COURSE OUTLINE

1. GENERAL INFORMATION

FACULTY/SCHOOL	PLANT SCIENCES		
DEPARTMENT	CROP SCIENCE		
LEVEL OF STUDY	*Pregraduate*		
COURSE UNIT CODE	**3530**	**Semester:**	1st
COURSE TITLE	FUNCTIONAL PLANT ANATOMY		
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	5
Laboratory Exersices		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:			
LANGUAGE OF INSTRUCTION:	Greek		
LANGUAGE OF EXAMINATION/ASSESSMENT:			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO		
COURSE WEBSITE (URL)	https://oeclass.aua.gr/eclass/courses/EFP169/		

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*

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

3. COURSE CONTENT

THEORY

Section I. Introduction
Chapter 1
Modern microscopes and the information derived from them
Chapter 2
The morphology and anatomy of the organs of each plant species is related to its position in the scale of evolution
Section II. The cells: Structural and functional units
Chapter 3
3.1. Plant cells have common characteristics
3.2. The cytoplasm
3.3. Biological membranes
3.4. The cell wall
3.5. Chloroplasts and mitochondria
3.6. The nucleus
3.7. The proliferation of any species presupposes the transmission of the nuclear genetic information from generation to generation
3.8. The ribosomes
3.9. Microsomes
3.10. The endoplasmic reticulum
3.11. The reticulum
3.12. The cytoskeleton
3.13. The vacuole
3.14. The lysosomes
3.15. The cellular inclusions
Section III. Cells make up tissues and tissues make up organs
Chapter 4
4.1. The plant body consists of meristematic and permanent tissues
4.2. The totipotency of plant cells allows the generation of tissues from adherent cells
4.3. The activation of meristematic tissues determines the type of growth of each plant species and therefore also the duration of its biological cycle
4.4. The meristem tissues
4.5. The permanent tissues
Chapter 5
5.1. All species of spermatophytes are composed of distinct organs
5.2. The individual organs have distinct roles
Chapter 6
Introduction: Functions of leaves
6.1. Three basic design patterns of spermatophyte leaves have been formed through evolution
6.2. The arrangement of the tissues and cells of a leaf is directly related to the function they offer
6.3. Leaf growth is mainly basipetal

6.4. Chimeras are due to abnormalities that occur during leaf development
6.5. Adaptation of leaves to adverse conditions
6.6. Adaptation to extreme or special conditions: The transformations of leaves
6.7. Acclimation of leaves to different growth conditions
Chapter 7
Introduction: Functions of the root
7.1. Through evolution, two main design patterns of spermatophyte roots have been formed
7.2. The root is composed of specialized tissues which are distributed in distinct anatomical zones along its axis
7.3. Root tissues in cross-section in the region of differentiation have a specific arrangement
7.4. Root tissues in cross-section in the region of secondary growth are characterized by the presence of cambium and epidermis
7.5. Acclimation of roots to different growth conditions: Roots react to changes in soil environmental conditions
7.6. The adaptation of roots to special or extreme conditions
7.7. Roots through evolution have developed symbiotic relationships with microorganisms
Chapter 8
Introduction: Functions of the stem
8.1. The formation of the shoot is closely related to the gradual transition of plant organisms during the evolution from the aquatic to the terrestrial environment
8.2. The stem is composed of specialized tissues which are distributed in distinct anatomical zones along its axis
8.3. Through evolution, two main design patterns of spermatophyte shoots have been formed
8.4. The area of the secondary structure refers to the increase in thickness of the shoots
8.5. Adaptation to extreme or special conditions: The transformations of the shoots
Chapter 9
Introduction: Functions of flowers, seeds and fruits
9.1. Spermatophytes reproduce through two alternative processes
9.2. Male and female cones are the organs of intrinsic reproduction of gymnosperms
9.3. Flowers are the organs of intrinsic reproduction of angiosperms
9.4. Pollination is a critical stage of reproduction
9.5. Embryogenesis is the process by which embryos arise
9.6. The gradual development of the embryo is also accompanied by the maturation of the seed
9.7. Fruits are extremely diverse

LABORATORY

Exercise 1 - The common compound microscope and the plant cell
Exercise 2 - Primary anatomy of the root
Exercise 3 - Primary anatomy of the shoot
Exercise 4 - Anatomy of the leaf
Exercise 5 - Reproduction of angiosperms - Flowers, seeds, fruits

4. TEACHING METHODS--ASSESSMENT

MODES OF DELIVERY *Face-to-face, in-class lecturing, distance teaching and distance learning etc.*	In-class lecturing
USE OF INFORMATION AND COMMUNICATION TECHNOLOGY *Use of ICT in teaching, Laboratory Education, Communication with students*	Use of slide presentation and blackboard. Communication with students. Learning process support by access to e-class asynchronous distance learning platform.
COURSE DESIGN *Description of teaching techniques, practices and methods:* *Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, Internship, Art*	

Activity/ Method	Semester workload
Lectures	39
Laboratory practice	10
Personal study	76

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.*		
	Total of Course (25 hours of workload per ECTS)	***125***

STUDENT PERFORMANCE EVALUATION/ASSESSMENT METHODS *Detailed description of the evaluation procedures:* *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.*	**I. Final written exam in the theory of the course** including a combination of 10 short-answer questions and open-ended questions. **II. The written examination in the laboratory part of the course** includes 5 short or open-ended questions, including questions for the identification of tissues and cell types of plant organs in drawings.

5. SUGGESTED BIBLIOGRAPHY:

Functional Plant Anatomy. 2014. G. Aivalakis, G. Karabourniotis, G. Liakopoulos, C. Fasseas. EMBRYO Publications (in Greek).
Mauseth James D. Βοτανική. 2020. Broken Hill Publishers.
Plant Anatomy. 2014. N.S. Christodoulakis. Kiriakidis Publications (in Greek).
Morphology and Anatomy of Plants. 2011. I. Tsekos, I. Ilias. Perpinia Publications (in Greek).

6. TEACHERS:

-Theory:
George Karabourniotis, Professor
Styliani Chorianopoulou, Associate Professor
Dimosthenis Nikolopoulos, Assistant Professor
Panagiota Bresta, Assistant Professor

-Laboratory:
Georgios Karabourniotis, Professor
Georgios Liakopoulos, Associate Professor
Dimosthenis Nikolopoulos, Assistant Professor
Styliani Chorianopoulou, Associate Professor
Panagiota Bresta, Assistant Professor
Aimilia-Eleni Nikolopoulou, Laboratory Teaching Stuff