

# COURSE UNIT DESCRIPTION - FUNCTIONAL CELL BIOLOGY

Course unit (module) title	Code
<b>FUNCTIONAL CELL BIOLOGY</b>	

Lecturer(s)	Department(s)
<b>Coordinator:</b> Prof. Sonata Jarmalaitė	Vilnius University, Department of Botany and Genetics, M.K.Čiurlionio g. 21/27, LT-03101 Vilnius

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

Mode of delivery	Period of delivered	Language(s) of instruction
Face to face	4 <sup>th</sup> semester, spring	Lithuanian (English)

Prerequisites and corequisites	
<b>Prerequisites:</b> Fundamentals of Genetics; Structural Cell Biology	<b>Corequisites (if any):</b>

Number of credits allocated to the course unit	Student's total workload	Contact hours	Self-study and research hours
<b>5</b>	<b>134</b>	<b>64</b>	<b>70</b>

## Purpose of the course unit: programme competences to be developed

Upon the successful completion of this course, students will acquire:

### *Subject-specific competences:*

- the modern life sciences research-based knowledge on the dynamic nature of the cell, including growth, proliferation, differentiation, senescence, death and malignization;
- skills to analytically, critically and systemically analyze and evaluate information in functional cell biology and related scientific fields;
- skills to select appropriate analytical methods and databases, perform experiments, interpret the data and draw science-based conclusions;
- skills to present in written and verbal forms the knowledge and concepts of functional cell biology, to participate in the scientific discussion and clearly communicate scientific material.

### *General competences:*

- analytical and critical thinking;
- skills for self-development, learning skills in order to study general science resources;
- ability to organize and plan their work and time.

Learning outcomes of the course unit	Teaching and learning methods	Assessment methods
<ul style="list-style-type: none"> <li>• Describes principles of regulation of cell proliferation cycle and checkpoint mechanisms; explains molecular mechanisms of mitosis and meiosis,</li> <li>• Analyses, compares and critically evaluates the cell biology information related to cell cycle;</li> <li>• Selects and applies databases relevant for cell biology related experiments;</li> </ul>	Lectures, seminars, self-study.	Midterm exam; individual presentation
<ul style="list-style-type: none"> <li>• Describes principles of cell differentiation, asymmetrical division, cell senescence, multiple death pathways and molecular mechanisms of cell malignization;</li> <li>• Analyses, compares and critically evaluates the cell biology information related to cellular changes;</li> <li>• Selects and applies databases relevant for cell biology related experiments;</li> </ul>	Lectures, seminars; self-study.	Midterm exam; individual presentation
<ul style="list-style-type: none"> <li>• Describes molecular principles of cell-to-cell interaction</li> </ul>	Lectures, seminars; self-study.	Final exam;

and interaction with extracellular matrix; mechanisms of cell signalling; <ul style="list-style-type: none"> <li>Analyses, compares and critically evaluates the cell biology information related to cellular interactions;</li> <li>Selects and applies databases relevant for cell biology related experiments;</li> </ul>		
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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
<b>1. Cell cycle</b>	<b>12</b>		<b>12</b>				<b>24</b>	<b>25</b>	Self-directed learning of the topic-related textbook material, database-based investigation
Introduction. Historical overview.	2		2				4	4	Self-directed learning of the topic-related textbook material,
Modern methods of cell cycle research, main phases and processes in cell cycle	2		2				4	4	Self-directed learning of the topic-related textbook material, preparation of individual presentation
The principles of cell cycle regulation, main regulatory proteins	2		2				4	5	Self-directed learning of the topic-related textbook material,
Molecular mechanisms of cell cycle regulation during G <sub>1</sub> and S phases	2		2				4	4	Self-directed learning of the topic-related textbook material,
Molecular mechanisms of mitosis	2		2				4	4	Self-directed learning of the topic-related textbook material, preparation of individual presentation
Molecular mechanisms of meiosis	2		2				4	4	Self-directed learning of the topic-related textbook material,
<b>2. Modifications in cellular cycle</b>	<b>10</b>		<b>10</b>				<b>20</b>	<b>27</b>	Self-directed learning of the topic-related textbook material, database-based investigation
Cell cycle of stem cells	2		2				4	5	Self-directed learning of the topic-related textbook material,
Cell differentiation	2		2				4	5	Self-directed learning of the topic-related textbook material, preparation of individual presentation
Cellular senescence	2		2				4	5	Self-directed learning of the topic-related textbook material,
Cell death and molecular regulation	2		2				4	6	Self-directed learning of the topic-related textbook material,
Molecular pathways of cell malignization	2		2				4	6	Self-directed learning of the topic-related textbook material, preparation of individual presentation
<b>3. Cell communication</b>	<b>10</b>		<b>10</b>				<b>20</b>	<b>18</b>	Self-directed learning of the topic-related textbook material, database-based investigation
Cell-to-cell interaction and contacts with extracellular matrix	3		3				6	6	Self-directed learning of the topic-related textbook material,
Extracellular signals and the principles of signal transduction	3		3				6	4	Self-directed learning of the topic-related textbook material, preparation of individual presentation
Cell signal transduction through nuclear and membrane receptors	2		2				4	4	Self-directed learning of the topic-related textbook material,
Cellular signals of proliferation,	2		2				4	4	Self-directed learning of the topic-

