COURSE OUTLINE

1. GENERAL

SCHOOL	AGRICULTURAL SCIENCES		
ACADEMIC UNIT	ANIMAL PRODUCTION, FISHERIES AND AQUACULTURE		
LEVEL OF STUDIES	UNDERGRATUATE		
COURSE CODE	**AS_400**	**SEMESTER**	**4rd**
COURSE TITLE	GENETICS		

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**
	3 LECTURES + 2 LAB	7
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*	general background, special background, specialised general knowledge,
PREREQUISITE COURSES:	None
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	GREEK. I t can be taught in English in case of foreign students' presence.
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 student, at the end of the relevant Learning Process, is in a position:

- Differentiates the types of cell divisions and distinguishes their importance in the development and creation of gametes.
- Explains the basic points of Mendelian theory.
- Draw diagrammatically and solve simple problems of monohybridism and dihydryism
- Explains the concepts of gene interaction e.g. epistasis, pleiotropy, penetration.
- Describes the mechanisms of sex determination in organisms.
- Predicts the results of a cross according to Mendel's laws.
- Understands the structure of DNA and RNA and why these molecules have different roles in the storage and coding of genetic information.
- Explains the Basic Dogma of Molecular Biology.
- Describes the basic mechanisms of expression and regulation of genetic information
- Knows the basic principles of population and quantitative genetics.
- Handles the organology of a laboratory of molecular biology.
- Applies basic laboratory methods of DNA manipulation.

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*
Team work	*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…*
	…….

Search for, analysis and synthesis of data and information, with the use of the necessary technology
Decision-making
Working independently
Team work
Respect for the natural environment
Criticism and self-criticism
Production of free, creative and inductive thinking

3. SYLLABUS

Lectures:

1. Cell: Structure and function (review), Cell division (Cell cycle and intermediate phase, Mitosis, Reduction, Spermatogenesis and ovulation, Native reproduction and biological cycles).
2. Mendelian inheritance (Mendelian analysis and probabilities, monohybridism, dybridism, Problems).
3. Extensions of Mendelian inheritance (Multiple alleles, Molecular genes, Interaction of genes (epistasis), Pleiotropy - expressivity).
4. Chromosomal theory of inheritance, sex inheritance (sex determination), sex-linked heredity.
5. Gene mapping and mapping (Genetic recombination, gene linkage, Mapping of three or more genes).
6. DNA: structure, anatomy and function of DNA and gene.
7. Flow of Genetic Information. Replication, transcription, translation, Gene expression, genetic code.
8. Gene regulation of prokaryotes and eukaryotes
9. Mutations of genes (discrimination of mutations, mutation detection and selection systems, mutagenic factors).
10. Structure and organization of chromosomes. Changes in structure, organization and number of chromosomes.
11. Extra-nuclear heredity (Inheritance of mitochondrial genes, parental effect, Molecular genetics of organelles).
12. Introduction to Population and Quantitative Genetics (Genetic Diversity, Influence of Inborn Reproduction on Genetic Diversity, Systemic and Random Processes of Alternating Frequency Changes, Phenotypic Values and Variations, Inheritance Factor, Selection of Quantitative Characters).
13. Evolution and Systems Biology: Principles.

Lab exercises:

1. Laboratory safety rules, instrument use.
2. DNA extraction.
3. DNA amplification by the PCR method.
4. Agarose gel electrophoresis.
5. Visual detection of DNA. Results.
6. Genetic problems solving: Punnett's odds and abnormalities,

7. Resolving genetic problems: monohybridism,
8. Resolving genetic problems: dihydryism,
9. Genetic problems solving: heterogeneous characters,
10. Genetic problems solving: genetics, genetic maps,
11. Genetic problems solving: gene frequency estimation

1. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face to face teaching. During the course the students will be invited to approach a research question and write a brief bibliographic essay, form their own questions to their colleagues based on the new information and participate in the interaction and learning activities after the lectures (eg coaching of colleagues, questioning their colleagues, class summary, "teach my classmate", etc.).
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	○ Power Point in lectures ○ Power Point in laboratory exercises ○ Using the e-Class platform for: ➢ Distribution of lectures ➢ Self-assessment exercises ➢ Learning streamline ➢ Deposit, monitoring and evaluation of work ➢ "After-class" activities ➢ Laboratory Examinations ➢ Progress evaluation
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***
1. Lectures (3 hours X 13 weeks)	39
2. literature search and reading connected with (1) (2 hours X 13 weeks)	26
3. Self-evalution exesrcises in e-Class (1 hours X 13 weeks)	13
4. LAB exercises (2 hours X 13 weeks)	22
5. Writing short lab reports or lab evaluation connected to (4) (1 hours X 13 weeks)	11
6. Participation in the "after class" activities (2hours X 13 weeks)	26
7. Study and preparation for the evaluation workload	10
8. Final exams	3
Course total *(6X25)*	***150***

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.

The evaluation will be done in Greek unless there is necessity for an avluation in English because of the presebce of foreign students.

The evaluation will be done as following:

Writing short lab reports or lab evaluation (Average of the report grades)	20%
Participation in the "after class" activities (Average)	15%
Participation in the "after class" activities (Average)	15%
Final exams	50%

Minimum grade to pass: 5 (Range: 0-10)

In the case of evaluation failure (in theory of the lab) the exams will be repeated but the follow up of the lab exercises it is not obligatory as long as the student was present in all the necessary lab exercises.
The evaluation grades of the other activities (eg after class) will be valid for the next two (2) years, meaning four (4) semesters from the typical semester taught.

2. ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

Hartwell L et al (2010). Genetics: From Genes to Genomes. McGraw-Hill Education; 4 edition (September 14, 2010)
Russell, P. J. (2005). *iGenetics: A Mendelian Approach*. Benjamin Cummings; 1 edition (April 14, 2005)

- Related academic journals:

Cell
Genetics
Evolution
Molecular Ecology
Journal of Human Genetics