****

**Department of Fish Resource and Aquatic Animals**

**College of Agriculture Engineering Sciences**

**University of Salahaddin**

**Subject: Aquatic Pollution**

**Course Book – *(*3rd Year)**

**Lecturer's name: Prof. Dr. Yahya A. Shekha**

**Academic Year: 2022/2023**

**Course Book**

|  |  |  |
| --- | --- | --- |
| **1. Course name** | **Aquatic Pollution** | |
| **2. Lecturer in charge** | **Asst. Prof.** **Dr. Yahya A. Shekha** | |
| **3. Department/ College** | **Fish Resource and Aquatic Animals- Agriculture Engineering Sciences** | |
| **4. Contact** | **e-mail:** [**yahyanian@gmail.com**](mailto:yahyanian@gmail.com) **or** [**yahya.shekha@su.edu.krd**](mailto:yahya.shekha@su.edu.krd)  **Tel: 07504532223** | |
|  | **For example Theory: 2**  **Practical: 3** | |
| **6. Teacher's academic profile** | I attained a B.Sc. degree in the Biology department college of science in 1992. After three years (1995) I was awarded an M.Sc. degree in Aquatic Microbiology in the same department. On 31-5-2003 I upgrade scientifically to lecturer. The Ph.D. degree was awarded in 2008 in Ecology and Pollution/ Water quality and Pollution, Biology Department, University of Baghdad, Iraq.  My academic title to Assistant Professor was attained on 27-3-2009. My scientific upgrade to Professor Degree is under process since 16-4-2016. During these years I taught students (B.Sc., M.Sc., and Ph.D.) in the Biology and Environment departments of different Colleges in many Universities in the Kurdistan Region various topics related to biology and ecology. Now I graduated with four M.Sc. students and now I supervised Ph.D. students in Environmental Sciences Department. I published more than 50 articles in local and international journals and participated in many scientific conferences. | |
| **7. Course overview:**  In this course, students will learns about water pollution in general, sources related to water pollution, types of contaminants (organic or inorganic, natural or synthetic, degradable or non-degradable, microbial). Furthermore, they will learn about the different aquatic ecosystems in Iraqi Kurdistan Region and familiarize with various anthropogenic activities which are posing a threat to the existence of these ecosystems, and the ways in which these ecosystems can be preserved. Students will also learn about the ways by which it can be used to solute water pollution. | | |
| **8. Course objective:**  Aquatic Pollution become one of the most important subject for all communities categories, it directly and indirectly affect human life, so it is important to study this subject for following reasons: learn the students all information about the water pollution, their components, constituents, living and non-living things in these aquatic ecosystems and the balance between the component in virgin or in clean environment, then known about all types of pollutant that may be physical, chemical or biological, or it may be from natural or artificial sources, or it may come from urban, industrial, agriculture source, then and how it may be effect on human being, what is the guidelines for these pollutant, there safe ranges for human, animal or plant life.  Teach student how to protect the environment from pollutant and pollution sources, conserve these ecosystems, put legislation and laws for each topics, in order to control the level of pollution in different aquatic ecosystems.  Awareness is another point should be taken account in this subject to learn even the community about the importance of water pollution and keep aquatic ecosystem clean. | | |
| **9. Student's obligation**  The attendance of student in the hall is the most important thing for lecturer, because it is the way to conduct information to student, then participating of student through lecture time by asking them, known their background, conversation, homework, quiz, report, etc. | | |
| **10. 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, description the types of pollution and their sources and any other illustrations, besides worksheet will be designed to let the chance for practicing on several aspects of the course in the classroom.  Graduate students will be required to review a scientific paper that relates to one of the course topics. The review will consist of a paper that is at a maximum of five pages (typed) in length and an oral presentation of the review (15 minutes in length). The goal is to have each student relate to the types and sources of environmental pollution. The format for the paper and presentation will be discussed in class. | | |
| **11. Assessment scheme**  Breakdown of overall assessment and examination  لێره‌ مامۆستا جۆری هه‌ڵسه‌نگاندن (تاقیکردنه‌وه‌کان یان ئه‌زموونه‌کان) ده‌نووسێت بۆ نموونه‌ تاقیکردنه‌وه‌ی مانگانه‌، کویزه‌کان، بیرکردنه‌وه‌ی ڕه‌خنه‌گرانه (پریزه‌نته‌یشن)، ڕاپۆرت نووسین، ووتار نووسین‌ یان ئاماده‌نه‌بوونی خوێندکار له‌ پۆلدا...هتد. ئامانه‌ چه‌ند نمره‌ی له‌سه‌رده‌بێت و مامۆستا چۆن نمره‌کان دابه‌شده‌کات؟‌ | | |
| **12. Student learning outcome:**  Aquatic pollution is the most important subject in our community because it has direct relation to our life, authority and NGOs and all companies give special importance to this subject. Student studies through this course it well cover all aquatic properties, pollutant, sources, effects, controlling, guidelines, conservation, restoration, well attended good information and knowledge about water pollution. | | |
| **13. Course Reading List and References‌:**  ▪ Balkis, Nuray. (2012). Water Pollution. **Published by InTech**, Croatia. 201pp.  ▪ Gray, N.V. (2010). Water Technology: An Introduction for Environmental Scientists and Engineers. 3rd Ed. IWA Publishing. 746pp.  ▪ Nollet, F.M. (2007). Hand Book: Water Analysis. 2nd Ed. CRC Press Taylor & Francis Group, Boca Raton, USA. 763pp.  ▪ Davis, M.L. (2010).Water and Wastewater Engineering: Design Principles and Practice. 2nd Ed. The McGraw-Hill Companies. | | |
| **14. The Topics:** | | **Lecturer's name** |
| ▪ Introduction to water pollution  ▪ Water pollution  ▪Drinking water pollution  ▪ Nature of wastewater  ▪ The Sapropic system and Saprobic indices  ▪ Water quality index (WQI)  ▪ Water Pollution by Agrochemical pollutants  ▪ Heavy metals as water pollutants  ▪ Pesticides as water pollutants  ▪ Hydrocarbons as water pollutants  ▪ Microbial activity in aquatic ecosystems  ▪ Facultative pond in wastewater treatment | | Lecturer's name  ex: (2 hrs) |
| **15. Practical Topics (If there is any)** | |  |
| ▪ Determination of color and Turbidity  ▪ Biochemical Oxygen Demand (BOD520)  ▪ Chemical Oxygen Demand (COD)  ▪ Nitrite, Nitrate, Organic Nitrogen and Total Nitrogen  ▪Determination of Nitrogen (Ammonia)  ▪First practical examination  ▪ Determination of orthophosphate (PO4)  ▪ Determination of Sulphate (SO4-2)  ▪ Determination of heavy metals by atomic Absorption  ▪ Determination of Oil and greases  ▪ Algae as organic pollution indicators  ▪Second practical examination  ▪ Detection of microorganisms  ▪ Insects as water pollution indicators  ▪Presentation seminar by students | | Lecturer's name  ex: (3 hrs) |
| **16. Examinations:**  ***1. Compositional:*** In this type of exam the questions usually start with Explain how, What are the reasons for…?, Why…?, How….?  With their typical answers  Examples should be provided  ***2.******True or false type of exams:***  In this type of exam. a short sentence about a specific subject will be provided, and then students will comment on the trueness or falseness of this particular sentence. Examples should be provided  ***3. Multiple choices:***  In this type of exam there will be a number of phrases next to or below a statement, and students will match the correct phrase. Examples should be provided. | | |
| **17. 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. | | |