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**Department of Environmental Science**

**College of Science**

**University of Salahaddin**

**Subject: Environmental Toxicity (practical)**

**Course Book/ First Semester – *(*3rd Year)**

**Assitant lecturer: Lanja Omer Tahir**

**Academic Year: 2022/2023**

**Course Book**

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| **1. Course name** | | | Environmental Toxicity (Practical) | |
| **2. Lecturer in charge** | | | Lanja Omer Tahir | |
| **3. Department/ College** | | | Environmental Sciences/Science | |
| **4. Contact** | | | e-mail:lanja.tahir@su.edu.krd  Tel:07507980946 | |
| **5. Time (in hours) per week** | | | Practical: 4 hrs | |
| **6. Office hours** | | | 2 hours in a week | |
| **7. Course code** | | |  | |
| **8. Teacher's academic profile** | | | I am **Lanja Omer Tahir** I have MSc. degree in Biology/ Water Quality. I get it in 2011 at the Biology Department at the College of Science-Salahaddin University. In addition, I get Bachelor’s in 2002-2003 in the biology department. I’m teaching different subjects in the environmental sciences & Health and biology department including; Environmental Toxicity and pesticide; limnology; plant and animal ecology; Ecology and pollution, Water pollution, Quality control, Algae, and Archegoniate. | |
| **9. Keywords** | | |  | |
| **10. Course overview:**  This systematic subject in this year comprise Toxicology sciences, toxicological text topics related to the study of the toxins, kinds of toxins and all chemical, physical, biological toxins that produce adverse effects on living organisms and their environments. Practically, we attempt to enrich the students' knowledge about toxicology as an important advanced science and it’s effects on living organism (plant, animal, human and microorganisms) and their environment (water, soil, air), extending their general academic technical and practical skills,and increasing their basic knowledge and understanding of Toxicology and pesticides and all the terminology related with; and how can to avoid from toxins & poisons; how can affect on organisms by affecting on, growth, productivity, life cycles of organisms, morphological appearance, shapes, sizes, color, odor by following up the appropriate tests and experiments on aquatic and terrestrial systems using many kinds of toxins: heavy metals, pesticide, fungicide, radiation, food preservatives, drugs etc… | | | | |
| **11. Course objective:**   1. We can summarize course objectives to the following points: 2. 1- To know the types of environmental toxicants practically. 3. 2- To find relationship between environmental toxicity and our lives. 4. 3- How to control Kurdistan Region from any toxicants. | | | | |
| **12. Student's obligation**  Every student must have two examinations, the attendance, classroom activities, translations and the weekly quizzes also taken into account by 6 marks for all. As well as the final examination of the course will be on 15 marks. So that the final grade will be based upon the following criteria:  \* Mean of three practical examinations: 15 %  \* Daily quizzes: 6%  \* Weekly Report and others: 8%  \* Activities: 6%  \* Final average : 35 % | | | | |
| **13. Forms of teaching**  Different forms of teaching will be used to reach the objectives of the course: power point presentations for the head titles and definitions and summary of conclusions, classification of materials and any other illustrations, besides worksheet will be designed to let the chance for practicing on several aspects of the course in the classroom, furthermore students will be asked to prepare research papers on selective topics and summarize articles contents published in English into either Kurdish or Arabic language, those articles need to be from printed media or internet articles. There will be classroom discussions and the lecture will give enough background to translate, solve, analyze, and evaluate problems sets, and different issues discussed throughout the course.  To get the best of the course, it is suggested that you attend classes as much as possible, read the required lectures, teacher's notes regularly as all of them are foundations for the course. Lecture's notes are for supporting and not for submitting the reading material including the handouts. Try as much as possible to participate in classroom discussions, and preparing the assignments given in the course given in the course. | | | | |
