

## GENERAL MICROBIOLOGY

### COURSE OUTLINE

#### 1. GENERAL INFORMATION

|                                                                                                                                                                                                                                 |                                                                                                           |                             |                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|-----------------------------|-----------------|
| <b>FACULTY/SCHOOL</b>                                                                                                                                                                                                           | SCHOOL OF FOOD AND NUTRITIONAL SCIENCES                                                                   |                             |                 |
| <b>DEPARTMENT</b>                                                                                                                                                                                                               | FOOD SCIENCE AND HUMAN NUTRITION                                                                          |                             |                 |
| <b>LEVEL OF STUDY</b>                                                                                                                                                                                                           | Undergraduate                                                                                             |                             |                 |
| <b>COURSE UNIT CODE</b>                                                                                                                                                                                                         | 1280                                                                                                      | <b>Semester:</b>            | 2 <sup>nd</sup> |
| <b>COURSE TITLE</b>                                                                                                                                                                                                             | General Microbiology                                                                                      |                             |                 |
| <b>INDEPENDENT TEACHING ACTIVITIES</b>                                                                                                                                                                                          |                                                                                                           | <b>WEEKLY TEACHNG HOURS</b> | <b>ECTS</b>     |
| <i>in case credits are awarded for separate components/parts of the course, e.g. in lectures, laboratory exercises, etc. If credits are awarded for the entire course, give the weekly teaching hours and the total credits</i> |                                                                                                           |                             |                 |
| Lectures                                                                                                                                                                                                                        |                                                                                                           | 3                           | 4               |
| Laboratory Exercises                                                                                                                                                                                                            |                                                                                                           | 2                           |                 |
| <i>Add rows if necessary. The organization of teaching and the teaching methods used are described in detail under section 4</i>                                                                                                |                                                                                                           |                             |                 |
| <b>COURSE TYPE</b><br><i>Background knowledge,<br/>Scientific expertise,<br/>General Knowledge,<br/>Skills Development</i>                                                                                                      | Background knowledge                                                                                      |                             |                 |
| <b>PREREQUISITE COURSES:</b>                                                                                                                                                                                                    | None                                                                                                      |                             |                 |
| <b>LANGUAGE OF INSTRUCTION:</b>                                                                                                                                                                                                 | Greek                                                                                                     |                             |                 |
| <b>LANGUAGE OF EXAMINATION/ASSESSMENT:</b>                                                                                                                                                                                      |                                                                                                           |                             |                 |
| <b>THE COURSE IS OFFERED TO ERASMUS STUDENTS</b>                                                                                                                                                                                | No                                                                                                        |                             |                 |
| <b>COURSE WEBSITE (URL)</b>                                                                                                                                                                                                     | <a href="https://oeclass.aua.gr/eclass/courses/EFP140/">https://oeclass.aua.gr/eclass/courses/EFP140/</a> |                             |                 |

#### 2. LEARNING OUTCOMES

**Learning Outcomes**

The course learning outcomes, specific knowledge, skills and competences of an appropriate (certain) level, which students will acquire upon successful completion of the course, are described in detail.

It is necessary to consult:

**APPENDIX A**

- Description of the level of learning outcomes for each level of study, in accordance with the European Higher Education Qualifications' Framework.
- Descriptive indicators for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and

**APPENDIX B**

- Guidelines for writing Learning Outcomes

General Microbiology is a basic course for understanding the diversity, cellular structure, function and phylogeny of microorganisms. It is the foundation for taking higher level microbiology-related courses in various Departments of the AUA, such as Plant Pathology, Food Safety and Technology, Food Microbiology, Soil Microbiology, Microbial Biotechnology, various courses on agricultural and non-agricultural waste treatment and bioremediation.

**General Competences**

Taking into consideration the general competences that students/graduates must acquire (as those are described in the Diploma Supplement and are mentioned below), at which of the following does the course attendance aim?

Search for, analysis and synthesis of data and information using appropriate technologies,  
Adapting to new situations  
Decision-making  
Individual/Independent work  
Group/Teamwork  
Working in an international environment  
Working in an interdisciplinary environment  
Introduction of innovative research

Project planning and management  
Respect for diversity and multiculturalism  
Environmental awareness  
Social, professional and ethical responsibility and sensitivity to gender issues  
Critical thinking  
Development of free, creative and inductive thinking  
... ..  
(Other..... citizenship, spiritual freedom, social awareness, altruism etc.)  
.....

- Data research, analysis and synthesis
- Decision making
- Individual work
- Environmental awareness
- Basic understanding of living organisms
- Offer constructive criticism and self-criticism
- Development of free, creative and inductive thinking
- Development of scientific thinking

**3. COURSE CONTENT**

**LECTURES**

Microbes and Microbiology  
History of microbiological discoveries

## Overview of microbial life

### Cell structure and function

- Structure of the cytoplasmic membrane in bacteria and archaea
- Cell walls of bacteria and Archaea
- Flagella and other cellular parts and organelles

### Microbial nutrition and laboratory culture

### Microbial growth

- The process of microbial cell division
- Temperature and microbial growth

### Principles of microbial metabolism

### Introduction to Virology

- Viruses
- Classification of viruses
- Viruses of bacteria, plants and animals

### Microbial evolution and systematics

- Microbial fossils
- RNA-based life
- The phylogenetic tree of life

### Microbial diversity: Bacteria

- Overview of bacteria
- Proteobacteria
- Gram-positive bacteria
- Cyanobacteria and prochlorophytes
- Chlamydia
- Stalked bacteria
- Flavobacteria
- Spirochetes
- Deinococci
- Green sulfur bacteria
- Hyperthermophilic bacteria

