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**Department of Environmental Science**

**College of Science**

**University of Salahaddin**

**Subject: Water Pollution**

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

**Lecturer's name Prof. Dr.Yahya Ahmed Shekha**

**Academic Year: 2022/2023**

**Course Book**

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| **1. Course name** | **Environmental Pollution** | |
| **2. Lecturer in charge** | **Dr.Yahya A. Shekha** | |
| **3. Department/ College** | **Basic Science- Basic Education** | |
| **4. Contact** | **e-mail:yahya.shekha@su.edu.krd**  **Tel: (optional)** | |
| **5. Time (in hours) per week** | **For example Theory: 2 hrs.** | |
| **6. Office hours** | **Every day 9- 12 am except day off** | |
| **7. Course code** |  | |
| **8. Teacher's academic profile** | **I accepted in Salahaddin University 1988- 1989 as a student in BSc and graduated 1991- 1992, then directly I accepted in MSc studies in 1992 and complete it in 1995 in specialization Environmental Microbiology (Aquatic microbiology), for ten years served as assistant lecturer in Biology Department/ College of Science, I teach under and postgraduate student all subjects related to environment to biology student, I attained Lecturer degree in 2003. Accepted in Biology Department- College of Science- Baghdad University 2004 for PhD studies, completed it in 2008 in Ecology and Pollution (Invertebrate Ecology and aquatic microbiology), attained assistant Prof. in 2009, and Professor in 2017. I published more than 32 manuscript in local and international Journals, participate in local conference and workshops,till now graduated four MSc student and I have another PhD student she still working in her project.** | |
| **9. Keywords** | **Environment, air, water, soil, pollution, human health** | |
| **10. Course overview:**  In this course, students will learns about ecology, branches of ecology, ecosystem. Furthermore, explaining the biotic components (Producers, consumers and decomposers). In addition to, abiotic components, energy flow in ecosystem. Food chains and web. Types of pyramids. | | |
| **11. Course objective:**  The course will cover principle information about Ecology, all component that consist our environment that surrounded us like physical, chemical, biological and geological factors and covers information about air, water and land, with references to metrological factors affecting our environment. The course will give students a better understanding of the Environment that surrounded us. | | |
| **12. 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. | | |
| **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, 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 ecology. The format for the paper and presentation will be discussed in class. | | |
| **14. Assessment scheme**  Lecture Exams (4 x 100 Points) 400 PointsAttendance, quizzes, report, home works 100 Points  Total 500 Points  Mean of four examination and others activities: 50%  Final examination: 50% | | |
| **15. Student learning outcome:**  Environmental 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 through studies in two courses which cover all environment (air, water and soil) properties, pollutant, sources, effects, controlling, guidelines, conservation, restoration, well attended good information and knowledge about pollution then it can be used or applied in future during their working . | | |
| **16. Course Reading List and References‌:**   1. ▪Gerry, Best. (1999). EnvironmentalPollution Studies. LiverpoolUniversity Press. 2. Marquita, K. Hill. (2004). UnderstandingEnvironmental Pollution. 2nd. Ed. Cambridge University Press. 3. Peirce, J. Jeffrey; Weiner, Ruth E. and Vesilind, E.Aarne. (1998). EnvironmentalPollution and control. 4th.ed. Butterworth-Heinemann. 4. Ronald A. Hites. (2007). Element of Environmental Chemistry. A John Wiley & Sons, INC., Publication. | | |
| **17. The Topics:** | | **Lecturer's name** |
| Week one: **Understanding pollution.** | | Lecturer's name |
| **Week Two: Overpopulation.** | |  |
| Week Three:Types and sources of air pollutants, particulate matter. | |  |
| Week Four:**Air pollutants (CO, CO2, NOx)** | |  |
| Week Five:**Air pollutants (SO2, H2S, Hydrocarbons)** | |  |
| Week Six:Examination | |  |
