APPLIED PLANT PHYSIOLOGY AND NUTRITION

1. GENERAL

SCHOOL	AGRICULTURAL SCIENCES		
DEPARTMENT	AGRICULTURE		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	AGR_605	**SEMESTER OF STUDIES**	6th
COURSE TITLE	Applied Plant Physiology and Nutrition		

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*	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures	2	
Laboratory exercises	2	
Total	4	5
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	General Background
PREREQUISITE COURSES:	Typically, there are not prerequisite courses.
TEACHING AND ASSESSMENT LANGUAGE:	Greek. Teaching may be however performed in English in case foreign students attend the course.
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Yes
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 students will attain:

basic knowledge about Phytohormones and to understand the role of plant Hormones in the normal function, growth, and productivity of plants.

basic knowledge about of plant nutrition and understand the basics of plant nutrition and the optimization and control of crop nutrition.

Also to acquire basic knowledge about biotic and abiotic stresses in plants, their effect on plant productivity and the quality of the products produced.

General Abilities

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	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking*
Working in an interdisciplinary environment	
Production of new research ideas	

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

be able to identify and deal with problems of hormonal disorders and to control and optimize production quantitatively and qualitatively using plant hormones.

 be able to identify and deal with crop nutrition problems and intervene to optimize production quantitatively and qualitatively.

 be able to identify and deal with stress problems in crop development

 To be able to utilize this knowledge in other knowledge subjects of agriculture

 Autonomous and Teamwork in an interdisciplinary environment

 Promotion of free, creative, and inductive thinking

 Exercising substantive criticism and solutions to plant nutrition problems

3. SYLLABUS

Plant hormones:
Regulation of plant growth and development, endogenous hereditary and exogenous factors.
Classes of Plant Hormones. Chemical Structure, Biosynthesis, Degradation, Physiological Role:
Growth promoting plant hormones: Auxins, Gibberellins, Cytokinins.
Growth retarders and inhibitors: Abscisic Acid, Ethylene.
Chemical growth regulators.
The use of plant Hormones in plant-applications
Phytoestrogens
Plant Nutrition:
Macro and Micronutrients
Factors Affecting Plant Nutrition
Determination of nutritional status of plants
Photoperiodism
Plant stress:
Abiotic stress factors
Extreme temperatures stress, nutritional stress.
Water stress, Salinity, etc..
Effects of stress on crops, stress control practice.
Biotic stress factors, Allelopathy

The **Laboratory exercises** include experiments and exercises in the laboratory and in the field:

1. Practical application of phytohormones to vegetables
2. Practical application of plant hormones in arboriculture
3. Effect of hormones on seed germination and rooting of cuttings

4. Malnutrition toxicities
5. Photoperiodism-applications
6. Coping with stressful situations

4. TEACHING AND LEARNING METHODS - EVALUATION

TEACHING METHOD *Face-to-face, Distance learning, etc.*	Lectures in the class and in the laboratory (face to face)
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES *Use of ICT in teaching, laboratory education, communication with students*	Use of Information and Communication Technologies (ICTs) (e.g. PowerPoint) in teaching. Direct communication with the students (face to face and by e-mail), Support of the learning process and uploading of the educational material to the electronic platform (e-class): https://eclass.upatras.gr
TEACHING METHODS *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*	

Activity	***Semester workload***
Lectures (2conduct hours per week x 13 weeks)	26
Laboratory practice, fieldwork (2 conduct hours per week x 6 weeks)	12
Writing short reports on laboratory exercises	12
Total examinations x 2 conduct hours each)	2
Hours for private study of the student and preparation for mid-term or/and final examination / Final examination	73
Total number of hours for the Course (25 hours of work-load per ECTS credit)	***125 hours (total student work-load)***

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, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	The evaluation criteria are presented and analyzed to the students at the beginning of the semester. • Final written theory exam (60%). • Final examination of laboratory exercises (40%). In case of advances, they participate by 30% in the final score, respectively.

5. RECOMMENDED LITERATURE

Books:

1. Καράταγλης Στέλιος. 1999. Φυσιολογία Φυτών. Art of text. Σελ. 305
2. Τσέκος Ιωάννης. 2003. Φυσιολογία Φυτών. Εκδόσεις Αφοι Κυριακίδη. Σελ 1940
3. Μετζάκης Δημήτρης. 2005. Καλλιέργειες in vitro. Εκδόσεις Ιων. Σελ. 195
4. N. K. Fageria (2008). The Use of Nutrients in Crop Plants. CRC Press, 430 p. ISBN: 13-978-4200-751-06.
5. Θεριός Ν. Ι. 1996 "Ανόργανη Θρέψη και Λιπάσματα" Εκδόσεις Γ. Δεδούσης

6. Taiz L, Zeiger E. 2006. Plant Physiology 4th ed. Sinauer Sunderland, MA, σελ 705

7. Σαλάχας Γ 1997. Σημειώσεις Θεωρίας Εφαρμοσμένης Φυσιολογίας Φυτών. Μεσολόγγι. Σελ. 60.

Magazines:

Journal of Plant Nutrition