

COURSE OUTLINE

1. GENERAL

SCHOOL	AGRICULTURAL SCIENCES		
DEPARTMENT	FOOD SCIENCE AND TECHNOLOGY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	FST_X08	SEMESTER OF STUDIES	Winter semester
COURSE TITLE	INDUSTRIAL FERMENTATIONS		
INDEPENDENT TEACHING ACTIVITIES <i>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</i>	WEEKLY TEACHING HOURS	ECTS CREDITS	
Lectures	3		
Exercises	2		
Total	5	5	
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i>	Elective Specialized general knowledge		
PREREQUISITE COURSES:	There are no prerequisite courses		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek.		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBPAGE (URL)	https://eclass.upatras.gr/		

2. LEARNING OUTCOMES

<p>Learning outcomes</p> <p><i>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.</i></p> <p><i>Consult Appendix A</i></p> <ul style="list-style-type: none"> • <i>Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area</i> • <i>Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B</i> • <i>Guidelines for writing Learning Outcomes</i>
<p>After completing this course, students will be able to:</p> <ul style="list-style-type: none"> - Know the basic principles of using microorganisms for the production of products in the food industry - Know the metabolic processes that lead to the production of fermentation products - Use the modern and automated methods of measuring the evolution of a microbial culture - Know the basic types of bioreactors and how they work - Understand the main types of fermentations - Familiarize themselves with the calculation of fermentation parameters
<p>General Competences</p> <p><i>Taking into consideration the general competences that the degree-holder must acquire (as these appear in the</i></p>

<i>Diploma Supplement and appear below), at which of the following does the course aim?</i>	
<i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i>	<i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i>
<i>Adapting to new situations</i>	<i>Adapting to new situations</i>
<i>Decision-making</i>	<i>Decision-making</i>
<i>Working independently</i>	<i>Working independently</i>
<i>Team work</i>	<i>Team work</i>
<i>Working in an international environment</i>	<i>Working in an international environment</i>
<i>Working in an interdisciplinary environment</i>	<i>Working in an interdisciplinary environment</i>
<i>Production of new research ideas</i>	<i>Production of new research ideas</i>
<ul style="list-style-type: none"> • Search, analysis and synthesis of data and information, using the necessary technologies • Decision making • Autonomous work • Teamwork • Promotion of free, creative and inductive thinking 	

3. SYLLABUS

<p>Biotechnology/White biotechnology - biotechnological production of high added value products (chemicals, biopolymers, etc.) for use in food and related industries.</p> <p>Metabolic processes of microorganisms leading to the production of fermentation products.</p> <p>Main types of bioreactors. Design, operation, control.</p> <p>Main types of fermentations. Industrial applications of the use of microorganisms for the production of food industry products - Factors affecting the kinetics of growth and metabolism of microorganisms - Fermentation technology.</p> <p>Factors affecting the growth of microorganisms in the bioreactor. Continuous, semi-continuous, discontinuous cultivation.</p> <p>Aerobic – anaerobic processes. Stages of fermentations.</p> <p>Laboratory part:</p> <p>Microorganism concentration calculation, microbial growth curve, specific growth rate calculation, limiting substrate consumption – biomass yield, solid state fermentations, product production.</p>

4. TEACHING AND LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Face-to-face	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>	<p>Use of Information and Communication Technologies (ICTs) (e.g. powerpoint) in teaching.</p> <p>Communication with students: through e-mail, department's website and platform e-class.</p> <p>The lectures content of the course for each chapter are uploaded on the internet, in the form of a series of .pdf files, where students can freely download them from the platform e-class.upatras.gr</p>	
TEACHING METHODS <i>The manner and methods of teaching are described in detail.</i> <i>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.</i> <i>The student's study hours for each learning activity are given as well as the hours of non-directed study</i>	Activities	Work Load per semester
	Lectures (3 hours per week x 13 weeks)	39
	Seminars (1 hour per week x 13 weeks)	20
	Final examination (3 hours)	50
	Non-guided study	16
	Total number of hours for the Course (25 hours of work-load per ECTS credit)	125

<i>according to the principles of the ECTS</i>	
<p>STUDENT PERFORMANCE EVALUATION</p> <p><i>Description of the evaluation procedure</i></p> <p><i>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</i></p> <p><i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i></p>	<p>Written examination after the end of the semester (100%) including:</p> <ul style="list-style-type: none"> • Multiple-choice questions • Benchmarking theory elements <p>Grading scale: 1 to 10. Minimum passing grade: 5. Examination time: 3 hours.</p>

5. ATTACHED BIBLIOGRAPHY

1. Αγγελής, Γ., 2007. Μικροβιολογία & Μικροβιακή Τεχνολογία. Εκδόσεις ΑΘ. Σταμούλης
2. Σπηλιώτης, Β., Μπατρινού, Α., 2013. Βιομηχανική Μικροβιολογία. Εκδόσεις Δίσιγμα
3. Νεραντζής, Η., Ταταρίδης, Π., Λογοθέτης, Σ., 2014. Βιοτεχνολογία και Βιομηχανικές Ζυμώσεις. Εκδόσεις Έμβρυο.
4. Κλώνης, Ι., 2007. Ενζυμολογία. Εκδόσεις "ΕΚΔΟΣΕΙΣ ΕΜΒΡΥΟ ΣΤ. ΒΑΣΙΛΕΙΑΔΗΣ"