutes
Workload	1. Lectures: 2 x 50 = 100 minutes (1.67 hours) per week. 2. Exercises and Assignments: 2 x 60 = 120 minutes (2 hours) per week. 3. Laboratory work: 1 x 170 minutes (2.83 hours) per week. 4. Private study: 2 x 60 = 120 minutes (2 hours) per week.
Credit points	3 credit points (~5 ECTS-eq)
Requirements according to the examination regulations	A student must have attended at least 80% of the lectures to be eligible for the final examination.
Recommended prerequisites	PBIOUM6107 (Biochemistry) PBIOUM6111 (Cell Biology)
Module objectives/intended learning outcomes	Students are able to: (LO4) Master the theoretical concept and basic biology procedure, laboratory management which is integrated by using logical, critical, systematic thinking.
Course Learning Outcome	1. Mastering the concepts, principles, and procedures of the field of genetics. 2. Designing investigations independently, creatively and innovatively by finding, analyzing, and solving problems in the field of genetics.

	3. Applying genetics technology to produce accurate and accountable data for the purposes of solving genetic problems through a research-based approach	
Content	This course covers the following main topics: ● The meaning of genetics as a whole, the scope of genetics in accordance with the big concepts of genetics, and the application of genetics in everyday life. ● Genetic material (DNA and RNA structure as genetic material, plasmid, episome, transposable element, extrachromosomal inheritance). ● Reproduction of genetic material (DNA replication) ● Expression of Genetic material (Transcription in organisms, Post-transcriptional modification and genetic code, Translation) ● Changes in Genetic material (mutations)	
Learning Activity	Week 1	● Discussion and Q&A: the scope of learning Genetics I: the meaning of genetics as a whole, the scope of genetics according to the big concepts of genetics, and the application of genetics in everyday life. ● Creating a culture medium for *D. melanogaster* and introducing project practicum topics.
	Week 2	● Reading, summarizing, and making questions and sharing about the structure of chromosomes in living things, DNA as genetic material based on Griffith and Hershey and Chase experiments, RNA as genetic material based on Fraenkel Conrat experiments, the difference between DNA and RNA. ● Continuing the project practicum, each group works on 16 different topics
	Week 3	● Reading, summarizing, and asking questions and sharing about Plasmids and episomes as genetic material, and transposable elements as genetic material. ● Continuing the project practicum, each group worked on 16 different topics. ● Classical Practicum 1: *DNA isolation*
	Week 4	● Reading, summarizing, and asking questions and sharing about *Extrachromosomal inheritance*: genetic material outside the chromosomes of the cell nucleus. ● Continuing the project practicum, each group worked on 16 different topics.
	Week 5	● Reading, summarizing, and asking questions and sharing about the DNA replication process based on the Meselson-Stahl experiment, the process of DNA replication in bacterial plasmids through *Rolling Circle Replication*, a way of reproducing retrovirus genetic material

		through *Reverse transcription*. ● Continuing the project practicum, each group worked on 16 different topics. ● Classical Practicum 2: *Stages of Mitotic Shallot Roots*
	Week 6	● Reading, summarizing, and making questions and sharing about the transcription process in prokaryotic living things, the transcription process in eukaryotic living things, transcription differences in prokaryotic and eukaryotic living things. ● Continuing the project practicum, each group works on 16 different topics
	Week 7	● Reading, summarizing, and asking questions and sharing about the post-transcriptional modification process in eukaryotic living things. ● Continuing the project practicum, each group worked on 16 different topics. ● Classical Practicum 3: *Observation of Giant Chromosomes from the Salivary Gland of Drosophila melanogaster Larvae*
	Week 8	● Reading, summarizing, and asking questions and sharing about the various genetic codes in living things, the role of various genetic codes in the expression of genetic material, and the universality of the genetic code. ● Continuing the project practicum, each group works on 16 different topics
	Week 9	● Reading, summarizing, and making questions and sharing about the process of translation in prokaryotic living things, the process of translation in eukaryotic living things, the difference in translation in prokaryotic and eukaryotic living things. ● Continuing the project practicum, each group worked on 16 different topics.
	Week 10	● Reading, summarizing, and asking questions and sharing about mutations and the causes of mutations in the genetic material of living things. ● Continuing the project practicum, each group worked on 16 different topics.
	Week 11 :	● Reading, summarizing, and making questions and sharing about the kinds of mutations that can occur in living things, differences in mutations based on where they occur (somatic and germ mutations), differences in mutations based on the scope of their occurrence (chromosomal and gene mutations), differences in mutations based on the nature of the event

