Department of Environmental Health
Faculty of Health Sciences
American University of Beirut

ENHL 235 (3 cr.)
Toxicology & Risk Analysis
Spring semester AY 2019 - 2020

Course Coordinator:

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Office hours: MW 11:00-12:00

Class time and location:

Date & Time: MW, 9:30 - 10:45 am
Building/Classroom: Van Dyck Hall, Room 203

Prerequisites:

ENHL 220, BIOL 200/201, CHEM 208 and CHEM209

Course description:

This course provides an introduction to the field of toxicology. Students are introduced to the basic concepts of chemical toxicity and how they apply to classical and emerging contaminants of concern. The course discusses cellular penetration, distribution, metabolic conversion, and elimination of toxic agents, as well as fundamentals of xenobiotic interaction with biological systems, and how these relate to selected families of toxicants. At the same time, models used to provide quantitative estimates of dose-related adverse effects are explored. In addition, the course provides an overview of the health risk analysis framework, including risk assessment, risk management, and risk communication, in the context of when and how exposure to contaminants of concern may be controlled. Students are given the opportunity to apply learned concepts through case-studies and student lead discussions.

Course learning objectives

By the end of the course, students will be able to:

1. Interpret a dose-response relationship
2. Demonstrate an understanding of the phases of chemical disposition
3. Describe the main xenobiotic-metabolic pathways
4. Explain how various scenarios and toxicity outcomes can occur at the cellular level
5. Demonstrate an understanding of the general principles governing toxicity of select families of hazardous chemicals

6. Describe components of health risk analysis
7. Describe how risk assessment is conducted
8. Demonstrate an understanding of how health-based standards are set

Course Material Readings:

John Timbrell. Introduction to Toxicology. Latest Edition. Boca Raton, Florida: CRC Press, latest edition.

The course material includes lecture handouts and reading assignments used for discussion. The lecture handouts and reading material will be posted on Moodle prior to class. If the lecture handouts are not posted on Moodle ahead of class, the course coordinator is responsible for bringing in hard copies to class.

Course requirements and student evaluations:

Students will be evaluated on two exams, class participation, and a final examination as following:

Assessment method	Date	LOs covered	Grade percentage
Exam 1	Feb 24th, 2020	1-4	30%
The exam normally consists of multiple-choice and/or short-answer questions. Questions are divided into 2 categories: (1) independent questions assessing the acquired level of knowledge of the student on the topic, and (2) questions testing the ability of the student to use provided data or premise in critical reasoning.			
Exam 2	Mar 30th, 2020	5-7	30%
The exam normally consists of multiple-choice and/or short-answer questions. Questions are divided into 2 categories: (1) independent questions assessing the acquired level of knowledge of the student on the topic, and (2) questions testing the ability of the student to use provided data or premise in critical reasoning.			
Final Examination	TBA	1-8	35%
The Final Examination consists of multiple-choice questions. Questions are divided into 2 categories: (1) independent questions assessing the acquired level of knowledge of the student on the topic, and (2) questions testing the ability of the student to use provided data or premise in critical reasoning.			
Class Participation			5%
Assessed mainly through in-class problem-solving, general contribution during class time, and physical presence.			

Course Policies

Attendance
You are urged to attend all classes. In cases of absence, you are responsible for the material missed and for any announcement made. Students who miss more than one-fifth of class sessions are subject to withdrawing from the course (W) as per the University policy.

Academic Integrity
Education is demanding and time management is essential. Do not hesitate to use the resources around you but do not cut corners. Cheating and plagiarism will not be tolerated. Please review the Student Code of Conduct in your handbook and familiarize yourself with definitions and penalties. If you're in doubt about what constitutes plagiarism, ask your instructor because it is your responsibility to know. The American University of Beirut has a strict anti-cheating and anti-plagiarism policy. Penalties include failing marks on the assignment in question, suspension or expulsion from University and a permanent mention of the disciplinary action in the student's records.

Students with Special Needs
If you have documented special needs and anticipate difficulties with the content or format of the course due to a physical or learning disability, please contact me and/or your academic advisor, as well as the Counseling Center in the Office of Student Affairs (Ext. 3196), as soon as possible to discuss options for accommodations. Those seeking accommodations must submit the Special Needs Support Request Form along with the required documentation.

