COURSE OUTLINE

1. GENERAL

SCHOOL	AGRICULTURAL SCIENCES		
ACADEMIC UNIT	AGRICULTURE		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	AGRI 501	**SEMESTER OF STUDIES**	5th
COURSE TITLE	PLANT BREEDING		

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	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 (4).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	specialised general knowledge
PREREQUISITE COURSES:	Typically, there are no prerequisite courses. Students must have basic knowledge of Genetics, Molecular Biology and Agricultural Experimentation.
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek. Teaching may be performed in English in case foreign students attend the course.
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes (English)
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 course aims at introducing the students to the basic concepts and principles of Plant breeding genetics as well as to the applications of plant breeding methods and the generation of new cultivars.

By completing this course, the students are expected to have achieved the following skills and capabilities.:

- To understand and implement a Plant breeding program for important field crops.
- To choose the appropriate selection methods and rank them according to their efficacy.
- To define specific aims for breeding programs of important field crops.
- To design the necessary steps for improvement of the breeding process.
- Based on knowing the principle and effect of plant breeding methods to predict the outcome and

breeding success

- To understand the concepts of molecular breeding
- To have the ability to recognize the experimental rationale of plant breeding studies genetic studies as they are described in peer-reviewed research articles and books.

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

Generally, by the end of this course the student will, furthermore, have develop the following general abilities (from the list above):

Searching, analysis and synthesis of facts and information, as well as using the necessary technologies
Decision making
Working independently
Project planning and management
Working in an interdisciplinary environment
Respect for the natural environment
Production of new research ideas
Promotion of free, creative and inductive thinking

3. SYLLABUS

1. Plant Breeding: overview and historical perspectives
2. Genetic variation. The genetic basis of plant breeding. Population structure of self- and cross-fertilized plants.
3. Quantitative traits. Components of variation of quantitative traits. Heredity, response to selection, inbreeding depression, heterosis. Genetic effects.
4. Plant reproduction. Reproductive systems. Introduction to reproduction and autogamy. Allogamy, hybridization, clonal propagation. Germplasm for breeding.
5. Pollination, self-incompatibility, male sterility, chemical male sterility.
6. Plant breeding objectives, Yield and morphological traits. Quality traits.
7. Breeding self-pollinated species.: Mass selection, pure line selection, pedigree selection, bulk population, single seed descent. Backcross breeding. Breeding clonal species.
8. Breeding cross-pollinated species. Recurrent selection for inter and intra population breeding.
9. Hybrid cultivars. Heterosis. Synthetic cultivars.
10. Molecular Breeding. Mapping of genes, molecular markers, marker assisted selection.
11. Double Haploids. Genetically modified plants.
12. Mutational Breeding, polyploidy, wide crossings.
13. Registration of cultivars, Marketing and social issues, Legal and regulatory issues.

Laboratory exercises:

- Calculation of the components of variance for quantitative traits
- Coefficient of heritability under the narrow and broad sense. Estimation of selective response and selection differential.
- Artificial pollination and crossing

- Evaluation of phenotypic variation, morphological descriptors.
- Genetic variation and molecular markers
- Calculation of heterosis

4. TEACHING AND LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face to face lectures in the classroom and the field.
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. Microsoft PowerPoint) in teaching. The contents of the course of each chapter are uploaded on the internet, that the students can freely download using a password which is provided to them at the beginning of the course.
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*	

Activity	***Semester workload***
Lectures (2 contact hours per week x 13 weeks)	26
Laboratory exercises (2 contact hours per week x 13 weeks)	26
Writing reports - solving of representative problems	13
Hours for private study of the student, preparation and attendance mid-term or/and final examinations.	60
Total number of hours for the Course (25 hours of workload per ECTS credit)	***125 hours (total student workload)***

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.*	Final mandatory written examination, full length questions and / or multiple-choice questions, as well as questions based on the laboratory work. Minimum pass grade= 5, scale 0-10. All the above are taking place in Greek as well as in English for foreign students (e.g. ERASMUS students) if any.

5. ATTACHED BIBLIOGRAPHY

- *Suggested bibliography:*

1. George Acquaah. Principles of Plant genetics and Breeding. Wiley-Blackwell; 2 edition (October 1, 2012)
2. Jack Brown, Peter D.S. Caligari, Hugo A. Campos. Plant Breeding. Blackwell Publishing Ltd, 2014
3. B.D. Singh: Plant Breeding, Principles and Methods. Kalyani Publishers 1993

- *Related academic journals:*

Crop Science

Molecular Breeding
Euphytica