Course Unit Descriptor

Study Programme: Agronomy

Course Unit Title: Molecular ecology of forest tree species

Course Unit Code: 19.AGR132

Name of Lecturer(s): Vladislava O. Galović

Type and Level of Studies: Doctoral studies

Course Status (compulsory/elective): elective

Semester (winter/summer): winter

Language of instruction: Serbian/English

Mode of course unit delivery (face-to-face/distance learning): face to face

Number of ECTS Allocated: 7

Prerequisites: Seminar paper and exam

Course Aims:

The course introduces course participants to a multidisciplinary approach to observing environmental issues, searching for solutions and providing answers to problems

Learning Outcomes:

Training students to be independent in master molecular techniques, isolation of different types of biomolecules; use of molecular platforms depending on research needs; independent mastering of molecular procedures in the laboratory. Students would be able to learn to use bioinformatics search engines and be able to independently interpret the processed results of molecular analyses, as well as to independently form and use gene data banks that are available on different websites and search engines.

Syllabus:

Theory

Introduction to molecular ecology - goals and basic concepts of molecular ecology; Relationship between ecology and molecular biology; introduction to conservation and sustainable management of genetic resources in forestry. Importance of biodiversity in forestry; Genetics in forest tree populations; Genetic structure and population size in forestry; Sexual reproduction in forest trees; Evolution and evolutionary factors, adaptation; Measurement of genetic variation within and between populations of a particular locus; Evaluation of genetic variability in pedigree research; Molecular markers in the characterization of diversity in forest species and their selection; New molecular approaches in measurement and conservation of adaptive genetic diversity in forestry; Genome editing and new generation sequencing; Molecular ecology of stress; Quantitative PCR method in measuring stress induction; Micro- and macropropagation as the main and auxiliary method in modern stress research; Molecular ecology and genetically modified organisms; Gene bank and bioinformatics.

Practice

Demonstration exercises: different methods of collecting samples, settings of experiments, ways of preserving them, introduction to different types of isolation of biomolecules from different tissues. Mastering PCR techniques, gel-electrophoretic identification of amplified target fragments, spectrophotometry, and purification of fragments as part of preparation for sequencing parts of the genome of target organisms, familiarization with the latest identification technologies. Familiarity with genome editing methods; Familiarization with the method of quantitative PCR and analysis

of the results.

Required Reading:

1. Lowe, A, Harris, S. & Ashton, P. 2004. Ecological genetics – design, analysis and application. Blackwell Publishing.
2. Beebee, T & Rowe, G. 2007. An introduction to molecular ecology. (2nd ed.).Oxford University Press.
3. Geburek, T. & Turok, J. 2005. Conservation and management of forest genetic resources in Europe. Arbora Publishers
4. Jenks A. M. & Hasegawa, M., P. 2005. Plant abiotic stress. Blackwell Publishing

Weekly Contact Hours:	**Lectures:** 4	**Practical work:** 0

Teaching Methods:

Lectures combined with interactive teaching, seminars, consultations and mentoring work with students.

Knowledge Assessment (maximum of 100 points):

Pre-exam obligations	points	**Final exam**	points
Active class participation		written exam	
Practical work		oral exam	60
Preliminary exam(s)		…….	
Seminar(s)			40

The methods of knowledge assessment may differ; the table presents only some of the options: written exam, oral exam, project presentation, seminars, etc.