Department of Biology

College of Science

University of Salahaddin

Subject: Toxicology (Theory)

Course Book: Fourth Class

Academic year: 2023-2024

Course book

Course Title		Toxicology - theory
Code	Theory Hr./week	Practical Hr./week
SBIO	2	2

Course type	**Compulsory**
Department/College	**Biology/Science**
Course language	**English**

Course lecturer(s)	**Dr. Abdulilah Saleh Ismaeil**
Contact	abdulilah.ismaeil**@su.edu.krd** **Tel: (+9647504733977)**
Teacher's academic Profile	I graduated in 1998 from Salahaddin University - college of science, biology department, ranked third among biology department. I got master science (Food microbiology) in 2005 at college of science-salahaddin university. I got PhD in Food Microbiology at college of science-salahaddin university in 2020.
Course Objectives	• The course introduces the basic concepts of food toxicology. Toxicology has got special attention to the deleterious effects of chemicals and physical agents on all living systems. Toxicology can be an independent descriptive, empiric discipline to the fact of difficulty in diagnosis, controversial management and unknown end points. Many lethal exposures deserve early diagnosis & management before the confirmatory evidences.

Intended Learning Outcomes	**Upon completion of this course students learn:** ➢ Known types of toxicants. ➢ How decrease exposure to toxic compounds. ➢ Differentiate between poison and toxin. ➢ How the toxins introduce to human. ➢ Biotransformation of toxin. ➢ Excretion different toxicants.
Forms of teaching	The lectures will given to the student before lecture time, during the lecture time the subjects will be explained using data show and Wight board together.
Examinations and Grading	The students are required to do two theoretical examination (15%). Final examination 50%
Course Reading List and References:	1- Gilbert, S. G. 2005. A small dose of toxicology, Taylor & Francis e-Library. 2- Klaassen, C. D. 2008. Toxicology The basic science of poisons, seventh edition. The McGraw-Hill Companies. 3- Alemu, B. 2007. Toxicology, Lecture notes For Medical Laboratory Science Students, Ethiopia Ministry of Health. 4- Hodgson, E. 2010. A textbook of Modern toxicology, fourth edition. A John Wiley & Sons, Inc., Publication

Weekly Subjects

First week

An Introduction of toxicology, Epidemiology, Toxicologic terms and definitions

Second week

Basic classification of toxicology, Toxicokinetics and Toxicodynamics

Third week

Dose response, General approach to poisoned patients.

Fourth week

Basic toxicological testing methods

Fifth week

Bacterial toxins, Bacterial Toxigenesis, Types of Bacterial toxins.

Sixth week

Mycotoxins, its definition and General features of mycotoxin formation, Mycotoxicosis

Seventh week - First exam.

Eighth week

Foodborne intoxication, Clinical signs and symptoms, Biotoxications.

Ninth week

Biological effects of radiation, types of radiation, Radiotherapy.

Tenth week

Metals as Toxicants, Common Toxic Mechanisms and Sites of Action, lead, mercury and cadmium.

Eleventh week

Solvents as toxicants, Classes of solvents, Solvent abuse, Environmental contamination, Toxicokinetics,

Twelfth week

Properties and toxicities of animal venoms, Properties of animal toxins, Scorpions, Bees, Snake.

Thirteenth week

Toxic effects of pesticides, Economics and public health, Use of Pesticides, Human Poisoning, Insecticides, Herbicides, Fungicides, Rodenticides.

Fourteenth week - Second exam.

Practical part

1. Course name	**Practical Toxicology**
2. Lecturer in charge	**Renas Najat Saleem**
3. Department/ College	**Biology**
4. Contact	Renas.saleem@su.edu.krd
5. Time (in hours) per week	**2 hours**
6. Office hours	
7. Course code	
8. Teacher's academic profile	**Assistant lecturer Renas Najat Saleem** **CV:** I graduated from Salahaddin University-College of science in 2005. In 2012 I finished my Higher Diploma degree at Salahaddin University. In 2016 I finished my M.Sc. degree at Salahaddin University. **Now I am PhD. Student In Hematology.**

Practical Toxicology

Virtually each day you can read in the paper about the effects of various chemicals in the environment and in the diet on human health. Most of the articles speak of adverse effects observed in recent scientific investigations. However, it is often very difficult to critically evaluate the real potential significance of this information.

