COURSE OUTLINE

1. GENERAL

SCHOOL	APPLIED BIOLOGY & BIOTECHNOLOGY		
ACADEMIC UNIT	BIOTECHNOLOGY		
LEVEL OF STUDIES	UDERGRADUATE		
COURSE CODE	**3602**	**ΕΞΑΜΗΝΟ ΣΠΟΥΔΩΝ**	6th
COURSE TITLE	Molecular Interactions and Biotechnological Applications		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	3 (x13 wks)	1,56
Practical Lab Courses	2 (x6 wks)	0,44
Group class presentation (selected topics/ scientific articles)	2 (x13 wks)	1,00
Autonomous study (personal assignment)	2 (x13 wks)	1,00
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).	SUM: 9,6 (x13 wks)	4.00

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Filed of Science
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek (Teaching & Exams)
IS THE COURSE OFFERED TO ERASMUS STUDENTS	English (Teaching & Exams)
COURSE WEBSITE (URL)	Under construction

2. LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

Upon successful completion of this course the students will acquire new knowledge and specific skills on the following subjects:

- Understands the basic principles governing the main categories of plant-microbe interactions.
- Understands the basic molecular mechanisms of plant-microbe recognition
- Understands plant defense mechanisms against pathogenic microorganisms.
- Will be aware of the benefits that can arise from the utilization of symbiotic plant-microorganism interactions in the context of sustainable agricultural development
- Can work with his / her classmates to analyze and jointly present a plan or study aimed at understanding the strategy and methods used to study and utilize plant-microorganism interactions
- Has developed and improved its ability to access online libraries and scientific journals

• Has strengthened the skills of analysis and presentation of research and bibliographic data

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology Adapting to new situations	*Project planning and management*
	Respect for difference and multiculturalism
	Respect for the natural environment
Decision-making	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Working independently	*Criticism and self-criticism*
Team work	*Production of free, creative and inductive thinking*
Working in an international environment Working in an interdisciplinary environment	*……*
	Others…
Production of new research ideas	*…….*

1) Retrieve, analyze and synthesize data and information relying on use of necessary technologies.
2) Adjust to new situations.
3) Decision making.
4) Work autonomously.
5) Work in groups.
6) Create novel scientific projects.
7) Design and develop research projects/experiments.
8) Be critical and self-critical.
9) Apply knowledge to practice.

3. SYLLABUS

1) Categories of Plant-Microorganism Interactions
2) Introduction to Phytopathology, The concept and expression of the disease
3) Basic knowledge of Phytopathological mycology
4) Basic knowledge of Phytopathological Prokaryology
5) Basic knowledge of Phytopathological Iology
6) Pathogenesis mechanisms in plants. Pathogen enzymes, microbial toxins, phytohormones.
7) Plant's defense mechanisms. Passive or pre-existing defense mechanisms. Stimulating active mechanisms. The hypersensitivity reaction. Resistant and acquired systemic endurance.
8) Immune plant immune system. Identification mechanisms between pathogenic hosts. Mechanisms of secretion of bacterial stimulants. Signal transduction mechanisms.
9) Symbiotic interactions between plants and microorganisms. The example of mycorrhiza and symbiotic nitrogen fixation.
10) The importance of symbiotic interactions in plant nutrition and sustainable agriculture
11) Molecular recognition and establishment of symbiotic plant-microorganism interactions.
12) The molecular evolution of symbiotic plant-microorganism interactions.

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Direct (face to face).
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Power point presentations, student contact electronically.
TEACHING METHODS *The manner and methods of teaching are described in detail.* *Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography,*	

Δραστηριότητα	***Φόρτος Εργασίας Εξαμήνου***
Lectures	39 h = 1.56 ECTS (13 wks x 3 h)
Practical Lab Courses	26 h = 1.04 ECTS

tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc. *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	(13 wks x 2 h) Group class presentations: 30 h = 1.2 ECTS (13 wks x 2,3 h) Autonomous study: 30 h = 1.2 ECTS (13 wks x 2,3 h) ***Total***: ***125 h (5 ECTS)***
STUDENT PERFORMANCE EVALUATION *Description of the evaluation procedure* *Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving,*	**I)** Written final examination (50%) with ranking difficulty on the basis of the issues and subjects presented during theoretical courses. The exams will include: - Questions of multiple choice. - Questions of theoretical knowledge. - Theoretical problems to be resolved. **II)** Laboratory exercises/ practical courses (30%). Students individually or in groups will provide a written report before the beginning of the next exercise. The grade of lab courses will be based on the writing reports, attendance and class participation. **III)** Group and small autonomous assignments (20%).

5. Recommended Literature

1. **Principles of Plant-Microbe Interactions**, Lugtenberg, Ben (Ed.) Springer, ISBN 978-3-319-08575-3

-Relevant Scientific Journals:

Molecular Plant-Microbe Interactions, Plant Pathology, Plant Physiology, Experimental Botany, New Phytologist.