# COURSE OUTLINE

## (1) GENERAL

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|---|---|
| **SCHOOL** | NATURAL SCIENCES |
| **ACADEMIC UNIT** | BIOLOGY |
| **LEVEL OF STUDIES** | UNDERGRADUATE |
| **COURSE CODE** | BIO_AY03      **SEMESTER** First |
| **COURSE TITLE** | MATHEMATICS |

| INDEPENDENT TEACHING ACTIVITIES<br>*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 |
|---|---|---|
| | 4 | 6 |
| | | |
| | | |
| *Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).* | | |

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| **COURSE TYPE**<br>*general background, special background, specialised general knowledge, skills development* | Basic Background |
| **PREREQUISITE COURSES:** | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | Yes |
| **COURSE WEBSITE (URL)** | https://eclass.upatras.gr/courses/BIO370/ |

## (2) LEARNING OUTCOMES

| **Learning outcomes** |
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| *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.*<br><br>*Consult Appendix A*<br>• *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*<br><br>• *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*<br><br>• *Guidelines for writing Learning Outcomes* |
| The subject of Mathematics has as a goal to provide to the students of the Department of Biology basic knowledge of upper-applied mathematics, that are needed in their science, in the fields of differential and integral calculus of one variable and of differential equations.<br><br>During the lessons the students become familiar with applications of mathematics in topics of Biology and of Environmental Sciences. These studies are basic and are used in many subjects of speciality of the next academic years of the Department of Biology. |

Generally, by the end of this course the students will, furthermore, develop the following general abilities (from the list above):
• Search, analysis and synthesis of facts and information using the necessary technologies
• Decision making
• Adaptation to new situations
• Working in an interdisciplinary environment
• Autonomous Work
•Teamwork
• Production of new research ideas
• Promotion of the free, creative and inductive thinking

## (3) SYLLABUS

**A)  Elements of Set Theory and Combinatorics** (Sets, Operations between sets, Permutations, Arrangements,  Combinations).
**B)   Differential calculus of a function of one variable**  (Functions, Limit, Continuity and Derivative of a function, Rate of change, Trigonometrical functions, Inverse trigonometrical functions, Exponential and logarithmic functions,  Study of functions, Differential, Applications in Biology).
**C)  Integral calculus of a function of one variable** (Indefinite and definite integral of a function, Computation of integrals of rational functions, Integrals of special form, Computation of surfaces and volumes, Generalized integrals, Applications in Biology).
**D) Sequences - Series** (Basic definitions,  Sequences of Fibonacci,  Applications in Biology).
**E)   Differential Equations** (An introduction to Differential Equations, Linear differential equations of first order, Differential equations of separable variables, Non-homogeneous linear differential equations, Differential Equations Bernoulli).
   **F) Applications of differential equations** (Population mathematical models, Applications of the accounting equation, Fermentation, Botany, Competition of species, Diffusion, Dating of objects).

## (4) TEACHING and LEARNING METHODS - EVALUATION

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| **DELIVERY**<br>*Face-to-face, Distance learning, etc.* | Lectures (face to face) |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY**<br>*Use of ICT in teaching, laboratory education, communication with students* | Supporting learning through the online platform e-class of University of Patras. |

| **TEACHING METHODS**<br>*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* | Activity | Semester workload |
|---|---|---|
| | Lectures | 52 |
| | | |
| | Solving suggested exercises | 50 |
| | Hours for private study of the student. | 45 |
| | | |
| | Final examination | *3* |
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| | Course total | *150* |

| **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.* | **Assessment Language:** Greek<br>**Assessment Language for Students Erasmus:** English<br><br>**Assessment methods:** Written Final Course Examination (100%) including<br><br>**1.** Theory<br>**2.** Exercises<br>**3.** Applications of mathematics in topics of Biology<br><br>Minimum passing grade: 5.<br>Maximum passing grade: 10. |

## (5) ATTACHED BIBLIOGRAPHY

*- Suggested bibliography:*

- Dimitrios Georgiou, Stavros Iliadis and Athanasios Megaritis, *Real Analysis*, Second Version, Tziolas 2017.

Vasilis Zafeiropoulos, Mathematical Analysis and Applications, Company of exploiting and management of estate of University of Patras, Fist Version, 2012.

*- Related academic journals:*