Non-Discrimination – Title IX
AUB is committed to facilitating a campus free of all forms of discrimination including sex/gender-based harassment prohibited by Title IX. The University's non-discrimination policy applies to, and protects, all students, faculty, and staff. If you think you have experienced discrimination or harassment, including sexual misconduct, we encourage you to tell someone promptly. If you speak to a faculty or staff member about an issue such as harassment, sexual violence, or discrimination, the information will be kept as private as possible, however, faculty and designated staff are required to bring it to the attention of the University's Title IX Coordinator. Faculty can refer you to fully confidential resources, and you can find information and contacts at www.aub.edu.lb/titleix. To report an incident, contact the University's Title IX Coordinator at 01-350000 ext. 2514, or titleix@aub.edu.lb. An anonymous report may be submitted online via EthicsPoint at www.aub.ethicspoint.com.

Φ Course Timetable

Session/ Date	Topic	Content	Reading	Relevant Assessment
1 W Jan 22	Course Overview	• Content and Requirements • Definitions		Exam 1 Final
Section I: General Principles				
2 M Jan 27	Introduction	• Historical aspects • Types of toxic agents • Potential exposures	Chapter 1	Exam 1 Final
3 W Jan 29	Dose-Response Relationship	• Dose-Response relationship • Dose-Response curve • Potency and safety	Chapter 1	Exam 1 Final
4 M Feb 03	Toxicant Disposition I	• Absorption	Chapter 2	Exam 1 Final
5 W Feb 05	Toxicant Disposition II	• Distribution • Excretion	Chapter 2	Exam 1 Final
Feb 10	**No Class: St Maroun's Day**			
6 W Feb 12	Toxicant Disposition III	• Phase I Metabolism	Chapter 3	Exam 1 Final
7 M Feb 17	Toxicant Disposition IV	• Phase II Metabolism • Factors in biotransformation	Chapter 3	Exam 1 Final
8 W Feb 19	Mechanisms of Cellular Toxicity	• Toxic intermediates • Types of Toxic responses	Chapter 4	Exam 1 Final
Section II: Special Topics				
9 **M Feb 24**	**EXAM 1: Sessions 1-8**			
10 W Feb 26	Environmental Toxicants	• Environmental exposure pathways • Environmental chemical exposure	Chapter 9	Exam 2
11 M Mar 02	*Case-Study 1**		Assigned Reading	Exam 2
12 W Mar 04	Industrial Toxicity	• Industrial chemicals exposures Toxic effects	Chapter 6	Exam 2
13 M Mar 09	Pesticides Toxicity	• Organochlorines • Organophosphates & Carbamates	Chapter 8	Exam 2
14 W Mar 11	Food Toxicity	• Food additives toxicity • Food contaminants	Chapter 7	Exam 2
15 M Mar 16	*Case-Study 2**		Assigned Reading	Exam 2
Section III: Risk Analysis				
16 W Mar 18	Introduction to Risk Analysis	• Defining Risk Overview of Risk assessment	Chapter 12	Exam 2 Final
17 M Mar 23	Chemical Regulatory Framework	• Controlling chemical exposure • Chemical regulatory agencies	Handouts	Exam 2 Final
W Mar 25	**No Class: Annunciation Day**			

18 **M Mar 30**	**EXAM 2: Sessions 10-17**			
19 W Apr 01	Hazard Identification	• Sources of Data • Toxicological evaluation	Chapter 12	Final
20 M Apr 06	Hazard Characterization	• Animal testing • Defining point of departure	Chapter 12	Final
21 W Apr 08	Setting Health-Based Standards	• Types of Standards • Extrapolations & uncertainties	Handouts	Final
M Apr 13	**No Class: Latin Easter**			
22 W Apr 15	Exposure Assessment (7)	• Aims of exposure assessment • Direct and indirect approaches • Quantitative methods	Handouts	Final
M Apr 20	**No Class: Greek Orthodox Easter**			
23 W Apr 22	Risk Characterization	• Non-cancer risks *vs.* cancer risk characterization • Cancer slope factor	Chapter 12	Final
24 M Apr 27	*Case-Study 3**		Assigned Reading	Final
25 W Apr 29	Risk Management	• Analyses for mitigation and minimization of risk • Risk of communication	Handouts	Final
26 Extra Session (TBA)	Toxicology in Public Health	• Wrap-up Session • Q & A	Handouts	Final
27 Date Announced by Registrar	***FINAL EXAMINATION (sessions 1-8, 16-17, 19-26)***			

ϕChanges in the timetable may occur during the term
****Sessions with assigned readings to be prepared before the session***

Drop end period: Apr 9th, 2019
Reading Period: May 3rd, 2019