		(spontaneous and induced mutations), the rate of mutation in living things, and the principle of detection of mutations in living things. ● Continuing the project practicum, each group worked on 16 different topics.
	Week 12 :	● Reading, summarizing, and making questions and sharing about the process of DNA repair, the relationship between mutation and adaptation, the practical application of mutations in everyday life, various changes in chromosomal structure, and disorders related to changes in the number of chromosomes. ● Continuing the project practicum, each group worked on 16 different topics.
	Week 13 :	Application of research designs and reports to solve genetic theory on the topics: (1) Mendel 1, (2) Mendel 2, (3) *Drosophila melanogaster* copulation process, (4) UV treatment.
	Week 14 :	Application of research designs and reports to solve genetic theory on the topics: (1) *non dosjunction*, (2) *crossing over*, (3) lethal interaction, (4) sex linkage.
	Week 15 :	Application of research designs and reports to solve genetic theory on the topics: (1) Polypoloidis of ferns, (2) colchicine treatment against mitosis, (3) rotenone treatment against mitosis, (4) sex ratio
	Week 16 :	Application of research designs and reports to solve genetic theory on the topics: (1) natural polyploidy in fish, (2) artificial polyploidy in fish, (3) identification of caught flies, (4) gene interactions.
Study and examination requirements and forms of examination	Project assignments (40%) : Authentic project reports and assessments Problem solving (30%) : Reading, Questioning, and Answering (RQA) Midterm examination (25%): Writing test Final examination (25%) : Writing test	
Media employed	LCD, blackboard, and Sipejar.	
Reading list	1. Klug, W.S.; Cummings, M.R.; Spencer, C.A.; Palladino, M.A and Killian, D.J. 2019. Concepts of Genetics. 12nd edition. Pearson Education: USA 2. Gardner, E.J., dkk. 1991. Principle of Genetic. New York: Chichester-Brisbane-Toronto-Singapore: John Wiley and Sons Inc. 3. Snustad, D. P. and Simmons, M. J. 2012. Principles of Genetics Sixth Edition. New York: John Wiley & Sons, Inc.	

	4. Corebima, A.D. 2013. Genetika Mutasi dan Rekombinasi. Surabaya: Airlangga University Press. 5. Amin, M.dkk. 2019. The Identification of Variation Sequences from Ovulation Rate Gene as Genetic Candidate for Twin Birth Markers in East Java Local Cows. IOP Conference Series: Earth and Environmental Science. Volume 276, conference 1 6. Bilkis, T., Khan, K. I., & Rahman, S. (2013). Inheritance Pattern of Sex-Linked Trait and Feeding and Sexual Behaviour of Drosophila Melanogaster. *International Journal of Pure and Applied Zoology ISSN (Print ISSN*, *1*(4), 337–343. http://www.ijpaz.com 7. Billeter, J. C., Rideout, E. J., Dornan, A. J., & Goodwin, S. F. (2006). Control of Male Sexual Behavior in Drosophila by the Sex Determination Pathway. *Current Biology*, *16*(17), 766–776. https://doi.org/10.1016/j.cub.2006.08.025 8. Fauzi, A., & Aloysius, D. C. (2016). PEMANFAATAN Drosophila melanogaster SEBAGAI ORGANISME MODEL. *Seminar Nasional Biologi*, *February*, 372–377. 9. Hemmer, L. W., & Blumenstiel, J. P. (2016). Holding it together: Rapid evolution and positive selection in the synaptonemal complex of Drosophila. *BMC Evolutionary Biology*, *16*(1), 1–17. https://doi.org/10.1186/s12862-016-0670-8 10. Yu, X. M., Gutman, I., Mosca, T. J., Iram, T., Özkan, E., Garcia, K. C., Luo, L., & Schuldiner, O. (2013). Plum, an immunoglobulin superfamily protein, regulates axon pruning by facilitating TGF-β signaling. *Neuron*, *78*(3), 456–468. https://doi.org/10.1016/j.neuron.2013.03.004
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