	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
Animal Reproduction*	4620102158	Study Program Elective Courses	**T=2**	**P=0**	**ECTS=3.18**	5	October 21, 2023

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	Prof Dr Dyah Hariani, M.Si, Dr Widowati Budijastuti M.Si, Dr. Nur ducha M.Si	Prof. Dr. Dyah Hariani, M.Si	Dr. H. Sunu Kuntjoro, S.Si., M.Si.

Learning model	**Case Studies**	
Program Learning Outcomes (PLO)	**PLO study program that is charged to the course**	
	PLO-6	Able to apply logical, critical, systematic and innovative thinking in the context of developing or implementing science and/or technology according to their field of expertise.
	PLO-11	Able to apply transferable skills in biology to develop ecopreneurship (eco-innovation, eco-opportunity, eco-commitment)
	Program Objectives (PO)	
	PO - 1	CPMK 1 Able to demonstrate basic knowledge about reproduction and development of animals and humans in analyzing current biological issues (PLO – 2: Knowledge)
	PO - 2	CPMK 2
	PO - 3	CPMK 3 Able to apply transferable skills in reproductive technology engineering and animal development to develop ecopreneurship (eco-innovation, eco-opportunity, eco-commitment (PLO – 7: Special Skills)
	PO - 4	CPMK 4 Able to apply logical, critical, systematic and innovative thinking in the context of developing or implementing science and/or technology according to their field of expertise (PLO – 9: General Skills)
	PO - 5	CPMK 5 Able to work independently, responsibly, both as an individual and in a group, and able to work together (PLO – 10: Attitude and Social)
	PLO-PO Matrix	

P.O	PLO-6	PLO-11
PO-1		
PO-2		
PO-3		
PO-4		
PO-5		

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
PO-1																
PO-2																
PO-3																
PO-4																
PO-5																

Short Course Description	This course examines the basic principles of reproduction and development of invertebrate and vertebrate animals including the process of gamete cell formation (male and female gametogenesis), the fertilization process, zygote division, gastrulation, neurulation, the estrous cycle in mammals and the menstrual cycle in humans as well as hormonal control, development embryo membranes, reproductive engineering techniques (environment, genetics and phenotype). This course also facilitates students to make research topics and become entrepreneurs, especially in the field of animal husbandry and fisheries by applying the principles of reproductive engineering. This course is presented in the form of theory, assignments and projects with presentations and discussions.	
References	**Main :**	

