

## MODULE DESCRIPTION

### General

School	Geotechnical Sciences
Department	Forest and Natural Environment Sciences

### Module Information

Title	Forest Genetis
Course Code	IY2
Level of Studies	Bachelor
Teaching Period	Winter semester
Attendance Type	COR
Prerequisites	No

Orientation	Weekly Hours		Year	Semester	ECTS
	Lectures	Laboratory work			
Ecosystem Ecology & Landscape Rehabilitation Section	3	2	5 <sup>th</sup>	9th	5

### Faculty Instructor

Prof. Dr. Theodora Merou

### Type of Module

- General Foundation
- Specific Foundation / Core
- Knowledge Deepening / Consolidation

### Mode of Delivery

- Face to face
- Distance learning

### Digital Module availability

- E-Study Guide
- Departments Website
- E-Learning

### Language

	Teaching	Examination
Greek	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
English	<input checked="" type="checkbox"/>	<input type="checkbox"/>

## Erasmus

- The course is offered to exchange programme students

## Learning Outcomes

During the syllabus, students will understand the genes structures and functions, their importance in populations' evolution as well as the basic principles and patterns of gene inheritance through the copy mechanism.

In the laboratory part of the course the students will learn different isolation and amplification techniques for nucleic acids (DNA, RNA) from plant tissues using modern equipment and molecular markers. Additionally, they will learn the expression patterns of genes by performing Real Time Polymerase Chain Reaction.

## List of General Competences

- Apply knowledge in practice
- Work autonomously
- Work in teams
- Work in an international context
- Work in an interdisciplinary team
- Respect natural environment
- Advance free, creative and causative thinking

## Module Content (Syllabus)

The syllabus covers a theoretical and an applied section. Its purpose is to learn the students' basic aspects of forest genetics and train them in the isolation of genetic material, the genetic diversity estimation as well as the identification of candidate genes with adaptive significance using specific molecular markers.

The theoretical part covers: a) An introduction to basic terms forest genetics (Molecular structure and function of the genetic material/ Gene flow mechanisms/ Translation and transcription of the genetic material/ Mendelian Genetics/ Gene expression and chromosome mapping/ Genetic diversity and genetic recombination/ Gene identification using molecular indices/ b) Population Genetics: Allele frequencies/ Calculation of genetic diversity/ Hardy-Weinberg equilibrium law/ Quantitative inheritance/ Phylogenetic trees/ Inbreeding depression and heterosis/ Polyploidy/ Gene polymorphism in natural populations.

The applied section includes isolation of nucleic acids (DNA, RNA) from plant samples originated from different populations of a given species/ Cleaning treatments in extracted genetic material (DNA, RNA)/ Amplification of the extracted DNA or cDNA through PCR/RT-PCR and exportation of the genetic diversity patterns. The results during the laboratory syllabus will be processed by students using a variety of available free specific software e.g. BioEdit, GenAlex, Poppr, MEGA, Phyelf etc.

## Educational Material Types

- Book
- Notes
- Slide presentations
- Video lectures

- Multimedia
- Interactive exercises
- Other:

### Use of Information and Communication Technologies

- Use of ICT in Course Teaching
- Use of ICT in Laboratory Teaching
- Use of ICT in Communication with Students
- Use of ICT in Student Assessment

### Module Organization

Please fill in the workload of each course activity

Course Activity	Workload (hours)
Lectures	50
Laboratory work	50
Field Trip/Short Individual Assignments	10
Independent Study	15
<b>Total</b>	125

\* 1 ECTS unit corresponds to 25 hours of workload

### Student Assessment Methods

- Written Exam with Multiple Choice Questions
- Written Exam with Short Answer Questions
- Written Exam with Extended Answer Questions
- Written Assignment
- Report
- Oral Exams
- Laboratory Assignment

### Suggested Bibliography (Eudoxus and additional bibliography)

1. White, T., Adams, T. & Neale, D. (2009). Forest Genetics. Publisher: CABI publishing.
2. Loukas M. (2010). Introduction to genetics. Publisher: Stamoulis Publications (In Greek).
3. Mpanos, G. (2010). Basic principles of genetics and inheritance. Publisher: Modern Education (In Greek).