

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	EN7	SEMESTER	7th or 8th
COURSE TITLE	Toxicology		
TEACHING ACTIVITIES		TEACHING HOURS PER WEEK	ECTS CREDITS
<i>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.</i>			
Theory		3	3
<i>Please, add lines if necessary. Teaching methods and organization of the course are described in section 4.</i>			
COURSE TYPE <i>Background, General Knowledge, Scientific Area, Skill Development</i>	Specialized Background Knowledge, Scientific Specialization, Skills Development		
PREREQUISITES:	NO		
TEACHING & EXAMINATION LANGUAGE:	ENGLISH-GREEK		
COURSE OFFERED TO ERASMUS STUDENTS:	NO		
COURSE URL:	https://eclass2.emt.duth.gr/courses/CHEM-N1105/		

(2) LEARNING OUTCOMES

<p>Learning Outcomes</p> <p><i>Please describe the learning outcomes of the course: Knowledge, skills and abilities acquired after the successful completion of the course.</i></p> <p>The course aims to introduce students to the fundamental concepts and principles of Toxicology. Upon successful completion of the course, students will have acquired the following skills and competencies:</p> <ol style="list-style-type: none"> 1. To understand the fundamental principles of Toxicology. 2. To understand the fate and disposition of toxic substances, including the history and scope of Toxicology, principles of Toxicology, mechanisms of toxicity, and risk assessment, as well as concepts related to the absorption, distribution, metabolism, and excretion (ADME) of toxic substances, xenobiotic biotransformation, and toxicokinetics. 3. To understand the concepts of systemic toxicity, chemical carcinogenesis, genetic toxicology, and developmental toxicology. 4. To understand target organ toxicity through the study of the mechanisms and significance of toxic responses in the blood, immune system, liver, kidneys, respiratory system, nervous system, eye and visual system, cardiovascular system, skin, reproductive system, and endocrine system. 5. To understand the toxic effects associated with various toxic agents, including pesticides, metals, solvents and vapours, radiation and radioactive materials, animal venoms and toxins, and plant, fungal, and algal toxins. 6. To develop an in-depth understanding of concepts related to Environmental Toxicology, air pollution, and Ecotoxicology. 7. To understand the applications of Toxicology, including Food Toxicology, Analytical and Forensic Toxicology, Clinical Toxicology, and Occupational Toxicology. <p>General Skills</p>
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Name the desirable general skills upon successful completion of the module

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

Upon successful completion of this course, students will have further developed the following skills and competencies:

1. The ability to demonstrate knowledge and understanding of the essential facts, concepts, theories, and applications related to Toxicology.
2. The ability to apply such knowledge and understanding to the solution of unfamiliar problems.
3. The ability to adopt and apply appropriate methodologies for solving unfamiliar problems.
4. Study skills required for continuing professional development.
5. The ability to interact effectively with others in addressing interdisciplinary problems.

More generally, upon successful completion of the course, students will have further developed the following generic competencies:

- Search for, analysis and synthesis of data and information, using the necessary technologies.
- Adaptation to new situations.
- Decision-making.
- Autonomous work.
- Teamwork.
- Exercise of critical thinking and self-criticism.
- Respect for the natural environment.
- Promotion of free, creative and inductive thinking.

(3) COURSE CONTENT

THEORY

1. General Principles of Toxicology.
2. Fate and Disposition of Toxic Substances: History and Scope of Toxicology - Principles of Toxicology - Mechanisms of Toxicity - Risk Assessment.
3. Fate and Disposition of Toxic Substances: Absorption, Distribution, Metabolism, and Excretion (ADME) of Toxic Substances - Xenobiotic Biotransformation - Toxicokinetics.
4. Non-Organ-Directed Toxicity: Chemical Carcinogenesis - Genetic Toxicology - Developmental Toxicology.
5. Target Organ Toxicity: Toxic Responses of the Blood - Toxic Responses of the Immune System - Toxic Responses of the Liver - Toxic Responses of the Kidneys - Toxic Responses of the Respiratory System - Toxic Responses of the Nervous System - Toxic Responses of the Eye and Visual System - Toxic Responses of the Cardiovascular System - Toxic Responses of the Skin - Toxic Responses of the Reproductive System - Toxic Responses of the Endocrine System.
6. Toxic Agents: Toxic Effects of Pesticides - Toxic Effects of Metals - Toxic Effects of Solvents and Vapours - Toxic Effects of Radiation and Radioactive Materials - Toxic Effects of Animal Venoms and Toxins - Toxic Effects of Plant, Fungal, and Algal Toxins.
7. Environmental Toxicology: Air Pollution - Ecotoxicology.
8. Applications of Toxicology: Food Toxicology - Analytical and Forensic Toxicology - Clinical Toxicology - Occupational Toxicology.

(4) LEARNING & TEACHING METHODS - EVALUATION

TEACHING METHOD <i>Face to face, Distance learning, etc.</i>	Face to face
USE OF INFORMATION & COMMUNICATIONS TECHNOLOGY	Use of ICT in Teaching Use of ICT in Communication with students

(ICT) <i>Use of ICT in Teaching, in Laboratory Education, in Communication with students</i>		
<p>TEACHING ORGANIZATION <i>The ways and methods of teaching are described in detail.</i> <i>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.</i></p> <p><i>The supervised and unsupervised workload per activity is indicated here, so that total workload per semester complies to ECTS standards.</i></p>	Activity	Workload/semester
	Lectures	39
	Independent Study and Literature Review	23
	Interactive Teaching	13
	Total Course Workload	75 hours/semester
<p>STUDENT EVALUATION <i>Description of the evaluation process</i></p> <p><i>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</i></p> <p><i>Please indicate all relevant information about the course assessment and how students are informed</i></p>	<ul style="list-style-type: none"> • Written examinations (mid-term and final examination). • Evaluation of assignments completed within the framework of interactive teaching activities. 	

(5) SUGGESTED BIBLIOGRAPHY

<p><i>Recommended Bibliography</i></p> <ol style="list-style-type: none"> 1. Klaassen, C.D., & Watkins, J.B. <i>Casarett & Doull's Essentials of Toxicology</i>. Greek Edition. Parisianou Publications, Athens, Greece, 2013. 2. Selected scientific papers and review articles covering topics of general interest and recent developments in Toxicology, Biochemistry, and related biological sciences. As is common in rapidly evolving scientific fields, recent advances may not yet be incorporated into textbooks. These materials are updated periodically and made available through the e-Class platform <p><i>Relevant Scientific Journals</i></p> <ul style="list-style-type: none"> - Toxicology - Toxicology Letters - Current opinion in toxicology - Current research in Toxicology - Food and Chemical Toxicology - Toxicology and Applied Pharmacology - Environmental Toxicology and Pharmacology - Regulatory Toxicology
