

COURSE OUTLINE

1. GENERAL

SCHOOL	AGRICULTURAL SCIENCES		
ACADEMIC UNIT	AGRICULTURE		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	AGR_707	SEMESTER OF STUDIES	SEVENTH
COURSE TITLE	Plant – Microbe Interactions		
INDEPENDENT TEACHING ACTIVITIES <i>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</i>		WEEKLY TEACHING HOURS	CREDITS
	Lectures	3	
	Seminar	1	
	Total	4	5
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (4).</i>			
COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i>	Selective, specialised general knowledge		
PREREQUISITE COURSES:	Typically, there are no prerequisite courses.		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek.		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBPAGE (URL)			

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*

At the end of this course the student will further develop the following skills:

1. Will have acquired a complete concept of the biology of interactions between plants and microorganisms in symbiotic relationships as well as in host - pathogenic relationships.
2. Will be able to report the mechanisms of defense of plants against pathogens, but also the mechanisms that pathogens use to cause genetic and molecular infection.
3. Will have the ability to monitor the evolution of research in these areas
4. Will be competent to understand strategies to produce pathogen-resistant varieties by exploiting molecules derived from the study of the interaction between hosts and pathogens.

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
Decision-making
Working independently

Project planning and management
Respect for difference and multiculturalism
Respect for the natural environment
Showing social, professional and ethical responsibility and sensitivity to gender issues
Criticism and self-criticism

<i>Team work</i>	<i>Production of free, creative and inductive thinking</i>
<i>Working in an international environment</i>
<i>Working in an interdisciplinary environment</i>	<i>Others...</i>
<i>Production of new research ideas</i>

Generally, by the end of this course the student will, furthermore, have developed the following general abilities (from the list above):

Search for, analysis and synthesis of data and information, with the use of the necessary technology
Adapting to new situations
Respect for the Environment
Promotion of free, creative and inductive thinking

3. SYLLABUS

1. Beneficial and harmful soil micro-organisms. Effects on plant growth and health.
2. Genetic basis of plant response and defense, gene identification.
3. Plant defense mechanisms, resistance and susceptibility to pathogens, molecular mechanisms and pathways (salicylic acid, jasmonic acid and ethylene as inducers of plant defense).
4. Interactions between plants and viruses. Viral vectors, proteins and microRNAs involved in the pathogenesis of plant viruses
5. Bacterial contamination mechanisms and factors. Bacterial pathogenesis. Genetics of host specificity.
6. Disease inducing mechanisms in fungal plant pathogens. Genetics of signal transfer.
7. The role of endophytes in plant growth and the treatment of plant diseases and pests.
8. Interactions of plants and soil microorganisms, symbiotic and non-symbiotic bacteria. Symbiotic and Saprophytic fungi. Mycorrhizae.
9. Nitrogen metabolism in the soil. Symbiotic and non-symbiotic nitrogen fixation.
10. Sulfur phosphorus, iron soil metabolism.
11. Microbiology of degraded soils. Upgrading of degraded lands.
12. Biodegradation of overburdened soils and sustainability. Biodiversity and Environmental Sustainability. The use of beneficial microorganisms in sustainable agriculture.
13. Microbiome and rhizosphere. The role of microbes in organic farming.

4. TEACHING AND LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Lectures and seminars in class, face to face.	
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES <i>Use of ICT in teaching, laboratory education, communication with students</i>	Use of Information and Communication Technologies (ICTs) (e.g. powerpoint) in teaching. The contents of the course of each chapter are uploaded on the internet, in the form of a series of pdf files that the students can freely download using a password which is provided to them at the beginning of the course.	
TEACHING METHODS <i>The manner and methods of teaching are</i>	Δραστηριότητα	Φόρτος Εργασίας Εξαμήνου
	Lectures (3 contact hours per week x 13	39

<p><i>described in detail.</i></p> <p><i>Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.</i></p> <p><i>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</i></p>	weeks)	
	Seminar (1 contact hours per week x 13 weeks)	13
	Assignments	20
	Hours for private study of the student, preparation and attendance mid-term or/and final examinations.	53
	Total number of hours for the Course (25 hours of work-load per ECTS credit)	125 hours (total student work-load)
<p>STUDENT PERFORMANCE EVALUATION</p> <p><i>Description of the evaluation procedure</i></p> <p><i>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other</i></p> <p><i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i></p>	<ol style="list-style-type: none"> 1. Mandatory written examination, with full length questions and / or multiple choice questions. Minimum pass grade= 5, scale 0-10. Total degree contribution 60%. 2. Mandatory assignments. Minimum pass grade= 5, scale 0-10. Total degree contribution 40%. 3. Final degree = sum 1+2. 4. All the above are taking place in Greek. 	

5. RECOMMENDED LITERATURE

Suggested bibliography:

1. Agrios G. N. Plant Pathology 5th Edition. 2015. Academic Press.

- Related academic journals:

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