Module designation	Animal Structure and Development 2
Module level, if applicable	Undergraduate
Code, if applicable	PBIOUM6113
Subtitle, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	Odd semester
Person responsible for the module	Dra. Amy Tenzer, M.S.
Lecturer	Dra. Amy Tenzer, M.S. Dra. Nursasi Handayani, M.Si Ajeng Daniarsih, S.Si, M.Si Nur'aini Kartikasari, S.Si, M.Sc
Language	Bahasa Indonesia
Relation to curriculum	Undergraduate degree program, compulsory, 3rd Semester
Type of teaching, contact hours	Undergraduate degree program: cooperative learning, presentation, laboratory work, 1 x 50 = 50 minutes and 1 x 170 minutes
Workload	1. Lectures: 1 x 50 = 50 minutes (0.83 hours) per week. 2. Exercises and Assignments: 1 x 60 = 60 minutes (1 hour) per week. 3. Laboratory work: 1 x 170 minutes (2.83 hours) per week. 4. Private study: 1 x 60 = 60 minutes (1 hours) per week.
Credit points	2 credit points (~3 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	PBIOUM6109 *Animal Structure and Development 1*
Module objectives/intended learning outcomes	Students are able to: (LO4) Master theoretical concepts and basic biological procedures and manage laboratories in an integrated manner using logical, critical, and systematic thinking.
Course Learning Outcomes	Mastering the theoretical concepts of the process of animal development from gametes to the formation of new individuals, gametogenesis to fertilization, the process of

	division of vertebrate embryos to gastrulation, the process of formation of the extraembryonic membrane and its functions, differentiation in each embryonic layer and organogenesis, developmental abnormalities and their regulation, metamorphosis and regeneration	
Content	This course covers the following main topics: ● Animal development theories and concepts; embryological relationship with other sciences ● Gametogenesis: spermatogenesis; oogenesis; various types of eggs; reproductive cycle ● Fertilization: fertilization conditions and mechanisms; parthenogenesis; twin ● Segmentation and blastulation: types of cleavage; the zygote cleavage mechanism of some vertebrates; blastula formation; blastula types ● Gastrulation: the goals and processes of gastrulation ● Neurulation: goals; neurulation processes; differentiation. ● Extraembryonic membranes: function; the process of forming an extraembryonic membrane ● Implantation and placentation: understanding; implantation process; implantation types; placental function; placenta types; the placenta formation process ● Organogenesis: embryonic induction; the process of forming ectoderm, mesoderm and endoderm derivative organs ● Developmental disorders: various developmental disorders and the factors that cause them. ● Metamorphosis: definition of larval stage; the process of metamorphosis in insects and amphibians ● Regeneration: various kinds of regeneration; regeneration process mechanism; regeneration inducing factors	
Learning activity	Week 1	Introduction: lecture orientation and arrangement Class discussion: theories and concepts of animal development.
	Week 2	Class discussion: Spermatogenesis Practicum: observation of testicular histology preparations.
	Week 3	Class discussion: Oogenesis Practicum: observation of ovarian histology preparations.
	Week 4	Classical discussion and Q&A: Reproductive Cycle Practicum: determining the stages of the estrus cycle of mice.
	Week 5	Student presentation: fertilization Classical discussion and Q&A.
	Week 6	Student presentation: segmentation and blastulation in human embryonic development Classical discussion and Q&A: realia media observations (models) of human embryonic

		development.
	Week 7	Student presentation: gastrulation and neurulation in human embryonic development Classical discussion and Q&A Observation: media realia (model) of human embryonic development.
	Week 8	MIDTERM EXAMINATION
	Week 9	Student presentation: human extraembryonic membrane, Classical Discussion and Q&A.
	Week 10	Student presentation: implantation and placentation in humans Classical Discussion and Q&A.
	Week 11	Student presentation: ectoderm-derived organogenesis, Classical Discussion and Q&A.
	Week 12	Student presentation: endoderm and mesoderm derived organogenesis Classical Discussion and Q&A.
	Week 13	Student presentation: developmental disorders Classical Discussion and Q&A.
	Week 14	Student presentation: metamorphosis Classical Discussion and Q&A.
	Week 15	Student presentation: regeneration Classical Discussion and Q&A Practical: zebrafish tail regeneration.
	Week 16	FINAL EXAMINATION
Study and examination requirements and forms of examination	Concept mastery test: 35% Assignments (assignments, project assignments, papers): 30% Appearance (presentation): 20% Activity (attendance, discussion): 15%	
Media employed	LCD, power point, white board, video and moodle (Sipejar)	
Reading list	1. Carlson, B.M. 2009. Human Embryology And Developmental Biology. Ed. 4. Mosby Elsevierl 2. Gilbert, S.F. 2010. Developmental Biology. Ed. 8, Sunderland: Sinauer 3. Mitchell, B., Sharma, R. 2012. Embryology. Ed.2. China. Churchill Livingstone Elsevier 4. Surjono, T.W. 2001. Perkembangan Hewan. Jakarta: Pusat Penerbitan Universitas Terbuka 5. Schoenwolf, G.C. 2009. Laboratory Studies of Vertebrate and Invertebrate Embryos: Guide and Atlas of Descriptive and Experimental Development. Ed.9. Pearson 6. Wolpert, L., Tickle, C. 2010. Principles of Development. Ed.4. New York. Oxford	
Date of class amendment made	January, 2022	