COURSE OUTLINE

1. GENERAL

SCHOOL	AGRICULTURAL SCIENCES		
ACADEMIC UNIT	FOOD SCIENCE AND TECHNOLOGY		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**FST_300**	**SEMESTER**	3rd
COURSE TITLE	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	3	
Lab Practical	2	
Total		5
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*	Compulsory GENERAL BACKGROUND
PREREQUISITE COURSES:	There are no prerequisite courses. However, the student should have basic knowledge of General Biology.
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek. Teaching may be performed in English in case of foreign students
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	https://eclass.upatras.gr/

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*

The objectives of this course are to provide the students with:
• The importance of Microbiology.
• The morphology and structure of microorganisms.
• An introduction to light and electron microscopy.
• The nutrition and metabolism of microorganism.
• The theory and application of microbial growth.
• Gene expression and the principles of microbial ecology.
• Introduce the principles of virology.
• The principles of Molecular Microbiology.
• An introduction to viruses and viral diversity.
• An introduction to plasmids, mutations, and transposons.
• An introduction to microbial genetics.

Upon completion of the course, students should be able to:
• Understand the interactions of plants and micro-organisms, and in particular with symbiotic nitrogen capture.
• Understand the importance of micro-organisms, their nutrition and metabolism.
• Understand the principles of molecular microbiology.
• Understand gene expression in prokaryotic organisms.
• Understand the role of viruses and understand viral multiplication, and viral diversity.
• Understand the principles of microbial genetics.
• Be able to work in a microbiology lab under aseptic conditions.
• Prepare nutrient substrates.
• Be able to perform microbial analysis of water and gram staining.

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…*
	…….

By the end of this course the student will, furthermore, have developed the following skills (abilities):

- *Search for, analysis and synthesis of data and information, with the use of the necessary technology*
- *Production of new research ideas*

- *Respect for the natural environment*
- *Production of free, creative and inductive thinking*
- *Team work*

3. SYLLABUS

LECTURES

1. Introduction to Microbiology- Macromolecules of microorganisms
2. Microscopy and cell morphology. Cell membranes and cell walls.
3. Movement of microorganisms. Surface structures and encapsulation of prokaryotes.
4. Microbial nutrition and laboratory cultures.
5. Metabolism of microorganisms.
6. Microbial growth. Environmental effects on microbial growth.
7. Overview of genes and gene expression.
8. Regulation of Gene Expression.
9. Microbial development and systematics.
10. Principles of Microbial Ecology.
11. Synthesis and processing of RNA.
12. Mechanisms of transfer and exchange of genetic material. Transposons & Plasmids.
13. Viruses, proliferation, viral diversity.

PRACTICAL EXERCISES

Practical 1: Introduction to a microbiology laboratory and safety
Practical 2: Preparation and sterilization of nutrients – use of autoclave
Practical 3: Aseptic methods in microbiology
Practical 4: Serial dilutions and microbial growth
Practical 5: Pure Cultures - Growth of bacteria in liquid cultures
Practical 6: Microscopic examination of microorganisms
Practical 7: Microbiological analysis of water
Practical 8: Gram staining

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face to face. Laboratory exercises in the Microbiology Lab.
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	• Use of ICT (powerpoint) in teaching • Use of ICT (powerpoint) in laboratory exercises • Use of ICT in Student Communication (Learning Support through the e-class platform)
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*	

Activity	***Semester workload***
Lectures	39
Laboratory practice	16
Writing short lab reports	25
Private study time of the students for the lab preparation and final examination	45

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*	**Course total (25 work load for each ECTS credit)**	**125**
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, • Open-ended questions, • Written work, • Essay/report	

5. ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

- *- Atlas, R. M. (1988). Experimental microbiology: fundamentals and applications.*
- *Atlas, R. M., & Bartha, R. (1981). Microbial ecology: fundamentals and applications.*
- *Madigan, M. T., Martinko, J. M., & Parker, J. (2017). Brock biology of microorganisms.*
- *Marylynn V. Yates, Cindy H. Nakatsu, Robert V. Miller, Suresh D. Pillai. (2007). Manual of Environmental Microbiology.*
- *Michael, T. M., John, M. M., & Jack, P. (2006). Brock biology of microorganisms.*

- Related academic journals:

- *Nature*
- *Science*
- *Trends in Microbiology (TIM)*
- *Trends in Biotechnology (TIBTECH)*
- *Proceedings of National Academy of Sciences, USA (PNAS)*
- *Journal of Bacteriology*
- *Applied and Environmental Microbiology*
- *New Scientist*
- *Scientific American*
- *The ISME Journal (International Society for Microbial Ecology)*