COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF SCIENCES		
DEPARTMENT	DEPARTMENT OF CHEMISTRY		
LEVEL OF STUDIES	ISCED level 6 – Bachelor's or equivalent level		
COURSE CODE	EN9	**SEMESTER**	7th or 8th Semester
COURSE TITLE	Food Microbiology		

TEACHING ACTIVITIES *If the ECTS Credits are distributed in distinct parts of the course e.g. lectures, labs etc. If the ECTS Credits are awarded to the whole course, then please indicate the teaching hours per week and the corresponding ECTS Credits.*	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Theory	3	
	3	3
Please, add lines if necessary. Teaching methods and organization of the course are described in section 4.		

COURSE TYPE *Background, General Knowledge, Scientific Area, Skill Development*	Specialized Background, Specialization, Skills Development
PREREQUISITES:	NO
TEACHING & EXAMINATION LANGUAGE:	GREEK
COURSE OFFERED TO ERASMUS STUDENTS:	NO
COURSE URL:	

(2) LEARNING OUTCOMES

Learning Outcomes
Please describe the learning outcomes of the course: Knowledge, skills and abilities acquired after the successful completion of the course.

The course aims to introduce students to the fundamental concepts of Food Microbiology. Upon successful completion of the course, the student will have acquired the following skills:

- To understand the basic principles of Food Microbiology.
- To understand terms and processes such as microbial growth, survival and inactivation in foods, including:
  - Microorganisms and their properties
  - Environment and routes of transmission of microorganisms
  - Factors influencing microbial growth and food spoilage
  - Food preservation and destruction of microorganisms
- To understand modern methods for the production of foods with the aid of microorganisms, including:
  - Lactic acid bacteria and their fermentation products
  - Yeast-based fermentations and other types of fermentation
- To understand the importance of spore-forming microorganisms in foods.
- To understand methods for the detection and enumeration of microorganisms in foods.
- To understand rapid and automated microbiological methods.
- To understand the significance and usefulness of indicator microorganisms and microbiological criteria.
- To understand the significance and usefulness of regulations and safety management principles – Food Safety and Preventive Public Health Protection.

- To be familiar with the most important foodborne pathogenic bacteria and the associated health risks, such as:
  - Bacillus cereus
  - Species of the genus Campylobacter
  - Clostridium botulinum
  - Clostridium perfringens
  - Enterohemorrhagic Escherichia coli
  - Listeria monocytogenes
  - Species of the genus Salmonella
  - Species of the genus Shigella
  - Staphylococcus aureus
  - Species of the genus Vibrio
  - Yersinia enterocolitica
- To be familiar with the most important spoilage organisms.
- To understand the role of other biological hazards to food and health (moulds, parasites, protozoa, helminths, animal parasites, viruses and prions).
- To understand the significance and role of antimicrobial chemical agents and natural antimicrobial substances.
- To understand terms and processes such as biological preservation and probiotic bacteria.
- To understand terms and processes related to physical methods of food preservation.
- To understand terms and processes related to non-thermal processing.
- To understand terms and processes related to sanitation and sanitary practices, including:
  - Food Safety Objectives
  - Good Manufacturing Practices (GMPs)
  - Hazard Analysis and Critical Control Points (HACCP)
  - Food Safety Modernization Act (FSMA)

General Skills

Name the desirable general skills upon successful completion of the module

Search, analysis and synthesis of data and information,
ICT Use
Adaptation to new situations
Decision making
Autonomous work
Teamwork
Working in an international environment
Working in an interdisciplinary environment
Production of new research ideas
Project design and management
Equity and Inclusion
Respect for the natural environment
Sustainability
Demonstration of social, professional and moral responsibility and sensitivity to gender issues
Critical thinking
Promoting free, creative and inductive reasoning

By the end of this course, the student will have further developed the following general competences:

1. Ability to demonstrate knowledge and understanding of the essential facts, concepts, theories and applications related to Food Microbiology.
2. Ability to apply this knowledge and understanding to solve unfamiliar problems.
3. Ability to adopt and apply appropriate methodology to solve unfamiliar problems.
4. Study skills required for continuing professional development.
5. Ability to interact effectively with others on interdisciplinary problems.

