COURSE OUTLINE

(1) GENERAL

SCHOOL	Food and Nutritional Sciences		
ACADEMIC UNIT	Food Science and Human Nutrition		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	**3290**	**SEMESTER**	3rd
COURSE TITLE	INSTRUMENTAL CHEMICAL 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**	**CREDITS**
Lectures and Practice Exercises	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*	special background
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	

(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 object of the course Instrumental Chemical Analysis is to familiarize students on a theoretical and practical level with modern methods of instrumental chemical analysis. More specifically, in the theoretical traditions, emphasis is given to the beginning of each method, to its organology, to the interpretation of the graphs or spectra provided each time, as well as to the processing of the results for qualitative and quantitative measurements. Particular emphasis is given at the end to the choice of method and / or methods for solving specific analytical practical problems by the research or industrial practice.

The purpose of the workshop is to familiarize students with the organology and applications of Instrumental Analysis Methods (which are usually used in research laboratories, in public or private testing laboratories, while at the same time seeking:

• The direct connection of theoretical knowledge with practical application.
• Learning the proper preparation of the sample before its analysis.
• Understanding the basic functional parameters on which each instrument analysis method depends.
• Learning the correct process of measuring, receiving, processing data and estimating the final result.

Simultaneously with the previous ones, the students are trained in the writing of laboratory reports.

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…*
	…….

Autonomous Work
- Decision making
- Production of new research ideas
- Production of free, creative and inductive thinking

(3) SYLLABUS

1. Introduction to Instrumental Chemical Analysis
2. Sampling - Pre-treatment of a sample for analysis
3. Extraction techniques
4. Distillation techniques
5. Chromatographic analysis techniques
6. Gas Chromatography (GC)
7. High performance liquid chromatography (HPLC)
8. Spectroscopic analysis techniques
9. Ultraviolet - Visible (UV-Vis) spectrophotometry
10. Infrared (IR) Spectroscopy
11. Raman spectroscopy
12. Nuclear Magnetic Resonance Spectroscopy (NMR) (1H, 13 C NMR)
13. Mass spectrometry (MS)
14. Exercises

(4) TEACHING and LEARNING METHODS - EVALUATION

<table>
<tr><td>DELIVERY
Face-to-face, Distance learning, etc.</td><td>Lectures in the amphitheater and laboratory exercises in the laboratory.</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td>Use Powerpoint slides. Communication with students via e-mail, e-class and e-student. Learning process support through access to e-class, online databases, etc.</td></tr>
<tr><td>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 according to the principles of the ECTS</td><td>
<table>
<tr><th>Activity</th><th>Semester workload</th></tr>
<tr><td>Lectures</td><td>40</td></tr>
<tr><td>Laboratory Excercises</td><td>30</td></tr>
<tr><td>Individual laboratory work (results report)</td><td>35</td></tr>
<tr><td>Written individual work</td><td>20</td></tr>
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<tr><td>Course total</td><td>125</td></tr>
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<tr><td>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.</td><td>I. Written final exam in the theory of the course which includes:
1. Short Answer Questions (40%)
2. Evaluation of theory data (40%)
3. Problem solving (20%)

II. The examination in the laboratory part of the course is formed by:
1. the participation of students in the laboratory:
a) oral examinations before and during the exercises (25%)
b) evaluation of laboratory reports for processing laboratory results (25%).
2. final written examination (50%).
Final exam in the laboratory part of the course which includes:
a) Short answer questions
b) Multiple choice test</td></tr>
</table>

(5) ATTACHED BIBLIOGRAPHY

1. ΑΝΑΛΥΤΙΚΗ ΧΗΜΕΙΑ, G. Christian, P. Dasgupta, K. Schug, Odysseus publishing
2. Principles of Instrumental Analysis. D. A. Skoog, F. James Holler, T. A. Nieman (Translation: M. I. Karagiannis, K. I. Efstathiou, N. Haniotakis)
3. P. A. Tarantilis, M. Polysiou, C. Pappas. Instrumental Chemical Analysis, University Notes.