

## Course Description Form

1. Course Name :	
Drainage	
2. Course Code:	
DRAI 355	
3. Semester / Year:	
Second Semester 2023/2024	
4. Description Preparation Date:	
1/2/2024	
5. Available Attendance Forms:	
In presence	
6. Number of Credit Hours (Total) / Number of Units (Total) :	
2 Theoretical +3 Practical / 3.5 Unit	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Faris Akram Salih Al-Wazzan                      Nour Jamal Hussein	
Email: <a href="mailto:dr.farisakram@uomosul.edu.iq">dr.farisakram@uomosul.edu.iq</a>	
8. Course Objectives	
Course Objectives	<ul style="list-style-type: none"> <li>● 1- Preparing students who have the ability to use modern drainage methods and describe these methods accurately with the possibility of using them within Iraqi soils, which represent calcareous soils... and integrating these methods with irrigation networks and getting rid of excess water.....</li> <li>● 2- Entering the agricultural sector with distinguished efficiency through participation. In puncture projects, modern irrigation techniques, and the use of the best methods in order to reduce water use within agricultural lands and reduce the risk of salt and desertification...</li> <li>3- Directing students towards a desire to obtain better experiences when applying for postgraduate studies</li> </ul>

## Teaching and Learning Strategies

**Theoretical:**  
 -Interactive lecture  
 -Brainstorming  
 -Dialogue and discussion  
 -Assigning tasks and reporting  
 -Presentations of models of irrigation and drainage network

**Practical:**  
 - Assigning group work to reveal leadership skills  
 - Assigning tasks and reporting for each experiment  
 - He is assigned to prepare a report entitled from his own diligence and prepare it for discussion with Students

## 2. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 Theoretical 3 Practical	<b>Theoretical:</b> a1 :Explains the concept to the student water drainage <b>practical :</b> a1 Enabling the student to understand the topic of water drainage	<b>Theoretical:</b> The concept of drainage and the introductory water drainage  <b>practical :</b> Introduction to water drainage	<b>theoretical:</b> Audio methods style Writing on the board Direct dialogue style  <b>practical :</b> Adapt tasks and reports	Conduct daily examinations. Assignment discussions
2	2 Theoretical 3 Practical	<b>theoretical:</b> a2 :Shows students signs Water drainage problems appear  <b>practical :</b> a2 :Enable the student to know the benefits of draining water	<b>theoretical:</b> Signs of water drainage problems  <b>practical :</b> Water drainage purposes	<b>theoretical:</b> Audio methods style Writing on the board Direct dialogue style  <b>practical :</b> Adapt tasks and reports	Conduct daily examinations. Assignment discussions
3	2 Theoretical 3 Practical	<b>Theoretical:</b> a3:Explains to the student the concepts of water movement <b>practical :</b> a3 :Shows the student investigative methods	<b>theoretical:</b> Movement of water in the soil and missing equations Her own  <b>practical :</b> Exploratory investigations	<b>theoretical:</b> Audio methods style Writing on the board Direct dialogue style  <b>practical :</b> Adapt tasks and reports	Conduct daily examinations. Assignment discussions

4	2 Theoretical 3 Practical	<b>Theoretical:</b> a4 : Explains to the student Solve movement problems Ground water <b>practical :</b> a4: Explains methods of investigation and detection of drainage	<b>Theoretical:</b> Solutions to groundwater movement problems  <b>practical :</b> Design investigations	<b>theoretical:</b> Audio methods style Writing on the board Direct dialogue style  <b>practical :</b> Adapt tasks and reports	Conduct daily examinations Assignment discussions
5	2 Theoretical 3 Practical	<b>Theoretical:</b> <b>b1:</b> Enabling student to Solve the relaxation equation  <b>practical :</b> b1: Shows the student the use of drawing scale	<b>Theoretical:</b> Derivation of the relaxation equation with examples  <b>practical :</b> Drawing scale	<b>theoretical:</b> Audio methods style Writing on the board Direct dialogue style  <b>practical :</b> Adapt tasks and reports	Conduct daily examinations. Assignment discussions
6	2 Theoretical 3 Practical	<b>Theoretical:</b> <b>a5:</b> Shows the student the importance of Flow network  <b>practical :</b> Empower understand conductivity	<b>Theoretical:</b> Flow network  <b>practical :</b> Methods for measuring the conductivity of saturated water. Laboratory methods	<b>theoretical:</b> Audio methods style Writing on the board Direct dialogue style  <b>practical :</b> Adapt tasks and reports	Conduct daily examinations. Assignment discussions
7	2 Theoretical 3 Practical	<b>Theoretical:</b> <b>b2:</b> Enabling student to Understanding Hoggart equation  <b>practical :</b> b2 Explains method for measuring conductivity in the field	<b>Theoretical:</b> Hockhart's equation to calculate the distance between trocars  <b>practical :</b> Methods for measuring saturated water conductivity; field methods above the groundwater level	<b>theoretical:</b> Audio methods style Writing on the board Direct dialogue style  <b>practical :</b> Adapt tasks and reports	Conduct daily examinations. Assignment discussions