| Week Seven:**Dust pollution** | |  |
| Week Eight:**Hazardous air pollutants, Health effects.** | |  |
| Week Nine:**Global and atmospheric climate change.** | |  |
| Week Ten:**Acid deposition.** | |  |
| Week Eleven:**Other phenomenon as results of pollution (Thermal inversion, El-NinoSouthern Oscillation).** | |  |
| Week Twelve:Examination | |  |
| Week Thirteen:Sources of water pollution, | |  |
| Week Fourteen:**Biodegradation (Aerobic and anaerobic decomposition).** | |  |
| Week Fifteen:**Effect of pollution on different aquatic ecosystems.** | |  |
| Week Sixteen:**Specific phenomena related with water pollution- Algal bloom, Eutrophication.** | |  |
| Week Seventeen:**.Ground water pollution.** | |  |
| Week Eighteen:Examination | |  |
| Week Nineteen:**Oil pollution.** | |  |
| Week Twenty:**Thermal pollution** | |  |
| Week Twenty One:Organisms as **Biological indicators.** | |  |
| Week Twenty Two:**Soil pollution.** | |  |
| Week Twenty Three:**Pollutants of Agrochemical Sources: Pesticide Ecology.** | |  |
| Week Twenty Four: Examination | |  |
| Week Twenty Five:**Soil Pollution through Biological Warfare.** | |  |
| Week Twenty Six:**Solid Waste.** | |  |
| Week Twenty Seven:**Visual pollution.** | |  |
| Week Twenty Eight:**Light pollution.** | |  |
| Week Twenty Nine: Noise pollution. | |  |
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| **19. Examinations:**  Q1: Discuss the following: (Choose only **five**)   1. Major sources of ground water pollution. 2. El- Nino. 3. Benefits of solid waste recycling. 4. Behavioral change for pest control. 5. Most important features make microorganisms suitable for using it as biological weapons. 6. Problems of overpopulation and their solutions. 7. Effects of air pollutants on vegetation.   1)5 Marks)  Q2: Define the following: (Choose only **ten**)  1. IPM 2.Thershold shift of noise 3.Mousse 4. Climate change 5.Systematic toxins 6. Global cooling 7. Graffiti 8.Thermal enrichment 9. Thermal inversion 10. Asthma 11. Silicosis 12- Composting.  (5 Marks)  Q3: Fill the following blanks with correct word:   1. Words or drawings scribbled on public or private property without the owners' consent is called . 2. Population change = ( ) – ( ). 3. Painful loudness for human ear is db while in library it reaches db. 4. Light glare may classified into , , and the most dangerous one to human vision is . 5. Air pollutant that attack human liver as a target are and . 6. An examples for asphyxiation gases are and . 7. Dustfall can be calculated as 8. The result of equal values between crude birth and death rates is called . 9. UVA wavelength ranged from , while UVB have wavelength range . 10. CH3C(O)OO + NO2 . 11. and are examples of secondary pollutant.   (10 Marks)  Q4: Illustrate **one** of the following by sketching:   1. Malthus’s and Marx’s differing views on excess population growth. 2. Sources of soil pollution. (5 Marks)   Q5: Only enumerate the following:  1. Solutions of light pollution.  2. Solutions of indoor pollution. (5 Marks)  Answers:   1. **Major sources of groundwater pollution:**   This vital resource is threatened in many areas by overuse and pollution and by a wide variety of industrial, agricultural, and domestic contaminants. For decades it was widely assumed that groundwater was impervious to pollution because soil would bind chemicals and cleanse water as it percolated through. Spring water or artesian well water was considered to be the definitive standard of water purity, but that is no longer true in many areas.  The U.S. EPA estimates that every day some 4.5 trillion 1 (1.2 trillion gal) of contaminated water seep into the ground in the United States from septic tanks, cesspools, municipal and industrial landfills and waste disposal sites, surface impoundments, agricultural fields, forests, and wells. The most important of these in terms of toxicity are probably waste disposal sites. Agricultural chemicals and wastes are responsible for the largest total volume of pollutants and area affected. Because deep underground aquifers often have residence times of thousands of years, many contaminants are extremely stable once underground. It is possible, but expensive, to pump water out of aquifers, clean it, and then pump it back. For very large aquifers, pollution may be essentially irreversible on a human timescale.  