More generally, upon completion of the course, the student will have further developed the following general competences:

- Searching for, analyzing and synthesizing data and information, using the necessary technologies
- Adaptation to new situations
- Decision-making
- Autonomous work
- Teamwork
- Exercise of criticism and self-criticism
- Respect for the natural environment
- Promotion of free, creative and inductive thinking

(3) COURSE CONTENT

The development of Food Microbiology as a scientific discipline

1. Microbial growth, survival and inactivation in foods
2. Microorganisms – properties of microorganisms
   - Environment and routes of transmission of microorganisms
   - Factors influencing microbial growth and food spoilage
   - Food preservation and destruction of microorganisms
3. Food production with the aid of microorganisms
   - Lactic acid bacteria and their fermentation products
   - Yeast-based fermentations and other fermentations
4. Bacterial spores and their significance
5. Detection and enumeration of microorganisms in foods
6. Rapid and automated microbiological methods
7. Indicator microorganisms and microbiological criteria
8. Regulations and safety management principles – Food Safety and Preventive Public Health Protection
9. Foodborne pathogenic bacteria – Health risks
   - Bacillus cereus
   - Species of the genus Campylobacter
   - Clostridium botulinum
   - Clostridium perfringens
   - Enterohemorrhagic Escherichia coli
   - Listeria monocytogenes
   - Species of the genus Salmonella
   - Species of the genus Shigella
   - Staphylococcus aureus
   - Species of the genus Vibrio
   - Yersinia enterocolitica
10. Spoilage organisms
11. Other biological hazards to foods and health – Moulds, parasites, protozoa, helminths, animal parasites, viruses and prions
12. Antimicrobial chemical agents and natural antimicrobial substances
13. Biological preservation and probiotic bacteria
14. Physical methods of food preservation
15. Non-thermal processing
16. Sanitation and related practices
    - Food Safety Objectives
    - Good Manufacturing Practices (GMPs)
    - Hazard Analysis and Critical Control Points (HACCP)
    - Food Safety Modernization Act (FSMA)

(4) LEARNING & TEACHING METHODS - EVALUATION

<table>
<tr><td>TEACHING METHOD
Face to face, Distance learning, etc.</td><td>Face to face</td></tr>
<tr><td>USE OF INFORMATION & COMMUNICATIONS TECHNOLOGY (ICT)
Use of ICT in Teaching, in Laboratory Education, in Communication with students</td><td>Use of ICT in teaching, in laboratory education, and in communication with students:
Organization of course material in ppt slides
Support of the learning process via the e-class electronic platform
Communication via email</td></tr>
<tr><td>TEACHING ORGANIZATION
The ways and methods of teaching are described in detail.
Lectures, Seminars, Laboratory Exercise, Field Exercise, Bibliographic research & analysis, Tutoring, Internship (Placement), Clinical Exercise, Art Workshop, Interactive learning, Study visits, Study / creation, project, creation, project. Etc.

The supervised and unsupervised workload per activity is indicated here, so that total workload per semester complies to ECTS standards.</td><td><table><tr><th>Activity</th><th>Workload/semester</th></tr><tr><td>Lectures</td><td>39</td></tr><tr><td>Bibliographic research & analysis</td><td>23</td></tr><tr><td>Interactive learning</td><td>13</td></tr><tr><td></td><td></td></tr><tr><td>Total</td><td>75</td></tr></table></td></tr>
<tr><td>STUDENT EVALUATION
Description of the evaluation process

Assessment Language, Assessment Methods, Formative or Concluding, Multiple Choice Test, Short Answer Questions, Essay Development Questions, Problem Solving, Written Assignment, Essay / Report, Oral Exam, Presentation in audience, Laboratory Report, Clinical examination of a patient, Artistic interpretation, Other/Others

Please indicate all relevant information about the course assessment and how students are informed</td><td>Written examination (mid-term and final examination)
Evaluation of assignments in the context of interactive teaching</td></tr>
</table>

(5) SUGGESTED BIBLIOGRAPHY

- Food Microbiology, Eudoxus Book Code: 94690299, Edition: 1/2020, Authors: Karl R. Matthews, Kalmia E. Kniel, Thomas J. Montville, ISBN: 9786182020043, Type: Textbook, Publisher: Εκδόσεις Δίσιγμα ΙΚΕ
- Food Microbiology and Hygiene, Eudoxus Book Code: 41957348, Edition: 1st/2013, Author: Heribert Keweloh, ISBN: 9789605080921, Type: Textbook, Publisher: Μαρία Πάρικου & ΣΙΑ ΕΠΕ
- Food Microbiology, Eudoxus Book Code: 122076003, Edition: 1st/2010, Authors: Thomas J. Montville, Karl R. Matthews, ISBN: 9789604117130, Type: Textbook, Publisher: Μαρία Πάρικου & ΣΙΑ ΕΠΕ
- Various scientific papers or review articles, which may be of general interest or cover recent developments in Biochemistry (and more broadly in the biological sciences) that, as is the case everywhere, take time to be incorporated into textbooks and may change every year, are uploaded on the e-class platform.

- Relevant scientific journals:
- Food Microbiology
- International Journal of Food Microbiology
- Fermentation
- AIMS Microbiology
- Marine Drugs
- Foods

- Food Research International
- Microbial Risk Analysis
- Journal of Microbiological Methods
- AIMS Agriculture and Food
- LWT – Food Science and Technology
- Journal of Functional Foods