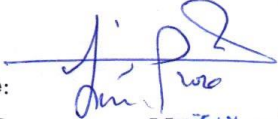


**Academic Program
and Course
Description Guide for
Undergraduate
Students**

2026

Academic Program Description Form

University Name: Wasit
Faculty/Institute: Agriculture
Scientific Department: Soil and Water Resources
Academic or Professional Program Name: Soil and Water Resources
Final Certificate Name: Soil and Water Resources
Academic System: Semester
Description Preparation Date: 2/11/2025
File Completion Date: 10/3/2026

Signature: 
Head of Department Name: علي جواد هادي
علي جواد هادي
Date: 10/3/2026

Signature: 
Scientific Associate Name: علي جواد هادي
Date: 10/3/2026

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department:

Date: 10/3/2026 Hibat Allah A. Hussein

Signature: 


Assist. Prof
Dr. Hakeem.S. Abed
Dean
Approval of the Dean

Introduction:

The educational program is a well-planned set of courses that include procedures and experiences arranged in the form of an academic syllabus. Its main goal is to improve and build graduates' skills so they are ready for the job market. The program is reviewed and evaluated every year through internal or external audit procedures and programs like the External Examiner Program.

The academic program description is a short summary of the main features of the program and its courses. It shows what skills students are working to develop based on the program's goals. This description is very important because it is the main part of getting the program accredited, and it is written by the teaching staff together under the supervision of scientific committees in the scientific departments.

This guide, in its second version, includes a description of the academic program after updating the subjects and paragraphs of the previous guide in light of the updates and developments of the educational system in Iraq, which included the description of the academic program in its traditional form (annual, quarterly), as well as the adoption of the academic program description circulated according to the letter of the Department of Studies T 3/2906 on 3/5/2023 regarding the programs that adopt the Bologna Process as the basis for their work.

In this regard, we can only emphasize the importance of writing an academic programs and course description to ensure the proper functioning of the educational process.

Concepts and terminology:

Academic Program Description: The academic program description provides a brief summary of its vision, mission and objectives, including an accurate description of the targeted learning outcomes according to specific learning strategies.

Course Description: Provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the students to achieve, proving whether they have made the most of the available learning opportunities. It is derived from the program description.

Program Vision: An ambitious picture for the future of the academic program to be sophisticated, inspiring, stimulating, realistic and applicable.

Program Mission: Briefly outlines the objectives and activities necessary to achieve them and defines the program's development paths and directions.

Program Objectives: They are statements that describe what the academic program intends to achieve within a specific period of time and are measurable and observable.

Curriculum Structure: All courses / subjects included in the academic program according to the approved learning system (quarterly, annual, Bologna Process) whether it is a requirement (ministry, university, college and scientific department) with the number of credit hours.

Learning Outcomes: A compatible set of knowledge, skills and values acquired by students after the successful completion of the academic program and must determine the learning outcomes of each course in a way that achieves the objectives of the program.

Teaching and learning strategies: They are the strategies used by the faculty members to develop students' teaching and learning, and they are plans that are followed to reach the learning goals. They describe all classroom and extra-curricular activities to achieve the learning outcomes of the program.

1. Program Vision

The primary vision of the Department of Soil Sciences and Water Resources aims to build a solid scientific foundation by providing a suitable environment for students to learn about physical, chemical, biological, and pedological properties. Through laboratory analysis, fieldwork, and the use of the latest technologies, students are equipped with solid scientific skills for soil analysis. This, in turn, leads to the development of scientific cadres who can contribute to solving land problems in the agricultural sector. Furthermore, the department conducts numerous scientific research projects annually through graduate student projects, faculty research, and undergraduate student graduation projects to address some soil and water-related problems. The department also contributes to developing students' research capabilities by designing experiments and writing solid scientific research for publication in international peer-reviewed journals. The department's primary goal is to achieve excellence in scientific research, create partnerships with government institutions and civil society, and participate in training workshops to keep pace with global developments.

2. Program Mission

Providing innovative scientific research and solutions on sustainable agriculture, facing contemporary challenges, leading to knowledge of new research areas, working collaboratively with researchers from the same or nearby departments. Preparing leadership cadres with the ability to think critically and then analyze problems for the purpose of solving them, which qualifies graduate students to manage some research projects by acquiring research skills and developing their leadership skills. The department is a pioneer in education by periodically updating the curricula to keep pace with reputable international universities and working to spread awareness among members of society to preserve natural resources and encourage and promoting sustainable practices to address climate change.

3. Program Objectives

The program aims to provide undergraduate and graduate students with the necessary knowledge to understand everything related to the concept of soil. The department aims to prepare graduates with a high-level understanding of the physical, chemical, and biological properties of soil, soil surveying and classification, and plant fertility and nutrition. They also have the ability to analyze and evaluate the quality of surface and groundwater, and to understand the effects of agricultural production by studying the interactions that occur among soil, water, and plants. In addition, the department focuses on two important factors: the first is natural resource management, through conducting studies on climate change and its impact on soil and water, finding solutions, and reducing pollution from some industrial products by promoting sustainable agriculture. The second factor is combating desertification and sand encroachment, identifying the causes of desertification, and finding and developing strategies to control it and increase productivity and preserving it as a natural resource.

4. Program Accreditation

The department is working to obtain program accreditation by applying the standards launched by the Ministry

5. Other external influences

Field visits to stations and relevant state institutions

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Notes*
Institution Requirements	15	29	15.38	Basic

College Requirements	19	62.5	33.15	Basic
Department Requirements	30	97	51.45	Basic
Summer Training	1			Basic
Other				
The total	65	188.5		

* This can include notes whether the course is basic or optional.

7. Program Description

Year/Level	Course Code	Course Name	Credit Hours
Third/ first semester	SoISPh31	Soil physics	30 theoretical + 45 practical
	SoISCh31	Soil chemistry	30 theoretical + 45 practical
	SoISFe32	Soil fertility	30 theoretical + 45 practical
	SoISlr32	Irrigation	30 theoretical + 45 practical
	SoISMo31	Soil morphology	30 theoretical + 45 practical
	SoIDAE31	Experi. Design and analysis	30 theoretical + 45 practical
	SoISWP31	Soil and water pollution	30 theoretical + 45 practical
	013301U	English language	30 theoretical
Third/ second semester	Solnre32	Economics of natural resourc.	30 theoretical
	SolDra32	Drainage	30 theoretical + 45 practical
	SolSMi32	Soil mineralogy	30 theoretical + 45 practical
	SolReSe21	Remote Sensing	30 theoretical + 45 practical
	SolSSa31	Soil salinity	30 theoretical + 45 practical
	SolSOM32	Organic soil matter	30 theoretical + 45 practical
Fourth/ first semester	SolSSC41	Soil survey and classification	30 theoretical + 45 practical
	SolSWC42	Soil and conservation	30 theoretical + 45 practical
	SolSMi42	Soil microbiology	30 theoretical + 45 practical
	SolPNu41	Plant nutrition	30 theoretical + 45 practical
	SolHyd41	Hydrology	30 theoretical + 45 practical
	U013401	English language	30 theoretically
	0013406	Graduation research project	30 practical
	SolSIT42	Irrigation systems technolog.	30 theoretical + 45 practical
Fourth/ second semester	SolFeT42	Fertilizer technologies	30 theoretical + 45 practical
	SolLRe41	Land Reclamation	30 theoretical + 45 practical
	SolSMa42	Soil management	30 theoretical + 45 practical
	SolSW41	Soil, water and plant relation.	30 theoretical + 45 practical
	SolDes32	Desertification	30 theoretical
	0023406	Graduation research project	30 practical
	0023407	Seminars	15 theoretical

8. Expected learning outcomes of the program	
Knowledge	
Cognitive goals	Student learns about the concept of soil and its geological components. The student learns about the types of soil and the external influences that contributed to the formation of soil. The student learns about the nutrients found in the soil.
Skills	
Skills objectives of the program	Thinking skill Scientific research skills Teaching skills
Ethics	
Evaluation	Theoretical tests Practical tests Weekly reports

9. Teaching and Learning Strategies
1– Explanation and clarification 2– Lecture method 3– Practical lessons in the lab. 4– Scientific trips to relevant departments and research stations and Self-learning method

10. Evaluation methods
1–Theoretical tests 2– Practical tests 3– Reports and studies

11. Faculty						
Faculty Members						
Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Professor Jamal Naser Abd AlRahman	Soil and water resources	Soil microbiology			√	
Professor Kahraman Hussain Habeeb	Soil and water resources	Soil fertility and fertilization			√	
Professor Mahdi Wasmi Seheeb	Soil and water resources	Soil chemistry			√	
Assistant Professor Laith Salem Salman	Soil and water resources	Soil Mineralogy			√	
Assistant Professor Ahmed Abed Gata	Machine engineering	Agricultural machines			√	
Assistant Professor Muhand Ismael Kulabs	Science	Atmosphere Science			√	
Assistant Professor Wisam Thamir Jabar	Biological Science	Environment and Pollution			√	
Dr. Ali Jawad Kadhim	Soil and water resources	Soil Physics			√	
Assistant Professor Noor AlHuda Jawad Kadhim	Soil and water resources	Soil Microbiology			√	

Dr. Zahraa Khalid Kamel	Soil and water resources	Soil Physics/Irrigation			√	
Dr. Muntather Hamadi Mansour	Soil and water resources	Soil fertility			√	
Lecture Mayada Shuhb Hamed	Soil and water resources	Soil physics			√	
Lecture Hiba Kalaf Razaq	Soil and water resources	Soil Chemistry			√	
Assistant Lecture Afrah Mahdi Saleh	Soil and water resources	Soil Physics			√	
Assistant Lecture Hassanian Mohammad Mahmood	Soil and water resources	Soil Classification			√	
Assistant Lecture Osam Hani Hameed	Soil and water resources	Soil Chemistry			√	
Assistant Lecture Asmma Hussain Alawi	Soil and water resources	Soil Fertility			√	
Assistant Lecture Ali Hussian Ali	Soil and water resources	Soil Physics			√	
Assistant Lecture Buraq Mussa Sadiq	Soil and water resources	Soil Microbiology			√	
Assistant Lecture Wafaa Awad Tuama	Soil and water resources	Soil Physics			√	
Assistant Lecture Yahaya Radhi Kareem	Soil and water resources	Soil Physics			√	
Assistant Lecture Karrar Kasim Farhan	Engineering	Refrigerating and Air conditioning			√	
Assistant Lecture Alaa Abd AlMunam Saheb	Engineering	Mechanic			√	

Assistant Lecture Makasid Muraad Saheb	Administration and Economics	Business Management			√	
Assistant Lecture Behar Alaa Majeed	Soil and water resources	Soil Fertility			√	

Professional Development

Mentoring new faculty members

Guiding new, visiting, full-time and part-time faculty members by following them up by the Scientific Committee and the Department Head, attending lectures, and giving them the necessary directions.

Professional development of faculty members

- 1- Follow teaching and learning strategies
- 2- Evaluation of learning outcomes by the scientific committee
- 3- Professional development through holding development courses

12. Acceptance Criterion

Central admission

13. The most important sources of information about the program

- 1- The website of the college and university
- 2- University guide
- 3- Central Library
- 4- The most important books and sources for the department
- 5- The Internet

14. Program Development Plan

- 1-Teamwork: Working within the group effectively and actively.
- 2- Time management: Managing time effectively and setting priorities with the ability to work organized by appointments.
- 3- Leadership: The ability to direct and motivate others.

4– Independence at work.

5– Negotiation and persuasion (the student is able to influence and persuade others to discuss and reach an agreement.

6– Global skills (the student is able to speak and understand other languages and appreciate other cultures.

