

COURSE OUTLINE

1. GENERAL

SCHOOL	Applied Biology and Biotechnology		
ACADEMIC UNIT	BIOTECHNOLOGY		
LEVEL OF STUDIES	BACHELOR OF SCIENCE		
COURSE CODE	297	ΕΞΑΜΗΝΟ ΣΠΟΥΔΩΝ	2 rd (spring semester)
COURSE TITLE	PLANT PHYSIOLOGY & RESPONSES		
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 (x13 wks)	1,56
Practical Lab Courses		2 (x7 wks)	0,56
Group class presentation (selected topics/ scientific articles)		2,5 (x13 wks)	1,3
Autonomous study (personal assignment)		3 (x13 wks)	1,56
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>		SUM:	5,0 (4,98)
COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i>	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)	www.aua.gr/plantdevelopment		

2. LEARNING OUTCOMES

Learning outcomes <i>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.</i> <i>Consult Appendix A</i> <ul style="list-style-type: none"> · 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
<p>Upon successful completion of this course the students will acquire new knowledge and specific skills on the following subjects:</p> <ul style="list-style-type: none"> • Primary structure and organization of the plant cell with emphasis given on its physiological properties • Significance of water and mineral nutrients on the homeostasis of a plant organism, and of the uptake and assimilation processes for the main nutrients. • The role of photosynthesis on plant growth, synthesis of plant-derived industrial materials, biomass yield, bioenergy and feed stock • Understanding mitochondrial respiration, mobilization of storage reserves and the effect of agrochemical compounds that inhibit mitochondrial respiration in plants • Response of plant organisms to light to complete their life cycle and ensure that their offspring will survive

- Understanding endogenous or synthetic plant hormones biosynthesis, transport, mode of action and potential applications in the field or *in vitro*
- Understanding of plant responses to endogenous hormonal cues
- Understanding the absorption of water and the water potential in plant cells
- Response of plants to abiotic stress conditions and especially to climate instability and change
- Cooperative interaction and learning to analyze and present studies aiming to resolve modern issues in agriculture associated with defective plant physiological processes
- Expertise and experience on browsing e-learning sites, online accessible libraries and the content of scientific journals
- Development of skills and abilities to mine the literature and present scientific results/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

Decision-making

Working

independently

Team work

Working in an international

environment

Working in an

interdisciplinary environment

Production of new research ideas

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

Production of free, creative and inductive thinking

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Others...

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- 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) Introduction (the plant cell, subcellular organelles, membrane compartments, signaling-communication).
- 2) Significance of water in the life of plants (Osmosis, water potential, absorption and transport of water, transpiration).
- 3) Absorption of mineral nutrients (rhizosphere, transport of mineral nutrients, Nitrogen fixation, Nitrogen and Sulfur cycle, oxidative stress).
- 4) Photosynthesis (chloroplast, structure and function of photosystems, protection mechanisms and repair of photosystems, the carbon cycles, CAM-metabolism, starch biosynthesis)
- 5) Respiration (Krebs cycle, main electron transport chain, oxidative phosphorylation, alternative electron transport chain, mobilization of storage reserves, thermogenesis, thermoregulation)
- 6) Response to light (light perception, photoreceptors, photomorphological responses)
- 7) Skotomorphogenesis, photomorphogenesis (molecular response mechanisms to light/dark)
- 8) Ecological importance of plant photoreceptors (seed germination, shade avoidance)
- 9) Phototropisms (Cholodny-Went theory, the role of auxin)
- 10) Photoperiodic regulation of flowering (short- and long- day plants, circadian regulation-the gate mechanisms, the regulatory mechanism of flowering)

- 11) Hormones (hormonal receptors, chemical groups, transport, effects, postharvest physiology)
- 12) Hormonal applications (in vitro, cell cycle effects, biotechnological applications)
- 13) Water Relations
- 14) Plant nutrition
- 15) Abiotic stress physiology

4. TEACHING and LEARNING METHODS - EVALUATION

5. DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Direct (face to face).	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>	Power point presentations, student contact electronically.	
TEACHING METHODS <i>The manner and methods of teaching are described in detail. 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. 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>	Teaching Method	Effort
	Lectures	39 h = 1.56 ECTS (13 wks x 3 h)
	Practical Lab Courses	14 h = 0.56 ECTS (7 wks x 2 h)
	Group class presentations	32.5 h = 1.3 ECTS (13 wks x 2,5 h)
	Autonomous study	39 h = 1.56 ECTS (13 wks x 3 h)
	Total	125 h (124.5) 5 ECTS (4.98)
STUDENT PERFORMANCE EVALUATION <i>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>	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%).	

6. Recommended Literature

1. Text book: **"Plant Physiology"** Taiz Lincoln, Zeiger Eduardo, Έκδοση: 1η Ελληνική-5η Αμερικανική/2011. ISBN: 978-960-98123-9-9
2. Text book: **" Plant Physiology "** Ridge Irene,Μανέττας Γιάννης,Μανέττας Γιάννης,Ψαράς Γιώργος Κ.,Λεβίδου Έφη,κ.ά. ISBN: 978-960-411-522-8
- 3.Text book [329]: **" Plant Physiology: From the molecule to the environment"** Ρουμπελάκη-Αγγελάκη Καλλιόπη. ISBN: 978-960-524-168-1

- Relevant Scientific Journals:

Plant Physiology, Plant Cell, Plant Journal, Trends in Plant Science, New Phytologist, Molecular Plant, Journal of Plant Physiology, Plant Physiology & Biochemistry, Journal of Experimental Botany, Annals of Botany.