	1. 1. Barnes, R.S.K., Peter, P. Calow, P.P., Olive, P.J.W., Golding , D.W. & Spicer, J.I. 2009. The Invertebrates: A Synthesis. 3rd Edition. Wiley-Blackwell 2. 2. Kobayashi,K., Kitano, T,, Iwao, Y., Kondo, M. 2018. Reproductive and Developmental Strategies. The Continuity of Life. Tokyo. Japan: Spinger Japan KK, part of Springers Nature 3. 3. Niemann, H & Wrenzycki., C. 2018. Animal Biotechnology 1 : Reproductive Biotechnologies. Switzerland: Spinger International Publishing AG. Part of Spinger Nature. 4. 4. Werner A.M., Monika H. & Maura, G. 2015. Development and Reproduction in Human and Animal Model Species. New York : Springer 5. 5. Hariani, D. & Kusuma, P.S.W. 2020. Biostimulasi Laserpunktur sebagai Rekayasa Reproduksi untuk Meningkatkan Potensi Ikan Lele. Sidoarjo : Zhifatama Jawara. 6. 6. Dyah Hariani, Nur Anindya Syamsudi & Hanifiya Samha Wardhani. 2023. Aplikasi vitamin E dalam Pakan dan Teknologi Laserpunkture sebagai Inisiasi Penguatan Potensi Reproduksi Tikus Jantan. 2023. Sidoarjo. PT Mitra Edukasi dan Publikasi. Taman,
	Supporters:
	1. 1. Nayar K. 1977. Reproduction of Invertebrate. New York: John Wiley & Sons. 2. Hafez B & Hafez E.S.E. 2008. Reproduction in Farm Animals. 7th eds. USA: Lippincott Williams & Wilkins. Baltimore, Marryland. 3. De Jonge, C.I. & Barratt.,C.L.R 2017. Sperm Cell. Production, Maturation, Fertilization, Regeneration. New York:Cambridge University Press. 2nd Edition. 4. Gardner, D.K., Weissman, A., Howles, C.M. & Zeev Shoham, Z. 2018. Texbook of Assisted Reproductive Techniques. Laboratory Perspectives. New York. Volume 1: CRC Press is an imprint of the Taylor & Francis Group. 5th Edition 5. Hariani, D. & Kusuma, P.S.W. 2020. Biostimulasi Laserpunktur sebagai Rekayasa Reproduksi untuk Meningkatkan Potensi Ikan Lele. Sidoarjo : Zhifatama Jawara. 2. 2. Hafez B & Hafez E.S.E. 2008. Reproduction in Farm Animals. 7th eds. USA: Lippincott Williams & Wilkins. Baltimore, Marryland 3. 3. De Jonge, C.I. & Barratt.,C.L.R 2017. Sperm Cell. Production, Maturation, Fertilization, Regeneration. New York:Cambridge University Press. 2nd Edition.
Supporting lecturer	Prof. Dr. Ir. Dyah Hariani, M.Si. Dr. Widowati Budijastuti, M.Si. Dr. Nur Ducha, S.Si., M.Si. Sisca Desi Prastyaningtias, 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		1.1. Provide an introduction to the Animal Reproduction course 2.2. Carry out a contract for studying Animal Reproduction 3.3. Explain the meaning of development in multicellular organisms and its applications 4.4. Make a scheme of the origin of primordial cells and gonad cells 5.5. Demonstrate an independent and honest attitude through question and answer activities and class discussions related to the basic principles of animal reproduction and development	**Criteria:** 1.1. Papers, literary presentations of research articles from 30 journals 2.2. Activeness in discussions and presentations, including a participation score of 20 3.3. UTS questions are material from the 1st to 7th meeting, UTS value is 20 4.4. UAS questions are material from the 9th to 16th meeting, UAS score is 30 **Form of Assessment** : Participatory Activities, Tests	•Learning Method: Student centered Method: Discussion •Activity is to discuss the meaning of development in multicellular organisms and provide examples of development, compare the approaches used in studying reproduction and development of animals, Create a scheme of the origin of primordial cells and gonad cells. Give examples to humans and animals 2 X 50	•Visiting the website for online lectures on the basic principles of animal reproduction and its application to life •Flipped Learning, asynchronous learning in GC •Study PPT teaching materials •Chat related to development in multicellular organisms and provide examples Make a scheme of the origin of primordial cells and gonad cells 2x50	**Material:** Learning material: 1. Basic principles of animal reproduction 2. Approaches used in studying animal reproduction and development 3. Scheme of origin of primordial cells and gonad cells **References:** *Gilbert, Scott F. 2000. Development of Biology. New York: John Wiley & Sons.*	5%