Herbicides such as atrazine and alachlor are widely used on corn and soybeans and show up in about half of all wells in Iowa, for example. Nitrates from fertilizers often exceed safety standards in rural drinking water. They also are transformed into cancer-causing nitrosamines in the human gut. In Florida, one thousand drinking water wells were shut down by state authorities because of excessive levels of toxic chemicals, mostly ethylene dibromide (EDB), a pesticide used to kill nematodes (roundworms) that damage plant roots.  **El Nino/Southern Oscillations:**  The core of this climatic system is a huge pool of warm surface water in the Pacific Ocean that sloshes slowly back and forth between Indonesia and South America like water in a giant bathtub.  Most years, this pool is held in the western Pacific by steady equatorial trade winds pushing ocean surface currents westward. These surface winds are generated by a huge low-pressure cell formed by upwelling convection currents of moist air warmed by the ocean. Towering thunderheads created by rising air bring torrential summer rains to the tropical rainforests of Northern Australia and Southeast Asia. Winds high in the troposphere carry a return flow back to the eastern Pacific where dry subsiding currents create deserts from Chile to southern California. Surface waters driven westward by the trade winds are replaced by upwelling of cold, nutrient-rich, deep waters off the west coast of South America that support dense schools of anchovies and other finfish.  Every three to five years, for reasons that we don't fully understand, the Indonesian low collapses and the mass of warm Surface water surges back east across the Pacific. One theory is that the high cirrus clouds atop the cloud columns absorb enough solar radiation to cool the ocean surface and reverse trade winds and ocean surface currents so they flow eastward rather than west ward. Another theory is that eastward-flowing deep currents called barocline waves periodically interfere with coastal upwelling, warming the sea surface off South America and eliminating the temperature gradient across the Pacific. At any rate, the shift in position of the tropical depression sets off a chain of events lasting a year or more with repercussions in weather systems across North and South America and perhaps around the world.   1. **Benefits of Recycling:**   Recycling is usually a better alternative to either dumping or burning wastes. It saves money, energy, raw materials, and land space, while also reducing pollution. Recycling also encourages individual awareness and responsibility for the refuse produced. Curbside pickup of recyclables costs around $35 per ton, as opposed to the $80 paid to dispose of them at an average metropolitan landfill. Many recycling programs cover their own expenses with materials sales and may even bring revenue to the community. Another benefit of recycling is that it could cut our waste volumes drastically and reduce the pressure on disposal systems.  Japan probably has the most successful recycling program in the world. Half of all household and commercial wastes in Japan are recycled while the rest is about equally incinerated or landfilled. By comparison, the United States landfills more than 60 percent of all solid waste. Japanese families diligently separate wastes into as many as seven categories, each picked up on a different day. Would we do the same. Some authors say that Americans are too lazy to recycle. Recycling lowers our demands for raw resources. In the United States, we cut down 2 million trees every day to produce newsprint *U* and paper products, a heavy drain on our forests. Recycling the print run of a single Sunday issue of the *New York Times* would spare 75,000 trees. Every piece of plastic we make reduces the reserves supply of petroleum and makes us more dependent on foreign oil.  