Course Description Form

1. Course Name:
Irrigation and Drainage Equipment
2. Course Code:
IRDE382
3. Semester / Year:
Second semester 2025-2026
4. Description Preparation Date:
1/2/2026
5. Available Attendance Forms:
Combined (Attendance + distance education)
6. Number of Credit Hours (Total) / Number of Units (Total)
30 theoretical hours +60 practical hours =90 hours / 4 Units
7. Course administrator's name (mention all, if more than one name)
Name:Ahmed Mohammad Ameen Saeed Email:ahmed_ameem@uomosul.edu.iq **Mahmood Hassan Rafeek mahmoud.h.r@uomosul.edu.iq**
8. Course Objectives
1- Studying the science of irrigation machines, equipment and devices and what are the purposes for which the irrigation process is carried out. **2- Study the types of pumps used in the field of irrigation, their parts, installation, how to install and operate them, and methods of sustaining, maintaining and repairing them.** **3- Identify the types of sprinkler and drip irrigation systems, the disadvantages and advantages of each system, and the parts of the irrigation network for each type.** **4- Identify the types of sprinklers and drippers used in sprinkler and drip irrigation and how they work, install them, operate and maintain them.** **5- Choosing the appropriate irrigation method for the type of soil and the type of crop grown by choosing the appropriate equipment and devices for that.** **6 - Use water in the irrigation process correctly and economically through the appropriate equipment.** **7- Understanding the scientific and engineering foundations of irrigation systems with all their mechanical parts and how to design and modify them to suit the nature of the field, its topography, the nature of the irrigation water source, the type of cultivated plants, and the type of soil.** **8- Study the auxiliary equipment for puncture operations to suit the type of puncturing system in the field**
9. Teaching and Learning Strategies
1-Interactive lecture **2-Brainstorming** **3-Dialogue and discussion** **4-Field Training** **5-Practical exercises** **6-Field project** **7-Self-education**

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 theoretical	A2 The student learns about the types and types of irrigation pumps A2Understands the hydraulic foundations of pumps	Irrigation pumps (types and basics) and hydraulic foundations for pumps used in irrigation systems	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Semester test1 Final test
	4 Practical	C2 The student explains the methods of attaching and disassembling pumps A2 Explains the role and importance of each part of the pump	Explaining the mechanical parts of irrigation pumps and how to connect and disassemble them	Interactive lecture, brainstorming, dialogue and discussion, field training, and self-learning	test1 Final test
2	2 theoretical	A2The student learns about centrifugal pumps A2 and classifies its types C1 and enumerates its features and parts	Centrifugal pumps, their types, features and parts	Interactive lecture, brainstorming, dialogue and discussion, self-learning	test1 Final test
	4 Practical	B3 The student applies the processes of installing and operating centrifugal pumps in the fields C4 The type of motor required for each pump is determined to suit the pumping requirements	Places for installing and operating centrifugal pumps in the fields and connecting them in series or parallel to suit the types of engines used.	Interactive lecture, brainstorming, dialogue and discussion, field training, and self-learning	test1 Final test
3	2 theoretical	A1 The student understands and calculates the pumping and discharge height,necessary capacity and efficiency of pumps B3 implements installation and running processes Pumps	Installing and operating pumps, calculating the pumping and discharge height, the necessary capacity, and the efficiency of the pumps	Interactive lecture, brainstorming, dialogue and discussion, self-learning	test1 Final test
	4 Practical	A3 Solves mathematical problems about pumping and discharge height, required capacity, pump efficiency, and choosing the appropriate pump.	Mathematical problems about pumping and discharge height, necessary capacity, pump efficiency, and choosing the appropriate pump	Interactive lecture, brainstorming, dialogue and discussion, field training, and self-learning	test1 Final test
4	2 theoretical	A2The student learns about turbine and submersible pumps A2 and classifies its types C1 and enumerates its features and parts	Turbo and submersible pumps, their types,advantages, disadvantages, and parts	Interactive lecture, brainstorming, dialogue and discussion, self-learning	test1 Final test
	4 Practical	B3 The student applies the	Installing and operating	Interactive lecture,	test1