2		1.1. Explain the stages in the oogenesis process 2.2. Explain the process of folliculogenesis 3.3. Identify oocytes and follicles in the ovaries	**Criteria:** 1.1. Papers, literary presentations of research articles from 30 journals 2.2. Activeness in discussions and presentations, including a participation score of 20 3.3. UTS questions are material from the 1st to 7th meeting, UTS value is 20 4.4. UAS questions are material from the 9th to 16th meeting, UAS score is 30 **Form of Assessment** : Participatory Activities, Tests	•Learning Method: Student centered • Lecturers facilitate student-centered learning through discussion activities about the stages in the oogenesis process. •Students explain the process of folliculogenesis. • Students identify oocytes and follicles in the ovaries • Students do assignments and discussions 2 X 50'	•Visiting the website for online lectures on female gametogenes •Flipped Learning, asynchronous learning at GC •Study of PPT teaching materials • Learning Method: Student centered •Lecturers facilitate student-centred learning through discussion activities about the stages in the oogenesis process. •Students explain the process of folliculogenesis. • Students identify oocytes and follicles in the ovaries • Students do assignments and discussions 2 X 50'	**Material:** The concept of asexual and sexual reproduction in invertebrate animals and its application to the role of animals in life: **Reference:** *Barnes. 2000. The New Synthetics of Invertebrates. New York: John Wiley & Sons.*	2%
3		1.1. Explain the stages in the menstrual cycle 2.2. Analyze graphs of hormonal relationships, endometrial changes and ovarian changes in the menstrual cycle and estrous cycle	**Criteria:** 1.1. Papers, literary presentations of research articles from 30 journals 2.2. Activeness in discussions and presentations, including a participation score of 20 3.3. UTS questions are material from the 1st to 7th meeting, UTS value is 20 4.4. UAS questions are material from the 9th to 16th meeting, UAS score is 30 **Form of Assessment** : Project Results Assessment / Product Assessment, Test	•Learning Method: Student centered •Lecturer facilitates student-centered learning through discussion activities by explaining the stages of the menstrual cycle •Analyzes graphs of hormonal relationships, endometrial changes and ovarian changes in the menstrual cycle and estrus cycle •Assignments Independent assignments look for examples of journal articles and its application is related to the menstrual cycle in humans and estrus in animals •Students do assignments, and discussions 2 X 50'	•Visiting the website for online lectures on the menstrual cycle and estrous cycle, and their application to humans and animals •Flipped Learning, asynchronous learning at GC •Study of PPT teaching materials •Lecturers facilitate student-centered learning through discussion activities by explaining the stages of the menstrual cycle •Analyze graphs of hormonal relationships, endometrial changes and ovarian changes in the menstrual cycle and estrus cycle •Assignment Independent assignments look for examples of journal articles and their applications related to the menstrual cycle in humans and estrus in animals •Students do assignments and discussions 2 X 50'	**Material:** The concept of asexual and sexual reproduction in invertebrate animals and its application to the role of animals in life: **Reference:** *Barnes. 2000. The New Synthetics of Invertebrates. New York: John Wiley & Sons.*	5%

4	1. Differentiate the types of endocrine in invertebrate animals	1.1. Identify the parts of the testicles 2.2. Compare the stages of mitosis, meiosis and sperm-myogenesis in male vertebrate gametogenesis 3.3. Create a scheme of hormonal relationships in the spermatogenesis process	**Criteria:** 1.1. Papers, literary presentations of research articles from 30 journals 2.2. Activeness in discussions and presentations, including a participation score of 20 3.3. UTS questions are material from the 1st to 7th meeting, UTS value is 20 4.4. UAS questions are material from the 9th to 16th meeting, UAS score is 30 **Form of Assessment** : Project Results Assessment / Product Assessment	Learning Method: Student centered •Lecturers facilitate student-centered learning through discussion activities by identifying the parts of the testicles. •Students compare the stages of mitosis, meiosis and sperm-myogenesis in male vertebrate gametogenesis. •Students make a scheme of hormonal relationships in the spermatogenesis process . •Independent assignment is to look for examples of journal articles on hormonal relationships in the spermatogenesis process. •Assignment to prepare a simple research proposal related to the use of natural biological resources to improve the quality of spermatogenesis 2 X 50	•Visiting the website for online lectures on male gametogenesis in vertebrate animals •Flipped Learning, asynchronous learning in GC •Study of PPT teaching materials •Active discussions in forums Learning Method: Student centered •Lecturer facilitates student-centred learning through discussion activities by identifying parts- part of the testicle. •Students compare the stages of mitosis, meiosis and sperm-myogenesis in male vertebrate gametogenesis. •Students make a scheme of hormonal relationships in the spermatogenesis process . •Independent assignment is to look for examples of journal articles on hormonal relationships in the spermatogenesis process. •Assignment to prepare a simple research proposal related to the use of natural biological resources to improve the quality of spermatogenesis 2x50		13%
5	Understanding male gametogenesis in vertebrates	1.1. Describe the structure of mature spermatozoa and various abnormalities 2.2. Explain the processes that occur in spermatozoa while in the epididymis 3.3. Differentiate the role of male accessory glands	**Criteria:** 1.1. Papers, literary presentations of research articles from 30 journals 2.2. Activeness in discussions and presentations, including a participation score of 20 3.3. UTS questions are material from the 1st to 7th meeting, UTS value is 20 4.4. UAS questions are material from the 9th to 16th meeting, UAS score is 30 **Form of Assessment** : Project Results Assessment / Product Assessment	Learning Method: Student centered • The lecturer facilitates student-centered learning through discussion activities by describing the structure of mature spermatozoa and various abnormalities. • Explain the processes that occur in spermatozoa while in the epididymis. • Differentiate the role of the 2 X 50 male accessory glands	Visit the website for online lectures on the male reproductive tract, structure of mature spermatozoa, and transportation of male gametes •Flipped Learning, asynchronous learning at GC: • Study PPT teaching materials Learning Method: Student centered • Lecturer facilitates student-centered learning through discussion activities by illustrating the structure of mature spermatozoa and various abnormalities. • Explain the processes that occur in spermatozoa while in the epididymis. • Differentiate the role of the male accessory glands • Students do assignments and discussions • Students have 2x50 discussions		2%