Program Skills Outline

				Required Program Learning Outcomes											
Year / Level	Course Code	Course Name	Core or Elective	Knowledge				Skills				Values			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
Third Year First Semester	SolSPH31	Soil Physics	Core					•				•		•	
	SolSCH31	Soil Chemistry	Core						•						
	SolSFe32	Soil Fertility	Core		•			•		•			•		
	SolSIr32	Irrigation	Core		•	•					•				•
	SolSMo31	Soil Morphology	Core								•				•
	SolDAE31	Experimental Design and Analysis	Core		•								•		
	SolSWP31	Soil, Water and Plant Pollution	Core	•	•	•	•	•	•	•	•	•	•	•	•
	013301U	English Language			•		•								
Third Year Second Semester	Soinre32	Natural Resources Economics	Core					•				•		•	
	SolDra32	Drainage	Core						•						
	SolSMi32	Soil Mineralogy	Core	•	•	•	•	•	•	•	•	•	•	•	•
	SolReSe21	Remote Sensing	Core		•		•								
	SolSSa31	Soil Salinity	Core					•				•		•	

	SolSOM32	Soil Organic Matter	Core						•						
Fourth Year First Semester	SolSSC41	Soil Survey and Classification	Core		•			•		•			•		
	SolSWC42	Soil and Water Conservation	Core		•	•					•				•
	SolSMi42	Soil Microbiology	Core								•				•
	SolPNu41	Plant Nutrition	Core		•								•		
	SolHyd41	Hydrology and Water Resources	Core	•	•	•	•	•	•	•	•	•	•	•	•
	U013401	English Language	Core		•		•								
	0013406	Graduation Research Project	Core					•				•		•	
	SolSIT42	Irrigation Systems Technologies	Core						•						
Fourth Year Second Semester	SolFeT42	Fertilizer Technologies	Core	•	•	•	•	•	•	•	•	•	•	•	•
	SolLRe41	Land Reclamation	Core		•		•								
	SolSMa42	Soil Management	Core					•				•		•	
	SolSW41	Soil-Water-Plant Relations	Core						•						
	SolDes32	Desertification	Core		•			•		•			•		
	0023406	Graduation Research Project	Core		•	•					•				•
	0023407	Seminars	Core								•				•

Please place a mark in the boxes corresponding to the individual program learning outcomes being assessed

•

Course Description Form

1. Course Name:	
Remote Sensing - Theoretical	
2. Course Code:	
SolReSe21	
3. Semester / Year:	
Second Semester / Third Stage / 2025-2026	
4. Description Preparation Date:	
2/11/2025	
5. Available Attendance Forms:	
In-person attendance	
6. Number of Credit Hours (Total) / Number of Units (Total):	
30 theoretical hours + 45 practical hours = 75 hours / 3units	
7. Course Administrator's Name (Mention All, If More Than One Name):	
Asst. Prof. Muhannad Ismail Khalbas — albwmoanad@uowasit.edu.iq Asst. Lect. Hiba Kalf Razzaq — hibaalquraishy@uowasit.edu.iq	
8. Course Objectives:	
Course Objectives	1- Introduce students to the concept, objectives, components, and applications of remote sensing. 2- Study electromagnetic energy interactions, spectral reflectance, and the factors affecting them. 3- Identify sensors, their types and characteristics, and study aerial and satellite images. 4- Study methods of satellite image classification and interpretation. 5- Introduce Geographic Information Systems (GIS) and their agricultural and environmental applications.
9. Teaching and Learning Strategies:	
Strategy	1- Explanation and clarification. 2- Lecture method. 3- Student groups. 4- Practical lessons in agricultural fields. 5- Scientific visits to specialized departments and research stations. 6- Self-learning method.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or Subject	Learning Method	Evaluation Method
First	5	History and objectives of remote sensing	Remote Sensing	Explanation, model presentation, and lecture	Exam
Second	5	Electromagnetic energy and parts of the electromagnetic spectrum	Remote Sensing	Explanation, model presentation, and lecture	Exam
Third	5	Interaction of energy with environmental components	Remote Sensing	Explanation, model presentation, and lecture	Exam
Fourth	5	Spectral reflectance and the factors affecting it	Remote Sensing	Explanation, model presentation, and lecture	Exam
Fifth	5	Aerial photography and stages of its development	Remote Sensing	Explanation, model presentation, and lecture	Exam
Sixth	5	Types of aerial photographs and their characteristics	Remote Sensing	Explanation, model presentation, and lecture	Exam
Seventh	5	Principles of aerial and satellite image interpretation	Remote Sensing	Explanation, discussion, and practical application	Exam and report
Eighth	5	Active and passive sensors and their characteristics	Remote Sensing	Explanation and image/model presentation	Exam
Ninth	5	Satellites and remote sensing platforms	Remote Sensing	Explanation, model presentation, and lecture	Exam
Tenth	5	Pre-processing of satellite images	Remote Sensing	Explanation and practical application	Practical exam
Eleventh	5	Supervised and unsupervised classification of satellite images	Remote Sensing	Explanation and practical application	Exam and report

Week	Hours	Required Learning Outcomes	Unit or Subject	Learning Method	Evaluation Method
Twelfth	5	Vegetation, water, and soil indices	Remote Sensing	Explanation and examples	Exam
Thirteenth	5	Introduction to Geographic Information Systems (GIS)	GIS and Remote Sensing	Explanation and practical application	Report
Fourteenth	5	Integration of GIS with remote sensing data	GIS and Remote Sensing	Explanation and practical application	Exam
Fifteenth	5	Applications of remote sensing in agriculture, soil, and environment	Remote Sensing	Discussion and comprehensive review	Comprehensive exam

11. Course Evaluation

No.	Evaluation Method	Due	Mark	Weight
1	Report 1	Fourth week	2.5	2.5%
2	Report 2	Fifth week	2.5	2.5%
3	Short test 1	Sixth week	2	2%
4	Short test 2	Fourteenth week	2	2%
5	Short test 3	Fifteenth week	1	1%
6	Semester test 1	Sixth week	7.5	7.5%
7	Semester test 2	Eleventh week	7.5	7.5%
8	Final theoretical exam	Final exams	40	40%
9	Practical/field project	Fifteenth week	5	5%
10	Field evaluation	Third and fifth weeks	2	2%
11	Short practical test 1	First week	1	1%
12	Short practical test 2	Fourth week	0.5	0.5%
13	Short practical test 3	Fourteenth week	1	1%
14	Live drawings and homework	Selected weeks	5.5	5.5%
15	Final practical exam	Final exams	20	20%
16	Total	-	100	100%

12. Learning and Teaching Resources

Required textbooks (if any)	Basics of Remote Sensing and Geographic Information Systems; approved departmental lectures.
Main references	Lillesand, Kiefer & Chipman: Remote Sensing and Image Interpretation. Jensen: Introductory Digital Image Processing.
Recommended books and references	Campbell & Wynne: Introduction to Remote Sensing. Burrough et al.: Principles of Geographical Information Systems.
Electronic references and websites	NASA Earthdata, USGS EarthExplorer, FAO, and peer-reviewed remote sensing and GIS journals.

Course Description Form

1. Course Name:	
Remote Sensing - Practical	
2. Course Code:	
0C23302	
3. Semester / Year:	
Second Semester / Third Stage / 2025-2026	
4. Description Preparation Date:	
2/11/2025	
5. Available Attendance Forms:	
In-person attendance	
6. Number of Credit Hours (Total) / Number of Units (Total):	
45 practical hours / 3 units	
7. Course Administrator's Name (Mention All, If More Than One Name):	
Asst. Lect. Hiba Kalf Razzaq — hibaalquraishy@uowasit.edu.iq	
8. Course Objectives:	
Course Objectives	1- Introduce students to the concept, objectives, components, and applications of remote sensing. 2- Study electromagnetic energy interactions, spectral reflectance, and the factors affecting them. 3- Identify sensors, their types and characteristics, and study aerial and satellite images. 4- Study methods of satellite image classification and interpretation. 5- Introduce Geographic Information Systems (GIS) and their agricultural and environmental applications.
9. Teaching and Learning Strategies:	
Strategy	1- Explanation and clarification. 2- Lecture method. 3- Student groups. 4- Practical lessons in agricultural fields. 5- Scientific visits to specialized departments and research stations. 6- Self-learning method.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or Subject	Learning Method	Evaluation Method
First	3	Identify the history and objectives of remote sensing	Electromagnetic Spectrum and Remote Sensing	Explanation, model presentation, and lecture	Daily exam

Week	Hours	Required Learning Outcomes	Unit or Subject	Learning Method	Evaluation Method
Second	3	Understand spectral reflectance and its controlling factors	Spectral Reflectance	Explanation, model presentation, and lecture	Daily exam
Third	3	Understand aerial photography and its development	Aerial Photography and Its Development	Explanation, model presentation, and lecture	Report
Fourth	3	Apply rules for classifying aerial photographs	Classification of Aerial Photographs	Explanation, model presentation, and lecture	Report
Fifth	3	Identify types and characteristics of aerial photographs	Types and Characteristics of Aerial Photographs	Explanation, model presentation, and lecture	Daily exam
Sixth	3	Identify types and characteristics of sensors	Sensors and Space Platforms	Explanation, model presentation, and lecture	Report
Seventh	3	Identify types and characteristics of spatial data	Spatial Data Using GIS	Explanation, model presentation, and lecture	Report
Eighth	3	Assess practical learning	Monthly Exam	Monthly exam	Exam
Ninth	3	Apply remote sensing to spatial data	Remote Sensing of Spatial Data	Explanation, model presentation, and lecture	Report
Tenth	3	Identify land problems, maps, and management applications	Land Problems, Maps, and Management	Explanation, model presentation, and lecture	Daily exam
Eleventh	3	Process spatial data using remote sensing techniques	Remote Sensing of Spatial Data	Explanation, model presentation, and lecture	Report
Twelfth	3	Evaluate land using remote sensing applications	Land Evaluation Applications	Explanation, model presentation, and lecture	Daily exam

Week	Hours	Required Learning Outcomes	Unit or Subject	Learning Method	Evaluation Method
Thirteenth	3	Use GIS for soil management	Soil Management Using GIS	Explanation, model presentation, and lecture	Report
Fourteenth	3	Integrate GIS and remote sensing applications	GIS and Remote Sensing Applications	Explanation, model presentation, and lecture	Daily exam
Fifteenth	3	Assess final practical learning	Monthly Exam	Monthly exam	Exam

11. Course Evaluation

Practical tests	5
Reports and studies	5
Semester exam	10
Final practical exam	20

12. Learning and Teaching Resources

Required textbooks (if any)	Remote Sensing, A. M. Al-Mashhadani, 2014.
Main references	Fundamentals of Remote Sensing, Canada Centre for Remote Sensing.
Recommended books and references	Peer-reviewed journals related to remote sensing.
Electronic references and websites	Google Earth, USGS, and approved electronic resources.

Course Description Form

1. Course Name:						
Design and Analysis of Agricultural Experiments - Theoretical						
2. Course Code:						
SolDAE31						
3. Semester / Year:						
First Semester / Third Stage / 2025-2026						
4. Description Preparation Date:						
2/11/2025						
5. Available Attendance Forms:						
In presence- full time						
6. Number of Credit Hours (Total) / Number of Units (Total):						
5 hours per week (2 theoretical + 3 practical) / 3units						
7. Course Administrator's Name (Mention All, If More Than One Name):						
Dr. Reyad Jabbar Mansour .						
8. Course Objectives:						
Course Objectives.				• Introduction to the general concepts of statistics. • Understanding the general principles of agricultural experimental design. • Identifying the main experimental designs, their importance, and how to select the appropriate design. • Understanding factorial experiments and interaction effects in agricultural research. • Applying essential statistical tests and interpreting experimental results.		
9. Teaching and Learning Strategies:						
Strategy		•Project-Based Learning (PBL): Students design a complete agricultural experiment (e.g., testing fertilizer efficiency), monitor it in the field or greenhouse, collect data, analyze it statistically, and write a final report. •Problem-Based Learning: Presenting real-world agricultural issues (e.g., sudden crop yield drop) and tasking students with designing a statistical experiment to identify and solve the problem. •Practical & Software-Assisted Learning: Training students on using statistical software (such as SPSS, SAS, or RStudio) to analyze agricultural data, moving away from tedious manual calculations. •Cooperative Learning: Dividing students into small teams to work together on implementing various experimental designs (e.g., RCBD, Split-Plot, or Latin Square), which enhances peer learning and analytical skills. •Flipped Classroom: Students review the theoretical concepts of statistical designs at home (via recorded lectures or readings), while class time is dedicated to hands-on data analysis and biological interpretation of results.				
10. Course Structure						
Week	Hours	Required learning outcomes	Unit Name	or Subject	Learning Method	Evaluation Method

