COURSE OUTLINE

(1) General information

FACULTY/SCHOOL	TECHNOLOGY		
DEPARTMENT	ENVIRONMENTAL SCIENCES		
LEVEL OF STUDY	*Undergraduate*		
COURSE UNIT CODE	NEW **COURSE**	**SEMESTER**	5
COURSE TITLE	MODERN METHODS FOR MONITORING ENVIRONMENTAL POLLUTION		

INDEPENDENT TEACHING ACTIVITIES in case credits are awarded for separate components/parts of the course, e.g. in lectures, laboratory exercises, etc. If credits are awarded for the entire course, give the weekly teaching hours and the total credits	**WEEKLY TEACHNG HOURS**	**CREDITS**
THEORETICAL BACKGROUND	3	3
LABORATORY PRACTICE	2	2
TOTAL	5	5

COURSE TYPE Background knowledge, Scientific expertise, General Knowledge, Skills Development	Skills development
PREREQUISITE COURSES:	ANALYTICAL AND ENVIRONMENTAL CHEMISTRY, ECOLOGICAL ENGINEERING
LANGUAGE OF INSTRUCTION &EXAMINATION/ASSESSMENT:	Greek
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No
COURSE WEBSITE (URL)	-

(2) LEARNING OUTCOMES

Learning Outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate (certain) level, which students will acquire upon successful completion of the course, are described in detail.
It is necessary to consult:

APPENDIX A

- *Description of the level of learning outcomes for each level of study, in accordance with the European Higher Education Qualifications' Framework.*
- *Descriptive indicators for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and*

APPENDIX B

- *Guidelines for writing Learning Outcomes*

Upon completion of the course the students are expected to

- *Acquire knowledge on the use of modern and highly sensitive methods in the analysis of organic environmental pollutants*
- *Acquire skills in the selection of appropriate methods in the analysis of environmental samples*
- *Acquire knowledge in new fast-track technologies for the detection of pollutants in environmental samples*

General Competences

Taking into consideration the general competences that students/graduates must acquire (as those are described in the Diploma Supplement and are mentioned below), at which of the following does the course attendance aim?

Search for, analysis and synthesis of data and information by the use of appropriate technologies,	*Project planning and management*
Adapting to new situations	*Respect for diversity and multiculturalism*
Decision-making	*Environmental awareness*
Individual/Independent work	*Social, professional and ethical responsibility and sensitivity to gender issues*
Group/Team work	*Critical thinking*
Working in an international environment	*Development of free, creative and inductive thinking*
Working in an interdisciplinary environment	*……*
Introduction of innovative research	*(Other…….citizenship, spiritual freedom, social awareness, altruism etc.)*
	…….

The teaching methods followed and the course content encourage:

1) The search, analysis and composing of information with the use of relevant technologies
2) Decision making upon critical evalution of data and information available
3) Group working
4) Individual working
5) Working in an international and multidisciplinary environment
6) Production of novel research ideas
7) Planning and management of constructions
8) Respect to environment and strengthening of environmental awareness
9) liberal, constructive and inductive thinking

(3) COURSE CONTENT

In the frame of the course novel and modern technologies currently used for the analysis of environmental samples will be presented. These methods are used for the detection and the qualitative and quantitative determination of environmental contaminants in complex environmental matrices. The fundamentals of analytical and biological methods will be presented along with applications in the analysis of water, soil and air samples. The headings of the lectures will be:

1. Review of the main organic and inorganic pollutants, Emerging micropollutants
2. Environmental Regulatory Framework – Maximum acceptable residues limits in environmental samples
3. State of the art methods in instrumental analysis (non-target analysis) with chromatography (LC-MS/MS, LC-LTQ-Orbitrap, LC-TOF-MS)) for the detection of emerging pollutants
4. Application of modern analytical tools for the detection of organic pollutants in environmental samples
5. Lab-on-a-chip – Applications in the detection of environmental pollutants

6. Biosensors – Species and fundamentals of operation

7. Biosensors – Applications in environmental samples

Laboratory Practicals

1. Analysis of environmental samples in LC-MS/MS – identification of molecules
2. Analysis of environmental samples in GC-MS/MS – identification of volatile molecules
3. Calculation of the limit of detection (LOD) and limit of quantification (LOQ)

(4) TEACHING METHODS-ASSESSMENT

<table>
<tr><td>MODES OF DELIVERY
Face-to-face, in-class lecturing, distance teaching and distance learning etc.</td><td>In-class lecturing, face to face</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATION TECHNOLOGY
Use of ICT in teaching, Laboratory Education, Communication with students</td><td>Use of power point presentations
Email communication with students
Upload of literature, examination papers and teaching material through e-class</td></tr>
<tr><td>COURSE DESIGN
Description of teaching techniques, practices and methods:
Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, Internship, Art Workshop, Interactive teaching, Educational visits, projects, Essay writing, Artistic creativity, etc.

The study hours for each learning activity as well as the hours of self-directed study are given following the principles of the ECTS.</td><td>
<table>
<tr><th>Activity/Method</th><th>Semester workload</th></tr>
<tr><td>Lectures</td><td>39</td></tr>
<tr><td>Theory study</td><td>40</td></tr>
<tr><td>Laboratory practicals</td><td>26</td></tr>
<tr><td>Essay writing and presentation</td><td>20</td></tr>
<tr><td>Course total
(25 hours of workload per credit unit)</td><td>125</td></tr>
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<tr><td>STUDENT PERFORMANCE EVALUATION/ASSESSMENT METHODS
Detailed description of the evaluation procedures:

Language of evaluation, assessment methods, formative or summative (conclusive), multiple choice tests, short- answer questions, open-ended questions, problem solving, written work, essay/report, oral exam, presentation, laboratory work, other……etc.</td><td>Students performance evaluation
• Through written exams at the end of the semester 80% of the final grade
• Presentation of a case study by groups of students 20% of final grade</td></tr>
</table>

Specifically, defined evaluation criteria are stated, as well as if and where they are accessible by the students.	

(5) SUGGESTED BIBLIOGRAPHY:

-Suggested bibliography

• INSTRUMENTAL ENVIRONMENTAL ANALYSIS – Delligianis, Hela, TZIOLA Publishers

- NANOBIOTECHNOLOGY AND BIOSENSORS - Kintzios S., 2017, EMBRYO Publishers.

-Complementary bibliography

Lecture notes: presentations of the lectures and of laboratory practicals are available in the e-class platform for all students to download