	UNIVERSITAS PADJADJARAN **FACULTY OF MATHEMATICS AND NATURAL SCIENCES** **MASTER OF SCIENCE IN BIOLOGY**	**COURSE CODE: D20D2108**
Module designation	Embryogenesis in Environmental Stress	
Semester(s) in which themodule is taught	2	
Person(s) responsible for the module	Dr. Kartiawati Alipin, M.S. Dr. Desak Made Malini, M.Si. Dr. Mohamad Nurzaman, M.Si. Dr. Tia Setiawati, M.Si.	
Medium of instruction	English and Indonesian	
Relation to curriculum	Compulsory Master of Science in Biology	
Teaching methods	Lecture, Discussion, Cooperative Learning and Problem Based Learning	
Workload	Total workload: 8160 minutes (90,67 hours) **CLASS** Lecture, Discussion, Cooperative Learning and Problem Based Learning : 2 x 50'x 16 weeks = 1600 minutes (26.67 hours) Exercise : 2 x 60'x 16 weeks = 1920 minutes (32 hours) Private study : 2 x 60'x 16 weeks = 1920 minutes (32 hours)	
Credit points	2.00 SKS (3.62 ECTS)	

Required and recommended prerequisites for joining the module	-

Module objectives/intendedlearning outcomes	1. After completing this course, the student will able to explain the stages of embryogenesis, organogenesis, mechanisms of normal development and show malformations due to the choked environment in both animals and plants. Can plan applications with other sciences related to animals or plants. 2. After completing this course, the student will able to analyze and apply the concept of embryogenesis, especially somatic embryos in their use for individual selection of plants that have tolerant properties to extreme environmental conditions 3. Students are able to analyze and apply the concept of embryogenesis, especially embryo manipulation so as to develop the quality of livestock and the preservation of endangered animals, as well as toxicity tests that can provide safety assurance information for humans,

Contents	The course covers embryogenesis in animals and plants in the stress of the physical environment. The subject of animal embryogenesis, starting from the stages of embryogenesis (cleavage, blastulation, gastrulation, and neurulation), organogenesis, normal development mechanisms and factors that affect malformations due to the choked environment such as infectious agents, physical agents, chemical agents, hormones. While the subject of plant embryogenesis, as an introduction is explained globally about androceum and ginoceum gametogenesis, embryonic development in dicots and monocots, and the factors that influence it. The main subjects include the influence of various biotic stresses (drought/dehydration, salinity, pH of the medium, temperature, ZPT, light intensity, humidity on embryonic development and seed germination, the role of the enzyme fostatase in the adaptation of seed germination to environmental changes and the role of LEA protein on environmental stress.

Examination forms	Essay and written examination
Study and examination requirements	Minimum attendance at lectures is 80%. Final score is evaluated based on assignment and group case study reports (20%), Assignment (20%), mid semester exam (30%), and end semester exam (30%).
Reading lists	1. Sadler. T.W. 2010. Langmans Medical Embryology. 11th ed. Philadelphia. 2. Gilbert, S.F. 2000. Developmental Biology, 6th ed. Sunderland:Sinauer Associates,Inc. 3. Bhojwani,S.S. and S.P Bhatnagar, 1978, The embryology of Angiosperm, Vikas publishing House Ltd.New Delhi. 4. Johri,B.M, (ed), 1984, The embryology of Angiosperm, McGraw Hill Book Company, New YorkSchmidt-Nielsen, K. 1997. Animal Physiology: Adaptation and Environment. Fifth Edition. Cambridge University Press.