1	2	Defines statistics and determines its importance.	Introduction to Statistics	Lecture	Whiteboard Lecture
2	2	Distinguishes between different types of measures.	Measures of Central Tendency and Dispersion	Lecture	Whiteboard Lecture
3	2	Defines design, treatment, replication, and factor.	Introduction to Agricultural Experimental Design	Lecture	In-person Whiteboard Lecture
4	2	Distributes treatments according to the design; Analyzes data based on the design.	Completely Randomized Design (CRD) - Applications	Lecture	In-person Lecture & Field Application
5	2	Tests data using LSD, Duncan, and Tukey tests.	Post-Hoc Tests (Multiple Comparisons)	Lecture	Lecture & In-class Problem Solving
6	2	Evaluates student performance.	First Month Exam	-	Inside the Classroom
7	2	Implements the design in the field; Analyzes the data.	Randomized Complete Block Design (RCBD)	Lecture	In-person Lecture & Field Application
8	2	Estimates relative efficiency and compares designs accordingly.	Relative Efficiency: RCBD vs. CRD	Lecture	In-person Lecture & Homework Assignments
9	2	Implements a Latin Square design; Analyzes its data.	Latin Square Design	Lecture	In-person Lecture & Field Application
10	2	Differentiates between factorial and simple experiments.	Factorial Experiments in CRD	Lecture	In-person Lecture & Field Application
11	2	Applies a factorial experiment in RCBD and analyzes its data.	Factorial Experiments in RCBD	Lecture	In-person Lecture & Field Application
12	2	Applies a factorial experiment in Latin Square and analyzes its data.	Factorial Experiments in Latin Square Design	Lecture	In-person Lecture & Field Application
13	2	Differentiates between factorial and split-plot experiments; Identifies reasons for using split-plot.	Split-Plot Design	Lecture	In-person Lecture & Field Application
14	2	Implements a multi-factor experiment using Split-Split Plot design; Differentiates between main and sub-plots.	Split-Split Plot Design	Lecture	In-person Lecture & Field Application
15	2	Evaluates student performance.	Second Month Exam	-	In-person Exam

11. Course Evaluation

Distribution of the score out of 100 according to the tasks assigned to the student, such as daily preparation, daily oral, monthly, or written exams, reports, etc.

12. Learning and Teaching Resources

Required textbooks (methodology, if any)	design and analysis of agricultural experiments
Main references (sources)	Principles of Statistics. design and analysis of agricultural experiments
Recommended supporting books and references (scientific journals, reports...)	Statistical procedures for agricultural research.
Electronic references, websites	Many resources

Course Description Form

1. Course Name:	
Design and Analysis of Agricultural Experiments - Practical	
2. Course Code:	
316 EXDA	
3. Semester / Year:	
First Semester / Third Stage / 2025-2026	
4. Description Preparation Date:	
2/11/2025	
5. Available Attendance Forms:	
In-person attendance	
6. Number of Credit Hours (Total) / Number of Units (Total):	
3 practical hours / units	
7. Course Administrator's Name (Mention All, If More Than One Name):	
Name: Husian Njem Hameed Email: husain@uowasit.edu.iq	
8. Course Objectives:	
Course Objectives	•To enable students to organize and statistically analyze data from animal experiments. •To teach students how to perform analysis of variance and interpret ANOVA tables. •To train students to use mean comparison tests such as LSD, Tukey, and Duncan tests. •To develop students' ability to write statistical results in a scientific style suitable for reports and research papers. •To link theoretical concepts with practical applications in feed trials, growth experiments, milk production, blood traits, digestibility, and reproductive efficiency.
9. Teaching and Learning Strategies:	
Strategy	•Delivering theoretical lectures to explain basic concepts and experimental designs. •Using interactive lectures and classroom discussions. •Solving statistical exercises during lectures and practical classes. •Applying practical exercises using hypothetical and real data from animal production experiments. •Training students to construct and interpret analysis of variance tables. •Using the board, data show, and available statistical software. •Assigning students practical reports on the analysis of animal experiment data. •Linking theoretical content with practical examples such as feeding trials, growth, milk production, and blood traits.

10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	practical + 3	The student should identify the basic concepts of experimental design.	Introduction to experimental design and its importance in animal production research; treatment, experimental unit, replication, randomization, and experimental error	Theoretical lecture + data analysis	Oral questions + short quiz
2	practical + 3	The student should understand basic statistical concepts related to experiment analysis.	Mean, variance, standard deviation, standard error, statistical hypotheses, and significance level	Practical application + discussion	Practical assignment + short quiz
3	practical + 3	The student should interpret the ANOVA table and its components.	Analysis of variance, sources of variation, degrees of freedom, mean squares, F value, and interpretation of ANOVA	Theoretical lecture + practical application	Practical exercise + classroom questions
4	practical + 3	The student should apply completely randomized design to animal data.	Completely Randomized Design, CRD, and its applications in animal feeding trials and feed treatments	Data analysis + discussion	Practical test + report
5	practical + 3	The student should analyze growth and weight-gain data.	Analysis of CRD data using examples from growth, weight gain, and feed conversion ratio experiments	Theoretical lecture + practical application	Data analysis report
6	practical + 3	The student should distinguish when to use randomized complete block design.	Randomized Complete Block Design, RCBD, and its applications when differences exist among animals, pens, or initial body weights	Theoretical lecture + applied examples	Theoretical test + practical exercise
7	practical + 3	The student should analyze RCBD data.	Analysis of RCBD data and interpretation of results in animal production experiments	Interactive lecture + data analysis	Practical report
8	practical + 3	The student should identify Latin Square Design and its animal applications.	Latin Square Design and its applications in digestibility experiments, ruminant studies, and period-based experiments	Theoretical lecture + practical application	Short quiz + assignment
9	practical + 3	The student should interpret factorial experiments and main effects.	Factorial Experiments and their applications in studying feed type, additive level, sex, or age	Theoretical lecture + exercises	Theoretical test + exercise
10	practical + 3	The student should interpret interactions among factors in animal experiments.	Interaction among factors and its interpretation in animal production research	Theoretical lecture + practical application	Practical report

11	practical + 3	The student should use ANCOVA when a covariate exists.	Analysis of covariance, ANCOVA, and its use with covariates such as initial body weight or age	Theoretical lecture + data analysis	Analytical assignment
12	practical + 3	The student should interpret statistical hypotheses and significance.	Statistical hypothesis testing, statistical significance, and the difference between statistical and scientific significance	Practical application + discussion	Short quiz
13	practical + 3	The student should apply mean comparison tests.	Mean comparison tests: LSD, Tukey, and Duncan tests, and conditions for using each test	Theoretical lecture + data analysis	Practical test + report
14	practical + 3	The student should check ANOVA assumptions.	Assumptions of ANOVA: normality, homogeneity of variance, independence of errors, and methods of checking them	Practical application + discussion	Practical assignment
15	practical + 3	The student should complete an applied analysis of animal experiment data.	Comprehensive practical application using data from an animal production experiment, general review, discussion of student reports, and writing results scientifically	Theoretical lecture + practical application	Final report evaluation

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports etc

No.	Evaluation Type	Score
1	Short daily quizzes	5
2	Assignments and practical exercises	5
6	Coursework total	5
7	exam	5
	Total	20

12. Learning and Teaching Resources

Item	Resources
Recommended books and references	Steel, R. G. D., Torrie, J. H., & Dickey, D. A. Principles and Procedures of Statistics: A Biometrical Approach.
Recommended books and references	Mead, R., Curnow, R. N., & Hasted, A. M. Statistical Methods in Agriculture and Experimental Biology.
Electronic references and websites	Scientific websites and statistical software resources related to experimental data analysis, such as Excel, SPSS, R, and GenStat, according to available facilities.

Course Description Form

1. Course Name:	
Soil and Water Pollution - Theoretical	
2. Course Code:	
SolSWP31	
3. Semester / Year:	
First Semester / Third Stage / 2025-2026	
4. Description Preparation Date:	
2/11/2025	
5. Available Attendance Forms:	
•In-person attendance •Online attendance •Hybrid attendance •Practical laboratory attendance •Field visit attendance •Seminar and workshop attendance •Interactive classroom participation •Self-directed learning attendance •Group discussion participation •Research and project-based attendance	
6. Number of Credit Hours (Total) / Number of Units (Total):	
75/5 3 unit	
7. Course Administrator's Name (Mention All, If More Than One Name):	
Name: Dr. Wisam Thamer Jabbar Al-Mayah Email:Walmayah@uowasit.edu.iq	
Name:	Email:
8. Course Objectives:	
Course Objectives	•To provide students with fundamental concepts of soil and water pollution and their natural and anthropogenic sources. •To introduce students to the chemical, physical, and biological pollutants and their impacts on the agricultural environment. •To develop students' ability to identify and assess pollution levels in soil and water using scientific and laboratory methods. •To enhance students' understanding of the effects of pollution on agricultural production, human health, living organisms, and natural resources. •To equip students with skills to apply preventive measures and pollution control practices in agricultural systems. •To enable students to interpret environmental analysis results and relate them to various agricultural and environmental problems. •To encourage students to adopt sustainable management practices for soil and water resources and environmental protection.
9. Teaching and Learning Strategies:	
Strategy	•Theoretical lectures •Interactive classroom discussion •Cooperative learning

		•Problem-based learning •Brainstorming •Practical and laboratory teaching •Field visits •E-learning •Project-based learning •Case study method •Self-directed learning •Scientific presentations and seminars			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Credits	Learning Method	Evaluation on Method
First	2	Identifying the sources and types of soil and water pollution	Introduction to Soil and Water Pollution	Interactive lectures	Exam
Second	2	Identifying the sources and types of soil and water pollution	Sources and Types of Soil Pollutants	Interactive lectures	Exam
Third	2	Identifying the sources and types of soil and water pollution	Sources and Types of Water Pollutants	Interactive lectures	Exam
Fourth	2	Identifying the sources and types of soil and water pollution	Physical, Chemical, and Biological Properties of Polluted Soils	Problem-based learning	Exam
Fifth	2	Explaining the impact of pollutants on the agricultural environment and human health	Heavy Metal Contamination in Agricultural Soils	Problem-based learning	Exam
Sixth	2	Explaining the impact of pollutants on the agricultural environment and human health	Pesticides and Fertilizer Residues in Soil and Water	Problem-based learning	Exam
Seventh	2	Explaining the impact of pollutants on the agricultural environment and human health	Salinity and Sodicity Problems in Agricultural Lands	Practical and laboratory learning	Exam
Eighth	2	Explaining the impact of pollutants on the agricultural environment and human health	Industrial and Petroleum Pollution and Their Environmental Impacts	Practical and laboratory learning	Exam
Nineth	2	Explaining the impact of pollutants on the agricultural environment and human health	Wastewater Management and Agricultural Reuse	Practical and laboratory learning	Exam

Tenth	2	Explaining the impact of pollutants on the agricultural environment and human health	Soil Erosion and Its Relationship to Environmental Pollution	Practical and laboratory learning	Exam
Eleventh	2	Explaining the impact of pollutants on the agricultural environment and human health	Methods of Soil and Water Pollution Assessment and Analysis	Practical and laboratory learning	Exam
Twelfth	2	Analysis and diagnosis of pollution problems using scientific methods	Environmental Impacts of Pollution on Crop Production and Human Health	Practical and laboratory learning	Exam
Thirteenth	2	Analysis and diagnosis of pollution problems using scientific methods	Soil and Water Remediation Techniques and Sustainable Management	Real-life case studies	Exam
Fourteenth	2	Analysis and diagnosis of pollution problems using scientific methods	Environmental Protection Strategies and Recent Trends in Pollution Control	Real-life case studies	Exam
Fifteenth	Midterm exam	Midterm exam	Midterm exam	Midterm exam	Exam
11. Course Evaluation					
12. Learning and Teaching Resources					
Required Textbooks (Prescribed, if any)			Soil and Water Pollution – Mahmoud Fadhil Al-Jumaili et al.)A comprehensive and approved textbook used in several agricultural colleges, addressing sources of pollutants, their effects, methods of transport, and treatment(Soil and Water Pollution – Mahmoud Fadhil Abdul (Tikrit University((A systematic academic textbook covering the fundamentals of pollution, soil and water characteristics, organic and inorganic pollutants, and their modeling.)		
Core References			Brady, N. C., & Weil, R. R. (2016). <i>The Nature and Properties of Soils</i> . Pearson. Sparks, D. L. (2003). <i>Environmental Soil Chemistry</i> . Academic Press.		
Recommended References & Readings (Scientific Journals, Reports, etc.)			Water, Air, & Soil Pollution – Springer <i>Environmental Pollution</i> – Elsevier		
Online References			https://www.fao.org/ https://www.unep.org/		

Course Description Form

1. Course Name:	
Soil and Water Pollution - Practical	
2. Course Code:	
0013306	
3. Semester / Year:	
First Semester / Third Stage / 2025-2026	
4. Description Preparation Date:	
2/11/2025	
5. Available Attendance Forms:	
In-person attendance	
6. Number of Credit Hours (Total) / Number of Units (Total):	
Practical: 45 hours / Number of units: 3	
7. Course Administrator's Name (Mention All, If More Than One Name):	
Name: Asst. Lect. Buraq Musa Sadeq Email: BuAlghuribawi@uowasit.edu.iq	
8. Course Objectives:	
Course Objectives	*Introducing the student to the nature of environmental pollution and its basic components. * Studying the different types of pollution (air, water, soil, and noise pollution). * Studying the role of chemical and physical pollutants in the degradation of the ecosystem. * Using modern techniques and methods in treating pollution and mitigating its effects.
9. Teaching and Learning Strategies:	
Strategy	•Cognitive Goals * Enabling the student to understand the nature of pollution and its various sources. * Enabling the student to distinguish between the different types of environmental pollutants. * Enabling the student to distinguish between the main groups of pollutants in the environment in terms of composition, characteristics, and degradation rate. * Learning how to utilize biological and chemical methods to improve environmental quality and reduce dependency on polluting materials. * Enabling the student to understand the effect of physical and chemical factors on the distribution and spread of pollutants in the ecosystem. •Skill-Based Goals * Laboratory and field diagnosis of pollution levels in water, air, and soil. * Developing and applying skills to measure environmental quality and identify sources of defect. * Isolating pollutants and determining safe methods for their disposal or recycling. * Measuring environmental activity and monitoring biological changes resulting from pollution.
10. Course Structure	

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
First	5	(Memorizing, understanding, practical application)	Safety and Security Instructions in Laboratories and an Introduction to Environmental pollution	(Explanation, model demonstration, and lecture)	Exam
Second	5	(Memorizing, understanding, practical application)	Apparatus and Tools Used in the Laboratory	(Explanation, model demonstration, and lecture)	Exam
Third	5	(Memorizing, understanding, practical application)	Sample Collection, Preservation, and Their Importance	(Explanation, model demonstration, and lecture)	Exam
Fourth	5	(Memorizing, understanding, practical application)	Estimation of Total Dissolved Solids (TDS) in Water	(Explanation, model demonstration, and lecture)	Exam
Fifth	5	(Memorizing, understanding, practical application)	Method for Measuring Chlorides	(Explanation, model demonstration, and lecture)	Exam
Sixth	5	(Memorizing, understanding, practical application)	Monthly Exam	(Explanation, model demonstration, and lecture)	Exam
Seventh	5	(Memorizing, understanding, practical application)	Measurement of Hydrogen Ion Concentration (pH) in Water	(Explanation, model demonstration, and lecture)	Exam
Eighth	5	(Memorizing, understanding, practical application)	Measurement of Dissolved Oxygen (DO) in Water	(Explanation, model demonstration, and lecture)	Exam
Ninth	5	(Memorizing, understanding, practical application)	How to Measure Using a pH Meter	(Explanation, model demonstration, and lecture)	Exam
Tenth	5	(Memorizing, understanding, practical application)	Determination of Biochemical Oxygen Demand (BOD)	(Explanation, model demonstration, and lecture)	Exam
Eleventh	5	(Memorizing, understanding, practical application)	Measurement of Water Turbidity	(Explanation, model demonstration, and lecture)	Exam
Twelfth	5	(Memorizing, understanding, practical application)	Second Monthly Exam	(Explanation, model demonstration, and lecture)	Exam
Thirteenth	5	(Memorizing, understanding, practical application)	Calculation of Water Acidity	(Explanation, model demonstration, and lecture)	Exam
Fourteenth	5	(Memorizing, understanding, practical application)	Calculation of Water Alkalinity	(Explanation, model demonstration, and lecture)	Exam

Fifteenth	5	(Memorizing, understanding, practical application)	Comprehensive Exam	(Explanation, model demonstration, and lecture)	Exam
11. Course Evaluation					
Theoretical Exams: 10 Practical Exams:10 Reports and Studies:10 Term/Semester Exam:10 Attendance:10 Final Exam:50					
12. Learning and Teaching Resources					
Required textbooks (curricular books, if any)			Air, Water and Soil Pollution		
Main references (sources)					
Recommended books and references (scientific journals, reports...)			Iraqi Academic Scientific Journals		
Electronic References, Websites					

Course Description Form

1. Course Name:					
Soil Physics - Theoretical					
2. Course Code:					
SolPh31					
3. Semester / Year:					
First Semester / Third Stage / 2025-2026					
4. Description Preparation Date:					
2/11/2025					
5. Available Attendance Forms:					
Actual Presence					
6. Number of Credit Hours (Total) / Number of Units (Total):					
30 theoretical 45 practical 3 credits					
7. Course Administrator's Name (Mention All, If More Than One Name):					
akjwad@uowasit.edu.iq Name: Dr. Ali Jawad Kadhim Al-Sarraji Email: Name: Mayada Shahab Hamed Email: mhamed@uowsit.edu.iq					
8. Course Objectives:					
Course Objectives	1 –Researches the study of soil physics and the physical properties of soil 2 –Study how to measure the physical properties of soil 3 –Applying measurements of physical properties to solve scientific problems related to agriculture and the environment 4 –Understanding the relationship between physical soil properties 5 –Knowing the movement of water in the soil and the flow of water in saturated and unsaturated soils.				
9. Teaching and Learning Strategies:					
Strategy	1 –Explanation and clarification 2 –Lecture method 3 –Student groups 4 –Practical lessons 5 –Scientific trips 6 – Self-learning method				
10. Course Structure					
Week	Hours	Required Learning Outcomes	Subject Name	Learning Method	Evaluation on Method

First	4	introduction and definition of soil science, soil physics and some related relationships	Soil Physics	Explanation, presentation of the model and lecture	Exam
Second	4	Explanation, presentation of the model and lecture	Soil physics	Physical soil properties, soil texture, particle size distribution, and Stock's law	Exam
Third	4	Explanation, presentation of the model and lecture	Soil physics	The specific area of soil and methods for determining it physically and chemically	Exam
Fourth	4	Explanation, presentation of the model and lecture	Soil physics	Soil Structure: its definition, importance, and how to study it	Exam
Fifth	4	Explanation, presentation of the model and lecture	Soil physics	Methods of studying soil structure and evidence of soil structure	Exam
Sixth	4	Explanation, presentation of the model and lecture	Soil physics	Stability of soil aggregates, methods of studying them, and factors affecting the formation of aggregates	Exam
Seventh	4	Explanation, presentation of the model and lecture	Soil physics	Soil water and general water properties, soil air, air capacity, and gas exchange in the soil	Exam
Eighth	4	Explanation, presentation of the model and lecture	Soil physics	Water properties related to porous media (soil), soil water energy and methods of expressing and measuring it	Exam
Nineth	4	Explanation, presentation of the model and lecture	Soil physics	Soil temperature, soil temperature, and heat flow in the soil	Exam
Tenth	4	Explanation, presentation of the model and lecture	Soil physics	Water flow in saturated soils and water flow in unsaturated soils	Exam
Eleventh	4	Explanation, presentation of the model and lecture	Soil physics	Water infiltration in soil: methods for measuring it and equations	Exam
Twelfth	4	Explanation, presentation of the model and lecture	Soil physics	rrigation and drainage change the physical properties of surface soil	Exam

Thirteenth	4	Explanation, presentation of the model and lecture	Soil physics	Water balance and energy balance in the field	Exam
Fourteenth	4	Explanation, presentation of the model and lecture	Soil physics	Evaluation of the water balance equation, water consumption, evapotranspiration	Exam
Fifteenth	4	Explanation, presentation of the model and lecture	Soil physics		Exam
11. Course Evaluation					
1 –Theoretical tests	25				
2 –Practical tests	15				
3 –Reports and studies	10				
4 –Final exam	50				
12. Learning and Teaching Resources					
Required Textbooks (Prescribed, if any)			1 –Soil Physics, written by Dr. Hisham Mahmoud Hassan 2000 2 –Basics of soil physics, translation. Mahdi Ibrahim Odeh 1990.		
Core References			Basics of soil physics, translation. Mahdi Ibrahim Odeh 1990		
Recommended References & Readings (Scientific Journals, Reports, etc.)			Iraqi academic scientific journals		
Online References			Soil physics		

Course Description Form

1. Course Name:					
Soil Physics - Practical					
2. Course Code:					
SolPh31					
3. Semester / Year:					
First Semester / Third Stage / 2025-2026					
4. Description Preparation Date:					
2/11/2025					
5. Available Attendance Forms:					
Physical attendant					
6. Number of Credit Hours (Total) / Number of Units (Total):					
3 hours / 45 hours					
7. Course Administrator's Name (Mention All, If More Than One Name):					
Name: Afrah Mahdi Saleh Email:afalobaidi@uowasit.edu.iq					
Name: Email:					
8. Course Objectives:					
Course Objectives		Familiarize students with basic methods for measurement of soil density, particle size distribution, compaction, water content and energy, saturated and unsaturated hydraulic conductivity, and transport of solutes, heat, and gas.			
9. Teaching and Learning Strategies:					
Strategy		2- Lecture method 3- Student groups 4- Practical lessons 5- Scientific trips 6 - Self-learning method			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Credits	Learning Method	Evaluation on Method
First	3	Water Content and Bulk density	1.5	Lab	Exam
Second	3	Particle density	1.5	Lab	Exam
Third	3	Particle size analysis	1.5	Lab	Exam
Fourth	3	Atterburg Limits	1.5	Lab	Exam

Fifth	3	Analysis of Lab #3	1.5	Lab	Exam
Sixth	3	Field and lab measurement of soil water	1.5	Lab	Exam
Seventh	3	water characteristics	1.5	Lab	Exam
Eighth	3	Mid-Term Exam	1.5	Lab	Exam
Ninth	3	Saturated hydraulic	1.5	Lab	Exam
Tenth	3	Field hydraulic conductivity	1.5	Lab	Exam
Eleventh	3	Prep of lab Reports	1.5	Lab	Exam
Twelfth	3	Solute transport	1.5	Lab	Exam
Thirteenth	3	Computer Simulations	1.5	Lab	Exam
Fourteenth	3	Soil heat transport	1.5	Lab	Exam
Fifteenth	3	Final Exam	1.5	Lab	Exam
11. Course Evaluation					
1-Laboratory Reports			75%		
2- Mid-term Examination			15%		
3- Final examination			15%		
.					
12. Learning and Teaching Resources					
Required Textbooks (Prescribed, if any)			Soil Physics, written by Dr. Hisham Mahmoud Hassan 2000 Basics of soil physics, translation. Mahdi Ibrahim Odeh 1990.		
Core References			Basics of soil physics, translation. Mahdi Ibrahim Odeh 1990		
Recommended References & Readings (Scientific Journals, Reports, etc.)			Iraqi academic scientific journals		
Online References			Soil physics		

Course Description Form

1. Course Name:					
Soil Chemistry - Theoretical					
2. Course Code:					
SolSch31					
3. Semester / Year:					
First Semester / Third Stage / 2025-2026					
4. Description Preparation Date:					
2/11/2025					
5. Available Attendance Forms:					
Attend					
6. Number of Credit Hours (Total) / Number of Units (Total):					
30 theoretical 45 practical =75 hrs units 3					
7. Course Administrator's Name (Mention All, If More Than One Name):					
Name: Assistant Professor Dr. Mahdi Wasmey Scheib Email: malaiedy@uowasit.edu.iq					
8. Course Objectives:					
Course Objectives		The soil chemistry course aims to explain the principles used in studying the chemical composition of soil. During this course, the student is introduced to all the chemical properties of soil and how to estimate and calculate them practically and in the field. During this course, all chemical properties of soil are linked to other branches of soil science.			
9. Teaching and Learning Strategies:					
Strategy	- Make the learner active and effective in educational situations. - Teach students to respect different opinions and value others - Benefit from other people's ideas and information.				
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
First	5	The importance of studying soil chemistry,	Soil chemistry	Explanation, presentation of the model and lecture	Exam
the second	5	Ion exchange equations, physicochemical equations	Soil chemistry	Explanation, presentation of the model and lecture	Exam

the third	5	chemical equations, soil anion exchange capacity	Soil chemistry	Explanation, presentation of the model and lecture	Exam
the fourth	5	Solubility balance in soil	Soil chemistry	Explanation, presentation of the model and lecture	Exam
Fifth	5	Carbonate equilibrium, CO ₂ -H ₂ O system, CaCO ₃ -H ₂ O-CO ₂ system in soil	Soil chemistry	Explanation, presentation of the model and lecture	Exam
Sixth	5	Phosphorus balance, ionization of phosphorus in soil, phosphorus reactions	Soil chemistry	Explanation, presentation of the model and lecture	Exam
Seventh	5	Chemical potential of ions in the soil system - soil solution	Soil chemistry	Explanation, presentation of the model and lecture	Exam
Eighth	5	phosphorus dissolution Soil acidity and alkalinity	Soil chemistry	Explanation, presentation of the model and lecture	Exam
Ninth	5	curves in the Al ₂ O ₃ -Fe ₂ O ₃ -CaO-P ₂ O ₅ -H ₂ O system	Soil chemistry	Explanation, presentation of the model and lecture	Exam
Tenth	5	the importance of studying the degree of soil reaction	Soil chemistry	Explanation, presentation of the model and lecture	Exam
Eleventh	5	sources of acidity in the soil, methods for measuring acidity and alkalinity	Soil chemistry	Explanation, presentation of the model and lecture	Exam
Twelfth	5	effect of the degree of reaction on the cation exchange capacity.	Soil chemistry	Explanation, presentation of the model and lecture	Exam
Thirteenth	5	Equilibrium curves, soil buffering, acidity	Soil chemistry	Explanation, presentation of the model and lecture	Exam
Fourteenth	5	alkalinity of soils in dry and semi-arid areas, calcareous soils, and gypsum soils.	Soil chemistry	Explanation, presentation of the model and lecture	Exam

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Soil chemistry
Main references (sources)	Books related to the subject and scientific research
Recommended books and references (scientific journals, reports...)	

Course Description Form

1. Course Name:					
Soil Chemistry - Practical					
2. Course Code:					
SolSch31					
3. Semester / Year:					
First Semester / Third Stage / 2025-2026					
4. Description Preparation Date:					
2/11/2025					
5. Available Attendance Forms:					
In person					
6. Number of Credit Hours (Total) / Number of Units (Total):					
Hours practical		Number of Unit			
7. Course Administrator's Name (Mention All, If More Than One Name):					
yaradhi@uowasit.edu.iq Name: M.M yahya ride karim Email:					
8. Course Objectives:					
Course Objectives		.1 Identifying the chemical composition of mineral and organic soil components. .2 Understanding the chemical reactions that occur within the soil and their effect on soil fertility			
9. Teaching and Learning Strategies:					
Strategy		1- Training students on the use of laboratory equipment. 2- Conducting chemical analyses of soil. 3- Measuring the degree of reaction (pH) and electrical conductivity (EC). 4- Estimating macro and micronutrients. 5- Preparing standard chemical solutions			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Credits	Learning Method	Evaluation on Method
First	3	Memorization, understanding, practical, application	Soil sampling and preparation for chemical analysis	Explanation, Model Presentation, and Lecture	Exam
Second	3	Memorization, understanding, practical, application	soil extracts and their analysis	Explanation, Model Presentation, and Lecture	Exam
Third	3	Memorization, understanding, practical, application	Water-soluble ions	Explanation, Model Presentation, and Lecture	Exam
Fourth	3	Memorization, understanding, practical, application	Estimation of cation exchange capacity	Explanation, Model Presentation, and Lecture	Exam
Fifth	3	Memorization, understanding, practical, application	Estimation of organic matter	Explanation, Model Presentation, and Lecture	Exam
Sixth	3	Memorization, understanding, practical, application	Monthly Exam	Explanation, Model Presentation, and Lecture	Exam

Seventh	3	Memorization, understanding, practical, application	Estimation of sulfates	Explanation, Model Presentation, and Lecture	Exam
Eighth	3	Memorization, understanding, practical, application	Estimation of calcium carbonate	Explanation, Model Presentation, and Lecture	Exam
Ninth	3	Memorization, understanding, practical, application	Estimation of some major soil nutrients	Explanation, Model Presentation, and Lecture	Exam
Tenth	3	Memorization, understanding, practical, application	Estimation of available phosphorus	Explanation, Model Presentation, and Lecture	Exam
Eleventh	3	Memorization, understanding, practical, application	Estimation of nitrogen	Explanation, Model Presentation, and Lecture	Exam
Twelfth	3	Memorization, understanding, practical, application	Estimation of carbonates and bicarbonates	Explanation, Model Presentation, and Lecture	Exam
Thirteenth	3	Memorization, understanding, practical, application	Second monthly exam	Explanation, Model Presentation, and Lecture	Exam
Fourteenth	3	Memorization, understanding, practical, application	Estimation of sodium and potassium	Explanation, Model Presentation, and Lecture	Exam
Fifteenth	3	Memorization, understanding, practical, application	Observation and study of the crystal structures of some common and pre-prepared clays	Explanation, Model Presentation, and Lecture	Exam

11. Course Evaluation

- 1 Practical Tests 10
- 2 Reports and Studies 5
- 3 Attendance 5
- 4 Final Exam 20

12. Learning and Teaching Resources

Required Textbooks (Prescribed, if any)	Modern Irrigation Systems Technologies
Core References	
Recommended References & Readings (Scientific Journals, Reports, etc.)	Iraqi academic scientific journals
Online References	

Course Description Form

1. Course Name:					
Soil Morphology - Theoretical					
2. Course Code:					
SolSMo31					
3. Semester / Year:					
First Semester / Third Stage / 2025-2026					
4. Description Preparation Date:					
2/11/2025					
5. Available Attendance Forms:					
Actual presence					
6. Number of Credit Hours (Total) / Number of Units (Total):					
2 theoretical 3 practical units 3.					
7. Course Administrator's Name (Mention All, If More Than One Name):					
Name: Zahraa khalid kameel Email: Zakameel@uowasit.edu.iq Name: Afrah Mahd Email:					
8. Course Objectives:					
Course Objectives	For the student to become familiar with the science of metallurgy. • The student should classify soil minerals and methods for distinguishing them • The student should separate the negative and positive effect of minerals on the soil • The student gets to know the depth of the soil and discover it • The student will be able to manage soil according to mineral content				
9. Teaching and Learning Strategies:					
Strategy	1-Explanation and clarification 2- Lecture method 3- Student groups 4- Practical lessons 5- Scientific trips 6 - Self-learning method				
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
first	5	The student gets to know the concept of morphology	Soil morphology	Explanation, presentation of the model and lecture	the exam
the second	5	The student gets to know the soil horizons		Explanation, presentation of the model and lecture	the exam

the third	5	The student gets to know the diagnostic soil horizons	Soil morphology	Explanation, presentation of the model and lecture	the exam
the fourth	5	The student gets to know thermal systems		Explanation, presentation of the model and lecture	the exam
Fifth	5	The student gets to know the humidity systems.		Explanation, presentation of the model and lecture	the exam
Sixth	5	For the student to become familiar with the methods of morphological description of the soil in question		Explanation, presentation of the model and lecture	the exam
Seventh	5	The student will be familiar with chemical weathering		Explanation, presentation of the model and lecture	the exam
Eighth	5	The student gets to know physical weathering		Explanation, presentation of the model and lecture	the exam
Ninth	5	For the student to know the factors of soil formation		Explanation, presentation of the model and lecture	the exam
The tenth	5	The student gets to know the processes of soil formation		Explanation, presentation of the model and lecture	the exam
Eleventh	5	The student gets to know the main processes of soil formation.	Soil morphology	Explanation, presentation of the model and lecture	the exam
Twelfth	5	For the student to recognize the symbols used with horizons.		Explanation, presentation of the model and lecture	the exam
Thirteenth	5	For the student to become familiar with the morphological description form		Explanation, presentation of the model and lecture	the exam
fourteenth	5	Exam 1		Explanation, presentation of the model and lecture	the exam
Fifteenth	5	Exam 2		Explanation, presentation of the model and lecture	the exam

11. Course Evaluation

1-Theoretical tests	25
2- Practical tests	15
3- Reports and studies	10
4- Final exam	50

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	- Soil morphology, Dr. Walid Khaled Al-Akidi - Lectures
Main references (sources)	
Recommended books and references (scientific journals, reports...)	Iraqi academic scientific journals
Electronic References, Websites	Soil Science Society Of America

Course Description Form

1. Course Name:					
Soil Morphology - Practical					
2. Course Code:					
SolSMo31					
3. Semester / Year:					
First Semester / Third Stage / 2025-2026					
4. Description Preparation Date:					
2/11/2025					
5. Available Attendance Forms:					
Physical Attendant					
6. Number of Credit Hours (Total) / Number of Units (Total):					
3 hours / 45 hours					
7. Course Administrator's Name (Mention All, If More Than One Name):					
Name: Afrah Mahdi Al-Obaidi			Email: afalobaidi@uowasit.edu.iq		
Name:			Email:		
8. Course Objectives:					
Course Objectives		1 Field & Lab Application: Master the skills of digging soil profiles and accurately delineating horizons in the field. 2 Precise Morphological Description: Gain the ability to practically evaluate soil properties (color via Munsell chart, texture by feel, structure, and consistence). 3 Field Testing & Documentation: Identify chemical and biological features within the profile, collect scientific samples, and draft a comprehensive morphological report.			
9. Teaching and Learning Strategies:					
Strategy		1 Direct Field Learning: Rely on field trips and hands-on application to enable students to interact with soil in its natural environment. 2 Teamwork & Demonstration: Provide live instructional demonstrations followed by student practice with collaborative working groups. 3 Project & Report-Based Learning: Require students to prepare periodic and final scientific reports to analyze the studied profiles and link practical work with theory.			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Credits	Learning Method	Evaluation on Method
First	3	Lab safety measures & introduction of field and lab tools	1.5		Exam
Second	3	How to select a profile site and prepare it for study	1.5		Exam

Third	3	Methods of dig and describing a profile in the field	1.5		Exam
Fourth	3	Distinguishing defining Hor Boundaries (Distinctness Topography).	1.5		Exam
Fifth	3	Practical estima of soil color u Munsell Chart (M & Dry).	1.5		Exam
Sixth	3	First Midterm E (Practical/Field)	1.5		Exam
Seventh	3	Estimation of texture by method vs. labora methods.	1.5		Exam
Eighth	3	Determining Structure type, gr and size classes.	1.5		Exam
Ninth	3	Testing consistence u dry, moist, and conditions.	1.5		Exam
Tenth	3	Field detection carbonates u Hydrochloric (HCl).	1.5		Exam
Eleventh	3	Second Midt Exam (Practical/I	1.5		Exam
Twelfth	3	Describing re pores, and biolog activity within profile.	1.5		Exam
Thirteenth	3	Methods of collec soil sam (disturbed undisturbed) f horizons.	1.5		Exam
Fourteenth	3	Writing the final profile descrip report and discuss	1.5		Exam
Fifteenth	3	Final E (Practical)	1.5		Exam

11. Course Evaluation

1-Laboratory Reports	75%
2- Mid-term Examination	15%
3- Final examination	15%

12. Learning and Teaching Resources

Required Textbooks (Prescribed, if any)	<i>Soil Genesis and Classification</i> – By S. W. Buol, R. J. Southard, R. C. Graham, and P. A. McDaniel.
Core References	<i>Field Book for Describing and Sampling Soils</i> – Natio Soil Survey Center, USDA
Recommended References & Readings (Scientific Journals, Reports, etc.)	<i>Soil Science Society of America Journal (SSSAJ)</i> – Specially papers on Pedology and Soil Morphology.
Online References	USDA-NRCS Soil Survey: (nrcs.usda.gov/resources/soils) – The ultimate resour for soil taxonomy, field books, and manuals

Course Description Form

1. Course Name:					
Drainage - Theoretical					
2. Course Code:					
SolDra32					
3. Semester / Year:					
Second Semester / Third Stage / 2025-2026					
4. Description Preparation Date:					
2/11/2025					
5. Available Attendance Forms:					
Actual Presence					
6. Number of Credit Hours (Total) / Number of Units (Total):					
30 theoretical 45 practical 3 Credits					
7. Course Administrator's Name (Mention All, If More Than One Name):					
Name: Dr. Ali Jawad Kadhim Al-Sarraj Email: akjwad@uowasit.edu.iq					
Name: Mayada Shuhab Hamed Email: mhamed@uowasit.edu.iq					
8. Course Objectives:					
Course Objectives	It examines the concept of drainage, the types of drains, the basic purpose of their construction, and the characteristics of the soil related to drainage The relationship of drainage to plant growth and productivity, as well as the patterns of distribution of drains networks and the requirements for implementing sewers. Mechanization and maintenance of drains of all kinds.				
9. Teaching and Learning Strategies:					
Strategy	1-Explanation and clarification 2- Lecture method 3- Student groups 4- Practical lessons 5- Scientific trips 6 - Self-learning method				
10. Course Structure					
Week	Hours	Required Learning Outcomes	Credits	Learning Method	Evaluation Method
First	4	Explanation, presentation of the model and lecture	drainage	The concept of drainage, the purpose of constructing drains, the relationship of drainage to plant growth and productivity	Exam

Second	4	Explanation, presentation of the model and lecture	drainage	Physical soil properties related to drainage	Exam
Third	4	Explanation, presentation of the model and lecture	drainage	The hydrological cycle and the location of irrigation and drainage therein	Exam
Fourth	4	Explanation, presentation of the model and lecture	drainage	Drainage, soil salinity, leaching requirements and salt balance	Exam
Fifth	4	Explanation, presentation of the model and lecture	drainage	Investigations required to establish drains	Exam
Sixth	4	Explanation, presentation of the model and lecture	drainage	Water flow in the soil and its relationship to the concept of drainage. Analysis of flow	Exam
Seventh	4	Explanation, presentation of the model and lecture	drainage	Measurement of saturated water conductivity	Exam
Eighth	4	Explanation, presentation of the model and lecture	drainage	Types of drains, their classification, and the objectives of their establishment	Exam
Ninth	4	Explanation, presentation of the model and lecture	drainage	Open drains and covered drains	Exam
Tenth	4	Explanation, presentation of the model and lecture	drainage	Incise and vertical drains and design of drains systems	Exam
Eleventh	4	Explanation, presentation of the model and lecture	drainage	drain network distribution patterns	Exam
Twelfth	4	Explanation, presentation of the model and lecture	drainage	Mechanization of drains and supplies for implementing drains	Exam
Thirteenth	4	Explanation, presentation of the model and lecture	drainage	Maintenance of covered drains, methods of cleaning them, causes of malfunctions,	Exam

				and processing in the drain system		
Fourteenth	4	Explanation, presentation of the model and lecture	drainage	Maintenance of open drains	Exam	
Fifteenth	4	Explanation, presentation of the model and lecture	drainage	Designs of open and covered drain systems and calculation of distances between drains	Exam	
11. Course Evaluation						
1-Theoretical tests		25				
2- Practical tests		15				
3- Reports and studies		10				
4- Final exam		50				
12. Learning and Teaching Resources						
Required Textbooks (Prescribed, if any)			Drainage (investigations, designs, implementation and maintenance). Dr. Mohsen Muhareb Awad Al-Lami and Dr. Alaa Saleh Abdul-Jabbar Al-Janabi. Iraq . Ministry of Higher Education and Scientific Research. University of Al Mosul .			
Core References			Field drainage engineering			
Recommended References & Readings (Scientific Journals, Reports, etc.)			Iraqi academic scientific journals			
Online References			Soil Science Society Of America Library Genesis			

Course Description Form

1. Course Name:					
Drainage - Practical					
2. Course Code:					
SolDra32					
3. Semester / Year:					
Second Semester / Third Stage / 2025-2026					
4. Description Preparation Date:					
2/11/2025					
5. Available Attendance Forms:					
In-person attendance					
6. Number of Credit Hours (Total) / Number of Units (Total):					
Practical: 45 hours / Number of units: 3					
7. Course Administrator's Name (Mention All, If More Than One Name):					
Name: Asst. Lect. Behar Alaa Majeed			Email: BeharalRubacee@uowasit.edu.iq		
8. Course Objectives:					
Course Objectives		It examines the concept of drainage, the types of drains, and the primary purpose of their construction, as well as soil properties related to drainage. It also investigates the relationship between drainage and plant growth and productivity, in addition to exploring the layout patterns of drainage networks, drainage implementation requirements, and the mechanization and maintenance of various types of drains.			
9. Teaching and Learning Strategies:					
Strategy		☐ Explanation and clarification ☐ Lecture method ☐ Student groups / Group work ☐ Practical lessons in agricultural fields / Fieldwork ☐ Scientific field trips to specialized departments and research stations ☐ Self-learning method / Independent learning			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Credits	Learning Method	Evaluation Method

First	3	Concept of drainage, purpose of constructing drains, and the relationship between drainage and plant growth and productivity.		Explanation, model presentation, and lecture	Exam
Second	3	Physical soil properties related to drainage.		Explanation, model presentation, and lecture	Exam
Third	3	The hydrological cycle and the position of irrigation and drainage within it.		Explanation, model presentation, and lecture	Exam
Fourth	3	Drainage and soil salinity, leaching requirements, and salt balance.		Explanation, model presentation, and lecture	Exam
Fifth	3	Investigations required for constructing drainage systems.		Explanation, model presentation, and lecture	Exam
Sixth	3	Water flow in soil and its relationship to the concept of drainage (flow analysis).		Explanation, model presentation, and lecture	Exam
Seventh	3	Measurement of saturated hydraulic conductivity.		Explanation, model presentation, and lecture	Exam
Eighth	3	Types and classification of drains, and the objectives of their construction.		Explanation, model presentation, and lecture	Exam
Ninth	3	Open drains and subsurface (covered) drains.		Explanation, model presentation, and lecture	Exam
Tenth	3	Interceptor and vertical drains, and the design of drainage systems.		Explanation, model presentation, and lecture	Exam
Eleventh	3	Layout patterns of drainage networks.		Explanation, model presentation, and lecture	Exam
Twelfth	3	Mechanization of drainage and installation/implementation requirements.		Explanation, model presentation, and lecture	Exam
Thirteenth	3	Maintenance of subsurface (covered) drains, cleaning methods, and causes of malfunction and remedies in drainage systems.		Explanation, model presentation, and lecture	Exam
Fourteenth	3	Maintenance of open drains.		Explanation, model presentation, and lecture	Exam
Fifteenth	3	Design of open and subsurface drainage systems, and calculating drain spacing.		Explanation, model presentation, and lecture	Exam

11. Course Evaluation					
1-	Theoretical Quizzes	Exams	10 Marks		
2-	Practical Exams	10 Marks			
3-	3. Reports and Studies	10 Marks			
4-	Midterm / Term Exam	10 Marks			
5-	Attendance	10 Marks			
6-	Final Exam	50 Marks			
7-	Total Mark	100 Marks			
12. Learning and Teaching Resources					
Required Textbooks (Prescribed, if any)			Drainage: Investigations, Designs, Implementation, and Maintenance		
			Dr. Mohsen Muhareb Awad Al-Lami and Dr. Alaa Saleh Abdul-Jabbar Al-Janabi		
			Iraq, Ministry of Higher Education and Scientific Research, University of Mosul		
Core References			Field Drainage Engineering		
Recommended References & Readings (Scientific Journals, Reports, etc.)			Textbooks and scientific research papers related to the subject matter		
Online References					

Course Description Form

1. Course Name:					
Soil Fertility - Theoretical					
2. Course Code:					
SolSFe32					
3. Semester / Year:					
First Semester / Third Stage / 2025-2026					
4. Description Preparation Date:					
2/11/2025					
5. Available Attendance Forms:					
In-person attendance					
6. Number of Credit Hours (Total) / Number of Units (Total):					
Practical: 45 hours / Number of units: 3					
7. Course Administrator's Name (Mention All, If More Than One Name):					
Name: Kahraman Hussain Habeeb Email: kahraman@uowasit.edu.iq					
8. Course Objectives:					
Course Objectives		☐ Studying soils, their nutrient content, and their relationship with plant growth. ☐ Studying nutrient availability and the factors affecting it. ☐ Studying macronutrients, micronutrients, and beneficial nutrients for plants.			
9. Teaching and Learning Strategies:					
Strategy					
10. Course Structure					
Week	Hours	Required Learning Outcomes	Credits	Learning Method	Evaluation on Method
First	2	Growth and factors affecting it	soil fertility material	Explanation, model presentation, and lecture	Exam
Second	2	Essential elements / Essential nutrients	soil fertility material	Explanation, model presentation, and lecture	Exam
Third	2	Phosphorus	soil fertility material	Explanation, model presentation, and lecture	Exam
Fourth	2	Potassium	soil fertility material	Explanation, model	Exam

				presentation, and lecture	
Fifth	2	Sulfur	soil fertility material	Explanation, model presentation, and lecture	Exam
Sixth	2	Calcium	soil fertility material	Explanation, model presentation, and lecture	Exam
Seventh	2	Magnesium	soil fertility material	Explanation, model presentation, and lecture	Exam
Eighth	2	Micronutrients / Trace elements	soil fertility material	Explanation, model presentation, and lecture	Exam
Ninth	2	Beneficial elements	soil fertility material	Explanation, model presentation, and lecture	Exam
Tenth	2	Soil organic matter	soil fertility material	Explanation, model presentation, and lecture	Exam
Eleventh	2	Soil fertility evaluation	soil fertility material	Explanation, model presentation, and lecture	Exam
Twelfth	2	Nutrient deficiency symptoms	soil fertility material	Explanation, model presentation, and lecture	Exam
Thirteenth	2	Biological experiments	soil fertility material	Explanation, model presentation, and lecture	Exam
Fourteenth	2	Soil nutrient testing / Soil analysis	soil fertility material	Explanation, model presentation, and lecture	Exam
Fifteenth	2	Plant tissue testing / Plant analysis	soil fertility material	Explanation, model presentation, and lecture	Exam

11. Course Evaluation

- | | | | |
|----|------------------------|-------|-----------|
| 1- | Theoretical Quizzes | Exams | 10 Marks |
| 2- | Practical Exams | | 10 Marks |
| 3- | 3. Reports and Studies | | 10 Marks |
| 4- | Midterm / Term Exam | | 10 Marks |
| 5- | Attendance | | 10 Marks |
| 6- | Final Exam | | 50 Marks |
| 7- | Total Mark | | 100 Marks |

12. Learning and Teaching Resources

Required Textbooks (Prescribed, if any)	soil fertility material Nour El-Din Shawqi
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Core References		
Recommended References & Readings (Scientific Journals, Reports, etc.)		
Online References		

Course Description Form

1. Course Name:					
Soil Fertility - Practical					
2. Course Code:					
SolSFe32					
3. Semester / Year:					
First Semester / Third Stage / 2025-2026					
4. Description Preparation Date:					
2/11/2025					
5. Available Attendance Forms:					
In-person attendance					
6. Number of Credit Hours (Total) / Number of Units (Total):					
Practical: 45 hours / Number of units: 3					
7. Course Administrator's Name (Mention All, If More Than One Name):					
Name: Asst. Lect. Behar Alaa Majeed Email: BeharalRubacee@uowasit.edu.iq					
8. Course Objectives:					
Course Objectives		☐ Studying soils, their nutrient content, and their relationship with plant growth. ☐ Studying nutrient availability and the factors affecting it. ☐ Studying macronutrients, micronutrients, and beneficial nutrients for plants.			
9. Teaching and Learning Strategies:					
Strategy		1. Explanation, demonstration, and conducting laboratory experiments . 2. Lecture method. 3. Student groups. 4. Practical lessons. 5. Field trips. 6. Self-learning method .			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Credits	Learning Method	Evaluation on Method
First	3	Growth and factors affecting it	soil fertility material	Explanation, model presentation, and lecture	Exam
Second	3	Essential elements / Essential nutrients	soil fertility material	Explanation, model	Exam

				presentation, and lecture	
Third	3	Phosphorus	soil fertility material	Explanation, model presentation, and lecture	Exam
Fourth	3	Potassium	soil fertility material	Explanation, model presentation, and lecture	Exam
Fifth	3	Sulfur	soil fertility material	Explanation, model presentation, and lecture	Exam
Sixth	3	Calcium	soil fertility material	Explanation, model presentation, and lecture	Exam
Seventh	3	Magnesium	soil fertility material	Explanation, model presentation, and lecture	Exam
Eighth	3	Micronutrients / Trace elements	soil fertility material	Explanation, model presentation, and lecture	Exam
Nineth	3	Beneficial elements	soil fertility material	Explanation, model presentation, and lecture	Exam
Tenth	3	Soil organic matter	soil fertility material	Explanation, model presentation, and lecture	Exam
Eleventh	3	Soil fertility evaluation	soil fertility material	Explanation, model presentation, and lecture	Exam
Twelfth	3	Nutrient deficiency symptoms	soil fertility material	Explanation, model presentation, and lecture	Exam
Thirteenth	3	Biological experiments	soil fertility material	Explanation, model presentation, and lecture	Exam
Fourteenth	3	Soil nutrient testing / Soil analysis	soil fertility material	Explanation, model presentation, and lecture	Exam
Fifteenth	3	Plant tissue testing / Plant analysis	soil fertility material	Explanation, model presentation, and lecture	Exam

11. Course Evaluation

7. Theoretical Quizzes Exams 10 Marks
8. Practical Exams 10 Marks
9. 3. Reports and Studies 10 Marks

10.	Midterm / Term Exam	10 Marks
11.	Attendance	10 Marks
12.	Final Exam	50 Marks
13.	Total Mark	100 Marks

12. Learning and Teaching Resources

Required Textbooks (Prescribed, if any)	soil fertility material Nour El-Din Shawqi
Core References	
Recommended References & Readings (Scientific Journals, Reports, etc.)	
Online References	

Course Description Form

1. Course Name:	
Irrigation - Theoretical	
2. Course Code:	
SolSIr32	
3. Semester / Year:	
First Semester / Third Stage / 2025-2026	
4. Description Preparation Date:	
2/11/2025	
5. Available Attendance Forms:	
Actual Presence	
6. Number of Credit Hours (Total) / Number of Units (Total):	
30 Theoretical 45 Practical 3 credits	
7. Course Administrator's Name (Mention All, If More Than One Name):	
akjwad@uowasit.edu.iq Name: Dr. Ali Jawad Kadhim Al-Sarraj Email: Name: Hasanain Mohammed Mahmood Email: hassanenm800@uowasit.edu.iq	
8. Course Objectives:	
Course Objectives	1-It discusses irrigation, the science of irrigation, the tasks of each of them, the sources of irrigation, methods of controlling it, and exploiting water resources 2- Researches how to design, plan and implement irrigation facilities 3-Studies how to calculate plant water needs and water consumption. 4- Apply and calculate irrigation efficiency, irrigation interval, and irrigation water depth 5-Study measuring water using different methods 6-Knowledge of traditional irrigation methods and modern irrigation methods and the difference between them.
9. Teaching and Learning Strategies:	
Strategy	1-Explanation and clarification 2- Lecture method 3- Student groups 4- Practical lessons 5- Scientific trips 6 - Self-learning method
10. Course Structure	

Week	Hours	Required Learning Outcomes	Credits	Learning Method	Evaluation Method
First	4	Explanation, presentation of the model and lecture	Irrigation	The concept of irrigation, irrigation in ancient and modern times	Exam
Second	4	Explanation, presentation of the model and lecture	Irrigation	Irrigation water sources, irrigation water quality	Exam
Third	4	Explanation, presentation of the model and lecture	Irrigation	Soil physical properties associated with irrigation	Exam
Fourth	4	Explanation, presentation of the model and lecture	Irrigation	The relationship of water with soil, soil moisture constants, movement of water in the soil, water flow	Exam
Fifth	4	Explanation, presentation of the model and lecture	Irrigation	Water measurement	Exam
Sixth	4	Explanation, presentation of the model and lecture	Irrigation	Plant water consumption	Exam
Seventh	4	Explanation, presentation of the model and lecture	Irrigation	Water requirements and irrigation scheduling	Exam
Eighth	4	Explanation, presentation of the model and lecture	Irrigation	Transport and distribution of irrigation water, movement of water in pipes and open channels	Exam
Ninth	4	Explanation, presentation of the model and lecture	Irrigation	Design of soil and lined irrigation channels	Exam
Tenth	4	Explanation, presentation of the model and lecture	Irrigation	Efficiency, adequacy and consistency of irrigation	Exam
Eleventh	4	Explanation, presentation of the model and lecture	Irrigation	Traditional irrigation methods	Exam
Twelfth	4	Explanation, presentation of the model and lecture	Irrigation	Modern irrigation methods	Exam
Thirteenth	4	Explanation, presentation of the model and lecture	Irrigation	Modern irrigation methods and	Exam

				rationalization of water use	
Fourteenth	4	Explanation, presentation of the model and lecture	Irrigation	Pumping water and how to calculate pump capacity	Exam
Fifteenth	4	Explanation, presentation of the model and lecture	Irrigation		Exam
11. Course Evaluation					
1-Theoretical tests		25			
2- Practical tests		15			
3- Reports and studies		10			
4- Final exam		50			
12. Learning and Teaching Resources					
Required Textbooks (Prescribed, if any)			1-Irrigation, its basics and applications, written by Dr. Nabil Ibrahim Al-Tayef and Dr. Issam Khudair Hamza Al-Hadithi 1988 Ministry of Higher Education and Scientific Research - University of Baghdad. 2-Irrigation and drainage, written by Dr. Laith Khalil Ismail 2000 Ministry of Higher Education and Scientific Research - University of Mosul 3- Modern irrigation technologies and other topics in the water issue, written by Dr. Issam Khudair Al-Hadithi, Dr. Ahmed Madloul Al-Kubaisi, and Dr. Yas Khudair Hamza Al-Hadithi, 2010, Ministry of Higher Education and Scientific Research - Anbar University		
Core References			1- drainage (investigations, designs, implementation and maintenance). Dr. Mohsen Muhareb Awad Al-Lami and Dr. Alaa Saleh Abdul-Jabbar Al-Janabi. Iraq . Ministry of Higher Education and Scientific Research. University of Al Mosul . 2- Modern irrigation technologies and other topics in the water issue, written by Dr. Issam Khudair Al-Hadithi, Dr. Ahmed Madloul Al-Kubaisi, and Dr. Yas Khudair Hamza Al-Hadithi, 2010, Ministry of Higher Education and Scientific Research - Anbar University		
Recommended References & Readings (Scientific Journals, Reports, etc.)			Iraqi academic scientific journals		
Online References			Soil Science Society Of America Library Genesis		

Course Description Form

1. Course Name:	
Irrigation - Practical	
2. Course Code:	
SolSIr32	
3. Semester / Year:	
First Semester / Third Stage / 2025-2026	
4. Description Preparation Date:	
2/11/2025	
5. Available Attendance Forms:	
Actual Attendance	
6. Number of Credit Hours (Total) / Number of Units (Total):	
30 Theory + 45 Practical = 75 Total Hours / 3 Units	
7. Course Administrator's Name (Mention All, If More Than One Name):	
Name : Wafaa Awad Tuama Email: wafaa.awad@uowasit.edu.iq	
8. Course Objectives:	
1. Field and laboratory measurements 2. Design and operational skills 3. Quality and evaluation 4. Utilizing modern technologies	Course Objectives
9. Teaching and Learning Strategies:	
-1Strategy for Measuring Soil Hydraulic Properties (Water) -2Scheduling Calculations and Water Requirements Strategy (How much and when to irrigate(-3Field Evaluation of Irrigation Systems Strategy 5. Surface irrigation	Strategy

6. Sprinkler irrigation					
7. Drip irrigation					
10. Course Structure					
Week	Hours	Learning Outcomes	Topic \UnitName	Learning Metho	Evaluation
1	3	Memorization, Understanding, Practical Application	Mathematical relationships of soil components and equivalent depth of soil water	Explanation, Models, Lecture	Exam
2	3	Memorization, Understanding, Practical Application	Methods of measuring soil moisture	Explanation, Models, Lecture	Exam
3	3	Memorization, Understanding, Practical Application	Measuring field capacity and permanent wilting point	Explanation, Models, Lecture	Exam
4	3	Memorization, Understanding, Practical Application	Infiltration measurement	Explanation, Models, Lecture	Exam
5	3	Memorization, Understanding, Practical Applicatio	Irrigation methods	Explanation, Models, Lecture	Exam
6	3	Memorization, Understanding, Practical Application	Water consumption	Explanation, Models, Lecture	Exam
7	3	Memorization, Understanding, Practical Application	Methods of measuring irrigation water discharge	Explanation, Models, Lecture	Exam
8	3	Memorization, Understanding, Practical Application	Design of irrigation canal	Explanation, Models, Lecture	Exam
9	3	Memorization, Understanding, Practical Application	Measuring the distance between drains	Explanation, Models, Lecture	Exam
10	3	Second Monthly Exam	Second Monthly Exam	Explanation, Models, Lecture	Exam
11	3	Memorization, Understanding, Practical Application	Evaluation of modern irrigation systems	Explanation, Models, Lecture	Exam
12	3	Memorization, Understanding, Practical Application	Calculation of pump capacities	Explanation, Models, Lecture	Exam

13	3	Memorization, Understanding, Practical Application	Field visit to an irrigation project	Explanation, Models, Lecture	Exam
14	3	Second Monthly Exam	Second Monthly Exam	Explanation, Models, Lecture	Exam
15	3	Comprehensive Exam	Comprehensive Exam	Explanation, Models, Lecture	Exam
11. Course Evaluation					
12. Learning and Teaching Resources					
Resource Category					
Required Textbooks (Curriculum, if any)			Applying irrigation Principles		
Main References (Sources))			Applying Irrigation Principles		
Recommended Supporting References (Scientific journals, reports....)			Iraqi Academic Scientific Journals		
Electronic References, Internet Sites					

Course Description Form

1. Course Name:	
Soil Organic Matter - Theoretical	
2. Course Code:	
SolSOM32	
3. Semester / Year:	
Second Semester / Third Stage / 2025-2026	
4. Description Preparation Date:	
2/11/2025	
5. Available Attendance Forms:	
Actual presence	
6. Number of Credit Hours (Total) / Number of Units (Total):	
30 theoretical 45 practical =75 hrs units 3	
7. Course Administrator's Name (Mention All, If More Than One Name):	
Name: Prof Dr: Mahdi Wasmeiy Seheib Email: malaiedy@wasit.edu.iq	
8. Course Objectives:	
Course Objectives	• Teaching students the basic concepts related to organic matter in the soil and understanding its role in various environmental systems, including agricultural ones, forests, marshes, and swamps. • Estimating the percentage of organic matter in the soil using various laboratory methods or estimating it in the field and then expressing it quantitatively in kilograms or tons per hectare. • Drawing a relative score for the organic carbon balance between the soil and its external surroundings. • Describe how carbon and nitrogen move under the influence of current agricultural methods and the impact of sudden, severe changes such as fires, droughts, and floods. • Measuring the ability of the soil in the short and long term to recover and perform its functions, by knowing the level of microbial mass, the ratio of carbon to nitrogen, and the nature of the organic matter, • Realizing the agricultural and environmental value of organic matter, • To contribute to improving the general management of organic matter in the soil.
9. Teaching and Learning Strategies:	
Strategy	1-Explanation and clarification 2- Lecture method 3- Student groups 4- Practical lessons 5- Scientific trips 6 - Self-learning method

10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
first	5	Sources of organic matter in soil	Soil Organic Matter	Explanation, presentation of the model and lecture	the exam
the second	5	Humus, its origin, definition and properties	Soil Organic Matter	Explanation, presentation of the model and lecture	the exam
the third	5	Components of plant waste	Soil Organic Matter	Explanation, presentation of the model and lecture	the exam
the fourth	5	Decomposition of organic compounds and formation of humus	Soil Organic Matter	Explanation, presentation of the model and lecture	the exam
Fifth	5	Simple organic compounds resulting from the decomposition of organic matter	Soil Organic Matter	Explanation, presentation of the model and lecture	the exam
Sixth	5	Carbon cycle in nature	Soil Organic Matter	Explanation, presentation of the model and lecture	the exam
Seventh	5	Organic compounds containing nitrogen and their mineralization	Soil Organic Matter	Explanation, presentation of the model and lecture	the exam
Eighth	5	Organic compounds containing phosphorus and their mineralization	Soil Organic Matter	Explanation, presentation of the model and lecture	the exam
Ninth	5	Sulfur-containing organic compounds and their mineralization	Soil Organic Matter	Explanation, presentation of the model and lecture	the exam

