Study Programme : PhD in Biology

Degree level: Doctoral degree

Course Title: Advanced plant genetics

Professor: Dragana Obreht

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 diversity in natural plant populations and genetic collections of cultivated plants. Students will learn methods and strategies of protein and molecular markers variability analysis, methods of statistical analysis, and marker validation. Students get informed with methods of genetic mapping and programs of genetic conservation and plant breeding

Course Outcome:

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

- explain role and importance of genetic polymorphism in natural plant 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 and plant breedeing

Course Content:

Theoretical part Genetic polymorphism: term, role and importance. Genetic variability within population. Isozyme analyses. Hybride heteropolymers, electrophoretic resolution, choice of loci, allozyme assay, allozyme variability data analysis. Statistics of genetic polymorphism. Development and application of molecular markers in plant genetic diversity studies. Seed banks and core collections of cultured plants. DNA fingerprinting and plant breeders rights. Gene mapping: mapping populations, chromosome engeneering, marker types, linkage analysis and marker validation. Marker-trait associative analysis. Gene identification – position-independent gene identification strategies. Positional cloning. Candidate gene identification.

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

Reading List:

1. de Vienne D. Molecular markers in plant genetics and biotechnology. Sceience Publishers Inc. USA, 2003.
2. Soltis D. E., Soltis, P. S. Isozymes in plant biology (Advanced in plant science Vol.4) Timber Press, USA, 1990.
3. 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: