

The University of Jordan

Faculty: Medicine

Department: Pathology, Microbiology and Forensic Medicine.

Semester: 1st.

Academic Year: 2013/2014

Environmental Toxicology (0501707).

Credit hours	3.0	Prerequisite	Analytical Toxicology (0501703) Analysis of Chemical Toxins (0501704)	Level	2
Coordinator / Lecturer	Prof. Abdelkader Battah	Office number	215	Office phone	23489
Course website	http://www2.ju.edu.jo/sites/Academic/akbattah/Material/ET-%20Toxicology%200501707.pdf	E-mail	akbattah@ju.edu.jo akbattah@gmail.com	Place	2 nd floor

Office hours					
Day	Sunday	Monday	Tuesday	Wednesday	Thursday
Time	10:00-12:00	-----	10:00-12:00	-----	10:00-12:00

Course Description

This course covers contaminants of the water, soil, air, food additive and preservatives as well as radiation pollution. It will cover sources and cycle of these toxins, mechanism of actions and their effects as well as their detection in different media. Also this course explore the update principles of natural products toxins from plant, animals and micro-organism and research methods for their identification and their application to the practice of toxicology. It will develop and integrate a systematic theoretical and practical approach toward problem solving.

Learning Objectives

To introduce the students to the different application of environmental chemistry techniques in the analysis of environmental pollutants at trace level using simple and advance techniques with emphasis on safety and good laboratory practice.

Intended Learning Outcomes (ILOs):

Successful completion of the course should lead to the following outcomes:

A. Knowledge and Understanding: Student is expected to:

A₁. Apply chemistry techniques in analysis of environmental pollutants at trace level using simple and advance techniques with emphasis on safety and good laboratory practice.

B. Intellectual Analytical and Cognitive Skills: Student is expected to:

B₁. Understand the basic chemistry behind separation techniques used in toxicology laboratories.

B₂. Appreciation of different techniques in environmental toxicological analysis.

C. Subject- Specific Skills: Students is expected to:

C₁. Describe the toxicity of the environmentally important gases in the atmosphere.

C₂. Describe the effects of anthropogenic pollutants on the troposphere and stratosphere and relate this knowledge to the understanding of major atmospheric pollution issues, namely ozone depletion, the greenhouse effect and photochemical smog.

C₃. Explain the main mechanisms of action of representative examples of environmental toxicants in causing a toxic response in living organisms.

C₄. Give examples of how synergistic and antagonistic effects can influence the toxic response to mixtures of pollutants in the environment.

C₅. Explain how representative examples of environmental toxicants can be experimentally detected and quantified in complex environmental samples.

C₆. Discuss the main factors affecting the quality of chemical analysis data for environmental systems, including issues affecting accuracy, uncertainty and detection limits in analytical methods.

C₇. Propose methods of analysis for representative examples of environmental toxicants, based on a combination of practical experience and general principles learned in the course.

C₈. Discuss the applicability of chemical analysis and toxicity data, both individually and together, in risk assessment and environmental monitoring.

D. Transferable Key Skills: Students is expected to be able to:

D₁. Have the ability to conduct analysis using the available instruments and apply the techniques learned in drugs analysis.

Teaching/Learning Methods

Teaching Method	ILO/s
Seminars and Discussions:	Yes
Homework and Assignments:	Yes
Other:	Laboratory work

Course Contents

Content	Reference	Week	ILO/s
Introduction		1	Lecture
Introduction to environmental toxicology and air pollution: <ul style="list-style-type: none"> ✓ Pollutant Cycles. ✓ Urban Pollutants: Their Sources and Biological Effects. ✓ Trends and Present Status of Air Quality. ✓ Pollution (by Motor Vehicles, Industrial Chemicals, Incinerators). ✓ Tall Stacks and Their Role in Transport of Pollutants. ✓ Heavy metals. ✓ Pesticides. ✓ Indoor Air Pollution. 	All references listed below.	2	Presentation, Discussion
Introduction to Environmental Toxicology Lab.	Laboratory Manual.	2	Laboratory work
Pollution of the atmosphere: <ul style="list-style-type: none"> ✓ The Earth's Atmosphere. ✓ Formation and Sustenance of Stratospheric Ozone. ✓ Contents. ✓ Depletion of Stratospheric Ozone. ✓ Emission of CO₂ and Models of Climatic Changes. ✓ Current Developments. ✓ Heavy metals. ✓ Pesticides. ✓ The Effects of Atmospheric Changes on Human Health. 	All references listed below.	3	Presentation, Discussion
Test for Ozone.	Laboratory Manual.	3	Laboratory work
Water and land pollution: <ul style="list-style-type: none"> ✓ Freshwater Reserves. ✓ Nitrogen Overload. ✓ Transport of Water Pollutants. ✓ Urban Pollutants. ✓ Heavy metals Pollution. ✓ Pesticides pollution. ✓ Soil Erosion. ✓ Nutrients and Pesticides. ✓ Alternative Agriculture. ✓ Genetically Modified Crops. ✓ Industrial Pollutants. ✓ Pollution of Groundwater. ✓ Airborne Water and Land Pollution. 	All references listed below.	4	Presentation, Discussion