Recycling also reduces energy consumption and air pollution. Plastic bottle recycling could save 50 to 60 percent of the energy needed to make new ones. Making new steel from old scrap offers up to 75 percent energy savings. Ever since disposable paper, glass, metal, foam, and plastic packaging began to accompany nearly everything we buy, these discarded wrappings have collected on our roadsides and in our lakes, rivers, and oceans. Without incentives to properly dispose of beverage cans, bottles, and papers, it often seems easier to just toss them aside when we have finished using them. Litter is a costly as well as unsightly problem. We pay an estimated 32 cents for each piece of litter picked up by crews along state highways, which adds up to $500 million every year. "Bottle-bills" requiring deposits on bottles and cans have reduced littering in many states.   1. **Behavioral Changes:**   Crop rotation (growing a different crop in a field each year in a two to six-year cycle) keeps pest populations from building up. For instance, a soybean/corn hay rotation is effective and economical against white-fringed weevils. Mechanical cultivation can substitute for herbicides but increases erosion. Flooding fields before planting or burning crop residues and replanting with a cover crop can suppress both weeds and insect pests. Habitat diversification, such as restoring windbreaks, hedgerows, and ground cover on watercourses, not only prevents soil erosion but also provides perch areas and nesting space for birds and other predators that eat insect pests. Growing crops in areas where pests are absent makes good sense. Adjusting planting times can avoid pest outbreaks, while switching from huge monoculture fields to mixed polyculture (many crops grown together) makes it more difficult for pests to find the crops they like. Tillage at the right time can greatly reduce pest populations. For instance, spring or fall plowing can help control over wintering corn earworms. An important behavioral adjustment can occur in our attitudes and preferences. Farmers can be persuaded that the bare earth look in row crops made possible by powerful herbicides is not good for the soil or for themselves. Allowing a few weeds to creep in or planting a cover crop between rows may make more sense in the long run. Consumers may have to learn to accept fruits and vegetables that are less than perfect.   1. Important criteria for the use of harmful or disease-carrying biological agents, making them suitable for use as biological weapons, include: **infectivity**, **virulence**, **toxicity**, **pathogenic character**, **incubation period**, **transmissibility**, **lethality**, and **stability**. Other than their counterparts in chemical warfare, these agents are characterized by their ability to multiply in the body over time and actually increase their effect. 2. Environmental problems are aggravated by population explosions. More people mean more resources and energy are consumed and more pollution is created and more waste is sent to landfills. More land is needed to grow crops and build houses. More trees are cut down for new homes. More cars are built, more fossil fuels are used, and more gases are released into the environment. More natural wilderness areas or beautiful landscapes are destroyed to provide resources and cropland. In short, population growth makes other environmental problems harder to solve.  * Shortage of food * Shortage of social facilities, like houses, schools and hospitals. * Shortage of jobs * Environmental pollution * Traffic congestion  1. **Effects of air pollutants on vegetation:**   Vegetation is affected very quickly by the presence of pollution. Crops are destroyed, and shrubbery and ornamental plants become spotted and are eventually devastated.  Sulfur dioxide enters the leaf through the stoma and causes injuries on the blade. Leaves are marked with an ivory or brown to reddish-brown color. Although brief exposure at a low concentration only temporarily injures the plant, sustained exposure causes death of plant cells.  Hydrogen fluoride is toxic to some plants at extremely low concentrations. Fluoride particles can harm a plant when they are absorbed through the surface of the leaf. Leaves exposed to fluoride generally have burned, dried-out edges. Photochemical smog are a serious hazard to plants, because they produce both visible and invisible injuries. The stomata or leaf openings, through which the plant draws carbon dioxide, are closed up. Severe smogs kill plants, whereas chronic exposure to lesser smogs retards their growth. The harmful components of the smog are ozone and PAN. Ethylene, a gaseous hydrocarbon, is a product of automotive exhausts. It is part of the photochemical smog process and also part of the destruction of vegetation.   