6	Controls the male reproductive tract, the structure of mature spermatozoa, and the transportation of male gametes	1.1. Make a scheme of the process of external fertilization in lower vertebrates (fish, frogs) and internal fertilization 2.2. Explain the factors that can influence the process of external fertilization in lower vertebrates and internal fertilization 3.3. Explain the process of spermatozoa capacitation in the female reproductive tract	**Criteria:** 1.1. Practical papers and reports, including 30 practical marks 2.2. Activeness in discussions and presentations, including a participation score of 20 3.3. UTS questions are material from the 1st to 7th meeting, UTS value is 20 4.4. UAS questions are material from the 9th to 16th meeting, UAS score is 30 **Form of Assessment** : Project Results Assessment / Product Assessment	Learning Method: Student centered • Lecturer facilitates student-centered learning through discussion activities by creating a scheme of the external fertilization process in lower vertebrates (fish, frogs) and internal fertilization • Explains the factors that can influence the external fertilization process in lower vertebrates internal fertilization higher vertebrates •Students do assignments, and discus •Explain the process of spermatozoa capacitation in the female reproductive tract •Independent assignments look for examples of journal articles related to internal and internal fertilization 2 X 50	Visit the website for online lectures on the fertilization process and its application to animals in life •Flipped Learning, asynchronous learning at GC • Study PPT teaching materials •Learning Method: Student centered • Lecturer facilitates student-centered learning through discussion activities by creating a scheme of the external fertilization process in lower vertebrates (fish, frogs) and internal fertilization • Explain the factors that can influence the process of external fertilization in lower vertebrates internal fertilization in higher vertebrates • Students do assignments, and discus • Explain the process of spermatozoa capacitation in the female reproductive tract • Independent assignment to find examples of journal articles related to internal and internal fertilization 2x50		0%