| **14. Assessment scheme**  The overall marks are of two part daily quizzes and monthly exams. The daily tests (quizzes) will be given 10 marks and finally calculated on 3% in addition to the monthly tests (2-3 tests), all these marks calculated as the yearly attempt mark 15% this is the yearly quest degree and the final exam will be done on 20%.  ‌ | | | | |
| **15. Student learning outcome:**  Students will learn the types of environmental toxicity practically in general, also they will learn how to control, minimize the sources of toxicants and the effects. | | | | |
| **16. Course Reading List and References‌:**  **"Fundamentals of Toxicology".** (2005). Pandey, K; Shukla, J.P. and Trivedi, S.P. New Central Book Agency (P) Ltd. India.  “**Principels of Biochemical Toxicology**”, 2009, by John A. Timbrell, 4thedition,Informa healthcare.  “**Principels of Biochemical Toxicology**”, Environmental and Industrial Applications, by John A. Timbrell, 4thedition, Informa healthcare.  And any other **Toxicology** bookspublished in 20 & 21st century, or can be obtained from sites of internet searching. | | | | |
| **17. The Topics:** | | | | **Lecturer's name** |
| **Weeks** | | | | **Subjects** |
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| **Environmental Toxicity:** | | | | |
| Lab 01 | Terminology. | | | |
| Lab 02 | Introduction to toxicology and toxicity testing procedures.   1. In terrestrial systems. 2. In aquatic systems. | | | |
| Lab 03-06 | * Toxic metal detection in: plants, water, soil and sediment and animal tissues. * Uses of toxicity tests in aquatic systems:  1. Tests on algae: 2. Cytotoxicity testing of CuSO4 on *Chara* sp. 3. Determination of LD50 of CuSO4 on *Euglena* sp. 4. Determination of CuSO4 bioaccumulation in *Chara* sp. | | | |
| Lab 07-10 | 1. Tests on protozoa: 2. Cytotoxicity testing of HgCl2 on *Paramecium* sp. 3. Determination of LD50 of HgCl2 on *Amoeba* sp. 4. Determination of HgCl2 bioaccumulation in *Paramecium* sp. | | | |
| Lab 11 | Effect of UV radiation on bacterial growth (eg. *Bacillus* sp.).  Effect of UV radiation on fungal growth (eg. *Aspergillus* sp.). | | | |
| Lab 12-13 | * Determination of polycyclic aromatic hydrocarbons (PAHs) in environmental samples (water, soil, sediments, foods, etc). * Toxicity of hydrocarbons in the environment. Testing chloroform, petroleum oil, naphthalene, benzene and ethanol on *E. coli* growth. | | | |
| Lab 14-15 | * Detection of food preservatives. * Effect of food preservatives on microorganisms. * Determination of aflatoxin and ochratoxin in foods. | | | |
| Lab 16 | Testing of the expired drugs on laboratory animals (mice or rat). | | | |
| Lab 17 | Determination of toxicity of Xenobiotic on higher organisms (animals). | | | |
| 24-25 | Effect of pesticides on non-target organisms:  Uses of toxicity tests in terrestrial systems (soil):   1. Tests on invertebrates: Toxicity testing of Glyphosate on earth worms. 2. Tests on plants (Weeds and Grassws): Toxicity testing of Glyphosate (Herbicide) on seed germination. | | | |
| **18. Practical Topics (If there is any)** | | | |  |
| **19. Examinations:** | | | | |
| **20. Extra notes:**  Here the lecturer shall write any note or comment that is not covered in this template and he/she wishes to enrich the course book with his/her valuable remarks. | | | | |
| **21. Peer reviewپێداچوونه‌وه‌ی هاوه‌ڵ**  This course book has to be reviewed and signed by a peer. The peer approves the contents of your course book by writing few sentences in this section.  *(A peer is person who has enough knowledge about the subject you are teaching, he/she has to be a professor, assistant professor, a lecturer or an expert in the field of your subject).*  ئه‌م کۆرسبووکه‌ ده‌بێت له‌لایه‌ن هاوه‌ڵێکی ئه‌کادیمیه‌وه‌ سه‌یر بکرێت و ناوه‌ڕۆکی بابه‌ته‌کانی کۆرسه‌که‌ په‌سه‌ند بکات و جه‌ند ووشه‌یه‌ک بنووسێت له‌سه‌ر شیاوی ناوه‌ڕۆکی کۆرسه‌که و واژووی له‌سه‌ر بکات.  هاوه‌ڵ ئه‌و که‌سه‌یه‌ که‌ زانیاری هه‌بێت له‌سه‌ر کۆرسه‌که‌ و ده‌بیت پله‌ی زانستی له‌ مامۆستا که‌متر نه‌بێت.‌‌ | | | | |

**Examples of Semester Examinations**

**Q1: Choose the suitable phrases for the following sentences:** (20 Marks**)**

1. Aflatoxin B1 is one of the:

**a)** Endotoxin **b)** Mycotoxin **c)** Phytotoxin

2. NaCl used as a: **a)** food preservatives **b)** color additives **c)** Industrial solvent

3. The germicidal properties of UV radiation that effectively inactivates the microorganisms:

**a)** UVA **b)** UVB **c)** UVC

4. for staining the slide it is better to use specific stain for each organ for histopathological studies mainly:

