SOILLESS CULTURE SYSTEMS

COURSE OUTLINE

1. GENERAL

SCHOOL	AGRICULTURAL SCIENCES		
DEPARTMENT	AGRICULTURE		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	AGRI_804	**SEMESTER OF STUDIES**	8th
COURSE TITLE	SOILLESS CULTURE SYSTEMS		

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*	specialised general knowledge, skills development
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*

The purpose of the course is the scientific training of students in the systems and new innovative technologies of soilless crops (hydroponic and aeroponic technologies, aquaponics, etc.).

The students should know: the basic technological equipment and the basic cultivation practices applied in the various systems of soilless crops. They will have gained experience and knowledge in the development of modern cutting-edge technologies in the various hydroponic methods of greenhouse crops.

They will also have gained experience and knowledge in the development of the modern cutting-edge technologies in

aeroponics, as well as its basic cultivation practices and future applications. Finally, they will have acquired experience and knowledge for the development of aquaponics.

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
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

Generally, by the end of this course the students will, furthermore, have develop 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
Decision-making
Working independently
Production of free, creative and inductive thinking
Respect for the natural environment

3. SYLLABUS

1. Hydroponics: Soilless Cultivation systems.
2. Equipment of hydroponic units
3. Nutritive solutions. Fertilizers used in hydroponics. Nutritive solutions preparation systems. Irrigation systems.
4. Substrates and channels for growing crops.
5. Hydroponic growing systems: Open hydroponic systems. Closed hydroponic systems.
6. Float systems. N.F.T. Systems, N.G.S. Systems Aquaculture systems.
7. Hydroponic crops of vegetables and flower plants.
8. Aeroponics: Historical review. Fundamentals of Aeroponics.
9. Advantages and Disadvantages.
10. Modern Aeroponic cultivation systems: Hight and Low pressure units' Commercial systems
11. Vertical aeroponic growing systems.
12. Aeroponic organic cultivation. NASA Aeroponic Systems. Garden Towers.
13. Fully automated aeroponic plant growing system. Aeroponic cultivation of vegetables and flower plants.
14. Aquaponics, (fish and plants co-growing systems).

Laboratory Exercises

The laboratory exercises aim to deepen and familiarize the students with the concepts and methodologies analyzed in the theoretical part.

1. Open hydroponic systems. Closed hydroponic systems. Nutritive solutions for horticultural and flower crops.
2. Nutritive solutions preparation and supply systems.
3. Installation of hydroponic cultivation (horticultural or floricultural species).
4. Vertical aeroponic growing system (vertical cultivation of aeroponics), NASA aeroponic systems. Garden Towers.
5. Fully automated aeroponic plant cultivation system.
6. Aquaponics, (fish and plants co-growing systems).

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*	
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.*	1. Optionally, two mid-term examinations with the final examination grade to be the mean mark. It is mandatory to obtain pass grade (≥5) in each examination. 2. Written examination after the end of the semester. Minimum passing grade: 5. **Evaluation of theoretical part (50%)** Written examination. It is mandatory to obtain pass grade (≥5). **Evaluation of the laboratory work (50%)** Written examination. It is mandatory to obtain pass grade (≥5).

Activity	***Semester workload***
Lectures (2 conduct hours per week x 13 weeks)	26
Laboratory practice, fieldwork (2 conduct hours per week x 6 weeks)	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	85
Total number of hours for the Course (25 hours of work-load per ECTS credit)	***125 hours (total student work-load)***

5. RECOMMENDED LITERATURE

- ✓ Σάββας Δημήτριος, «Καλλιέργειες εκτός εδάφους», Εκδόσεις Αγρότυπος, 2012.
- ✓ Σαλάχας Γεώργιος, «Αεροπονία», σημειώσεις, 2016.
- ✓ .Adams, P., 2002. Nutritional control in hydroponics. In: Savvas, D., Passam, H.C. (eds). Hydroponic Production of Vegetables and Ornamentals. Embryo Publications, Athens, Greece, pp. 211-261.
- ✓ Hassal and Associates Pty Ltd, 2001. Hydroponics as an Agricultural Production System. A report for the Rural Industries Research and Development Corporation. Publication No 01/141 November 2001.