7	Understanding female gametogenesis	1.1. Explain the technical requirements for reproductive engineering in fish 2.2. Explain methods for stimulating gonad maturity. 3.3. Explain the methods of polyploidy, androgenesis and gynogenesis in fish 4.4. Explain sex reversal and its mechanism 5.5. Explain laserpuncture technology 6.6. Explain the mechanism by which laser induction accelerates the maturation of fish gonads	**Criteria:** 1.1. Practical papers and reports, including 30 practical marks 2.2. Activeness in discussions and presentations, including a participation score of 20 3.3. UTS questions are material from the 1st to 7th meeting, UTS value is 20 4.4. UAS questions are material from the 9th to 16th meeting, UAS score is 30 **Forms of Assessment** : Project Results Assessment / Product Assessment, Portfolio Assessment, Practice / Performance	• Learning Method: Student centered • Lecturers facilitate student-centered learning through discussion activities explaining the technical requirements for reproductive engineering in fish. • Describe methods for stimulating gonad maturity. • Explain the methods of polyploidy, androgenesis and gynogenesis in fish. • Explain sex reversal and its mechanics • Explain laserpuncture technology. • Explain the mechanism by which laser induction accelerates the maturation of fish gonads • Independent assignment to look for examples of journal articles on the application of reproductive engineering to animals, such as fish for cultivation • Students do assignments and discussions 2 X 50	Visiting the website for online lectures Reproductive engineering in animals and applying it to animals in life for cultivation •Flipped Learning, asynchronous learning at GC • Studying PPT teaching materials •Learning Method: Student centered •Lecturer facilitates student-centered learning through discussion activities explaining requirements technical engineering of reproduction in fish. •Explain methods for stimulating gonad maturity. •Explain the methods of polyploidy, androgenesis and gynogenesis in fish. •Explain sex reversal and mechanics • Explain laserpuncture technology. • Explain the mechanism by which laser induction accelerates the maturation of fish gonads • Independent assignment to look for examples of journal articles on the application of reproductive engineering to animals, such as fish for cultivation • Students work on assignments and discussion 2x50		3%
8	UTS	Skilled in applying the concepts and principles of Animal Reproduction responsibly	**Criteria:** 1.1. Papers, literacy presentations of research articles 30 2.2. Activeness in discussions and presentations, including a participation score of 20 3.3. UTS questions are material from the 1st to 7th meeting, UTS value is 20 4.4. UAS questions are material from the 9th to 16th meeting, UAS score is 30 **Form of Assessment** : Test	Learning strategies at meetings 1-7 2 X 50			15%

9	Mastering the menstrual cycle and estrus cycle, and their application to humans and animals	1.1. Distinguish between types/methods of asexual and sexual reproduction in invertebrate animals 2.2. Relate the reproductive techniques of various examples of invertebrate animals to the influence of hormones, feed and environmental factors	**Criteria:** 1.1. Papers, literacy presentations of research articles 30 2.2. Activeness in discussions and presentations, including a participation score of 20 3.3. UTS questions are material from the 1st to 7th meeting, UTS value is 20 4.4. UAS questions are material from the 9th to 16th meeting, UAS score is 30 **Form of Assessment** : Participatory Activities	Learning Method: Student centered: Discussion (2x50') Lecturer facilitates student centered learning through discussion activities by differentiating between asexual and sexual reproduction methods of invertebrate animals, Relating reproductive techniques of various examples of invertebrate animals with the influence of hormones, feed and environmental factors Student discussion 2 X 50	•Visiting the website for online lectures on the concept of asexual and sexual reproduction of invertebrate animals and its application to the role of animals in life •Flipped Learning, asynchronous learning GC • Studying student-centered PPT teaching materials through discussion activities by differentiating the ways of asexual and sexual reproduction of invertebrate animals, Connecting techniques reproduction of various examples of invertebrate animals with the influence of hormones, feed and environmental factors Student discussion (2x50') Lecturer facilitates 2x50		2%
10	Understand the fertilization process and its application to animals in life	1.1. Able to plan business opportunities in the field of reproduction related to worm cultivation 2.2. Be able to design types of food that can accelerate the reproductive development of earthworms 3.3. Able to design and develop (Design and Development) 4.4. Arrange a Schedule (Createa Schedule) 5.5. Monitoring	**Criteria:** 1.1. Papers, practical activity reports 30 2.2. Activeness in discussions and presentations, including a participation score of 20 3.3. UTS questions are material from the 1st to 7th meeting, UTS value is 20 4.4. UAS questions are material from the 9th to 16th meeting, UAS score is 30 **Form of Assessment** : Participatory Activities	The lecturer facilitates student-centered learning through discussion activities by creating a scheme of the external fertilization process in lower vertebrates (fish, frogs) and internal fertilization. Explain the factors that can influence the process of external fertilization in lower vertebrates, internal fertilization in higher vertebrates. Explain the process of capacitation of spermatozoa in the female reproductive tract and student assignment: Independent assignment to find examples of journal articles related to internal and external fertilization 2x50) minutes [Lecture] 4 X 50	The lecturer facilitates student-centered learning through discussion activities by creating a scheme of the external fertilization process in lower vertebrates (fish, frogs) and internal fertilization. Explain the factors that can influence the process of external fertilization in lower vertebrates, internal fertilization in higher vertebrates. Explain the process of capacitation of spermatozoa in the female reproductive tract and student assignment: Independent assignment to find examples of journal articles related to internal and external fertilization 2x50) minutes [Lecture]		6%