		installation and operation of turbine and submersible pumps in the fields **C4 The type of motor required for each pump is determined to suit the pumping requirements**	**pumps** **Turbine and submersible turbines, their maintenance and maintenance**	**brainstorming, dialogue and discussion, field training, and self-learning**	**Final test**
5	**2 theoretical**	**A2 The student learns about mixed flow pumps and axial pumps** **A2 and classifies its types** **C1 and enumerates its features and parts**	**Mixed flow pumps and axial pumps (their advantages, disadvantages, and parts)**	**Interactive lecture, brainstorming, dialogue and discussion, self-learning**	**Short daily test1** **test1** **Final test**
	4 Practical	**B3 The student applies the installation and operation of mixed flow pumps and axial pumps in the fields** **C4 specifies the type of engine required for each** **Pump to suit pumping requirements**	**Installing and operating flow pumps** **Mixed and axial pumps and connecting them in series and parallel to suit the types of engines used**	**Interactive lecture, brainstorming, dialogue and discussion, field training, and self-learning**	**Semester test1** **Final test**
6	**2 theoretical**	**A1 The student learns about sprinkler irrigation** **A1 and understands its uses** **C1 enumerates its advantages and disadvantages** **A5 and distinguishes its types**	**Sprinkler irrigation (advantages and disadvantages)** **Areas of its use and types of sprinkler irrigation systems**	**Interactive lecture, brainstorming, dialogue and discussion, self-learning**	**test1** **Final test**
	4 Practical	**C4 The student connects the engineering and field foundations with the type of sprinkler system that is compatible with the topography of the field, the type of soil, the types of cultivated plants, and the climate of the region.**	**Field engineering foundations for selection** **The type of sprinkler irrigation system that suits the topography of the field, the type of soil, the types of plants grown, and the climate of the area**	**Interactive lecture, brainstorming, dialogue and discussion, field training, and self-learning**	**test1** **Final test**
7	**2 theoretical**	**A2 The student learns about the fixed and semi-fixed sprinkler irrigation system** **A2 and classifies its types** **C1 and enumerates its features and parts**	**Fixed and semi-fixed sprinkler irrigation systems, their advantages and disadvantages, and the component parts of irrigation networks**	**Interactive lecture, brainstorming, dialogue and discussion, self-learning**	**test1** **Final test**
	4 Practical	**B3 The student applies the processes of installing and operating a fixed and semi-fixed sprinkler irrigation system in the fields** **A3 solves mathematical problems about drainage, pressure, and water distribution uniformity coefficient calculations**	**Field applications for the design and installation of fixed and semi-fixed sprinkler irrigation networks, selection of sprinklers, determining the distances between them, drainage and pressure calculations, and water distribution uniformity coefficient.**	**Interactive lecture, brainstorming, dialogue and discussion, field training, and self-learning**	**test1** **Final test**
8	**2 theoretical**	**A2 The student learns about**	**Irrigation by artillery**	**Interactive lecture,**	**test1**

		the artillery sprinkler irrigation system A2 and its types are classified C1 and enumerates its features and parts	**sprinkler, its types and parts Its features and methods of installation and operation**	**brainstorming, dialogue and discussion, self-learning**	**Final test**
	4 Practical	**B3 The student applies the operations of installing and operating an artillery irrigation system in the fields A3 solves mathematical problems about drainage, pressure, and water distribution uniformity coefficient calculations**	**B3 The student applies the processes of installing and operating an artillery irrigation system in the fields A3 solves mathematical problems related to calculations of drainage uniformity coefficient, pressure and water distribution**	**Interactive lecture, brainstorming, dialogue and discussion, field training, and self-learning**	**test1 Final test**
9	**2 theoretical**	**A2 The student learns about the winged sprinkler irrigation system A2 and its types are classified C1 and enumerates its features and parts**	**Winged sprinkler irrigation, its types, parts, features, and methods of installing and operating it**	**Interactive lecture, brainstorming, dialogue and discussion, self-learning**	**test1 Final test**
	4 Practical	**B3 The student applies the processes of installing and operating a winged sprinkler irrigation system in the fields A3 solves mathematical problems about drainage, pressure, and water distribution uniformity coefficient calculations**	**Field applications for irrigation design and installation Winged spraying, drainage calculations, pressure, and water distribution uniformity coefficient**	**Interactive lecture, brainstorming, dialogue and discussion, field training, and self-learning**	**test1 Final test**
10	**2 theoretical**	**A2 The student learns about the linear moving sprinkler irrigation system A2 and its types are classified C1 and enumerates its features and parts**	**Linear moving sprinkler irrigation , its types, parts, features, and methods of installation and operation**	**Interactive lecture, brainstorming, dialogue and discussion, self-learning**	**Short daily test2 test1 Final test**
	4 Practical	**B3 The student applies the processes of installing and operating a linear moving sprinkler irrigation system (driver) in the fields A3 solves mathematical problems about drainage, pressure, and water distribution uniformity coefficient calculations**	**Field applications for the design and installation of linearly moving sprinkler irrigation, drainage and pressure calculations, and water distribution uniformity coefficient.**	**Interactive lecture, brainstorming, dialogue and discussion, field training, and self-learning**	**test1 Final test**
11	**2 theoretical**	**A2 The student learns about the circular (pivot) sprinkler irrigation system. A2 and its types are**	**Circularly moving sprinkler irrigation (pivotal), its types, parts, features and methods**	**Interactive lecture, brainstorming, dialogue and discussion, self-**	**test1 Final test**

