Course Description Form of Drainage

1. Course Name:	
Drainage	
2. Course Code:	
REMS309	
3. Semester / Year:	
Second semester/ 2024-2025	
4. Description Preparation Date:	
15/1/2025	
5. Available Attendance Forms:	
Full time (theoretical lecture and practical lecture) weekly	
6. Number of Credit Hours (Total) / Number of Units (Total)	
5 hours (2 hours theoretical and 3 hours practical per week) for 14 weeks, number of units 3.5 units	
7. Course Administrator's Name (Mention All, If More Than One Name)	
Name: Phd. Ibraheem Ahmad Hdraes Email: ibraheeahmad@uodiyala.edu.iq	
8. Course Objectives	
Course Objectives: Graduating students who are able to:	1 -Drilling examines the sources of irrigation water and methods of controlling it in agricultural fields 2 -It includes planning, designing and implementing puncture networks 3 -Transporting drainage water and studying methods of disposal 4 -Studying problems related to adding water, such as salinization, drainage, and soil reclamation 5- Calculating the cost of puncture maintenance as part of production costs
9. Teaching and Learning Strategies	

Strategy	In-person lectures for 14 weeks, including two monthly exams, daily exams, and scientific reports

10. Course Structure

Theoretical part

Week	Hours	Required learning outcomes	Unit or Subject	Learning Method	Evaluation Method
1	**2**	The concept of puncture, justifications for establishing punctures, the relationship of puncture to plant growth and productivity	**Drainage**	**Lecture Dialogue & discussion Brainstorming**	Daily, monthly and final exams and daily reports
2	**2**	Physical soil properties related to drilling	**Drainage**	**Lecture Dialogue & discussion Brainstorming**	Daily, monthly and final exams and daily reports
3	**2**	The hydrological cycle and the location of irrigation and drainage	**Drainage**	**Lecture Dialogue & discussion Brainstorming**	Daily, monthly and final exams and daily reports
4	**2**	Water flow in the soil, its forms, and its relationship to the concept of drainage, flow analysis	**Drainage**	**Lecture Dialogue & discussion Brainstorming**	Daily, monthly and final exams and daily reports
5	**2**	Puncture and soil salinity, washing requirements and salt balance	**Drainage**	**Lecture Dialogue & discussion Brainstorming**	Daily, monthly and final exams and daily reports
6	**2**	Investigations required to establish trocars, exploratory and design investigations	**Drainage**	**Lecture Dialogue & discussion Brainstorming**	Daily, monthly and final exams and daily reports
7	**2**	Measurement of saturated water conductivity above and below the groundwater level	**Drainage**	**Lecture Dialogue & discussion Brainstorming**	Daily, monthly and final exams and daily reports
8	**2**	Types of trocars, their classification, and the objectives of their construction	**Drainage**	**Lecture Dialogue & discussion Brainstorming**	Daily, monthly and final exams and daily reports
9	**2**	Open trocars	**Drainage**	**Lecture Dialogue & discussion Brainstorming**	Daily, monthly and final exams and daily reports
10	**2**	Covered trocars	**Drainage**	**Lecture Dialogue & discussion Brainstorming**	Daily, monthly and final exams and daily reports

11	**2**	Incisive and vertical trocars	**Drainage**	**Lecture Dialogue & discussion Brainstorming**	Daily, monthly and final exams and daily reports
12	**2**	Designs of open and covered puncture systems and calculation of distances between trocars	**Drainage**	**Lecture Dialogue & discussion Brainstorming**	Daily, monthly and final exams and daily reports
13	**2**	Mechanization of trocars and supplies for implementing trocars	**Drainage**	**Lecture Dialogue & discussion Brainstorming**	Daily, monthly and final exams and daily reports
14	**2**	Maintenance of open and covered trocars	**Drainage**	**Lecture Dialogue & discussion Brainstorming**	Daily, monthly and final exams and daily reports
15	**2**	Maintenance of covered trocars	**Drainage**	**Lecture Dialogue & discussion Brainstorming**	Daily, monthly and final exams and daily reports
Practical part					
Week	**Hours**	**Required learning outcomes**	**Unit or Subject Name**	**Learning Method**	**Evaluation Method**
1	**3**	Investigations required to establish trocars, exploratory and operational investigations	**Drainage**	**Observation Dialogue & discussion**	Daily, monthly and final exams and daily reports
2	**3**	Surveys, adjustment and settlement procedures and their calculations	**Drainage**	**Observation Dialogue & discussion**	Daily, monthly and final exams and daily reports
3	**3**	Measurement of saturated water conductivity in the laboratory	**Drainage**	**Observation Dialogue & discussion**	Daily, monthly and final exams and daily reports
4	**3**	Measurement of saturated water conductivity in the field above the groundwater level	**Drainage**	**Observation Dialogue & discussion**	Daily, monthly and final exams and daily reports
5	**3**	Measurement of saturated water conductivity in the field below the groundwater level	**Drainage**	**Observation Dialogue & discussion**	Daily, monthly and final exams and daily reports
6	**3**	Measuring ground water levels	**Drainage**	**Observation Dialogue & discussion**	Daily, monthly and final exams and daily reports
7	**3**	Calculation of water drainage in open trocars	**Drainage**	**Observation Dialogue & discussion**	Daily, monthly and final exams and daily reports
8	**3**	Open trocar design	**Drainage**	**Observation Dialogue & discussion**	Daily, monthly and final exams and daily reports
9	**3**	Design of covered trocars	**Drainage**	**Observation Dialogue & discussion**	Daily, monthly and final exams and daily reports

10	**3**	Applications in calculating the distance between trocars, under stable flow conditions	**Drainage**	**Observation Dialogue & discussion**	Daily, monthly and final exams and daily reports
11	**3**	Applications in calculating the distance between trocars, under unstable flow conditions	**Drainage**	**Observation Dialogue & discussion**	Daily, monthly and final exams and daily reports
12	**3**	Using the electronic computer to design puncture systems	**Drainage**	**Observation Dialogue & discussion**	Daily, monthly and final exams and daily reports
13	**3**	Horizontal, vertical and radial flow of water into the trocars	**Drainage**	**Observation Dialogue & discussion**	Daily, monthly and final exams and daily reports
14	**3**	A field visit to one of the puncture projects	**Drainage**	**Observation Dialogue & discussion**	Daily, monthly and final exams and daily reports
15	**3**	A field visit to one of the puncture projects	**Drainage**	**Observation Dialogue & discussion**	Daily, monthly and final exams and daily reports

11. Course Evaluation

Examination Monthly & daily exams with discussion questions inside the lecture.
The degree of participation in the questions related to the subject.

12. Learning and Teaching Sources

Required Textbooks (Curricular Books, If Any)	1- Inspection, investigations, designs, implementation and maintenance. Written by Dr. Mohsen Muhareb Al-Lami and Dr. Alaa Saleh Al-Janabi. 1991.
Main References (Sources)	1- Inspection, investigations, designs, implementation and maintenance. Written by Dr. Mohsen Muhareb Al-Lami and Dr. Alaa Saleh Al-Janabi. 1991.
Recommended Books and References (Scientific Journals, Reports...)	Iraqi academic scientific journals
Electronic References, Websites	Soil Science Society of America Library Genesis