COURSE OUTLINE

1. GENERAL

SCHOOL	AGRICULTURAL SCIENCES		
ACADEMIC UNIT	FOOD SCIENCE AND TECHNOLOGY		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**FST_402**	**SEMESTER**	4th
COURSE TITLE	FOOD 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	
Lab Practical	2	
Total		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*	Specialised general knowledge
PREREQUISITE COURSES:	There are no prerequisite courses. However, the student should have basic knowledge of Microbiology.
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek. Teaching may be performed in English in case of foreign students
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	https://eclass.upatras.gr/

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 purpose of this course is for students to understand the fundamental importance of microorganisms in food (especially with regard to their negative effects: alterations and causing foodborne illnesses). Thus, this course focuses on the main categories of microorganisms found in food (bacteria, molds, yeasts, protozoa, and viruses), their sources, the microflora of different food categories, the characteristics of microbial growth in food, and the phenomena that can be observed during this process (colonization, mutualism, cooperation, competition). It also covers the endogenous (e.g. nutrient components, water activity) and exogenous (e.g. temperature, relative humidity of the environment) factors that affect microbial growth in food, the metabolism (aerobic respiration and fermentation) of the main components (carbohydrates, proteins, and lipids) of food by microorganisms, the important factors of microbial spoilage of food, the indicators (organoleptic, microbiological, and chemical) of microbial spoilage of food, and the main microorganisms associated with the spoilage of different food categories. Additionally, it discusses the importance of foodborne illnesses for public health and a country's economy, the types of foodborne illnesses (food poisoning, food infections, and toxicoinfections), the pathogenic microorganisms associated with each type, and finally, the microbial indicators of enteric pathogens (e.g. coliform bacteria, enterococci). The laboratory exercises aim to help students better understand some of the basic topics covered in the theory of the course.

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

By the end of this course the student will, furthermore, have developed the following skills (abilities):

- *Search for, analysis and synthesis of data and information, with the use of the necessary technology*
- *Production of new research ideas*
- *Respect for the natural environment*
- *Production of free, creative and inductive thinking*
- *Team work*

3. SYLLABUS

LECTURES

1. History and significance of food microbiology. Characteristics of dominant microorganisms in foods.
2. Important microorganisms in foods.
3. Sources of microorganisms in foods.
4. Normal microbiological flora of various foods.
5. Characteristics of microbial growth in foods.
6. Factors affecting microbial growth in foods.
7. Microbial metabolism of food components.
8. Important factors in microbial spoilage of foods.
9. Food alteration by microbial enzymes.
10. Indicators of microbial spoilage and specific foodborne microorganisms in various foods.
11. Important aspects of foodborne illnesses.
12. Important foodborne pathogenic bacteria.
13. Indicator microorganisms of enteric pathogens.

PRACTICAL EXERCISES

1. Effect of temperature on microbial growth and death (calculation of decimal reduction time).
2. Indirect calculation of microbial population through turbidity measurements (absorption).
3. Determination of milk hygiene quality through enumeration of coliform bacteria and biochemical tests for gas and indole production.
4. Isolation of pathogenic Salmonella bacteria from food using the enrichment method and biochemical identification.
5. Calculation of minimum inhibitory concentration (MIC) of chemical antimicrobial agents through the tube dilution method.

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face to face. Laboratory exercises in the Microbiology Lab.
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	• Use of ICT (powerpoint) in teaching • Use of ICT (powerpoint) in laboratory exercises • Use of ICT in Student Communication (Learning Support through the e-class platform)
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*	

Activity	***Semester workload***
Lectures	39
Laboratory practice	16
Writing short lab reports	25
Private study time of the students for the lab preparation and final examination	45
Course total **(25 work load for each ECTS credit)**	**125**

according to the principles of the ECTS	
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.*	• Short-answer questions, • Open-ended questions, • Written work, • Essay/report

5. ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

1. Food Microbiology T.J. Montville, K.R. Matthews

- Related academic journals:

1. International Journal of Food Microbiology (https://www.journals.elsevier.com/international-journal-of-food-microbiology)
2. Food Microbiology (https://www.journals.elsevier.com/food-microbiology/most-downloaded-articles)
3. Journal of Food Protection (http://jfoodprotection.org/)
4. Frontiers in Microbiology, Section Food Microbiology
5. Foodborne Pathogens and Disease (http://www.liebertpub.com/fpd)
6. Journal of Food Safety (http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1745-4565) The ISME Journal (International Society for Microbial Ecology)