COURSE OUTLINE

1. GENERAL

SCHOOL	Agricultural Sciences		
ACADEMIC UNIT	BIOSYSTEMS& AGRICULTURAL ENGINEERING		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	BAE 908	**SEMESTER**	9th
COURSE TITLE	PRINCIPLES OF GENETIC IMPROVEMENT		

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	2	
Laboratory	0	
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*	Specialised general knowledge, Skills Development
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)	https://eclass.upatras.gr/courses/

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 to introduce students to the basic principles governing the genetic improvement of plants and to the main methodological/technological approaches used to achieve the goals of a breeding program.

By the end of the semester, students will be able to understand and implement a breeding program for a qualitative or quantitative trait in selfing, cross-fertilizing and clonally reproduced species, utilizing specific selection schemes and breeding methodologies.
At the same time, they will have familiarized themselves with specific computational and laboratory techniques that are often used for improvement either in the field or in the laboratory. Finally, they will have familiarized themselves with the legal and regulatory issues related to the creation, patenting and protection of new varieties, and the use of molecular technologies in plant improvement.

To look for information about the course in a foreign language bibliography.

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	*Project planning and management*
information, with the use of the	*Respect for difference and multiculturalism*
necessary technology	*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	*Others…*
Working in an interdisciplinary	*…….*
environment	
Production of new research ideas	

At the end of this course the student will have further developed the following general skills:
Search, analysis and synthesis of data and information, also using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Teamwork
Generating new research ideas
Respect for the natural environment
Exercise criticism and self-criticism
Promotion of free, creative and inductive thinking

3. SYLLABUS

1. Introduction to Plant Breeding. Chronology
2. Genetic variability. Introduction and exploitation of genetic material. Gene stock. The genetic basis of plant improvement. The population structure of self-pollinated and cross-pollinated plants.
3. Quantitative traits. Components of the variability of quantitative traits. Heredity. Response to choice. Homomixture Degeneration and Heterosis. Genetic effects.
4. Reproduction of plants. Breeding systems, autogamy, allogamy, hybridization, clonal reproduction. Types of cultivated plants.
5. Pollination control systems: Self-incompatibility, Male sterility, Chemical sterility.
6. Improvement Objectives: performance and morphological traits, quality traits.
7. Improvement of self-fertilizing species: Mass selection. Clean lines. Pedigree improvement. Single seed origin. Cross-over. Enhancement of mass populations. Improvement of clonally produced plants
8. Cross-pollinated plant improvement: Recurrent selection for intra- and inter-population improvement.
9. Production methods and utilization of hybrid varieties. Fertilization. Production methods and utilization of synthetic varieties.
10. Molecular plant breeding. Molecular gene mapping. Molecular - Genetic markers. Selection using molecular markers.
11. Generation of doubled haploids. Genetically modified plants.
12. Special improvement methods: Polyploidy. Mutagenesis. Distant intersections.
13. Create registration registration, maintenance and promotion of new varieties. Ethical and Regulatory Issues in Plant Breeding.

4. TEACHING and LEARNING METHODS - EVALUATION

<table>
<tr><td>DELIVERY
Face-to-face, Distance learning, etc.</td><td>Face to face deliveries.</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td>• Use of ICT (power point) in Teaching
• Use of ICT (power point) in Laboratory Training
• Video presentation
• Use of ICT in Communication with students (Learning process support through the electronic platform e-class).</td></tr>
<tr><td>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</td><td>
<table>
<tr><th>Activity</th><th>Semester workload</th></tr>
<tr><td>Lectures</td><td>39</td></tr>
<tr><td>Tutorials</td><td>26</td></tr>
<tr><td>Study and literature survey</td><td>20</td></tr>
<tr><td>Exams</td><td>10</td></tr>
<tr><td>Unguided study</td><td>30</td></tr>
<tr><td>Course total</td><td>125</td></tr>
</table>
</td></tr>
<tr><td>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.</td><td>1. The main assessment criteria focus on understanding and correlating the knowledge that students gain from the course with knowledge from other courses.
The evaluation is continuous and dynamic. It mainly includes short project work, solving problems or answering open questions. Exams are conducted orally or in writing or a combination of the two, with or without pre-examination of the key topics of the course, with or without progressions and by other inventive methods, depending on the dynamics and the needs of the audience</td></tr>
</table>

5. RECOMMENDED LITERATURE in Greek

6. George Acquaah. Αρχές Γενετικής και Βελτίωσης των Φυτών. Εκδόσεις Utopia ΕΠΕ, 2019
7. Π.Ι. Καλτσίκης: Βελτίωση Φυτών- Αρχές και Μέθοδοι. Εκδόσεις Σταμούλη 1989
8. Δ. Γ. Ρουπακιάς: Βελτίωση Φυτών. University Studio Press. Θεσσαλονίκη. 2010
9. Jack Brown, Peter D.S. Caligari, Hugo A. Campos. Plant Breeding. Blackwell Publishing Ltd, 2014
10. B.D. Singh: Plant Breeding, Principles and Methods. Kalyani Publishers 1993

Scientific journals
Crop Science
Molecular Breeding
Euphytica