COURSE OUTLINE

1. GENERAL

SCHOOL	AGRICULTURAL SCIENCES		
DEPARTMENT	FOOD SCIENCE AND TECHNOLOGY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**FST_800**	**SEMESTER OF STUDIES**	8th
COURSE TITLE	Molecular Techniques in Food Analysis		

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**	**ECTS CREDITS**
Lectures	3	
Exercises	2	
Total	**5**	**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*	Compulsory Specialised general knowledge
PREREQUISITE COURSES:	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

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 to acquaint students with terms related to molecular biology, to help them understand the dynamics of various molecular techniques and their use in food analysis, to carry out selected molecular methods in the laboratory and to choose the most appropriate technique to serve the purpose of any experimental design.

After completing the course students will have an excellent understanding of molecular techniques, Genomics, Metagenomics, Transcriptomics, Proteomics, Electrophoresis, Isolation of genomic DNA and RNA, Polymerase Chain Reaction, Sanger and Next Generation Sequencing techniques.

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	*Search for, analysis and synthesis of data and information, with the use of the necessary technology*
Adapting to new situations	*Adapting to new situations*
Decision-making	*Decision-making*
Working independently	*Working independently*

Team work *Working in an international environment* *Working in an interdisciplinary environment* *Production of new research ideas*	*Team work* *Working in an international environment* *Working in an interdisciplinary environment* *Production of new research ideas*

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

3.SYLLABUS

Lectures

Lecture 1: Introduction and history of diagnosis.
Lecture 2: Infectious and physiological diseases, metabolic errors, genetic basis of disease, hereditary diseases.
Lecture 3: Infection - mode of transmission in infections, factors predisposing to microbial pathogenicity, types of infectious disease - bacterial, viral, fungal, protozoan, and other parasites.
Lecture 4: Philosophy and general approach to clinical specimens. Specimen collection - method of specimen collection, transport, and processing.
Lecture 5: Microbial communities of the human body, host-parasite relationships.
Lecture 6: Traditional methods and tools for disease diagnosis: diagnosis of infection caused by *Streptococcus*, Coliforms, *Salmonella*, *Shigella*, *Vibrio* and *Mycobacterium*.
Lecture 7: Molecular diagnosis of fungal infections. Important fungal diseases.
Lecture 8: Molecular diagnosis of DNA and RNA viruses.
Lecture 9: Molecular diagnosis of protozoan diseases.
Lecture 10: Molecular Diagnostic Techniques I.
Lecture 11: Molecular Diagnostic Techniques II.
Lecture 12: Genomics and Metagenomics as diagnostic tools.
Lecture 13: Microarrays as diagnostic tools.

Laboratory practice

1. Polymerase Chain Reaction (PCR).
2. Real-time Polymerase Chain Reaction (RT-qPCR).
3. Applications of microarrays.
4. Southern hybridization.
5. Northern hybridization.
6. Isolation and characterization of proteins.
7. ELISA (enzyme-linked immunosorbent assay).

4. TEACHING AND LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Use of Information and Communication Technologies (ICTs) (e.g., PowerPoint) in teaching. Laboratory practice in groups of 18-20 students Communication with students: through e-mail, department's website and platform e-class. 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
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,*	

Activities	***Work Load per semester***
Lectures (3 hours per week x 13 weeks)	39
Laboratory practice (2 hours per week x 7 weeks)	14
Study and analysis of bibliography	47

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 according to the principles of the ECTS*	<table><tr><td>Non-guided study</td><td>22</td></tr><tr><td>Final examination (3 hours)</td><td>3</td></tr><tr><td>***Total number of hours for the Course (25 hours of work-load per ECTS credit)***</td><td>**125**</td></tr></table>
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.*	Language of evaluation: Greek Methods of evaluation: Written examination after the end of the semester (100%) including: • Multiple-choice questions • Short-answer questions • Open-ended questions • Solving short calculation problems (e.g., calculating DNA/RNA concentration and quality) Grading scale: 1 to 10. Minimum passing grade: 5. Examination time: 3 hours.

5. ATTACHED BIBLIOGRAPHY

Suggested international bibliography

1. Medical Microbiology, Edited by Greenwood, D, Slack, R and Peutherer, J, ELST Publishers.
2. Parasitology, Chatterjee K.D, Chatterjee Medical Publishers.
3. Bailey & Scott's Diagnostic Microbiology, Betty A. Forbes, Daniel F. Sahm, Alice S. Weissfeld, Ernest A. Trevino, Published by C.V. Mosby.
4. Jawetz, Melnick, & Adelberg's Medical Microbiology, Geo F. Brooks, Stephen A. Morse, Janet S. Butel.
5. Fundamentals of Molecular Diagnostics. David E. Bruns, Edward R. Ashwood, Carl A. Burtis. Saunders Group.
6. Henry's Clinical Diagnosis and Management by Laboratory Methods. Mcpherson
7. Molecular Diagnostics: Fundamentals, Methods & Clinical applications. Lele Buckingham and Maribeth L. Flaws.
8. Molecular Diagnostics for the Clinical Laboratorian 2Ed, W.B. Coleman. Humana Press.

Related scientific journals

- The Journal of Molecular Diagnostics
- Molecular Diagnosis & Therapy
- Journal Expert Review of Molecular Diagnostics
- Advances in Molecular Diagnostics
- Frontiers in Molecular Diagnostics and Therapeutics