COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Agricultural Sciences		
ACADEMIC UNIT	Biosystems & Agricultural Engineering		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	BAE_800	**SEMESTER**	8th
COURSE TITLE	**AGRICULTURAL BIOTECHNOLOGY**		

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*	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	3	
Tutorials	0	
Laboratory	2	
TOTAL	**5**	**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*	Background (Fundamental Principles of Environmental Hydraulics & Hydrology) Skills Development (Water quality control)
PREREQUISITE COURSES:	There are no prerequisite courses.
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek .-For Erasmus students in English
IS THE COURSE 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 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 course will introduce the student to the field of plant biotechnology, modification and use of the plants for improvement of human well being.

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

The student will learn modern protocols of plant transgenesis including transformation and regeneration. Plant genetics, selection and crossing of Arabidopsis thaliana as well as plant

pathology based on the interaction of Tobacco with Tobacco Mosaic Virus (TMV) will be introduced.
In general, upon completion of this course the student will have further developed the following general skills (from the list above):
Search, analysis and synthesis of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Teamwork
Respect for the natural environment
Exercise criticism and self-criticism

(3) SYLLABUS

The course involves study of:

1. Plant tissue culture
2. Model plants in Plant Biotechnology
3. Transgene features (factors that affect expression, modification, promoters, etc.)
4. Agrobacterium tumefaciens (biology, Ti plasmid, tumor formation, T-DNA transfer, transformation, vector systems, transgene analysis)- Agrobacterium rhizogenes
5. Methodologies for direct gene transfer (particle bombardment, electroporation etc.)
6. Clean DNA technology
7. Plastid transformation
8. Transient gene expression-Gene silencing transformation systems
9. Applications:
    - Improved Agronomic traits
    - Improved quality and yield traits
    - Improved developmental traits
    - Molecular “pharming”
10. Risk assessment
11. Patents- Public acceptance of transgenic plants
12. Molecular breeding
13. Genomics and mutagenesis (tagging, high-throughput systems, etc.)

Laboratories
• Isolation and quantitative analysis of nucleic acids
• Nucleic acid electrophoresis
• Specific sequence DNA detection - Molecular Hybridization
• Restriction enzymes - Gene mapping
• Plasmids - Transformation of bacteria
• Polymerase chain reaction - Applications
• Bioinformatics - Databases
• Genetically modified crops

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face to face deliveries. Laboratory exercises in Physical Chemistry
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	• Use of ICT (power point) in Teaching • Use of ICT (power point) in Laboratory Training • Use of ICT in Communication with students (Learning process support through the electronic platform e-class).
TEACHING METHODS *The manner and methods of teaching are described in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements,*	

Activity	***Semester workload***
Lectures	39
Laboratory	26
Writing short reports of laboratory exercises	13

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*	Final Exams: 3 Study hours and preparation for the laboratory exercises and the final examination: 44 Course total: **125**
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. The laboratories participate by 30% in the final grade. In order to be examined in theory, the student must have completed all the laboratories and have been successfully examined in them. 2. The main assessment criteria focus on understanding and correlating the knowledge that students gain from the course with other knowledge. Particular emphasis is placed on whether they have developed the ability to apply this knowledge to crop selection and to assess the impact of these changes on the environment. Emphasis is also placed on demonstrating critical ability and justifying the choices they make in each problem. 3. Evaluation is dynamic. It mainly involves problem solving. is done orally or in writing or with a combination of the two, with or without pre-examination on the basic principles of the course, with or without exculpatory advances and with other test or inventive methods, depending on the composition of the dynamics and the needs of the audience. 4. The above are done in the Greek language. For foreign language students (eg Erasmus students) conducted in English

(5) RECOMMENDED LITERATURE

Suggested bibliography:

- **Βιβλίο [59415066]: ΒΙΟΤΕΧΝΟΛΟΓΙΑ ΦΥΤΩΝ, Πολυδεύκης Χατζόπουλος Λεπτομέρειες**
- **Βιβλίο [77119689]: ΜΟΡΙΑΚΗ ΒΙΟΛΟΓΙΑ ΑΝΑΠΤΥΞΗΣ ΦΥΤΩΝ, Κρίτων Καλαντίδης, Δήμητρα Μηλιώνη, Καλλιόπη Παπαδοπούλου, Σταμάτης Ρήγας, Ανδρέας Ρούσσης, Κοσμάς Χαραλαμπίδης, Πολυδεύκης Χατζόπουλος Λεπτομέρειες**
- **Βιβλίο [2625]: ΑΝΑΣΥΝΔΥΑΣΜΕΝΟ DNA, James D. Watson κ.α. Λεπτομέρειες**

-Complementary bibliography:

- Plant Biotechnology, Slater A., Nigel W.S, Fowler M.R.,Oxford University Press, 2003.