**a)** Haematoxylene **b)** Eosin **c)** Both of them

5. The adverse effects caused by toxic substances and occurring within a long period of time is considered as:

**a)** Acute toxicity **b)** Sub chronic toxicity **c)** Chronic toxicity

**Q2:** Write the steps of digestion of water

**Q3:-** Answer two of the following? (20 marks)

A/ What are the main toxic metals?

B/ What are the adverse effects of pesticides?

C/ What are the sources of radiation?

**Q4:-**Define the following criteria: LD50, Bioconcentration, Fungicide, Acidoses, Digestion?

(10 marks)

**Q5:-** Write down the procedure of parafilm method? (10 marks)

**Q6:-** Write **(T)** or **(F)** for the following, ***the false points\should be corrected***: (30 marks)

* 1. *Beneficial therapeutic drugs* can be toxic and producing harmful effects at some dose.
  2. All toxins are toxicants, but not all toxicants are toxins.
  3. More than 5%from thousands of mushrooms species are poisonous.
  4. Azo or aromatic amine dyes cause allergic reactions and contact dermatitis.
  5. Bacillus thuringiensis has a pesticidal property.

**Q7:-**Describe the chronic health effects of solvents (10 marks)

**Q8:** Mach the sentences in column A with suitable sentences in column B (20 marks)

|  |  |
| --- | --- |
| **A** | **B** |
| 1. HNO3 used in 2. NaCl cause 3. Organochloride used in 4. Pesticides cause 5. Benzoic acid is | 1. Neurodevelopment disorders 2. Halogenated hydrocarbons 3. Organic food preservatives 4. Aliphatic hydrocarbons 5. Kidney failure 6. Fire extinguisher 7. Digestion of water 8. Plasmolytic effect 9. pesticides |

**Q9:** Count only: (15 Marks)

1. Microbial toxins. 2. Subclasses of pesticides (5)

3. Parts of atomic absorption spectrophotometer instrument.

4. Classification of toxicity tests according to duration.

5. Earth worm classified according to the main ecophsiological category.

**Q10:** Fill the blanks with suitable sentences: (25 Marks)

1. …………….and …………….are two groups of pesticide identified as being extremely toxic to earth worms.
2. The short wave length for UV light processing range is…….. from …….....nm, called the ……..range which effectively inactivates the microorganisms.
3. Muskgrasses are actually ………..named by…………..
4. LC50 stands for ……………….and cause …………………........of a sample group of an organism, while EC50 stands for…………………that has………………….of test group of an organism.
5. …………..,…………….and ……………..are methods of adding test solution in toxicity test of aquatic system.

**Q1:A/ Fill the blanks with suitable phrases: (20 marks)**

1. A pesticide may be a ………….…..; ……………; …………….; …………….or ……………….used against any pest.
2. EPA classified pesticide in to two types……………….and ………………..
3. Earth worm are classified in to three main ecophysiological categories are: …………….;………………..and ……………………
4. Mancozeb is a …………………used for control of ………………

**B/** Write the health effect of pesticide on human, in briefly? **(5 marks)**

**Q2: Choose suitable phrases for the following criteria: (10 marks)**

1. The ability of a species to withstand specified levels of a particular pesticide.

a) Resistance b) Tolerance c) persistence

2. Keep pests away

a) Repellents b) Attractants c) Desiccants

3. Kill pests simply by touching them.

a) Contact poisoning b) Stomach poisoning c) Systemic poisoning

4. Earth worms depending on both physical and chemical properties of the soil:

a) Temperature & PH b) Aeration & food available c) All of them

5.………….not considered as household products:

a) Sanitizer b) Perfume c) Pet collars

**Q3: Define the following criteria: (25 marks)**

1. Biological control  **2.** Selective pesticide **3.** Acaricide **4.** Pesticide residue **5.** Half-life

**Q4: Describe, How can use pesticide in the field? (20 marks)**

**Q5: what are the differences between the following: (20 marks)**

1. Active ingredient and inert ingredient
2. Lethal poisoning and sub- lethal poisoning
3. Avicide and piscicide
4. Botanical pesticide and biochemical pesticide