1. **IPM:** Integrated pest management (**IPM**) is a flexible, ecologically based pest-control strategy that uses a combination of techniques applied at specific times, aimed at specific crops and pests. It often uses mechanical cultivation and techniques such as vacuuming bugs off crops as an alternative to chemical application. 2. **Thershold shift of noise:**A **threshold shift** is an elevation in the threshold of hearing-that is, the quietest sound that can be heard becomes a louder sound. 3. **Mousse:** when oil spills to seawater some of the compounds in the oil evaporate, the oil gets thicker, waves batter this viscous oil into a thick water and- oil emulsion called mousse. 4. **Climate change** is the unpredictable adjustment from one climate condition to another.   5. **Systemic Toxins:** Chemicals picked up from the environment by the lungs may cause disease in organs other than those of the respiratory tract. Air pollutants that get into the bloodstream via the lungs to cause problems in various other parts of the body are called systemic toxins. Lead and mercury are prime examples of systemic toxins that can be picked up from the air.   1. **Global Cooling:** Earth's atmosphere is also subject cooling factors. For example, on average clouds cover 50% of Earth's surface and reflect some 21%of solar radiation away to space. This reflection of sunlight is called the **planetary albedo**, and it contributes to overall cooling. 2. **Graffiti:** words or drawings scribbled on public or private property without the owners' consent. 3. Warm water has little deleterious effect and may even lead to improved function of the receiving aquatic ecosystem. This phenomenon is seen especially in seasonal waters and is known as **thermal enrichment**. 4. **Thermal inversion**: This phenomenon by which dirty air can be moved away from the earth's surface vertically is blocked whenever there is a temperature inversion. A temperature inversion or **thermal inversion** is a condition where in temperature actually increases with altitude within a layer in some part of the troposphere. In other words, there is a layer of warm air over some cold air. The effect of this is that surface-heated air rises through the lower levels only until it reaches the inversion layer. There the rising air is suddenly not warmer (less dense) than the air above or around it, and so it stops rising. Convection is thus halted, and air is effectively trapped, together with any pollutants it carries, as long as the inversion persists. 5. **Asthma** is an allergic reaction in which the membranes of the bronchioles are irritated by inappropriately severe reaction to foreign materials such as pollen. The disease is marked by narrowing of airways caused by bronchospasms, edema of bronchial linings, and over secretion of mucus. 6. **Silicosis** are caused by a special class of air pollutants that bring about structural changes in the lungs, the active ingredient is silicon dioxide. 7. **Composting:** Pressed for landfill space, many cities have banned yard waste from municipal garbage. Rather than bury this valuable organic material, they are turning it into a useful product through composting: biological degradation or breakdown of organic matter under aerobic (oxygen-rich) conditions. The organic compost resulting from this process makes a nutrient-rich soil amendment that aids water retention, slows soil erosion, and improves crop yields. A home compost pile is an easy and inexpensive way to dispose of organic waste in an interesting and environmentally friendly way.   13. Increasingly, cities are composting yard waste and other organic material. This quickly reduces the waste stream, and rich compost can be sold to gardeners for an extra profit.  Q3:   1. Graffiti. 2. (Births + Immigration) – (Deaths + Emigration). 3. 135db, 35db. 4. Blinding, disability and discomfort, most dangerous is discomfort. 5. Selenium and chlorinated hydrocarbon. 6. CO and H2S.   3   1. ZPG (zero population growth). 2. 320 to 400nm, 280- 320nm. 4. Ozone, PAN or acid rain. | | |
| **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.‌‌ | | |

