# COURSE OUTLINE

## 1. GENERAL

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|---|---|---|---|
| **SCHOOL** | FOOD, BIOTECHNOLOGY AND DEVELOPMENT | | |
| **ACADEMIC UNIT** | BIOTECHNOLOGY | | |
| **LEVEL OF STUDIES** | BACHELOR OF SCIENCE | | |
| **COURSE CODE** | **1425** | **SEMESTER** | **7o** |
| **COURSE TITLE** | Quantitative Traits | | |

| **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 and Practicals | 5 | 5 |
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| *Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (4).* | | |

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| **COURSE TYPE** *general background, special background, specialised general knowledge, skills development* | Field of Science |
| **PREREQUISITE COURSES:** | No |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS :** | Greek |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | Yes |
| **COURSE WEBSITE (URL)** | https://mediasrv.aua.gr/eclass/courses/BIOTECH148/ |

## 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*

Students will be able to:

- Calculate the number of genes which affect a quantitative trait
- Estimate the contribution of each allele in the phenotype of a quantitative trait
- Calculate the phenotypic value of an individual in the metric scale of quantitative traits
- Calculate the phenotypic value of a population
- Calculate the genotypic value of different genotypes
- Calculate Estimate the effective population size under various circumstances
- Calculate the average effect of a gene and the average effect of the gene substitution
- Calculate the breeding value and the dominance deviation of a genotype
- Calculate heterosis or hybrid vigor
- Estimate the genotype – environment correlation and interaction
- Calculate the additive and the dominance genetic variance of a quantitative trait
- Calculate the repeatability of a quantitative trait

- Calculate the variance within and between groups of relatives
- Calculate Cotterman k- coefficients between relatives
- Calculate the genetic covariance and the correlation among relatives
- Estimate the heritability coefficient and the extent of identity among relatives
- Estimate the heritability coefficient
- Estimate the variance of heritability coefficient
- Calculate selection differential and response to artificial selection
- Calculate the intensity of selection
- Calculate the total response of selection
- Estimate the asymmetry of response to selection
- Estimate selection limits
- Identify and locate quantitative traits loci with genetic neutral markers
- Estimate the general combining ability of experimental crosses between inbreeding lines
- Estimate the genetic correlation between two traits
- Estimate the correlated response to selection
- Estimate the heritability coefficient of threshold traits
- Estimate the effect of scale change in distribution and variance of quantitative traits
- Estimate the path coefficient and coefficient of determination between causes and effects in quantitative traits

**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?*

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|---|---|
| *Search for, analysis and synthesis of data and information, with the use of the necessary technology* | *Production of new research ideas* |
| *Adapting to new situations* | *Project planning and management* |
| *Decision-making* | *Respect for differences and multiculturalism* |
| *Working independently* | *Respect for the natural environment* |
| *Team work* | *Showing social, professional and ethical responsibility and sensitivity to gender issues* |
| *Working in an international environment* | *Criticism and self-criticism* |
| *Working in an interdisciplinary environment* | *Production of free, creative and inductive thinking* |

Retrieve, analyze and synthesize data and information, with the use of necessary technologies
Work autonomously
Work in teams
Work in an international context
Advance free, creative and causative thinking

## 3. SYLLABUS

- Mendelian and quantitative genetics
- Inheritance of quantitative traits
- Phenotypic value
- Phenotypic value of an individual
- Average phenotypic value of the population
- Phenotypic variation .Genetic and environmental effects
- Genotypic variation
- Effect of inbreeding on phenotypic variation

- Multiple measurements and repeatability
- Resemblance between relatives
- Variance within and between groups of relatives
- Consanguinity coefficient between relatives
- Genetic covariance and correlations between relatives
- Environmental covariance
- Effect of assortative mattings on the correlation between relatives
- Inheritance coefficient
- Factors affecting the inheritance coefficient
- Estimation of inheritance coefficient
- Studies on twins. Data from human populations
- Artificial selection
- Response of selection
- Changes in the frequencies of alleles
- Selection experiments
- Estimation of the number of genes that control a quantitative trait
- Continuous selection of enzymatic polymorphisms
- Selection based on relatives
- Inbreeding and mattings
- Correlated traits. Genetic and environmental correlations
- Associated response in selection
- Interaction between genotype and the environment
- Threshold traits. Genetic basis of threshold traits
- Estimation of inheritance coefficient
- Evolution of threshold traits
- Change of scale. Effect of the change of scale. Exercises).
- Path coefficients

**4. TEACHING and LEARNING METHODS - EVALUATION**

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|---|---|---|
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Direct learning | |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Power point presentations and self-assessment test on the Blackboard. | |
| **TEACHING METHODS** | ***Activity*** | ***Semester workload*** |

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|---|---|---|
| *The manner and methods of teaching are described in detail.*<br>*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.*<br><br>*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* | Lectures | 39 |
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| | Laboratory work (tutorials) focused on Genetics problem-solving in smaller groups | 26 |
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| | Independent study | 60 |
| | Course total (Total contact hours and training) | ***125*** |
| **STUDENT PERFORMANCE EVALUATION**<br>*Description of the evaluation procedure*<br><br>*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*<br><br>*Specifically-defined evaluation criteria are given, and if and where they are accessible to students.* | Written Examination | |

## 5. ATTACHED BIBLIOGRAPHY

*-Suggested bibliography :*
*-Relevant scientific journals:*

ΓΕΝΕΤΙΚΗ ΤΩΝ ΠΛΗΘΥΣΜΩΝ ΤΟΜΟΣ ΙΙ : Ποσοτικοί Χαρακτήρες ΜΙΧΑΗΛ Γ. ΛΟΥΚΑ
Εκδόσεις Σταμούλη