

COURSE OUTLINE “POPULATION AND EVOLUTIONARY GENETICS”

1. GENERAL

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| SCHOOL | HEALTH SCIENCES | | |
| DEPARTMENT | MOLECULAR BIOLOGY AND GENETICS | | |
| LEVEL OF STUDIES | ISCED LEVEL 6 | | |
| COURSE CODE | MBG321 | SEMESTER | 5 th |
| COURSE TITLE | POPULATION AND EVOLUTIONARY GENETICS | | |
| TEACHING ACTIVITIES <i>If the ECTS Credits are distributed in distinct parts of the course e.g. lectures, labs etc. If the ECTS Credits are awarded to the whole course, then please indicate the teaching hours per week and the corresponding ECTS Credits.</i> | | HOURS/WEEK | ECTS CREDITS |
| | | 3 | 4 |
| COURSE TYPE <i>Background, General Knowledge, Scientific Area, Skill Development</i> | SCIENTIFIC AREA | | |
| PREREQUISITES: | NO | | |
| TEACHING & EXAMINATION LANGUAGE: | GREEK ENGLISH FOR ERASMUS STUDENTS | | |
| COURSE OFFERED TO ERASMUS STUDENTS: | YES | | |
| COURSE URL: | https://eclass.duth.gr/courses/418340/ | | |

2. LEARNING OUTCOMES

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| <p>Learning Outcomes <i>Please describe the learning outcomes of the course: Knowledge, skills and abilities acquired after the successful completion of the course.</i></p> <p>The purpose of the course is to introduce students to the basic elements of population and evolutionary genetics, both through the acquisition of knowledge about the concepts, procedures, mechanisms that control it and its results, as well as the way that scientific research approaches the fundamental questions that arise about evolution and population genetics in a multitude of scientific fields. Through an interdisciplinary approach, from molecular biology and genetics to mathematical models and the philosophical extensions of evolutionary theory, students cultivate their own point of view and critical thinking.</p> <p>Students who successfully complete the course will have achieved the following learning objectives;</p> <ul style="list-style-type: none"> • they will know the basic concepts of Population Genetics, • they will have familiarized themselves with the basic principles of determining genetic diversity, • they will understand and will be able to apply basic methods of quantification and analysis of genetic diversity, • they will understand the evolutionary forces that shape genetic diversity at the molecular and population level, • they will understand the effects of the combined action of the forces of evolution on populations, • they will understand the implications of population genetics in other scientific fields and applications. |
| <p>General Skills <i>Name the desirable general skills upon successful completion of the module</i></p> <p><i>Search, analysis and synthesis of data and information, Project design and management</i> <i>ICT Use Equity and Inclusion</i> <i>Adaptation to new situations Respect for the natural environment</i></p> |

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| <i>Decision making</i> <i>Autonomous work</i> <i>Teamwork</i> <i>Working in an international environment</i> <i>Working in an interdisciplinary environment</i> <i>Production of new research ideas</i> | <i>Sustainability</i> <i>Demonstration of social, professional and moral responsibility and sensitivity to gender issues</i> <i>Critical thinking</i> <i>Promoting free, creative and inductive reasoning</i> |
| <ul style="list-style-type: none"> • Search, analysis and synthesis of data and information, ICT Use • Decision making • Autonomous work • Working in an interdisciplinary environment • Production of new research ideas • Critical thinking • Promoting free, creative and inductive reasoning | |

3. COURSE CONTENT

Lectures:

1. Genetic polymorphisms, introductory concepts
2. Hardy-Weinberg theorem
3. Linkage disequilibrium – haplotypes
4. The genetics of natural selection
5. Genetic drift, deviation from random reproduction
6. Gene flow and mutation
7. The dynamics of the evolution of quantitative traits, types of evolution, tools for quantifying selection
8. The evolution of quantitative traits (heritability coefficient, associated traits)
9. Direct and indirect evolutionary change, phenotypic plasticity
10. Complex action of evolutionary forces
11. Processing of genetic data at the population level
12. Genetics of conservation, genomics of biodiversity
13. Genetics of human populations – examples with diseases

Mandatory workshops:

(1) Describing genetic diversity with R, (2) Databases and genomes, (3) Linkage disequilibrium and polymorphisms.

4. LEARNING & TEACHING METHODS - EVALUATION

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| TEACHING METHOD <i>Face to face, Distance learning, etc.</i> | Face to face | |
| USE OF INFORMATION & COMMUNICATIONS TECHNOLOGY (ICT) <i>Use of ICT in Teaching, in Laboratory Education, in Communication with students</i> | Use of ICT in Teaching Use of ICT in Communication with students | |
| TEACHING ORGANIZATION <i>The ways and methods of teaching are described in detail.</i> <i>Lectures, Seminars, Laboratory Exercise, Field Exercise, Bibliographic research & analysis, Tutoring, Internship (Placement), Clinical Exercise, Art Workshop, Interactive learning, Study visits, Study / creation, project, creation, project. Etc.</i> <i>The supervised and unsupervised workload per activity is indicated here, so that total workload per semester complies to ECTS standards.</i> | Activity | Workload/semester |
| | Lectures | 40 |
| | Workshops | 6 |
| | Study at home | 74 |
| | Course Total | 120 |
| STUDENT EVALUATION <i>Description of the evaluation process</i> | Student evaluation languages Greek, English | |

Assessment Language, Assessment Methods, Formative or Concluding, Multiple Choice Test, Short Answer Questions, Essay Development Questions, Problem Solving, Written Assignment, Essay / Report, Oral Exam, Presentation in audience, Laboratory Report, Clinical examination of a patient, Artistic interpretation, Other/Others

Please indicate all relevant information about the course assessment and how students are informed

Method (Formative or Concluding)

Concluding

Student evaluation methods

Written exam with multiple choice test (25%)

Written Exam with Short Answer Questions (25%)

Written Exam with Problem Solving (25%)

Written Exam with Essay Development Questions (5%)

Written Assignment (20%)

The evaluation criteria are presented in the course work guide which is available on the course website.

5. SUGGESTED BIBLIOGRAPHY

Εξέλιξη. Έκδοση: 4η αμερικανική-1η ελληνική/2019

Douglas Futuyma, Mark Kirkpatrick. ΕΥΔΟΞΟΣ: 86197244, ISBN: 978-618-5173-46-3

ΥΤΟΡΙΑ ΕΚΔΟΣΕΙΣ Μ. ΕΠΕ.

Βασικές Αρχές Γενετικής,

W. S. Klug, M. R. Cummings, C. A. Spencer και M. A. Palla (11η Έκδοση), Έτος Έκδοσης: 2015,

Ακαδημαϊκές Εκδόσεις Ι. Μπάσδρα & Σια Ο.Ε. ISBN: 978-618-5135-03-4 Εύδοξος: 50662451

Εισαγωγή στην Πληθυσμιακή Βιολογία.

BOSSERT W.H., WILSON E.O., ΙΤΕ-ΠΑΝΕΠΙΣΤΗΜΙΑΚΕΣ ΕΚΔΟΣΕΙΣ ΚΡΗΤΗΣ. ΕΥΔΟΞΟΣ: 361

The textbooks cover 70-85% of the material. However, notes from the course presentations are also distributed electronically.