		classified C1 and enumerates its features and parts	**Install it and run it**	**learning**	
	4 Practical	**B3 The student applies the processes of installing and operating a circular (pivot) sprinkler irrigation system in the fields A3 solves mathematical problems about drainage, pressure, and water distribution uniformity coefficient calculations**	**Field applications for the design and installation of circularly moving (pivotal) sprinkler irrigation, drainage and pressure calculations, and water distribution uniformity coefficient.**	**Interactive lecture, brainstorming, dialogue and discussion, field training, and self-learning**	**test1 Final test**
12	**2 theoretical**	**A1 The student learns about drip irrigation A1 and understands its uses C1 enumerates its advantages and disadvantages A5 and distinguishes its types**	**Drip irrigation system, its importance, advantages, disadvantages, areas of use, types, and components of each type**	**Interactive lecture, brainstorming, dialogue and discussion, self-learning**	**test1 Final test**
	4 Practical	**C4 The student connects the engineering and field hydraulic foundations with the type of drip system that is compatible with the topography of the field, the type of soil, the types of cultivated plants, and the climate of the region.**	**Drip irrigation networks, their system design, drainage calculations, pressures and interspaces**	**Interactive lecture, brainstorming, dialogue and discussion, field training, and self-learning**	**test1 Final test**
13	**2 theoretical**	**C4 The student connects the engineering and field hydraulic foundations with the type of drip irrigation system A2 Understands the mathematical equations for each type of pixel**	**Hydraulic engineering foundations for the different types of drippers and the mathematical equations specific to each type**	**Interactive lecture, brainstorming, dialogue and discussion, self-learning**	**test1 Final test**
	4 Practical	**A3 The student solves exercises and problems about th hydraulic foundations of different types of drippers**	**Solve exercises and problems about the hydraulic foundations of different types of drippers**	**Interactive lecture, brainstorming, dialogue and discussion, field training, and self-learning**	**test1 Final test**
14	**2 theoretical**	**A1 The student learns about subsurface irrigation A1 and understands its uses C1 enumerates its advantages and disadvantages A5 and distinguishes its types**	**Subsurface irrigation, its importance, advantages, disadvantages, areas of use, types, and components of each type**	**Interactive lecture, brainstorming, dialogue and discussion, self-learning**	**test1 Final test**

	4 Practical	B3 The student applies the processes of installing and operating a subsurface irrigation system in the fields A3 solves mathematical problems about drainage, pressure, and interspace distances	Subsurface irrigation networks, their system design, drainage calculations, pressures and inter-space distances	Interactive lecture, brainstorming, dialogue and discussion, field training, and self-learning	test1 Final test
15	2 theoretical	A2 The student learns about all types of equipment used in puncture networks B3 The student applies installation and operation operations for aspiration network equipment	Equipment and machines used in puncture networks and how to connect and operate them	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Short daily test3 test1 Final test
	4 Practical	B3 The student applies maintenance, repair, and maintenance processes for various irrigation equipment	Maintenance and repair of irrigation and drainage equipment and machines	Interactive lecture, brainstorming, dialogue and discussion, field training, and self-learning	Semester test1 Final test

1. Course Evaluation

Seq.	Evaluating style	date	marks	Relative weight
1	Home reports	every 5 weeks	10	10%
2	Short tests	every 5 weeks	10	10%
3	Semester test 1	The seventh week	10	10%
4	Semester test 2	The final week	10	10%
5	Final practical test	End of the course	20	20%
6	Final theoretical test	End of the course	40	40%
	the total		100	100%

11. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	1- المضخات الزراعية . المؤسسة العامة للتعليم الفني والتدريب المهني 2005 2- الري بالرش الأجهزة والتطبيقات – ملفين كاي 2000 3- تقانات الري الحديثة . د.عصام خضير الحديثي وآخرون 2010 4-هندسة المضخات , محمود ربيع الملط 2000 5- هندسة الري , محسن حسين نوارة و حسن محمد حسيني
Recommended books and references (scientific journals, reports...)	1- الري اساسياته وتطبيقاته – د. نبيل ابراهيم – عصام خضير 1990 2- الري الزراعي – د. بدر جاسم علاوي – محمد حسن عزوز 198 3- هندسة مياه الري . د.فاضل محمد ظاهر 2021 4- معدات الري والبزل . د.عبدالرزاق عبداللطيف و د.شذى ماجد نفاوة 2017 5- Irrigation Eystems Engineering , Dr. A. Y. HACHEM & H. Ismaail ,st Addition, Dar Alhikma Publisher, Mosul Univ. Press, 1992
Electronic References, Websites	https://www.youtube.com

مدرس المادة العملي
م.محمود حسن رفيق

مدرس المادة النظري
م.أحمد محمدأمين سعيد

رئيس قسم المكائن والآلات الزراعية
أ.م.د.يوسف يعقوب هلال

رئيس اللجنة العلمية
أ.د. عادل أحمد عبدالله