

COURSE UNIT DESCRIPTION - DEVELOPMENTAL BIOLOGY

Course unit title	Code
DEVELOPMENTAL BIOLOGY	

Lecturer(s)	Department(s)
Coordinator: Prof. Donatas Žvingila	Vilnius University, Department of Botany and Genetics, M.K.Čiurlionio g. 21/27, LT-03101 Vilnius
Other(s):	

Cycle	Level of the course unit	Type of the course unit
Full-time studies (1 st stage)	1 out of 1	Compulsory

Mode of delivery	Period of delivered	Language(s) of instruction
Face to face	6 th semester, spring	Lithuanian (English)

Prerequisites and corequisites	
Prerequisites: Zoology, botany, biochemistry, genetics	Corequisites (if any): None

Number of credits allocated to the course unit	Student's total workload	Contact hours	Self-study and research hours
5	133	64	69

Purpose of the course unit: programme competences to be developed		
Upon the successful completion of this course, students will acquire: <i>Subject-specific competences:</i> • modern life sciences research-based knowledge about fundamental processes of development of the organisms; • basic knowledge about the molecular mechanisms and genes participating in cell specification and organogenesis; • basic knowledge about methods of developmental biology; • basic knowledge about medical, ecological and evolutionary aspects of developmental biology; • skills to analyze, compare and evaluate critically the development biology-related information <i>General competences:</i> • skills for self-development, learning skills in order to study general science resources;		
Learning outcomes of the course unit	Teaching and learning methods	Assessment methods
• Describes the main principles of development of living organisms • Explains the main problems and research directions of developmental biology • Describes the basic classical and molecular methods used in developmental biology • Describes essential medical, ecological and evolutionary aspects of developmental biology • Collects and interprets scientific information on various topics of developmental biology, and are able to convey this information to the audience.	Lectures, self-directed learning, films watch, discussion, presentation preparation and delivery	Midterm exam, exam

Content: breakdown of the topics	Contact hours							Self-study work: time and assignments	
	Lectures	Tutorials	Seminars	Exercises	Laboratory work	Internship/work placement	Contact hours	Self-study hours	Assignments
1. Introduction to developmental biology	2						2	2	Self-directed learning of the topic-related textbook material, analysis of the topic-related scientific papers.
Genetic theory of development (history and perspectives).	1						1	1	
Application of traditional and modern molecular methods in the developmental studies.	1						1	1	
2. Main problems studied by developmental genetics	10	4					14	12	Self-directed learning of the topic-related textbook material, analysis of the topic-related scientific papers.
Establishment of asymmetry.	2						2	2	
Acquirement of positional information. Theory of morphogenetic field.	2						2	2	
Morphogenesis – the generation of form.	1						1	2	
Interaction between cytoplasm and nucleus in the early development.	1						1	2	
The environment and developmental process.	2		2				4	2	
Genome stability during development.	2		2				4	2	
3. Molecular morphogenesis	4						4	5	Self-directed learning of the topic-related textbook material, analysis of the topic-related scientific papers.
Principles of phage morphogenesis. T4	1						1	1	
Developmental pathway of the <i>Escherichia coli</i> division site and septa morphogenesis.	1						1	1	
Sporulation of <i>Bacillus subtilis</i> .	2						2	3	
4. Molecular aspects of fertilization			1				1	1	
5. Early embryonic development of model invertebrates	6		4				10	8	Self-directed learning of the topic-related textbook material, analysis of the topic-related scientific papers.
<i>Dictyostelium discoideum</i> as model of transition from unicellularity to multicellularity.	2						2	2	
Cleavage and axis formation in nematode <i>Caenorhabditis elegans</i> .	2		2				4	3	
The genetics of axis specification and early development in <i>Drosophila</i> .	2		2				4	3	
6. Early development patterns of model vertebrates	7		2				9	9	Self-directed learning of the topic-related

									textbook material, analysis of the topic-related scientific papers.
Early amphibian development. Gastrulation organizer and its functions.	2						2	2	
The principles of zebrafish development.	2						2	2	
Axis specification in the avian embryo.	2						2	2	
Early mammalian development. Gastrulation and axis formation	1		2				3	3	
7. Organogenesis	1		14				15	20	Self-directed learning of the topic-related textbook material, analysis of the topic-related scientific papers.
Development of the central nervous system and epidermis.			2				2	3	
Specification and regionalization of the neural crest.			2				2	3	
Somitogenesis.	1						1	2	
Development of heart and blood vessels.			2				2	2	
Phases of the tetrapod limb development.			2				2	3	
Sex determination and development.			2				2	3	
Metamorphosis, regeneration and aging.			4				4	4	
8. Peculiarities of plant development	1		3				4	6	Self-directed learning of the topic-related textbook material, analysis of the topic-related scientific papers.
Formation of plant meristem tissue.			1				1	2	
Photomorphogenesis.			1				1	2	
Genetics of flowering.	1		1				2	2	
9. Developmental biology to medicine, ecology and evolution	1		4				5	4	Self-directed learning of the topic-related textbook material, analysis of the topic-related scientific papers.
Medical aspects of developmental biology.			2				2	2	
Developmental plasticity and symbiosis.	1		2				3	2	
Total	32		32				64	69	

Assessment strategy	Weight, %	Assessment period	Assessment criteria
Work during seminar	20	During the term	2 points: preparation and presentation of report on the given topic; the essay on the topic of the report; active participation in discussions; participation in more than 80% of the seminars; 1 point: preparation and presentation of report on the given topic; the essay on the topic of the report; participation in more than 80% of the seminars; 0 points: did not prepare a presentation and the written work, or spent more than 50% of the seminars.
Midterm exam	30	11 th week of the course	Test of 30 questions. 1 point: 10-17 answered questions ; 2 points: 18-25 answered questions ; 3 points: 26-30 answered questions.
Exam	50	16 th week of	Test of 50 questions .

		the course	1 point: 5-14 answered questions; 2 points: 15-24 answered questions; 3 points: 25-34 answered questions; 4 points: 35-44 answered questions; 5 points: 45-50 answered questions.
Total	100		Accumulative score from midterm exam, exam and work during seminar

Author	Year of publication	Title	Issue of a periodical or volume of a publication	Publishing place and house or web link
Compulsory reading				
Gilbert S. E.	2010	Developmental Biology	IX edition	Sinauer Associates
Wolpert L., Tickle Ch.	2011	Principles of Development		Oxford University Press
Optional reading				
Miglani G.S.	2007	Developmental Genetics	U-angl. / 575 / Mi-65 (VU Library)	Anshan Ltd.