Course code	Course group	Volume in ECTS credits	Course valid from	Course valid to	Reg. No.
BIO 3005		**ECTS 6**			

Course type (compulsory or optional)	**Compulsory**
Course level (study cycle)	**First level**
Semester the course is delivered	**Spring (VI)**
Study form (face-to-face or distant)	**Face-to-face**

Course title in Lithuanian

BENDROJI GENETIKA

Course title in English

GENERAL GENETICS

Short course annotation in Lithuanian (up to 500 characters)

Dalyko tikslas yra suvokti paveldimumo ir kintamumo reikšmę gyvojo pasaulio evoliucijoje. Šio dalyko dėstymas pradedamas analizuojant gametų segregacijos ir paveldimumo principus, ir palaipsniui pereinama prie suvokimo, kaip ir kokios genų sąveikos lemia gyvų organizmų požymių kaitą gamtoje. Pirmoje kurso dalyje didžiausias dėmesys skiriamas klasikinei (mendelinei) genetikai, tuo tarpu likusioje kurso dalyje pateikiami ir šiuolaikiniai atradimai molekulinės biologijos srityje, bei jų taikymas šiandieniniame pasaulyje.

Short course annotation in English (up to 500 characters)

This course starts from analyzing the principles of mendelian segregation and heredity, and then goes to understanding of genes interactions and the origin of variability of traits in nature. The first half of the course will focus on the basic principles of classical (Mendelian) genetics, while the second half of the course will deal with the modern discoveries of molecular biology and their applications in today's world.

Prerequisites for entering the course

General biology BIO1001, Organic and bioorganic chemistry BBK 2002

Course aim

The main aim of this course is to provide students with a strong background of classical genetics, to provide knowledge about the organization of genetic information in different organisms, the heredity of genetic material in the level of molecules, cells and organisms, the impact of variability in the evolution of the living world

Links between course outcomes and criteria of learning achievement evaluation

Study programme outcomes	Course outcomes	Criteria of learning achievement evaluation
1. To apply fundamental laws and methods in genetics for characterization and analysis of biological systems and objects. 5. To comprehend evolution of biological objects, laws in heredity and variability, features and molecular principles of congenital diseases, and to know how to apply them for investigation of biological diversity, structure of living organisms, functioning and evolution. .	Understand a historical perspective of genetics; describe basic inheritance patterns and the chromosomal basis of heredity; explain sources of genetic variability; understand the role of sex chromosomes; understand how cells reproduce through DNA and nucleic acids; describe the Central Dogma of Molecular Genetics; understand the basic principles in artificial selection.	Students will become familiar with Mendel's basic postulates and the additional insights that modern genetics has brought to this field; understands the basis of heredity of genetic material in the level of molecules, cells and organisms; realize the impact of variability in the evolution of the living world

8. To apply acquired knowledge to solve emerging problems, to recognize, analyze biological problems, to plan strategies to solve these problems, to plan and carry out various measurements, process and interpret biological data, to classify and present these data.	To become familiar with the language of genetics and the terminology of molecular biology. Use problem-solving skills to predict genetic outcomes.	Genetics, more than any other branch of biology, lends itself to problem solving and analytical thinking. Students will be assigned numerous problems in the text that will allow them to practice these skills. Exam questions will be designed to assess how well these skills have been mastered.

Link between course outcomes and content

Course outcomes	Content (topics)
Understand a historical perspective of genetics; describe basic inheritance patterns and the chromosomal basis of heredity; explain sources of genetic variability; understand the role of sex chromosomes; understand how cells reproduce through DNA and nucleic acids; describe the Central Dogma of Molecular Genetics; develop skills in analysis, problem-solving, communication, and ethical perspectives as they apply to genetics.	The science of genetics: basic concepts, main fields and brief history. Mendelian genetics: monohybrid, dihybrid and test crosses. Mendel's laws of heredity. The inheritance of traits: allelic and non-allelic gene interaction; polygenes, pleotropy and lethal genes. Cytological basis of inheritance: cell cycle, chromatin and chromosomes. Chromosomal theory of heredity: gene linkage and crossing-over; sex determination. Genetic information. The central dogma of molecular biology. Genome organization: coding, non-coding DNA, gene families, pseudogenes, repetitive sequences. Somatic cells genome investigation. DNA cloning and manipulation. Epigenetics and parental imprinting. Eukaryotic extranuclear inheritance: organelle heredity, infectious heredity and maternal effect. Mutation theory. Genetic backgrounds of plant and animal artificial selection.
To become familiar with the language of genetics and the terminology of molecular biology. Use problem-solving skills to predict genetic outcomes.	Practical works: model organisms, work with microscope; plant chromosome analysis; detection of metaphase chromosomes of plants; polytene chromosomes from the salivary glands of dipteran insects; the induction of heat shock genes; genealogical analysis of traits; mono-, di-and polyhibrid cross; the application of the laws of Mendelian inheritance; non allelic gene interactions and phenotype; lethal genes, sex –linked genes, linked genes and crossing over.

Study (teaching and learning) methods

Lectures, analysis of scientific literature, practical works in laboratory, practical solving of genetic problems, and independent study of scientific literature.

Methods of learning achievement assessment

Mid-term and final testing of skills. The level of knowledge is determined by the test questions and corresponding achievement score is expressed as a ten-point system.

Distribution of workload for students (contact and independent work hours)

Lectures – 45 h; practical work – 30 h, consultations, exams – 5.5 h. Independent work (including – preparation time for mid-term and final exams) – 79.5 h. Total - 160 h.

Structure of cumulative score and value of its constituent parts

Mid-term exam - 17 %; practical work – 33 % and final exam - 50 % of the total assessment.

Recommended reference materials

No.	Publication year	Authors of publication and title	Publishing house	Number of copies in		
				University library	*Self-study rooms*	*Other libraries*
Basic materials						
1.	2011	Hartwell, L.,Genetics : from genes to genomes	New York [N.Y.] : McGraw-Hill	2	1	

2.	2007	Lamb, Bernard C. The applied genetics of humans, animals, plants and fungi	London : Imperial College Press		1	
3.	2004	Strachan T., Read A.P., Human molecular genetics 3	London ; New York : Garland Press		1	
4.	2003	Rédei, George P. Encyclopedic dictionary of genetics, genomics, and proteomics	Hoboken (N.J.) : Wiley-Liss		1	
5.	2000	Slapšytė G., Paulauskas A., Morkūnas V. Genetikos praktikumas, II d.: Citogenetika. (Mokymo priemonė)	Kaunas: VDU	20		
Supplementary materials						
1.	2004	Brooker, Robert J. Genetics: analysis & principles	New York [N.Y.] : McGraw-Hill			
2.	1986	Vogel F., Motulsky A. G. Human Genetics /Problems and Approaches.	Spinger-Verlag Berlin, Heidelberg.			
3.	1984	Ayala F. J., Kiger J. A. Modern genetics.	California, London, Amsterdam, Benjamin/ Cummings Publishing Comp.			

Course programme designed by

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