COURSE OUTLINE

(1) GENERAL

SCHOOL	NATURAL SCIENCES		
ACADEMIC UNIT	BIOLOGY		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	BIO_HE05	**SEMESTER**	6/8
COURSE TITLE	APPLIED MICROBIOLOGY		

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
Lectures and laboratory exercises	2L; 3LE	6
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*	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, with the use of the necessary technology	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking*
Working in an interdisciplinary environment	*……*
Production of new research ideas	*Others…*
	…….

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

Respect for the natural environment

(3) SYLLABUS

1 Introduction.
2. The phenomenon of microbial growth. Monod Kinetics. Substrate inhibition.
3. Control of microbial growth. Sterilization.
4. Kinetics of microbial growth in batch and continuous systems. Balances.
5. Catabolism of major carbon sources. Catabolic suppression.
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 *Face-to-face, Distance learning, etc.*	In the classroom and in the laboratory
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	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*	
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.*	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%)

Activity	*Semester workload*
Lectures	13 (26 ώρες)
Laboratory Exercises in groups of 30 students	10 (30 ώρες)
Independent Study	94 ώρες
Course total	*150*

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

- «Microbiology and Microbial Technology» 2nd Edition, G. Aggelis, Unibooks Publishers, Athens 2017

- Related academic journals:

International scientific journals