COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Agricultural Sciences		
ACADEMIC UNIT	Biosystems & Agricultural Engineering		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**BAE_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	
Tutorials	0	
Laboratory	2	
TOTAL	**5**	**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*	Background General Knowledge Skills development
PREREQUISITE COURSES:	There are no prerequisite courses.
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek .-For Erasmus students in English
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	

(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 give students the concepts and importance of Microbiology.
• Introduce students to the nutrition and metabolism of microorganisms.
• Explain to students the theory and application of microbial growth.
• Explain to students the gene expression and principles of microbial ecology.
• Introduce students to the principles of virology.
• Explain the preparation of nutrient substrates and the concept of clean crops.
• Introduce students to Gram staining and microbial control of water.

Upon completion of the course students should be able to:

• Understand the interactions of plants and microorganisms and in particular such as symbiotic nitrogen fixation.
• Understand the importance of microorganisms, their nutrition and metabolism.

• Understand the principles of molecular microbiology.
• Understand gene expression in prokaryotic organisms.
• Understand the role of viruses and understand viral replication and viral diversity.
• Understand the principles of microbial genetics.
• Be able to work in a microbiology laboratory under aseptic conditions.
• Be able to prepare nutrient substrates.
• Be able to perform microbial control of water.

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, analysis and synthesis of data and information, using the necessary technologies
Production of new research ideas
Respect for the natural environment
Promoting free, creative and inductive thinking

(3) SYLLABUS

LESSON 1 Introductory concepts - Macromolecules of microorganisms
LESSON 2 Microscopy and cell morphology. Cell membranes and cell walls.
LESSON 3 Movement of microorganisms. Surface structures and inclusions of prokaryotes.
LESSON 4 Nutrition and laboratory crops.
LESSON 5 Metabolism of microorganisms.
LESSON 6 Theory and practice of microbial growth. Environmental effects on microbial growth.
LESSON 7 Overview of genes and gene expression. RNA synthesis and processing.
LESSON 8 Regulation of gene expression.
LESSON 9 Microbial evolution and systematic.
LESSON 10 Principles of Microbial Ecology.
LESSON 11 Characterization of microbial populations and communities by methods of classical microbiology and molecular microbial ecology.
LESSON 12 Mechanisms of transfer and exchange of genetic material. Transferable items. Plasmids.
LESSON 13 Viruses and viruses, viral proliferation, viral diversity.

LABORATORY EXERCISES
Exercise 1; Introduction to the microbiology laboratory
Exercise 2: Preparation and sterilization of nutrients
Exercise 3: Aseptic working methods in microbiology
Exercise 4: Determine the number of bacteria by sequential dilutions
Exercise 5: Clean cultures - growth of bacteria in liquid nutrients
Exercise 6: Staining and microscopic examination of microorganisms
Exercise 7: Microbiological control of water
Exercise 8: Staining by Gram

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face to face teaching, Experiential activities, Laboratory training

<table>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td>• Use of ICT (power point) in Teaching
• Use of ICT (power point) in Laboratory Training
• Use of ICT in Communication with students (Learning process support through the electronic platform e-class).</td></tr>
<tr><td>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</td><td>
<table>
<tr><th>Activity</th><th>Semester workload</th></tr>
<tr><td>Lectures</td><td>39</td></tr>
<tr><td>Laboratory</td><td>16</td></tr>
<tr><td>Writing short reports of laboratory exercises</td><td>25</td></tr>
<tr><td>Study hours. Literature survey, preparation for the laboratory exercises and the final examination</td><td>45</td></tr>
<tr><td>Course total</td><td>125</td></tr>
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</td></tr>
<tr><td>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.</td><td>1. The laboratories participate by 30% in the final grade. In order to be examined in theory, the student must have completed all the laboratories and have been successfully examined in them.
2. The main assessment criteria focus on understanding and correlating the knowledge that students gain from the course with other knowledge. Particular emphasis is placed on whether they have developed the ability to apply this knowledge to crop selection and to assess the impact of these changes on the environment. Emphasis is also placed on demonstrating critical ability and justifying the choices they make in each problem.
3. Evaluation is dynamic. It mainly involves problem solving. is done orally or in writing or with a combination of the two, with or without pre-examination on the basic principles of the course, with or without exculpatory advances and with other test or inventive methods, depending on the composition of the dynamics and the needs of the audience.
4. The above are done in the Greek language. For foreign language students (eg Erasmus students) conducted in English</td></tr>
</table>

(5) ATTACHED BIBLIOGRAPHY

- *"Brock Βιολογία των μικροοργανισμών" Τόμος Α'., MADIGAN,MARTINKO*
- *Μικροβιολογία & Μικροβιακή Τεχνολογία, Γεώργιος Αγγελής*
- *Microbial Ecology: Fundamentals and Applications. (Atlas, R.M. and Bartha, R.)*
- *Environmental Microbiology (Varnan, A.H. and Evans, M.G.)*
- *Manual of Environmental Microbiology (Hurst, C.J., Knudsen, G.R., McInerney, Stetzenbach, L.D. and Walter, M.V.)*
- *Brock Biology of microorganisms. (Madigan, M.T., Martinko, J.M. and Parker, J.)*
- *Microbes and man. (Postgate, J.)*
- *The outer reaches of life (Postgate, J.)*
- *Power unseen. How microbes rule the world (Dixon, B.)*
- *ΕΡΓΑΣΤΗΡΙΑΚΕΣ ΑΣΚΗΣΕΙΣ ΠΕΡΙΒΑΛΛΟΝΤΙΚΗΣ ΜΙΚΡΟΒΙΟΛΟΓΙΑΣ , Τσιάμης Γεώργιος*

Other sources:

- *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)e