Course code	Course group	Volume in ECTS credits	Course hours
BIO 6006	C	6	160

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

Course title in Lithuanian

MOLEKULINĖ EKOLOGIJA

Course title in English

MOLECULAR ECOLOGY

Short course annotation in Lithuanian

Molekulinė ekologija - naujas tarpdisciplininis mokslas. Dalyko tikslas – supažindinti studentus su molekulinės ekologijos raida, nagrinėjamais klausimais, ir tyrimo metodais. Kurso metu nagrinėjamas šiuolaikinių molekulinių technologijų, teorinių ir statistinių metodų panaudojimas sprendžiant įvairias ekologijos ir evoliucijos problemas; studentai įsisavina molekulinės ekologijos tyrimo metodus, pagrindines molekulinių žymenų technologijas. Nagrinėjamas molekulinių žymenų panaudojimas identifikuojant rūšis, individus, analizuojant evoliucinė populiacijų istorija, vidurūšinę genetinę įvairovę, gyvūnų elgsenos būdus, hibridus ir hibridines zonas, planuojant aplinkosauginės strategijas, tyrinėjant skirtingų genų funkciją populiacijose, molekuline adaptaciją ir kitus įvairovės aspektus. Aiškinama molekulinės ekologijos tyrimų duomenų analizę.

Short course annotation in English

Molecular ecology is a young field defined as the application of new molecular techniques as well as theoretical and statistical approaches to answer ecological questions. The course will cover a wide variety of molecular ecology research areas, including phylogeography, population genetics, conservation genetics, behavioral ecology, microbial ecology, adaptation, ecological genetics, hybridization, and speciation. Through this course students will learn about molecular markers and their application to answer questions ranging from relatedness among species, to the evolutionary history of populations, the amount of genetic variation within a species, patterns of behavior, the analysis of hybrid zones, the design of conservation strategies, and many other aspects of variation. Teaching methods are: lectures and laboratory works.

Prerequisites for entering the course

Genetics, Ecology, Animal Ecology, Evolution and Population Ecology

Course aim

Introduce molecular ecology, discipline research areas and tools; provide knowledge about molecular techniques, theoretical and statistical approaches as there is applied to ecology.

Links between course outcomes and criteria of learning achievement evaluation

Course outcomes	Criteria of learning achievement evaluation
Define molecular ecology.	Understand the aim, main tasks, tools and research area of molecular ecology. Know basic methodology.

Describe the various sorts of molecular marker and their properties	Identify and describe properties of the common contemporary molecular markers used to molecular ecology. Understand modes of inheritance. Manage to choose molecular markers depending on way in which they are inherited and research question. Understand the impact of molecular techniques in ecology, and in understanding of evolution.
Appreciate how molecular markers can help resolve species taxonomical status, analyze hybrid zones, and recognize specific organisms.	Explain the application of molecular markers and methods in identification of species, individual and sex. Describe how molecular markers are used to follow the processes of hybridization, dispersal and gene flow when distinct species or races meet. Understand and can careful interpret combination of molecular and morphological or behavioral data.
Describe the wide range of research directions that comprise the field of molecular ecology and the common molecular approaches to these research questions	Appreciate the application of molecular techniques in population ecology, behavioural ecology, phylogeography, and conservation. Understand patterns of geographical variation within species; rates and patterns of dispersal and migration; elucidate mate choice and breeding behaviour
Manage to analyse and interpret data from common analyses employed in molecular ecological studies	Can analyse the data of dominant, co-dominant and haploid markers. Examined sequence and microsatellite data. Quantifying genetic diversity, inbreeding, gene flow, population differentiation. Discuss and evaluate the conclusions reached in scientific papers based on the presented results and proposed hypotheses

Content (topics)

1. Introduction to molecular ecology.
2. Molecular markers and methods
3. Molecular Markers and Inheritance
4. Molecular identification: species, individuals, sex
5. Behavioral ecology: assessing relatedness, mating behavior and social systems
6. Population genetics: genetic diversity, population history; population subdivision; population genetics data analysis
7. Phylogeography
8. Conservation genetics

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

Lectures – 45 hours, laboratory work– 15 hours, examination – 3 hours, individual work – 97 hours.

Structure of cumulative score and value of its constituent parts

Final assessment sums the assessments of written final examination (50%), written mid-term examination (20%) and assessment of laboratory works (30%).

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	Freeland J., Kirk	Wiley-	1	1	

		H., Petersen S. Molecular Ecology. 2nd Edition	Blackwell.			
	2007	Beebee T., Rowe G. An introduction to Molecular ecology. 2nd Edition	Oxford university press.	1		
	2005	Beebee T., Rowe G. An introduction to Molecular ecology.	Oxford university press.		1	
Supplementary materials						
1.	2007	Conner J.K., Hartl D.L. Ekologinės genetikos pradmenys.	Vilnius university press			
2.	2004	R. Frankham, J.D. Ballou, D.A. Briscoe. A primer for conservation genetics	Cambridge University press			
		Journal: Molecular Ecology	Blackwell Publishing	http://onlinelibrary.wiley.com/journal/10.1111/%28ISSN%291365-294X		
		Journal: Molecular Ecology Resources	Blackwell Publishing	http://onlinelibrary.wiley.com/journal/ http:/ onlinelibrary.wiley.com/journal		

Course programme designed by

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