8	2 Theoretical 3 Practical	<p><b>Theoretical:</b> a6 :Explains to importance of equation for unstable state water</p> <p><b>practical :</b> a6 :Explains foundations measurement under groundwa</p>	<p><b>Theoretical:</b> Clover Dam equation for unsteady state water drainage</p> <p><b>practical :</b> Methods for measuring saturated water conductivity: field methods below the groundwater level</p>	<p><b>theoretical:</b> Audio methods style Writing on the board Direct dialogue style</p> <p><b>practical :</b> Adapt tasks and reports</p>	<p>Conduct daily examinations. Assignment discussions</p>
9	2 Theoretical 3 Practical	<p><b>Theoretical:</b> b3 :Shows the student the importance Forchheimer equation</p> <p><b>practical :</b> b3 :Enable the student understand the types of water drainage</p>	<p><b>Theoretical:</b> Forchheimer equation with examples and derivation</p> <p><b>practical :</b> Types of water drainage</p>	<p><b>theoretical:</b> Audio methods style Writing on the board Direct dialogue style</p> <p><b>practical :</b> Adapt tasks and reports</p>	<p>Conduct daily examinations. Assignment discussions</p>
10	2 Theoretical 3 Practical	<p><b>Theoretical:</b> b4 :student can Knowing calculation of the diameter trocar tubes</p> <p><b>practical :</b> b4 :Explains to student importance covered trocars</p>	<p><b>Theoretical:</b> Calculating the diameter of water drainage pipes</p> <p><b>practical :</b> Covered trocars</p>	<p><b>theoretical:</b> Audio methods style Writing on the board Direct dialogue style</p> <p><b>practical :</b> Adapt tasks and reports</p>	<p>Conduct daily examinations. Assignment discussions</p>
11	2 Theoretical 3 Practical	<p><b>Theoretical:</b> b5: student shows Calculate additional water wash away the salts</p> <p><b>practical :</b> b5: Shows student methods Add water to wash away the salts</p>	<p><b>Theoretical:</b> Laundry requirements with examples</p> <p><b>practical :</b> Calculating the amounts of water added for Laundry requirements</p>	<p><b>theoretical:</b> Audio methods style Writing on the board Direct dialogue style</p> <p><b>practical :</b> Adapt tasks and reports</p>	<p>Conduct daily examinations. Assignment discussions</p>

12	2 Theoretical 3 Practical	<b>Theoretical:</b> b6 :Shows Add water to wash away the salts <b>practical :</b> b6 :Explains the effect of salinity water drainage	<b>Theoretical:</b> Water drainage and its relationship to salinity  <b>practical :</b> The effect of salts on soil and water	<b>theoretical:</b> Audio methods style Writing on the board Direct dialogue style  <b>practical :</b> Adapt tasks and reports	Conduct daily examinations. Assignment discussions
13	2 Theoretical 3 Practical	<b>Theoretical:</b> a7 :Shows the student methods of maintaining trocars <b>practical :</b> a7 :Explains maintenance methods	<b>Theoretical:</b> Methods of maintaining trocar networks  <b>practical :</b> Maintenance concepts for trocars	<b>theoretical:</b> Audio methods style Writing on the board Direct dialogue style	Conduct daily examinations. Assignment discussions
14	2 Theoretical 3 Practical	<b>Theoretical:</b> b7:Shows met for designing tro  <b>practical :</b> b7:Demonstrat es practical design	<b>theoretical:</b> Methods and design of modern trocars  <b>practical :</b> Use programming to design trocars	<b>practical :</b> Adapt tasks and reports  <b>theoretical:</b> Audio methods style Writing on the board Direct dialogue style	Conduct daily examinations. Assignment discussions
15	2 Theoretical 3 Practical	<b>theoretical:</b> b8 :Demonstrates the design of trocars  <b>practical:</b> b8 : Shows the student a complete comparison of the types of trocars	<b>Theoretical:</b> Design of open and covered trocars  <b>practical :</b> Comprehensive comparison of open and covered trocars	<b>practical :</b> Adapt tasks and reports  <b>theoretical:</b> Audio methods style Writing on the board Direct dialogue style  <b>practical :</b> Adapt tasks and reports	Conduct daily examinations. Assignment discussions

### 3. Course evaluation

Relative weight %	Degree	Calendar appointment (weekly)	Calendar methods	ت
13%	7 Theoretical + 6 practical	Theoretically week (15) Practically week 1-15	Theoretical final report + practical experience reports	1
6 %	4+ Theoretical 2 practical	week (3)	Quiz(1)	2
15%	10 Theoretical+ 5 practical	week (9)	Exam Midterm (Theoretical and practical)	3
6%	4 + Theoretical 2 practical	week (12)	Quiz(2)	4
20%	20	Practical exam week	Final practical test	5
40%	40	Theory exam week	Final theoretical test	6
100%	100		Total	

### 4. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Drainage...D. Mohsen Al-Alamy
Main references (sources)	Irrigation and drainage book by Dr. Laith K
Recommended books and references (scientific journals, reports...)	SSSJ , WATER J .
Electronic References, Websites	<a href="https://doi.org/10.2136/sssabookser5.1.2ed">https://doi.org/10.2136/sssabookser5.1.2ed</a>

**Dr. Faris akram salih Al-Wazzan**

Theoretical teacher

**Nour Jamal Hussein**

Practical teacher

**Abdul Qadir Abash Al-Hadidi**

Head of the scientific committee

**Ammar Younis Kashmoula**

Head of the Department of Soil Sciences and Water Resources