### Microbial diversity: Archaea

- Phylogeny and metabolism
- Euryarhaeota
- Crenarchaeota

### Biology of the eukaryotic cell and eukaryotic microorganisms

### Introduction to Mycology

- Introduction to fungi, economic significance
- Taxonomy and phylogeny of fungi
- Fungal morphology and physiology (I) and (II)
- Reproduction and life cycles of fungi
- Chytridiomycota, Mucoromycota, Glomeromycota

- Ascomycota
- Lichens, Basidiomycota (I), Basidiomycota (II)
- Mitosporic fungi and parasexual cycle
- Oomycota and Myxomycota

#### LABORATORY EXERCISES

- Basic laboratory techniques in Microbiology: Isolation, culture and microscopic observation of microorganisms
- Bacteria (Gram stain and morphology)
- Photosynthetic microorganisms (prokaryotic and eukaryotic), Mucoromycota (asexual and sexual fruiting bodies)
- Ascomycota (asexual reproduction) and yeasts
- Ascomycota (sexual reproduction), Basidiomycota

#### 4. TEACHING METHODS--ASSESSMENT

| <p style="text-align: center;"><b>MODES OF DELIVERY</b></p> <p style="text-align: center;"><i>Face-to-face, in-class lecturing, distance teaching and distance learning etc.</i></p>                                                                                                                                                                                                                                                                                                                                         | In-class lectures                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                  |                   |          |          |                     |          |                                                                |  |                |          |  |  |  |  |  |  |                                                        |                  |
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| <p style="text-align: center;"><b>USE OF INFORMATION AND COMMUNICATION TECHNOLOGY</b></p> <p style="text-align: center;"><i>Use of ICT in teaching, Laboratory Education, Communication with students</i></p>                                                                                                                                                                                                                                                                                                                | Use of slide presentation and blackboard. Communication with students. Learning process support by access to e-class asynchronous distance learning platform.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                  |                   |          |          |                     |          |                                                                |  |                |          |  |  |  |  |  |  |                                                        |                  |
| <p style="text-align: center;"><b>COURSE DESIGN</b></p> <p><i>Description of teaching techniques, practices and methods:</i><br/> <i>Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, Internship, Art Workshop, Interactive teaching, educational visits, projects, Essay writing, Artistic creativity, etc.</i></p> <p><i>The study hours for each learning activity as well as the hours of self- directed study are given following the principles of the ECTS.</i></p> | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Activity/ Method</th> <th style="text-align: center;">Semester workload</th> </tr> </thead> <tbody> <tr> <td>Lectures</td> <td style="text-align: center;">39 hours</td> </tr> <tr> <td>Laboratory practice</td> <td style="text-align: center;">26 hours</td> </tr> <tr> <td>Individual laboratory project (data processing and commenting)</td> <td></td> </tr> <tr> <td>Personal study</td> <td style="text-align: center;">35 hours</td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td><b>Total of Course (25 hours of workload per ECTS)</b></td> <td style="text-align: center;"><b>100 hours</b></td> </tr> </tbody> </table> | Activity/ Method | Semester workload | Lectures | 39 hours | Laboratory practice | 26 hours | Individual laboratory project (data processing and commenting) |  | Personal study | 35 hours |  |  |  |  |  |  | <b>Total of Course (25 hours of workload per ECTS)</b> | <b>100 hours</b> |
| Activity/ Method                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Semester workload                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                  |                   |          |          |                     |          |                                                                |  |                |          |  |  |  |  |  |  |                                                        |                  |
| Lectures                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 39 hours                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                  |                   |          |          |                     |          |                                                                |  |                |          |  |  |  |  |  |  |                                                        |                  |
| Laboratory practice                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 26 hours                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                  |                   |          |          |                     |          |                                                                |  |                |          |  |  |  |  |  |  |                                                        |                  |
| Individual laboratory project (data processing and commenting)                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                  |                   |          |          |                     |          |                                                                |  |                |          |  |  |  |  |  |  |                                                        |                  |
| Personal study                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 35 hours                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                  |                   |          |          |                     |          |                                                                |  |                |          |  |  |  |  |  |  |                                                        |                  |
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| <b>Total of Course (25 hours of workload per ECTS)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>100 hours</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                  |                   |          |          |                     |          |                                                                |  |                |          |  |  |  |  |  |  |                                                        |                  |

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| <p style="text-align: center;"><b>STUDENT PERFORMANCE<br/>EVALUATION/ASSESSMENT METHODS</b></p> <p><i>Detailed description of the evaluation procedures:</i></p> <p><i>Language of evaluation, assessment methods, formative or summative (conclusive), multiple choice tests, short- answer questions, open-ended questions, problem solving, written work, essay/report, oral exam, presentation, laboratory work, other..... etc.</i></p> <p><i>Specifically defined evaluation criteria are stated, as well as if and where they are accessible by the students.</i></p> | <p>I. One or two midterm tests during the semester. They are optional for the students. The midterm test grade counts as a bonus on the final exam's grade.</p> <p>II. A final exam which includes questions requiring a short analysis. The questions are designed to evaluate basic knowledge of Microbiology and familiarization with the biology and applications of microorganisms related to Agriculture.</p> <p>III. A written exam on the laboratory exercises. Students are required to identify microorganisms presented during the laboratory exercises and justify their identification.</p> |
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**5. SUGGESTED BIBLIOGRAPHY:**

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| <ul style="list-style-type: none"> <li>● Brock, Biology of Microorganisms (2nd edition), Crete University Press (2018).</li> <li>● Introduction to Mycology. University Notes by Professor Georgios Zervakis (2019)</li> <li>● Laboratory exercise material available at the e-class website of the lesson</li> </ul> |
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