COURSE OUTLINE

1. GENERAL INFORMATION

FACULTY/SCHOOL	SCHOOL OF PLANT SCIENCES		
DEPARTMENT	DEPARTMENT OF CROP SCIENCE		
LEVEL OF STUDY	*Pregraduate*		
COURSE UNIT CODE	865	**Semester:**	AUTUMN
COURSE TITLE	VEGETABLE PROPAGATION PHYSIOLOGY AND TECHNOLOGY		
INDEPENDENT TEACHING ACTIVITIES *in case credits are awarded for separate components/parts of the course, e.g. in lectures, laboratory exercises, etc. If credits are awarded for the entire course, give the weekly teaching hours and the total credits*		**WEEKLY TEACHNG HOURS**	**ECTS**
	Lectures	3	3
	Laboratory Exercises	2	2
Add rows if necessary. The organization of teaching and the teaching methods used are described in detail under section 4			
COURSE TYPE *Background knowledge, Scientific expertise, General Knowledge, Skills Development*	Scientific expertise		
PREREQUISITE COURSES:	Plant Physiology, Principles of Vegetable Production		
LANGUAGE OF INSTRUCTION:	Greek English (for Erasmus students)		
LANGUAGE OF EXAMINATION/ASSESSMENT:			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	YES		
COURSE WEBSITE (URL)			

2. LEARNING OUTCOMES

Learning Outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate (certain) level, which students will acquire upon successful completion of the course, are described in detail. It is necessary to consult:

APPENDIX A

- *Description of the level of learning outcomes for each level of study, in accordance with the European Higher Education Qualifications' Framework.*
- *Descriptive indicators for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and*

APPENDIX B

- *Guidelines for writing Learning Outcomes*

The course "Vegetable propagation physiology and technology" aims in providing knowledge and information to students regarding the technique and the particularities of growing different vegetable species for seed production, as well as the procedures during production, storage, packaging and marketing of vegetable seeds. There is also reference on the physiology of seed germination, of dormancy and aging, with emphasis in vegetable species, as well as in methods and techniques to improve germination ability and vigour and to break dormancy in vegetable seeds.

In parallel, practical laboratory exercises are following theory and are dealing with the effect of temperature on seed germination rate and percentage of several vegetable species, to the application of methods and

techniques (e.g. priming, treatments of seeds with plant growth regulators) so as to improve germination rate and final germination percentage, to break dormancy (e.g. thermodormancy in lettuce), etc.. Moreover, students are getting familiar with several methods to assess seed quality characteristics in vegetables (e.g. methods for assessment of germination ability and vigour, determination of the moisture content of seeds, etc.). In all laboratory exercises, students in groups of 3-4 are performing small experiments and at the end of the semester every group is presenting its results to all students, using Powerpoint presentations.

General Competences

Taking into consideration the general competences that students/graduates must acquire (as those are described in the Diploma Supplement and are mentioned below), at which of the following does the course attendance aim?

Search for, analysis and synthesis of data and information by the use of appropriate technologies,	*Project planning and management*
Adapting to new situations	*Respect for diversity and multiculturalism*
Decision-making	*Environmental awareness*
Individual/Independent work	*Social, professional and ethical responsibility and sensitivity to gender issues*
Group/Team work	*Critical thinking*
Working in an international environment	*Development of free, creative and inductive thinking*
Working in an interdisciplinary environment	*……*
Introduction of innovative research	*(Other…….citizenship, spiritual freedom, social awareness, altruism etc.)*
	…….

- Decision-making
- Group/Team work
- Development of free, creative and inductive thinking

3. COURSE CONTENT

THEORY

- Introduction to the sector of vegetable seed production. The origins of seed production. The magnitude of the vegetable seed industry. Environmental and political impact of the seed industry. The vegetable seed market in Greece. The potential for vegetable seed production in Greece.
- Stages in the creation, multiplication and maintenance of vegetable genetic material.
- Basic principles of vegetable seed production. Factors affecting flowering, pollination and fertilization. Synchronization of flowering. Plant growth regulators for flower induction and sex expression. Pollination and fertilization. The use of insects for pollination. the control of weeds, pests and diseases during cultivation
- Cultural techniques in seed-production crops of vegetables. Production of hybrids. Seed harvesting, extraction, cleaning and dehydration.
- Seed storage and packaging. Pre and post-harvest factors affecting seed longevity.
- Special guidelines for seed production in the most important vegetable species belonging to the families: Alliaceae (onion, leek), Asteraceae (lettuce, endive, chicory), Chenopodiaceae (beetroot, swiss chard, spinach), Brassicaceae (cabbage, cauliflower, broccoli, etc.), Apiaceae (carrot, celery, celeriac, parsley, etc.), Cucurbitaceae (cucumber, watermelon, melon, zucchini), Fabaceae (pea, snap bean, etc.), Solanaceae (tomato, pepper, eggplant, potato), Malvaceae (okra).
- Seed dormancy. Types of dormancy (e.g. primary, secondary, endogenous, exogenous etc.). Difference between dormancy and rest. Dormancy effects on the behavior of vegetable propagation material.
- Seed aging. Implications of aging on the germinability and vigour of seeds and on the subsequent growth and yield of crops. Factors affecting aging. Physiological and biochemical characteristics of aging and its morphological and anatomical effects. Prevention and recovery of damages in seeds due to aging.

