(1) GENERAL

<table>
<thead>
<tr>
<th>SCHOOL</th>
<th>NATURAL SCIENCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACADEMIC UNIT</td>
<td>BIOLOGY</td>
</tr>
<tr>
<td>LEVEL OF STUDIES</td>
<td>UNDERGRADUATE</td>
</tr>
<tr>
<td>COURSE CODE</td>
<td>BIO_HE05</td>
</tr>
<tr>
<td>SEMESTER</td>
<td>6/8</td>
</tr>
<tr>
<td>COURSE TITLE</td>
<td>APPLIED MICROBIOLOGY</td>
</tr>
</tbody>
</table>

INDEPENDENT TEACHING ACTIVITIES

<table>
<thead>
<tr>
<th>Activity</th>
<th>WEEKLY TEACHING HOURS</th>
<th>CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures and laboratory exercises</td>
<td>2L; 3LE</td>
<td>6</td>
</tr>
</tbody>
</table>

Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).

COURSE TYPE

Scientific area

PREREQUISITE COURSES:

There are no prerequisite courses. Knowledge of General Biology, Biochemistry, Microbiology and Mathematics (differential equations) is desirable.

LANGUAGE OF INSTRUCTION and EXAMINATIONS:

Greek

IS THE COURSE OFFERED TO ERASMUS STUDENTS

NO

COURSE WEBSITE (URL)

https://eclass.upatras.gr/courses/BIO241/

(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

As a result of the training, the students will be able to interpret the phenomenon of microbial growth in batch and continuous systems and to draw biomass and substrate balances. They will also understand the metabolic pathways used by micro-organisms to assimilate the various sources of carbon, and how their metabolism is regulated at molecular level during the growth cycle. The above knowledge will be established through laboratory exercises, problem solving, and examples of biotechnological applications.

Upon successful completion of the course, students will be able to:

- Design microbial cultures for the production of metabolic products or enzymes
- Perform microbial cultures in different systems
  - Quantify various microbial substrates and metabolic products of microorganisms (intracellular and extracellular) using instrumental analysis (GC, HPLC).
- Determine the maximum productivity of a bioreactor and the conditions which is achieved.
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, 
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

- Autonomous Work
- Teamwork
- Production of new ideas for research work

Respect for the natural environment

(3) SYLLABUS

1. Introduction.
6. Transport phenomena and design of bioreactors. Effect of physico-chemical environment on microbial growth.
7. Examples of biotechnological applications of microbiology in the pharmaceutical, food and chemical industries and the environment.
(4) TEACHING and LEARNING METHODS - EVALUATION

### DELIVERY

In the classroom and in the laboratory

### USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY

Lectures using PC - Microsoft PowerPoint

### 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

<table>
<thead>
<tr>
<th>Activity</th>
<th>Semester workload</th>
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<tbody>
<tr>
<td>Lectures</td>
<td>13 (26 ώρες)</td>
</tr>
<tr>
<td>Laboratory Exercises in groups of 30 students</td>
<td>10 (30 ώρες)</td>
</tr>
<tr>
<td>Independent Study</td>
<td>94 ώρες</td>
</tr>
</tbody>
</table>

Course total: 150

### 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, etc.

Specifically-defined evaluation criteria are given, and if and where they are accessible to students.

Student assessment includes:
- Written final examination with questions and exercises on the subject and practical examination in the laboratory (80%)
- Individual work during the semester (20%)

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

- Related academic journals:
  International scientific journals