# COURSE OUTLINE

## 1. GENERAL

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| **SCHOOL** | FOOD AND NUTRITIONAL SCIENCES | | |
| **DEPARTMENT** | FOOD SCIENCE AND HUMAN NUTRITION | | |
| **LEVEL OF STUDIES** | UNDERGRADUATE | | |
| **COURSE CODE** | **1205** | **SEMESTER** | 4th |
| **COURSE TITLE** | PRINCIPLES OF FOOD BIOTECHNOLOGY | | |

| **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 Practical courses | 3 h (Theoretical course) | 5 |
| | 2 h (Practical training) | |
| | | |
| *Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).* | | |

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| **COURSE TYPE** *general background, special background, specialised general knowledge, skills development* | Field of Science |
| **PREREQUISITE COURSES:** | None |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No |
| **COURSE WEBSITE (URL)** | http://fst.aua.gr/en/node/122 |

## 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 course aims at:

a) providing knowledge of the Principles of the Microbial Biotechnology, the Fermentation Technology and the Bioprocesses.

b) providing knowledge and expertise in microbial (principally) and enzymatic (to lesser extent) processes implicated with the White Biotechnology and the Food Technology.

c) the acquisition of competencies concerning how microbial cells, enzymes and bioreactors function and how biotechnological products are recovered.

d) finally the development of the ability of the person to successfully perform calculations concerning the various studied bioprocesses related with the Food Technology and the White Biotechnology.

**General Competences**

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| *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*<br>*Adapting to new situations*<br>*Decision-making*<br>*Working independently*<br>*Team work*<br>*Working in an international environment*<br>*Working in an interdisciplinary environment*<br>*Production of new research ideas* | *Project planning and management*<br>*Respect for difference and multiculturalism*<br>*Respect for the natural environment*<br>*Showing social, professional and ethical responsibility and sensitivity to gender issues*<br>*Criticism and self-criticism*<br>*Production of free, creative and inductive thinking*<br>*……*<br>*Others…*<br>*…….* |
| Work autonomously<br>Work in teams | |

## 3. SYLLABUS

i. From the antiquity to Manouil Sarris Tenedios and from Antonie van Leeuwenhoek the systems biology – Definition and colors of Biotechnology.
ii. Microorganisms if Industrial Fermentations; fungi, yeasts, bacteria and their physiological features.
iii. How microbial cells grow. Factors influencing the microbial growth.
iv. Basic metabolic pathways utilized and basic metabolic products synthesized by the microorganisms of the Industrial Fermentations.
v. Basic mathematical models simulating microbial growth.
vi. The kinetics of microbial growth: Batch culture. Mass balances and calculations.
vii. The kinetics of microbial growth: Fed-batch culture. Mass balances and calculations.
viii. The kinetics of microbial growth: Continuous culture. Mass balances and calculations..
ix. Technology of bioreactors – Scale up of processes – Modeling of processes.
x. Enzyme technology – The enzymatic catalysis – Influence of pH and temperature upon the enzymatic catalysis – Models of enzymatic catalysis.
x. Down-stream processing of biotechnological products.

## 4. TEACHING and LEARNING METHODS - EVALUATION

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|---|---|
| **DELIVERY**<br>*Face-to-face, Distance learning, etc* | Direct distant learning |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY**<br>*Use of ICT in teaching, laboratory education, communication with students* | Power point presentations (Theoretical course).<br>Experimental training (exercises, demonstration) (Practical course). |
| **TEACHING METHODS**<br>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.<br><br>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 | |

| ***Activity*** | ***Semester workload*** |
|---|---|
| Theory lectures | 13 weeks |
| Laboratory training | 10 sessions |
| Theory lectures | 75 h |
| Laboratory training | 50 h |
| | |
| | |
| TOTAL | ***125*** |

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| **STUDENT PERFORMANCE EVALUATION**<br>*Description of the evaluation procedure*<br><br>*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*<br><br>*Specifically-defined evaluation criteria are given, and if and where they are accessible to students.* | Theoretical course: written examination, that comprises questions of knowledge, comprehension and problems resolutions (100%).<br>Laboratory course: Questions of knowledge and comprehension concerning the practical aspects of the course (100%). |

## 5. LITERATURE

1. ΜΙΚΡΟΒΙΟΛΟΓΙΑ ΚΑΙ ΜΙΚΡΟΒΙΑΚΗ ΤΕΧΝΟΛΟΓΙΑ, Συγγραφέας: Γ. ΑΓΓΕΛΗΣ, Εκδόσεις ΣΤΑΜΟΥΛΗΣ ΑΕ, 2η έκδοση, 2017
2. ΜΗΧΑΝΙΚΗ ΒΙΟΔΙΕΡΓΑΣΙΩΝ - ΒΑΣΙΚΕΣ ΕΝΝΟΙΕΣ, Συγγραφέας: M. SHULER – F. KARGI, ΠΑΝ/ΚΕΣ ΕΚΔΟΣΕΙΣ ΕΜΠ, 2005