- Seed treatments for diseases and pests control and improvement of germination. Film coating and seed pelleting. Treatments with inorganic nutrients, plant growth regulators, inoculation with PGPRs and mycorhizae. Seed priming: physiological basis, effects on seed and crop performance, application in commercial scale.

LABORATORY

- The structure and development of vegetable seeds.
- The influence of temperature on the germination of vegetable seeds.
- Thermodormancy of lettuce seeds
- Osmoconditioning (priming) of seeds (1). Effect of priming on seed germination at suboptimal temperatures.
- Osmoconditioning (priming) of seeds (2). Effect of priming on seed germination under salinity conditions.
- Methods of seed quality control. Germination ability and vigour. I.S.T.A. methods for assessing the germination ability. Determination of the moisture content of seeds according to ISTA and alternative methods.
- ISTA methods for assessing seed vigour: Tetrazolium test. Electrical conductivity test. Accelerated aging test. Controlled deterioration test.

4. TEACHING METHODS--ASSESSMENT

MODES OF DELIVERY *Face-to-face, in-class lecturing, distance teaching and distance learning etc.*	In-class lecturing Distance learning when necessary
USE OF INFORMATION AND COMMUNICATION TECHNOLOGY *Use of ICT in teaching, Laboratory Education, Communication with students*	Use of Powerpoint presentations, multimedia and internet (e.g. videos, YouTube) and blackboard. Communication with students. Learning process support by access to e-class asynchronous distance learning platform (e.g. MS Teams, Zoom, Skype) Promoting and teaching students to use spreadsheets (e.g. Excel) and statistical packages (e.g. StatGraphics, Jump, SPSS etc) to analyze experimental data from the laboratory exersices. Use of Microsoft Office (e.g. Word, Excel, Powerpoint) for the presentation of experimental results.
COURSE DESIGN *Description of teaching techniques, practices and methods:* *Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, Internship, Art Workshop, Interactive teaching, Educational visits, projects, Essay writing, Artistic creativity, etc.* *The study hours for each learning activity as well as the hours of self-directed study are given following the principles of the ECTS.*	

Activity/ Method	Semester workload
Lectures	40
Laboratory practice	25
Individual laboratory project (data processing and commenting)	20
Personal study	40
Total of Course (25 hours of workload per ECTS)	***125***

STUDENT PERFORMANCE EVALUATION/ASSESSMENT METHODS *Detailed description of the evaluation procedures:*	**I. Final written exam in the theory of the course** including 5-6 questions. **II. The examination in the laboratory part of the**

Language of evaluation, assessment methods, formative or summative (conclusive), multiple choice tests, short- answer questions, open-ended questions, problem solving, written work, essay/report, oral exam, presentation, laboratory work, other……etc. *Specifically defined evaluation criteria are stated, as well as if and where they are accessible by the students.*	**course** consists of: a. Evaluation of the participation of each student in the short-term experiments performed in each laboratory exercise and of the final presentation of the experimental results (30%) b. Final written exam including 5-6 short-answer questions

5. SUGGESTED BIBLIOGRAPHY:

- Πάσσαμ Χ., (2013). Σποροπαραγωγή Κηπευτικών. Εκδόσεις Έμβρυο, σελ. 592.
- Πάσσαμ Χ., (2004). Φυσιολογία και τεχνολογία πολλαπλασιαστικού υλικού κηπευτικών (Εργαστηριακές ασκήσεις). Εκδόσεις Γ.Π.Α., 35 σελ.
- Ξυνιάς, Ι.Ν. και Τοκατλίδης, Ι.Σ. (2013). Σποροπαραγωγή. Θεωρία και Ασκήσεις. Εκδόσεις Έμβρυο, σελ. 292.
- George, R.A.T. (2009). Vegetable seed production (3rd ed.). CABI Publishing, Oxforshire, U.K., 320p.
- Elias S.G., Copeland L.O., McDonald M.B. and Baalbaki R.Z. (2012). Seed Testing. Principles and Practices. Michigan State University Press, 354p.
- International Seed Testing Association (I.S.T.A.) (2009). International Rules for Seed Testing. The International Seed Testing Association, Bassersdorf, Switzerland, Edition 2009.
- Bewley J.D., Bradford K.J., Hilhorst H.W.M. and Nonogaki H. (2013). Seeds. Physiology of Development, Germination and Dormancy, 3rd Edition. Springer Science+Business Media, LLC, 407p.

6. TEACHERS:

-Theory: Ioannis Karapanos, Associate Professor

-Laboratory: Ioannis Karapanos, Associate Professor