**COURSE OUTLINE**

1. **GENERAL**

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| **SCHOOL** | Health Sciences | | | | |
| **ACADEMIC UNIT** | Biological Applications and Technology | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | **BEΕ832** | **SEMESTER** | | **8th** | |
| **COURSE TITLE** | BIOINFORMATICS | | | | |
| **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** |
|  | | | 5 | | 5 |
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|  | | |  | |  |
| *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* | Special background | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** | http://www.bat.uoi.gr/eng/sem08.php | | | | |

1. **LEARNING OUTCOMES**

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| **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* | |
| Introduce students to the content of Bioinformatics, as well as the concepts, tools and possible applications in several biological problems. Additionally, to provide them with skills on specific databases and software packages that are widely used in the field. | |
| **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*  *Adapting to new situations*  *Decision-making*  *Working independently*  *Team work*  *Working in an international environment*  *Working in an interdisciplinary environment*  *Production of new research ideas* | *Project planning and management*  *Respect for difference and multiculturalism*  *Respect for the natural environment*  *Showing social, professional and ethical responsibility and sensitivity to gender issues*  *Criticism and self-criticism*  *Production of free, creative and inductive thinking*  *……*  *Others…*  *…….* |
| Search for, analysis and synthesis of data and information, with the use of the necessary technology  Working independently  Team work  Working in an interdisciplinary environment  Production of new research ideas  Production of free, creative, and inductive thinking | |

1. **SYLLABUS**

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| Course Theory: Computational Approaches to Biological Problems - Cellular structures, Genome Decoding and Analysis, Gene Regulation, Phylogenesis, Clinical and Biological Databases;  Computational Applications - Analysis of DNA Sequences, Sequence Alignment, Computational Analysis of Protein Information, Phylogenetic Trees, Microarray Data Analysis & Genetic Networks;  Computational Tools - Stochastic Models, Hidden Markov Models, Artificial Neural Networks, Genetic Algorithms.  Laboratory Exercises: Biological Databases - Design and Management; Protein Databases - Information Retrieval and Data Analysis; DNA Databases; DNA Sequence Analysis; Protein Sequence Analysis; Homology Analysis of Biological Sequences; Multiple Sequence Alignment; Protein 3-D Structure Analysis; RNA Processing and Analysis; Building Phylogenetic Trees; Analysis of Microarray Data. |

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

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| **DELIVERY** *Face-to-face, Distance learning, etc.* | Classroom and computers laboratory |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | **Yes** |
| **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 | 26 | | Laboratory practice | 33 | | Team project | 33 | | Study hours (theory) | 26 | | Study hours (laboratory) | 33 | |  |  | |  |  | |  |  | |  |  | | Course total | ***151*** | |
| **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.* | Short-answer questions  Problem solving  Written work  Laboratory work |

1. **ATTACHED BIBLIOGRAPHY**

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| *- Suggested bibliography:*  *- Related academic journals:*  Introduction to Bioinformatics (Course notes), C. Papaloukas, University of Ioannina Press, 2016  Bioinformatics, P. Bagkos, Open Academic Editions, 2015 (http://hdl.handle.net/ 11419/5016)  Bioinformatics and Functional Genomics, J. Pevsner, Academic Publications J. Basdra & Co., 2019 (ISBN: 978-618-5135-17-1)  Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins (3rd edition), A.D. Baxevanis and B. F. Francis Ouellette, Wiley-Interscience, 2004 (ISBN: 978-0-471-46101-2) |