11	Understand the fertilization process and its application to animals in life	1.1. Able to plan business opportunities in the field of reproduction related to worm cultivation 2.2. Be able to design types of food that can accelerate the reproductive development of earthworms 3.3. Able to design and develop (Design and Development) 4.4. Arrange a Schedule (Createa Schedule) 5.5. Monitoring	**Criteria:** 1.1. Papers, practical activity reports 30 2.2. Activeness in discussions and presentations, including a participation score of 20 3.3. UTS questions are material from the 1st to 7th meeting, UTS value is 20 4.4. UAS questions are material from the 9th to 16th meeting, UAS score is 30 **Form of Assessment** : Participatory Activities	The lecturer facilitates student-centered learning through discussion activities by creating a scheme of the external fertilization process in lower vertebrates (fish, frogs) and internal fertilization. Explain the factors that can influence the process of external fertilization in lower vertebrates, internal fertilization in higher vertebrates. Explain the process of capacitation of spermatozoa in the female reproductive tract and student assignment: Independent assignment to find examples of journal articles related to internal and external fertilization 2x50) minutes [Lecture] 4 X 50	The lecturer facilitates student-centered learning through discussion activities by creating a scheme of the external fertilization process in lower vertebrates (fish, frogs) and internal fertilization. Explain the factors that can influence the process of external fertilization in lower vertebrates, internal fertilization in higher vertebrates. Explain the process of capacitation of spermatozoa in the female reproductive tract and student assignment: Independent assignment to find examples of journal articles related to internal and external fertilization 2x50) minutes [Lecture]		6%
12	Understand reproductive engineering in animals and apply it to animals in life for cultivation	Explain the technical requirements for reproductive engineering in fish. Compare methods of superovulation in fish. Explain methods to stimulate gonad maturity. Explain methods of polyploidy, androgenesis and gynogenesis in fish. Create a scheme of stages in carrying out artificial insemination in fish.	**Criteria:** 1.1. Papers, literacy presentations of research articles 30 2.2. Activeness in discussions and presentations, including a participation score of 20 3.3. UTS questions are material from the 1st to 7th meeting, UTS value is 20 4.4. UAS questions are material from the 9th to 16th meeting, UAS score is 30 **Form of Assessment** : Portfolio Assessment	•Learning Method: Student centered: The lecturer facilitates student-centered learning through discussion activities by •differentiating the types of endocrine in invertebrate animals. •explain the role of endocrine in the gametogenesis process of various classes of invertebrate animals and give examples using independent student assignments •look for journal articles on types of endocrine in invertebrate animals and the role of endocrine in the gameto genesis process of various classes of invertebrate animals and discuss 4 X 50	•Visiting the website for online lectures on the concept of endocrine and its role in invertebrate animal reproduction •Flipped Learning, asynchronous learning at GC: •Study PPT teaching materials •Lecturers facilitate student-centered learning through active discussion activities in forums by •differentiating the types of endocrine in invertebrate animals. •explain the role of endocrine in the gametogenesis process of various classes of invertebrate animals and give examples using independent student assignments •look for journal articles on types of endocrine in invertebrate animals and the role of endocrine in the gameto genesis process of various classes of invertebrate animals and discuss them		2%