Measurement of chloride in drinking water.	Laboratory Manual.	4	Laboratory work
Radioactive pollution: <ul style="list-style-type: none"> ✓ Ionizing Radiation. ✓ Measurement of Radioactivity. ✓ Sources of Radiation. ✓ Health and Biological Effects of Radiation (α, β, γ emitting isotopes and Radon). ✓ Nuclear Energy. 	All references listed below.	5	Presentation, Discussion
Measurement of Dissolved Oxygen in drinking water.	Laboratory Manual.	5	Laboratory work
Food and drinks packaging and its recycling: <ul style="list-style-type: none"> ✓ The Magnitude of the Problem ✓ Plastic Packaging ✓ The Need to Recycle Packaging Waste. 	All references listed below	6	Presentation, Discussion
Determination the dose response using lettuce seeds.	Laboratory Manual.	6	Laboratory work
Mid Exam		7	
Mid Exam	Laboratory Manual.	7	Laboratory work
Effects of pollutions and risk assessment: <ul style="list-style-type: none"> ✓ An Introduction to Food Webs ✓ Some Specific Examples of the Environmental Toxicities ✓ Risk versus Benefit ✓ Development of Safer Chemicals. ✓ An overview of the theory and application of ecological and environmental risk assessment and management protocols. 	All references listed below.	8	Presentation, Discussion
<ul style="list-style-type: none"> ✓ Environmental occupational toxicology: Threshold Limit Values and Biological Exposure Indices. ✓ Respiratory Toxicity. ✓ Irritation of Airways and Edema. ✓ Pulmonary Fibrosis. ✓ Pulmonary Neoplasia. ✓ Allergic Responses. ✓ Nephrotoxins. ✓ Liver Damage. ✓ Other Toxic Responses. 	All references listed below.	9	Presentation, Discussion
Measurements of cholinesterase activity in plasma and whole blood (I).	Laboratory Manual.	9	Laboratory work

Pollution control: <ul style="list-style-type: none"> ✓ Clean-Coal Technology. ✓ Control of Mobile-Source Emission. ✓ Control of Nitrogen Oxides. ✓ Energy Conservation. ✓ Wastewater Treatment. ✓ Waste Disposal and Recycling. ✓ Hazardous Waste. 	All references listed below.	10	Presentation, Discussion
Measurements of cholinesterase activity in plasma and whole blood (II).	Laboratory Manual.	10	Laboratory work
Regulatory policies and international treaties: <ul style="list-style-type: none"> ✓ The National Environmental Policy Act Environmental Regulatory Framework. ✓ EPA and Its Responsibilities. ✓ OSHA and Its Responsibilities. ✓ Miscellaneous Environmental Acts and Treaties. 	All references listed below.	11	Presentation, Discussion
Measurements of lead in whole blood (I).	Laboratory Manual.		Laboratory work
Environmental monitoring (analytical approach): <ul style="list-style-type: none"> ✓ Why Monitor Environmental Contaminants? ✓ Methods of Monitoring ✓ The Meaning of Analytical Results ✓ Analytical Techniques 	All references listed below.	12	Presentation, Discussion
Measurements of lead in whole blood (II).	Laboratory Manual.	12	Laboratory work
Water sources and pollutions in Jordan: <ul style="list-style-type: none"> ✓ Water sources. ✓ Water pollution. ✓ Scarcity Policy. 	All references listed below.	13	Presentation, Discussion
Measurements of lead in whole blood (III).	Laboratory Manual.	13	Laboratory work
Principles of waste management: <ul style="list-style-type: none"> ✓ Introduction to waste management; Definition, types, characteristics, generation, storage, collection, transfer, treatment, and disposal of wastes. ✓ Federal, Virginia, and local regulatory requirements and issues including a discussion of Resource Conservation and Recovery Act (RCRA). 	All references listed below.	14	Presentation, Discussion
Final Exam		14	Laboratory work
Activity.	All references listed below.	15	Presentation, Discussion
Activity.	All references listed below.	16	Presentation, Discussion

Learning Methodology:

- Seminars, Discussions, Home work and Laboratory work.

Home work and Assignments:

- Analysis of solid and liquid samples for the presence of environmental pollutants.
- Writing technical report.

Evaluation:

Evaluation	Point %	Date
Midterm Exam	Theoretical Exam: 25%. Practical Exam: 5%.	As given by The university of Jordan
Assignments	Seminar: 10%. Writing technical report: 10%.	During the semester.
Homework	Theoretical and Practical Homework: 10%	During the semester.
Final Exam	Theoretical Exam: 30%. Practical Exam: 10%.	As given by The university of Jordan

Main Reference(s):

1. Environmental Toxicology, Sigmund F. Zakrzewski- 3rd edition.
2. Principles of Environmental Toxicology, IAN SHAW and JOHN CHADWICK
3. Casarett and Doulls Toxicology, The Basic Science of Poisons, Klaassen CD, Amadur MO and Doull J.

References:

4. Principles of Clinical Toxicology, Gossel TA, Bricker JD.
5. Medical Toxicology, Diagnosis and Treatment of Human Poisoning, Ellenhorn, Barceloux.
6. Hand book of Human Toxicology. Massaro ED.
7. Clarke's Isolation and Identification of Drugs, Moffat A.
8. A Text book of Modern Toxicology, Ernest Hodgson.
9. Internet containing documented scientific information.

Intended Grading Scale

00-55	C
56-60	C+
61-65	B⁻
66-70	B
71-75	B+
76-80	A⁻
81-100	A

Notes:

- Concerns or complaints should be expressed in the first instance to lecturer; if no resolution is forthcoming, then the issue should be brought to the attention of the Department Chair and if still unresolved the Dean and then ultimately the Vice President. For final complaints, there will be a committee to review grading the final exam.
- For more details on University regulations please visit: <http://www.ju.edu.jo/rules/index.htm>