differentiation, and survival.									related textbook material, preparation of individual presentation
<b>Total</b>	<b>32</b>		<b>32</b>				<b>64</b>	<b>70</b>	

Assessment strategy	Weight, %	Assessment period	Assessment criteria
Midterm exam	30	8-9 <sup>th</sup> week of the course	Test (virtual learning environment) of 30 questions from topic 1. <14 answered questions - 2-4 (insufficient) 14-15 answered questions - 5 (sufficient) 16-17 answered questions - 6 (satisfactory) 18-20 answered questions - 7 (highly satisfactory) 21-23 answered questions - 8 (good) 24-26 answered questions - 9 (very good) 27-30 answered questions - 10 (excellent)
Midterm exam	30	14-15 <sup>th</sup> week of the course	Test (virtual learning environment) of 30 questions from topic 2 <14 answered questions - 2-4 (insufficient) 14-15 answered questions - 5 (sufficient) 16-17 answered questions - 6 (satisfactory) 18-20 answered questions - 7 (highly satisfactory) 21-23 answered questions - 8 (good) 24-26 answered questions - 9 (very good) 27-30 answered questions - 10 (excellent)
Individual presentation	10	Individual presentation on database-based investigation according to table. The final exam is allowed only when the individual work is presented.	2-4 (insufficient) 5 (sufficient) 6 (satisfactory) 7 (highly satisfactory) 8 (good) 9 (very good) 10 (excellent)
Final exam	30	During exam session	Test (virtual learning environment) of 30 questions from topic 2 <14 answered questions - 2-4 (insufficient) 14-15 answered questions - 5 (sufficient) 16-17 answered questions - 6 (satisfactory) 18-20 answered questions - 7 (highly satisfactory) 21-23 answered questions - 8 (good) 24-26 answered questions - 9 (very good) 27-30 answered questions - 10 (excellent)
Total	100		The final grade is the sum of all evaluated parts.

Author	Year of publication	Title	Issue of a periodical or volume of a publication	Publishing place and house or web link
<b>Compulsory reading</b>				
Course virtual learning environment (lectures, Journal Club papers, PDF materials of instructor textbook)	2012	Cell biology		<a href="http://vma.esec.vu.lt">http://vma.esec.vu.lt</a>
Molecular Biology of the Cell	2008	Alberts, B., A. Johnson, J. Lewis, M. Raff, K. Roberts, P. Walter	VU library	Garland Science, New York
Cell biology	2004	Mildažienė V., Jarmalaitė S., Daugelavičius R	VU library	Technologija, Kaunas
<b>Optional reading</b>				

The world of the cell	2006	Becker W.M., Kleinsmith L.J., Hardin	VU library	Pearson Education, Inc., Benjamin Cummings
Cell cycle genetics	2008	Jarmalaitė S	VU library	Technologija, Kaunas