Study Programme : PhD in Biology

Degree level: Doctoral degree

Course Title: Genetic polymorphism in animal populations

Professor: Mihajla Djan

Required/Elective Course: elective course

Number of ECTS: 15

Prerequisites: previous consultation with a professor that will define form of engagement and course tasks depending on previous courses and current acquirements of a student

Course Objective: The course objective is to adopt knowledge on role and importance of genetic polymorphism in natural animal populations and to learn methods of isozyme variability analysis, strategy of development and application of microsatellite markers and to learn statistical analysis of molecular variability data. Student gets informed with methods and programs of genetic conservation of natural animal populations.

Course Outcome:

After successfully realized pre-exam and exam obligations, student is able to:

- explain role and importance of genetic polymorphism in natural animal populations
- explain organisation and methodology for determination of genetic variability within population
- observe special characteristics of different molecular markers, distinguish their advantages and disadvantages depending on type of genetic analysis in population
- apply isozyme variability analysis methods and methods for statistical analysis of isozyme variability data
- understand strategy for development and application of microsatellite markers in studies of genetic diversity
- define importance of genetic diversity, considering methods and programs of genetic conservation of natural animal populations

Course Content:

Theoretical part Genetic polymorphism: term, role and importance. Genetic variability within population. Molecular and protein markers. Isozyme analyses. Hybride heteropolymers, electrophoretic resolution, choice of loci, allozyme assay, allozyme variability data analysis. Statistics of genetic polymorphism, deviation from Hardy-Weinberg equilibrium tests, F statistics, neigbourhood joining, parasimony. Development and application of microsatellite markers in genetic diversity studies. Usage of microsatellites in mutation estimation, population expansion, inbreeding and conservation genetics. MHC gene polymorphism. Genetic variability in game populations, detection and sustainability of genetic variability in natural population, methods and programs of genetic conservation.

Practical part Individual and team work in the laboratory on on-going project tasks in the field of genetic variability of animal populations, detection of genetic variability in natural populations, application of methods and programs of genetic conservation.

Reading List:

1. Avise JC, Molecular Markers, Natural History and Evolution, Sinauer Associates, 2nd Edition, 2004.
2. Molecular Zoology Advances, trategies and Protocols. Edited by Joan D. Ferraris and Stephen R.Palumbi. Wiley – Liss Publisher, 1996.
3. Molecular Systematics. Edited by David M. Hillis and Craig Moritz, Sinauer SA, 1996.
4. Hedrick PW. Genetics of Populations. Jones & Bartlett Pulishers, 3rd edition, 2004.
5. Review papers published in leading international scientific journals

Total hours:				
Lectures: 5	Practicals:	Other:	Student research work:5	

Methods of instruction: theoretical lectures, laboratory and computational practical lessons, tutorials, Journal Club, seminar

Assessment (maximum number of points 100)

Requirements

Project task – 30; Seminar – 5; Paper presentation – 20; Oral exam - 45

Remark: