



**FOOD BIOTECHNOLOGY
COURSE OUTLINE**

GENERAL

SCHOOL	AGRICULTURAL SCIENCES		
DEPARTMENT	FOOD SCIENCE AND NUTRITION		
COURSE LEVEL	<i>Undergraduate</i>		
COURSE CODE	MK614	SEMESTER	6 th
COURSE TITLE	FOOD BIOTECHNOLOGY RESPONSIBLE: I. GIAVASIS		
INDEPENDENT TEACHING ACTIVITIES		WEEKLY TEACHING HOURS	ECTS
	Lectures	3	6
	Lab Lectures-exercises	3	
COURSE TYPE <i>Background, General Knowledge, Scientific Area, Skill Development</i>	<i>Scientific Area</i>		
PREREQUISITES:			
LANGUAGE OF TEACHING AND EXAMINATIONS:	GREEK		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	YES		
URL	https://eclass.uth.gr/courses/FOOD_U_172/		

TEACHING RESULTS

Teaching Results
<p>The course is a concise and summary description of methods, processes and technologies utilization of living microorganisms, or plant or animal cells for industrial production of products with applications in food, such as single cell protein and mycoprotein, enzymes, the microbial polysaccharides, polysaccharides, organic acids, vitamins, pigments, microbial fat, and other biotechnological products produced through microbial fermentation. In addition the course covers the applications of biocatalysis, i.e. the use of immobilized enzymes or cells for production of products or the production of food from tissue culture, such as laboratory meat. In the context of the course, a reference is first made to the types and metabolism of cells that they are used in biotechnology, in the conditions that affect the progress of a fermentation or culture cells, fermentation strategies, types of bioreactors, kinetics of industrial fermentations, the methods of enzyme immobilization and finally the applications of biotechnological products in food industry.</p> <p>Upon successful completion of the course, the student will be able to:</p> <ul style="list-style-type: none"> • Recognizes the differences between different types of cells (microbial, plant, animal) used in biotechnology, and different nutritional needs them or different requirements for their development. • Perceives the influence of environmental, nutrient substrate, or others parameters of a fermentation in the production of biotechnological products. • Become familiar with different fermentation strategies and microbial kinetics fermentations • Be aware of the risks to human health due to foodborne pathogens and the ways to prevent or deal with them. • Knows the types and the role of probiotic microorganisms in science and technology (fermented)



foods

- Knows and distinguishes the types of bioreactors for microbial fermentations, cell cultures or biocatalysis and how they work.
- Knows which are the main biotechnology products that find application in food science and technology, from which microorganisms or which cell types are produced, and what parameters determine their efficient production
- Knows the possible uses of enzymes or cells in biocatalysis and methods immobilization of enzymes or cells to produce biocatalysis products.
- Knows some modern forms of tissue culture for food production such as laboratory meat

General Skills

- Search, analysis and synthesis of data and information, with use of necessary technologies
- Adaptation to new situations
- Decision making
- Autonomous work
- Group work
- Work in an interdisciplinary environment
- Generation of new research ideas
- Exercise criticism and self-criticism
- Promotion of free, creative and inductive thinking

CONTENT

LECTURES

1st Week

Introduction to the basic concepts and the subject of Food Biotechnology

2nd Week

Basics of Prokaryotic and Eukaryotic Metabolism, Nutrition and Growth cells

3rd Week

Types and selection criteria of cells for the biotechnological production of products

4th Week

Microbial fermentations: Parameters that determine the efficiency and optimization of microbial fermentations

5th Week

Microbial fermentations: Different types of Fermentations (liquid, solid, continuous, discontinuous, discontinuous with feed, etc) and fermentation strategies

6th Week

Types and functions of bioreactors

7th Week

Kinetic parameters and optimization of Industrial Fermentations

8th Week

Microbial Protein Production (single cell protein and mycoprotein)

9th Week

Production of Microbial Polysaccharides 10th Week Production of Organic Acids, Alcohol, vitamins

11th Week

Production of dyes, antibiotics, microbial fat and laboratory meat

12th Week

Biocatalysis and Applications of Enzymes or Immobilized Cells

13th Week

Industrial production and enzyme immobilization methods

LAB LECTURES-EXERCISES

1st Isolation and maintenance of pure cultures of microorganisms

2nd Production of single cell protein and mycoprotein

3rd Production of ethanol from yeasts

4th Production of Lactic Acid from Lactobacillus and Citric Acid from Aspergillus

5th Production of Gellan by Sphingomonas

6th Amylase immobilization and enzyme activity measurement



TEACHING AND LEARNING METHODS - EVALUATION

TEACHING METHOD.	Face to face lectures in the auditorium/classroom and face to face laboratory exercises in an appropriate laboratory.		
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Use of e-class to communicate with students, posting announcements and educational materials, use MS-TEAMS platform in case of attendance need for distance education or examination		
TEACHING STRUCTURE	Activity Semester	Workload	
	Lectures	39	
	Lab Lectures	39	
	Literature Studying	15	
	Preparation for written examination	32	
	Course Total: (25 hours of workload per credit unit)	125	
EVALUATION OF STUDENTS	The evaluation language is Greek. The final grade of the course is formed by 70% of score of the theoretical part and by 30% of the laboratory courses. The exams for lectures part include multiple choice questions and developmental or critical questions. Laboratory exercises part exams include choice questions and exercises.		



BIBLIOGRAPHY

Suggested Bibliography:

- Microbiology and Microbial Technology, Aggelis Georgios [Details](#)
- FOOD BIOTECHNOLOGY, ROUKAS TRIANTAFYLLOS [Details](#)
- Biotechnology with elements of Biochemical Engineering, Liakopoulou - Maria Kyriakidou [Details](#)
- Modern Food Biotechnology, Batrinou A. [Details](#)
- BIOTECHNOLOGY AND INDUSTRIAL FERMENTS, Ilias Nerantzis, Panagiotis Tataridis, Stylianos Logothetis [Details](#)

Related scientific journals:

- Applied Microbiology and Biotechnology
- Journal of Applied Microbiology
- Enzyme and Microbial Technology
- Biotechnology and Bioengineering
- World Journal of Industrial Microbiology
- Food Biotechnology
- Fermentations
- Bioresource Technology