In this course, you will learn the basic principles that govern how chemicals interact with cells and organisms to cause adverse effects and what the critical determinants are that determine whether or not an adverse effect might occur. This will provide you with new tools to help interpret the barrage of information presented to you in the lay press and should be helpful in your professional activities.

Practically, we attempt to enrich the students' knowledge about toxicology as an important advanced science and its effects on living organism (animal, human and microorganisms) and their environment. We can increase their general academic technical and practical skills, increasing their basic knowledge and understanding of toxicology as well as all the terminology related to this science. They be informed about avoiding themselves from toxins and poisons, they know how toxins affect the organisms, their growth, productivity, life cycles, morphological appearance, shapes and sizes by following up the appropriate tests and experiments using many kinds of toxicants including heavy metals, pesticide, hydrocarbons, plastics and dioxins, radioactive substances, food additives, drugs, etc.

Course Objectives

Upon successfully completing this course, students will be able to:

- Describe the chemical properties and the biological processes which modulate the toxicokinetics of chemical agents of public health importance.
- Explain the significance of biotransformation reactions as a determinant of the toxicokinetic and toxicodynamics activities of chemicals.
- Describe molecular, cellular and pathophysiological responses resulting from exposure to chemical agents relevant to human health.
- Identify underlying susceptibility factors which contribute to the ability of chemicals to elicit bio-effects which contribute to human disease.
- Explain the science underlying testing for the ability of chemicals to elicit adverse human health effects.
- Put into perspective the role of toxicology in the risk assessment process.
- Discuss in depth the toxicology of selected organs and agents.

Forms of teaching

Different forms of teaching will be used like writing the head titles and topics, as well as power point presentation to give illustration about the principles toxicological terms and the principle of each procedure or tests used in the laboratory. Illustration methods are used include whiteboard, marker, data show and paper sheet if needed, showing videos, preparing samples , blood collection. Furthermore, students following up the results of the tests, writing notes, writing reports, doing weekly quizzes. Moreover, students may do educational field trips to food or water manufacturers and factories, besides students will be asked to prepare and answer the selective question marks assigned during the practical work or about the cause of the results. There will be discussions and give enough background to translate, solve, analyse, and evaluate problems sets, and different issues discussed throughout the course.

To get the best knowledge from this course, it is suggested that to encourage the students to participate in classroom discussions, laboratory activities and asking the teachers, preparing the assignments given in the course.

Grading

The students will do two practical exams in the form of (theoretical/practical or practical/practical). The first exam will be done in the mid of the course, and the second one will be done at the end of the course. The exam's evaluation is 30 marks, besides, other assignments including daily quiz, student's attendance, presence/absence, laboratory activities may take 5 marks. The final grade will be 35%. Thus: Practical examination and lab activities: 35%

Course material

Required references:

"Fundamentals of Toxicology". (2005). Pandey, K; Shukla, J.P. and Trivedi, S.P. New Central Book Agency (P) Ltd. India.
"**Principals of Biochemical Toxicology**", 2009, by John A. Timbrell, 4thedition, Informa healthcare.

Scientific articles about toxicology.

Course programme

Practical Toxicology Syllabus

Weeks	Subjects
Week 1	Lab 01: Terminology and Introduction to toxicology
Week 2	Lab 02: Toxicity of hydrocarbons on microorganisms
Week 3	Lab 03: Determination of Blood Alcohol concentration in Human.
Week 4	Lab 04: Effect of UV radiation on bacterial growth.
Week 5	Lab 05: Detection of food preservatives.
Week 6	Lab 06: Toxic material detection in samples by digestion method
Week 7	Lab 07: Detection of toxics in food and biological samples
Week 8	Lab 08; Determination of aflatoxin and ochratoxin in foods.
Week 9	First Examination
Week 10	Lab 09: Testing of the expired drugs on laboratory animals (mice or rat).
Week 11	Lab 10: Toxicity effects and duration study in rat administered toxics
Week 12	Lab 11: Toxicity Analysis of Toxic materials in laboratory rat (albino rats (Rattu norvegicus))
Week 13	Lab 12: Rat dissection and Hematological Analysis for rats administered toxics.
Week 14	Lab 13: Histological preparations for preserved tissues of rat administered toxics.
Week 15	Second Examination