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**Department of Horticulture**

**College of Agricultural Engineering sciences**

**University of Salahaddin**

**Subject: Irrigation Engineering Systems**

**Course Book – *2nd year***

**Lecturer's name: Dr. Abd-Elrahman Perdawood Haydar**

**Academic Year: 2022/2023**

**Course Book**

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| **1. Course name** | **Soil Conservation** | |
| **2. Lecturer in charge** | **Dr. Abd-Elrahman Perdawood Haydar** | |
| **3. Department/ College** | **Horticulture/ Agricultural Engineering sciences** | |
| **4. Contact** | **e-mail: Apsherwany @ yahoo.com**  **Tel: (0750 494 23 52)** | |
| **5. Time (in hours) per week** | **Theory: 2**  **Practical: 3** | |
| **6. Office hours** | **Sunday from 10 -12 a.m during the week** | |
| **7. Course code** |  | |
| **8. Teacher's academic profile** | **Through Ms. Degree practical subjects at: soil physics, soil conservation, irrigation systems, land leveling, Surveying was upon my responsibility. After Phd. Courses, working as a lecturer at my department and other departments at the subjects of : soil physics, surveying, hydrology, principles of soil science, irrigation and drainage were the main duties, besides cooperating works within the transitory commissions that charged from the department.** | |
| **9. Keywords** | **Irrigation objectives, Sources of Irrigation Water, Surface Irrigation, Sprinkler irrigation, Drip irrigation, RDI** | |
| **10**. **Course overview**:  \* Definitions of Irrigation, different concepts and factors that related with this science. Expressing the different methods of determining soil moisture content, and different formulas expressing relations between soil and water.  \*F.C and P.W.P and calculating depth of irrigation water  \* Types of Surface Irrigation and their efficiencies.  ▪Sprinkler Irrigation and its concept and common types, designing and calculating SP and Sl.  \*Drip Irrigation and its components, advantages and its disadvantages.  \*RDI, Importance of the system and its components, Mechanism of the working the system. | | |
| **11. Course objective:**  To inform the student s the importance of Irrigation in our life, and how selecting the irrigation system affects the level of different types of agricultural production, and what are the methods that can be used for each type of soil and the crop type. | | |
| **12. Student's obligation:** Student's participate at lecture within its questions and answers that directed to them. If it is possible the students can see different types of Irrigation and the constructed dams within a scientific journey outside Erbil governorate. | | |
| **13. Forms of teaching:** After preparing the lectures and printing it, data show and power point is used for expressing the subject, solving and discussing mathematical problems will be done on white board. | | |
| **14. Assessment scheme**  Two Examinations will be done at the whole course, presence and the absence of the students recorded by the lecturer and returns to themselves and the menace of the absence articulated at the beginning of the course, because the time-**generally**- do not help the lecturer. | | |
| **15. Student learning outcome:**  Agricultural subjects especially the subjects that has practical parts needs adequate time to perform what you want to give you students , within the lectures the students will participate at translating the theoretical information to a practical sides. The level of the benefits depends upon the number of the instruments and the time for working and training on them, therefore luxuriance of the adequate numbers of the instruments and their recent models helps both the lecturers and students to progress themselves. The absence of an open area near the college to achieve the practical works eases the operation, spending time in going and returning to the college do not assist our hope in learning and cognition of the subject,complicating the topics because of the wide space of the subject needs decreasing and concentrating on the level and specialist of the students.. | | |
| **16. Course Reading List and References‌:**  **1- Hart,W.E. (1975) Irrigation system design. Department of Agriculture and Chemical Engineering.**  **2-Walker, W.R. (1989) Guidelines for Designing and Evaluating Surface Irrigation Systems.**  **3- Asawa G.L. (2008) Irrigation and Water Resources Engineering**  1- **17. The topics** | | |
| **Weeks Topics** | | **Lecturer's name** |
| |  |  |  | | --- | --- | --- | | **1** | **Definition of Irrigation, Objectives of Irrigation, Types of irrigation** | **Dr. A. P. Haydar**  **( 2 hrs)** | | **2** | **Irrigation and its relations with other Sciences, Sources of irrigation water, Methods of Measuring Soil Water Content** | **Dr. A. P. Haydar**  **( 2 hrs)** | | **3** | **Solving questions relating with soil water content and depth of irrigation.** | **Dr. A. P. Haydar**  **( 2 hrs)** | | **4** | **Soil-water-plant relationship, Available Water Holding Capacity,**  **Problems related with these relations** | **Dr. A. P. Haydar**  **( 2 hrs)** | | **5** | **How do we measure, how much water is in a stream (Discharge)?**  **Velocity – Area Method of discharge measurement** | **Dr. A. P. Haydar**  **( 2 hrs)** | | **6** | **Resistance Equations (Manning’s equation), Problems concerning Discharge** | **Dr. A. P. Haydar**  **( 2 hrs)** | | **7** | **Irrigation Systems, factors that determine the correct method of irrigation to be used, Main systems of Irrigation** | **Dr. A. P. Haydar**  **( 2 hrs)** | | **8** | **Surface irrigation**, **Basin irrigation (Level border irrigation), Strip irrigation , Furrow irrigation,** | **Dr. A. P. Haydar**  **( 2 hrs)** | | **9** | **Infiltration and infiltration rate, and how to measure it , Solving problems relating with them.** | **Dr. A. P. Haydar**  **( 2 hrs)** | | **10** | **Mechanized Irrigation System:**  **Sprinkler irrigation, advantages of sprinkler irrigation, disadvantages of sprinkler irrigation, main components of the system** | **Dr. A. P. Haydar**  **( 2 hrs)** | | **11** | **Irrigated area by a line carrying a group of sprinklers (A), problems concerning the irrigated area** | **Dr. A. P. Haydar**  **( 2 hrs)** | | **12** | Drip irrigation, **Gross Command Area (GCA), Culturable Command Area (CCA), Intensity of Irrigation, Base period, Delta(Δ ) and Duty(D), Relation between Duty (D), Base (B), and Delta (Δ )** | **Dr. A. P. Haydar**  **( 2 hrs)** | | **13** | **RDI its importance, Mechanism of working the system** | **Dr. A. P. Haydar**  **( 2 hrs)** | | | |
| **19. Question examples**  **Q1)** Gamble the discharge of the rectangular channel is **1.4m3/s** and the velocity of the flow water in the channel is **0.5m/s.** Calculate the hydraulic radius of the channel, assuming the depth of water as **80cm.**  **Q2) a-**Enumerate the secondary sources of irrigation water.  **b-**Define Available water holding capacity, then express the relation between the heaviness of the soil texture and the water content.  **Q3)** Calculate the quantity of the irrigation water required to change the volumetric water content from **0.21 to 0.35.** Consider that the depth of the studied soil is **70cm.**  **Q4)** a- List the important advantages of sprinkler irrigation.  b- If the throw diameter of the sprinkler is 40m.Find the distance between two adjacent sprinklers along the lateral and the distance between two adjacent two adjacent laterals.  **Q5)** a- What are the main differences between sprinkler and drip irrigation.  b- Define RDI, and then and what is the Mechanism of the system working. | | |