13	Mastering the segmentation (clevage) stage in embryo development	1.1. Explain the relationship between egg type and embryo cleavage pattern 2.2. Compare holoblastic and meroblastic cleavage patterns 3.3. Describe the plane of embryo division and the presence of centrioles	**Criteria:** 1.1. Papers, literacy presentations of research articles 30 2.2. Activeness in discussions and presentations, including a participation score of 20 3.3. UTS questions are material from the 1st to 7th meeting, UTS value is 20 4.4. UAS questions are material from the 9th to 16th meeting, UAS score is 30 **Form of Assessment** : Participatory Activities	Learning Method: Student centered • The lecturer facilitates student-centered learning through discussion activities explaining the relationship between egg type and embryo cleavage patterns. • Compare holoblastic and meroblastic cleavage patterns • Describe the plane of embryo division and the presence of centrioles and student assignment • Independent assignment to look for examples of journal articles related to the segmentation (clevage) stage in embryo development and student assignment: Independent assignment to look for examples of journal articles related to the segmentation stage (clevage) in embryonic development • Students do assignments and discussions 4 X 50	•Visiting the website for online lectures Segmentation (clevage) stage in embryo development •Flipped Learning, GC asynchronous learning •Study of PPT teaching materials •Learning Method: Student centered •Lecturer facilitates student-centred learning through discussion activities explaining the relationship between egg types and patterns embryo division. •Compare holoblastic and meroblastic cleavage patterns •Describe the division plane of the embryo and the presence of centrioles and student assignment •Independent assignment to look for examples of journal articles related to the segmentation stage (clevage) in embryo development and student assignment:Independent assignment to look for examples of journal articles related to the segmentation stage (clevage) in embryonic development • Students do assignments and discussions		2%
14	Understand the stages of gastrulation, embryo development	1.1. Explain the purpose of the gastrulation process 2.2. Explain several types of morphogenesis movements at the gastrulation stage 3.3. Make a scheme of the stages of the gastrulation process of animal or human embryos	**Criteria:** 1.1. Papers, practical activity reports 30 2.2. Activeness in discussions and presentations, including a participation score of 20 3.3. UTS questions are material from the 1st to 7th meeting, UTS value is 20 4.4. UAS questions are material from the 9th to 16th meeting, UAS score is 30 **Form of Assessment** : Participatory Activities	• Learning Method: Student centered • Lecturers facilitate student-centered learning through discussion activities explaining the gastrulation process. . • Explain the types of morphogenesis movements at the gastrulation stage. • Make a scheme of the stages of the gastrulation process of animal or human embryos. • Explain the process of forming primitive stria and assign students: Independent assignment to look for examples of journal articles • Students do assignments and discussions 4 X 50	Visit the website for lectures on the gastrulation stage, on embryo development •Flipped Learning, asynchronous learning in GC • Study PPT teaching materials • Actively discuss Learning Method : Student centered • Lecturer facilitates student-centered learning through discussion activities explaining the gastrulation process. . • Explain the types of morphogenesis movements at the gastrulation stage. • Make a scheme of the stages of the gastrulation process of animal or human embryos. • Explain the process of forming primitive stria and assign students: Independent assignment, look for examples of journal articles • Students do assignments and discussions		3%

15	Understand the stages of gastrulation, embryo development	1.1. Explain the primary neurulation process accompanied by pictures 2.2. Explain the process of secondary neurulation	**Criteria:** 1.1. Papers, practical activity reports 30 2.2. Activeness in discussions and presentations, including a participation score of 20 3.3. UTS questions are material from the 1st to 7th meeting, UTS value is 20 4.4. UAS questions are material from the 9th to 16th meeting, UAS score is 30 **Form of Assessment** : Participatory Activities	Learning Method : Student centered • The lecturer facilitates student-centered learning through discussion activities explaining the primary neurulation process accompanied by pictures. • Explain the process of secondary neurulation. Explain the development of extra-embryonic membranes in various animals • Students do assignments and discussions 4 X 50	•Visiting the website for lectures on the process of neurulation and the development of extra embryonic membranes •Flipped Learning, asynchronous learning at GC: • Studying PPT teaching materials • Actively discussing in forums • Lecturers facilitate student-centered learning through discussion activities explaining the primary neurulation process accompanied by pictures . • Explain the process of secondary neurulation. • Explain the development of extra-embryonic membranes in various animals . • Students do assignments and discussions		3%
16	UAS		**Form of Assessment** : Test				15%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
1.	Participatory Activities	25.5%
2.	Project Results Assessment / Product Assessment	18.5%
3.	Portfolio Assessment	3%
4.	Practice / Performance	1%
5.	Test	36%
		84%

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.