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**Department of Environmental Sciences**

**College of Science**

**University of Salahaddin**

**Subject: Water Pollution (Practical)**

**Course Book /Second semester– (Third stage)**

**Lecturer's name: Lanja Omer Tahir**

**Academic Year: 2022/2023**

**Course Book**

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| **1. Course name** | Water Pollution (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: 6 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:**  **The course will cover environmental Pollution in general, we will describe the types of pollution which include Air Pollution, Water Pollution, Soil Pollution, Noise Pollution, Visual Pollution, Light Pollution, also we have experiments for these Pollutions in the laboratory.** | | |
| **11. Course objective:**   1. We can summarize course objectives to the following points: 2. 1- To know the types of Pollution practically. 3. 2- To find relationship between Pollution and our lives. 4. 3- How to control Kurdistan Region from any Pollutions. | | |
| **12. Student's obligation**  Every student must have three examinations, the attendance, classroom activities, translations and the weekly quizzes also taken into account by 5 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, preparing the assignments given n the coursegiven 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 Pollution practically in general, also they will learn how to control, minimize the sources of Pollution and the effects. | | |
| **16. Course Reading List and References‌:**   1. Frankt T., SIAN P. (2000). Air Pollution and Acid Rain. Division of Mathematics, Physical Sciences, & Engineering South Mountain Community College. 2. Graham C. (2004).Water Analysis Handbook. Head officeOFFICE: Canada. 3. Radojevic, M. and Bashkin, V. N. (2006). Practical Environmental Analysis. 2nd Edition. The Royal Society of Chemistry. | | |
| **17. The Topics:** | | **Lecturer's name** |
| **Course programme**  **(Water pollution)**  **1-Total Suspended Solids in water (TSS)**  **2-Biochemical oxygen demand (BOD5) determination**  **3-Chemical oxygen demand (COD) determination.**  **4-Determination of Oil and Grease in water**  **5-Determination of ammonia (NH3) in water**  **6-Determination of Nitrite (NO2) in water**  **7-Determination of total phosphorus (P) in water**  **8-Algae as bio indicator of water pollution**  **9-Invertebrate as bio indicator of water pollution**  **10 – seminar**  **11- exam** | | ***Week 1:***  ***Week 2:***  ***Week 3:***  ***Week 4:***  ***Week 5:***  ***Week 6:***  ***Week 7:***  ***Week 8:***  ***Week 9:***  ***Week 10 & 11:***  ***Week 12:*** |
| **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.‌‌ | | |

**University of Salahaddin Limnology & water quality Examination 3rd stage**

**Collage of science Practical/ second semester**

**Environmental science Department 2021 Time: 1hour**

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Q1/ Write the true on the end of true sentences and falls on the end of falls sentences and then correct the falls words. (7 marks)

1-The concentration of COD is always lower than BOD 5.

2- COD is oxidizing nitrogen compounds while BOD5 decompose only carbon compound waste.

3- The COD procedure provides an advantage to the process monitoring daily waste product and waste water discharge.

5- Cause Permanent hardness when it founds in the form of CaCO3or Mg CO3.

6- The presence of dissolved solids in water may affect its taste.

7- Organic N: - found in natural components, including: Protein, Carbohydrate.

Q2/ A) Choose the suitable answer. (5 marks)

1. The phenomenon that caused by high levels of N and P compounds in water called

a) Self-purification b) Deamination c) Eutrophication

2. --------------------- absorb heat from sunlight, which increases water temperature and subsequently decreases levels of dissolved oxygen

a) Precipitated solid matter b) Suspended solid matter c) Dissolved solid matter.

3- The preferable method for determination detection of COD is:

a) the Dichromate Reactor Digestion Method b) Dichromate reflux method c) EDTA titrimetrically method

4. The wave length of spectrophotometer that used for determination of Nitrite in water is:

a) 640 nm b) 543 nm c) 885 nm

5. Sulfate cause salinity when its concentration more than

a) 20ppm (mg.L-1) b) 50ppm (mg.L-1) c) 200 ppm (mg.L-1)

Q2/ B) write only the measured gas in this two following figure (3 marks)

** **

Q3/ connect the write words in list A & B ( 14 marks)

List A List B

1. Sulfanilamide

BOD5 2. Buffer solution

3. alkali-iodide-azide

4. Ammonium molybdate reagent

5. Sodium nitroprusside

NH3 6. starch solution

7. N-(1-naphthyl)-ethylene diamine dihydrochloride

PO4 8. concentrated sulfuric acid

9. Phenol

SO4 10. Stannous chloride reagent

11. Sodium thiosulfate

12. BaCl2

NO2 13. Oxidizing reagent (sodium citrate+NaOH+ NaOCL)

14. Manganese sulfate

Q4/ Fill the following blanks. (6marks)

1-The NO**3** concentration more than 10 mg.L**-1** in drinking water causes **------------------------------**

in infants, so the ----------------- turn to ------------------in digestive tract which in turn binds with

the ----------------------, then the Hb can’t carry O**2** to the body parts, reduced respiration activity & cause death sometimes.

2- We used dark bottles for determination of BOD5 to eliminate the --------------------- process

3- In BOD5 determination we use sodium azide NaN3 to remove ---------------- interference.

With our best wishes

Msc. Lanja Omer Tahir