COURSE OUTLINE

1. GENERAL

SCHOOL	AGRICULTURAL SCIENCES		
DEPARTMENT	FOOD SCIENCE AND NUTRITION		
EDUCATION LEVEL	*Undergraduate*		
LECTURE CODE	ME618	**SEMESTER**	6th
LECTURE TITLE	Molecular Diagnostics in Food Science		

SELF-ENDED TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**CREDIT UNITS (ECTS)**
LECTURES	3	3
LABORATORY EXERCISES	2	2
	5	5

COURSE TYPE	Scientific Area of Biology, Molecular Biology and Bioinformatics
PREREQUISITE COURSES:	Biology, Molecular Biology and Bioinformatics
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Yes (English)
COURSE WEBSITE (URL)	https://food.uth.gr/theodoros-goulas/

2. LEARNING OUTCOMES

Learning outcomes
Upon successful completion of the course, the student will be able to: • To know the most important molecular techniques used in food and beverage safety and quality • To know the applications of these in different foods with detailed examples. • Have a good knowledge of molecular analysis, sampling, approximations and sizes. • To know the basic equipment for the application of molecular analysis methods.
General Skills
1. Search, analysis and synthesis of data and information, also using the necessary technologies. 2. Adaptation to new situations. 3. Decision making. 4. Autonomous work. 5. Group work. 6. Generation of new research ideas. 7. Project planning and management. 8. Exercise criticism and self-criticism 9. Promotion of free, creative and inductive thinking

3. COURSE CONTENT

Theory

1st Week
Molecular techniques in food.

2nd Week
Unraveling the pathogenic behavior of plant pathogens through advanced molecular techniques

3rd Week
Molecular Characterization of Ochratoxigenic Fungal Flora as an Innovative Tool to Certify Coffee Origin

4th Week
Molecular and "Omics" Techniques for Studying Gut Microbiota Relevant to Food Animal Production

5th Week
Molecular identification and distribution of yeasts in fruit

6th Week
Current and new ideas on molecular methods for the identification of microbial growth in fruit juices

7th Week
Molecular techniques related to the identification of the bacterial microflora of seafood

8th Week
Assessment of the Microbial Ecology of Meat and Meat Products at the Molecular Level

9th Week
Molecular techniques for the determination of LAB in fermented cereals and meat products

10th Week
Determining the geographical origin of food with molecular techniques

11th Week
Molecular determination of enteric viruses in fresh produce

12th Week
Rapid detection of food pathogens using molecular methods 343

13th Week
Biosensor-based techniques: A reliable and primary tool for the detection of foodborne pathogens

Laboratory Exercises

1st Week
Real-time Reverse Transcription PCR

2nd Week
Quantitative PCR

3rd Week
ELISA

4th Week
Fluorescence in situ hybridization (FISH)

5th Week
Rabid Amplified Polymorphic DNA (RAPD)

6th Week
Terminal Restriction Fragment Length Polymorphism (TRFLP)

7th Week
Denaturing Gradient Gel Electrophoresis (DGGE)

8th Week
Temperature Gradient Gel Electrophoresis (TGGE)

9th Week
Ribosomal Intergenic Space Analysis (RISA)

10th Week
Next Generation Sequencing

11th Week
Microarrays

12th Week
Student presentations

13th Week
Student presentations and review of laboratory exercises

4. TEACHING AND LEARNING METHODS - ASSESSMENT

<table>
<tr><td>Delivery methog</td><td>In person.</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES</td><td></td></tr>
<tr><td>TEACHING ORGANIZATION</td><td>
<table>
<tr><th>Activity</th><th>Semester Workload</th></tr>
<tr><td>Lectures</td><td>39
(13 week x 3 hours)</td></tr>
<tr><td>Laboratory exercises.</td><td>26
(13 Lb. Ex. x 2 hours)</td></tr>
<tr><td>Report of laboratory exercises</td><td>21</td></tr>
<tr><td>Preparation for written exam</td><td>39
(13 Lect. x 2 hours)</td></tr>
<tr><td>Total Course
(25 workload hours per credit unit)</td><td>125
(5 ECTS)</td></tr>
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<tr><td>STUDENT EVALUATION</td><td>I. Written exam (80 %) of graded difficulty including:
- Multiple choice questions
- Short questions
- Questions of crisis and development

II. Laboratory exercises (20%):
- Participation and performance during the laboratory exercise
- Written report of laboratory results

Therefore: the total grade is obtained as a sum of the above two individual evaluations.</td></tr>
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5. SUGGESTED BIBLIOGRAPHY

-Suggested Bibliography :

- Molecular Techniques in Food Biology: Safety, Biotechnology, Authenticity and Traceability Aly Farag El Sheikha (Editor), Robert E. Levin (Editor), Jianping Xu (Editor)
- The Use of Molecular Biology Techniques in Food Traceability. M. Espiñeira, F.J.Santaclara

-Related Scientific Journals:

Journal of Microbiology, Biotechnology and Food Sciences
Food Science and Technology
Molecular Nutrition and Food Research
Molecular Nutrition and Food Technology
Molecular gastronomy
Food Chemistry