**COURSE OUTLINES**

1. **GENERAL**

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| **SCHOOL** | HEALTH SCIENCES |
| **ACADEMIC UNIT** | BIOLOGICAL APPLICATIONS AND TECHNOLOGIES |
| **LEVEL OF STUDIES** | undergraduate |
| **COURSE CODE** | ΒΕE504 | **SEMESTER** | 7th, 9th |
| **COURSE TITLE** | APPLIED GENETICS |
| **INDEPENDENT TEACHING ACTIVITIES**  | **WEEKLY TEACHING HOURS** | **CREDITS** |
| Lectures and lab courses | 6 | 6 |
| **COURSE TYPE** | Specialised general knowledge,Skills development |
| **PREREQUISITE COURSES:** | Basic Genetics, Molecular Biology |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek (instruction and examination)English (examination) |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | yes |
| **COURSE WEBSITE (URL)** | <http://ecourse.uoi.gr/enrol/index.php?id=663>http://www.bat.uoi.gr/show-lesson?l\_id=42 |

1. **LEARNING OUTCOMES**

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| **Learning outcomes** |
| By completing this course, the students will be able to understand, recognize and describe selected topics in genetics which are analyzed via classical and molecular methods. They will use the obtained knowledge in order to estimate, process and solve problems. In addition, they will be in the position to combine the techniques used for the study of the genetic basis in those certain fields, in order to develop their own approach of methodology in scientific studies which they will be asked to investigate.  |
| **General Competences**  |
| * Search for, analysis and synthesis of data and information, with the use of the necessary technology
* Team work
* Respect for difference and multiculturalism
* Production of free, creative and inductive thinking
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1. **SYLLABUS**

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| **Theory classes**1. Quantitative Genetics. The nature of the continuous traits, continuous phenotypes, questions studied in quantitative genetics. Statistical tools. Polygene inheritance. Heritability. Response to selection.
2. Genomics. Structural Genomics, Functional Genomics, Comparative Genomics. Ethics and Human Genome Project.
3. Behavioral Genetics. The meaning of behavior and the contribution of genetics. The correlation between genes and environment in behavior. Relation of simple genes and behavior: examples in animals and humans. Polygene correlation and behavior, genetic approach of human behavior: pedigree data, molecular approach, polygene disorders, examples.
4. Cancer Genetics. Cell cycle and cancer, genes and cancer (oncogenes, tumor suppressor genes, mutator genes), telomere shortening and human cancer, the multistep nature of cancer, chemicals and radiation as carcinogenes.
5. Pharmacogenetics – Familial Genetics. Genotypes and factors affecting the activity of certain medicines, pharmacogenetical polymorphisms – polygene control. The pharmacogenomical field.
6. Application of Genetics in humans. The genetic content. Genetic deseases. Application of Genetics in family programming. Genetic selection and negative eugenics.

**Laboratory course**: The students will deal with the location and the study of the expression of genes which code for products of biotechnological interest. They will use techniques such as DNA isolation, PCR, cloning and detection of activity by using reporter genes.  |

1. **TEACHING AND LEARNING METHODS - EVALUATION**

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| **DELIVERY** | Face-to face in the class and the lab |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY**  | Support of the learning procedure via the electronic platform “e-course” Communication with students via email & ecourse |
| **TEACHING METHODS** |

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| ***Activity*** | ***Semester workload*** |
| Lectures | 40 |
| Laboratory practice | 20 |
| Lab essay writing | 15 |
| Individual studying | 75 |
| Course total | **150** |

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| **STUDENT PERFORMANCE EVALUATION** | **Theory (80 %, should be ≥ 5)** Written exams including:* Short- or middle answer questions (75%)
* Problem solving (25%)

**Lab course (20%)** * General presence (50 %)
* Lab essay grade (50 %)
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1. **ATTACHED BIBLIOGRAPHY**

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| * Klug, Cummings, Spencer, Palladino **Concepts of genetics**, 11th edition, Pearson, 2015. ISBN-13: 978-0133865363.
* Russell P.J. **iGenetics – A Mendelian Approach,** Pearson, 2006. ISBN-13: 9780805346664
* <http://www.doegenomes.org> (Human Genome Project Information)
* <http://www.ornl.gov/TechResources/Human_Genome/home.html> (background information about the Human Genome Project)
* <http://www.sanger.ac.uk/> (Sanger Centre in Cambridge - genome analysis projects in human and other organisms)
* <http://www.ama-assn.org/ama/pub/category/3671.html> (American Medical Association site for Applied Genetics)
* <http://www.accessexcellence.org/> (Access Excellence - The National Health Museum)
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