The tenth	5	Effect of climate and vegetation on soil organic matter content	Soil Organic Matter	Explanation, presentation of the model and lecture	the exam
Eleventh	5	Changes in organic matter in agriculture and the direct effect of organic compounds on higher plants	Soil Organic Matter	Explanation, presentation of the model and lecture	the exam
Twelfth	5	The effect of organic matter on soil properties and the	Soil Organic Matter	Explanation, presentation of the model and lecture	the exam

		relationship between them			
Thirteenth	5	The C:N ratio, its importance and value in some plants and organisms	Soil Organic Matter	Explanation, presentation of the model and lecture	the exam
fourteenth	5	The amount of organic matter and nitrogen in the soil and Some characteristics of organic soil	Soil Organic Matter	Explanation, presentation of the model and lecture	the exam
Fifteenth	5	Liquid organic fertilizers	Soil Organic Matter	Explanation, presentation of the model and lecture	the exam

11. Course Evaluation

- 1-Theoretical tests 25
- 2- Practical tests 15
- 3- Reports and studies 10
- 4- Final exam 50

12. Learning and Teaching Resources

Require textbooks (curricular books, if any)	Soil organic matter and organic manure Prepared by: Nour El-Din Shawqi Abdel-Wahab Abdel-Razzaq and Qahtan Jamal
Main references (sources)	1. Soil Organic Matter in Sustainable Agriculture (Advances in Agroecology) by Fred Madoff and Ray R. Weil (May 27, 2004). CRC Press; 1 edition. 416 pages. 1- Carbon 2. Soil Organic Matter Characterization. Chapter 3. . Publisher and Nitrogen in the Terrestrial EnvironmentSpringer Netherlands 2008, pp 81-111.
Recommended books and references (scientific journals, reports...)	Iraqi academic scientific journals
Electroni References, Websites	Soil Science Society Of America Internet network

Course Description Form

1. Course Name:	
Soil Organic Matter - Practical	
2. Course Code:	
SolSOM32	
3. Semester / Year:	
Second Semester / Third Stage / 2025-2026	
4. Description Preparation Date:	
2/11/2025	
5. Available Attendance Forms:	
In-person attendance	
6. Number of Credit Hours (Total) / Number of Units (Total):	
Practical: 45 hours / Number of units: 3	
7. Course Administrator's Name (Mention All, If More Than One Name):	
Name: Asst. Lect. Behar Alaa Majeed Email: BeharalRubacee@uowasit.edu.iq	
8. Course Objectives:	
Course Objectives	- To teach students the fundamental concepts of soil organic matter and its role in various ecosystems, including agriculture, forests, marshes, and wetlands. - To estimate the percentage of soil organic matter using various laboratory methods or through field estimation, then express it quantitatively in kilograms or tons per hectare. - To plot a relative balance of organic carbon between the soil and its external environment. - To describe the movement of carbon and nitrogen under the influence of current agricultural practices and the impact of sudden, severe changes such as fires, droughts, and floods. - To measure the soil's short-term and long-term capacity to recover and perform its functions by determining the microbial mass level, the carbon-to-nitrogen ratio, and the nature of the organic matter. - To understand the agricultural and environmental value of organic matter. - To contribute to improving the overall management of soil organic matter.
9. Teaching and Learning Strategies:	
Strategy	- Explanation, demonstration, and conducting laboratory experiments . - Lecture method. - Student groups. - Practical lessons. - Field trips.

- Self-learning method .

10. Course Structure

Week	Hours	Required Learning Outcomes	Credits	Learning Method	Evaluation Method
First	3	Sources of organic matter in the soil	organic soil material	Explanation, model presentation, and lecture	Exam
Second	3	Humus: its origin, definition, and properties	organic soil material	Explanation, model presentation, and lecture	Exam
Third	3	Components of plant waste	organic soil material	Explanation, model presentation, and lecture	Exam
Fourth	3	Decomposition of organic compounds and formation of humus And simpler organic compounds resulting from the decomposition of organic matter	organic soil material	Explanation and conduct of a laboratory experiment	Exam
Fifth	3	The carbon cycle in nature	organic soil material	Explanation, model presentation, and lecture	Exam
Sixth	3	Nitrogen-containing organic compounds and their mineralization	organic soil material	Explanation, model presentation, and lecture	Exam
Seventh	3	Phosphorus-containing organic compounds and their mineralization	organic soil material	Explanation, model presentation, and lecture	Exam
Eighth	3	Sulfur-containing organic compounds and their mineralization	organic soil material	Explanation, model presentation, and lecture	Exam
Ninth	3	Effect of climate and plants on soil organic matter content	organic soil material	Explanation, model presentation, and lecture	Exam
Tenth	3	Changes in organic matter due to agriculture, and the direct effect of organic compounds on higher plants	organic soil material	Explanation, model presentation, and lecture	Exam
Eleventh	3	Effect of organic matter on soil properties and the relationship between them	organic soil material	Explanation, model presentation, and lecture	Exam
Twelfth	3	Carbon-to-Nitrogen (C:N) ratio: Its importance and value in certain plants and organisms	organic soil material	Explanation, model presentation, and lecture	Exam
Thirteenth	3	Amount of organic matter and nitrogen in soil	organic soil material	Explanation, model presentation, and lecture	Exam

Fourteenth	3	Certain properties of organic soil	organic soil material	Explanation, model presentation, and lecture	Exam
Fifteenth	3	Liquid organic fertilizers	organic soil material	Explanation, model presentation, and lecture	Exam

11. Course Evaluation

- Theoretical Quizzes Exams 10 Marks
- Practical Exams 10 Marks
- 3. Reports and Studies 10 Marks
- Midterm / Term Exam 10 Marks
- Attendance 10 Marks
- Final Exam 50 Marks
- Total Mark 100 Marks

12. Learning and Teaching Resources

Required Textbooks (Prescribed, if any)	Title: Organic Soil Matter and Organic Fertilization Prepared by: Nour El-Din Shawqi, Abdul-Wahab Abdul-Razzaq, and Qahtan Jamal
Core References	• <i>Soil Organic Matter in Sustainable Agriculture (Advances in Agroecology)</i> by Fred Magdoff and Ray R. Weil (May 27, 2004). CRC Press; 1st Edition. 416 pages. • <i>Soil Organic Matter Characterization (Chapter 3): Carbon and Nitrogen in the Terrestrial Environment</i>. Publisher: Springer Netherlands, 2008, pp. 81–111.
Recommended References & Readings (Scientific Journals, Reports, etc.)	• Iraqi Academic Scientific Journals
Online References	Soil Science Society of America (SSSA) and the World Wide Web

Course Description Form

1. Course Name:	
Soil Mineralogy - Theoretical	
2. Course Code:	
SolSMi32	
3. Semester / Year:	
Second Semester / Third Stage / 2025-2026	
4. Description Preparation Date:	
2/11/2025	
5. Available Attendance Forms:	
weekly	
6. Number of Credit Hours (Total) / Number of Units (Total):	
2 theoretical, 3 practical (75) hours / 3units	
7. Course Administrator's Name (Mention All, If More Than One Name):	
Name: Dr layth saleem salman Name: Ass. lec Hasanain Mohammed Mahmood Email: lsalman@uowasit.edu.iq Email :hassanenm800@uowasit.edu.iq	
8. Course Objectives:	
Course Objectives	1. • The learner should be able to understand and understand the relationship between the crystal and its systems and axes. 2. • Enable the student to know the structural composition of silicate minerals 3. • Enabling the student to understand and know the most important structural properties of minerals 4. • Identify the transformations that occur in clay minerals 5. • Enable the student to become familiar with the most important methods in detecting and distinguishing clay minerals and transactions 6. • Enable the student to identify the crystalline structure of minerals and identify surface charges separated by clay 7. • Measuring variable and fixed charges on clay surfaces 8. • Soil mineralogy examines primary and secondary soil minerals, and the learner should be able to understand and understand the relationship between crystals and their systems and axes. 9. • It includes studying the concept and origin of primary and secondary soil minerals and knowing the structural composition of silicate minerals 10. • The crystalline structure of minerals and understanding and knowing the most important structural properties of minerals 11. • General classification of minerals, construction of silicate minerals, detection and discrimination of clay minerals, and special treatments 12. • Study some aggregates of primary soil minerals, clay minerals, and the transformations that occur to clay minerals 13. • Identify the characteristics of the soil and the problems associated with the type of mineral or minerals that prevail

	14. • Identifying the crystalline structure of minerals, identifying the surface charges of separated clay, and measuring the variable and fixed charges on the clay surfaces.				
9. Teaching and Learning Strategies:					
Strategy	• Interactive lecture •Brainstorming • Dialogue and discussion •Field Training • Practical exercises • Field project •Self-education				
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learnin g method	Evaluat ion metho d
the first	5	The student gets to know the concept of mineralogy and its relationship to soil properties	Soil minerals	Explanati on and data show	Various exams
the second	5	The student gets to know smelt and its components	Soil minerals	Explanati on and data show	Various exams
the third	5	The student gets to know the crystallization processes	Soil minerals	Explanati on and data show	Various exams
the fourth	5	The student will be familiar with the formation of primary minerals	Soil minerals	Explanati on and data show	Various exams
Fifth	5	The student gets to know silicate minerals	Soil minerals	Explanati on and data show	Various exams
VI	5	The student gets to know the crystalline structure of minerals	Soil minerals	Explanati on and data show	Various exams
Seventh	5	The student gets to know the systems of building crystals	Soil minerals	Explanati on and data show	Various exams
VIII	5	The student gets to know the mineral composition of sand and silt	Soil minerals	Explanati on and data show	Various exams
Ninth	5	The student gets to know the mineral composition of clay	Soil minerals	Explanati on and data show	Various exams
The tenth	5	The student will know the reasons for the appearance of chargeson the surfaces of clay minerals	Soil minerals	Explanati on and data show	Various exams
eleventh	5	The student gets to know the 1:1 group of minerals	Soil minerals	Explanati on and data show	Various exams
twelveth	5	The student gets to know the mica group of minerals	Soil minerals	Explanati on and data show	Various exams

Thirteenth	5	The student gets to know the group of minerals vermiculite and smectite	Soil minerals	Explanation and data show	Various exams
fourteenth	5	The student gets to know the group of chlorite minerals	Soil minerals	Explanation and data show	Various exams
Fifteenth	5	The student gets to know the group of fibrous minerals	Soil minerals	Explanation and data show	Various exams

11. Course Evaluation

NO	Evaluation methods	Evaluation date	Degree	The ratio
.15	Report1	fourth week	2.5	2.5
.16	Report 2	The fifth week	2.5	2.5
.17	Short test (1) Quiz	the sixth week	2	2
.18	Short test (2) Quiz	The fourteenth week	2	2
.19	Short test (3) Quiz	The fifteenth week	1	1
.20	Semester test (1)	the sixth week	7.5	7.5
.21	Semester test (2)	The eleventh week is difficult	7.5	7.5
.22	Final theoretical test	Final semester exams	40	40
.23	Practical field project	The fifteenth week	5	5
.24	Field evaluation	The third and fifth week	2	2
.25	Short practical test (1) Quiz	The first week	1	1
.26	Short practical test (2) Quiz	fourth week	0.5	0.5
.27	A short practical test (3) Quiz	The fourteenth week	1	1
.28	Live drawings and homework	Weeks 6, 8, 9, 10, 11, 12 and 13	5.5	5.5
.29	Final practical test	Final semester exam	20	20
.30	the total		100	100%

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Soil Chemistry book, written by Dr. Kazem Mashhout 1986
Main references (sources)	
Recommended books and references (scientific journals, reports...)	The book (Soil Minerals) written by Prof. Dr. Salman Khalaf Issa 2021
Electronic References, Websites	

Course Description Form

1. Course Name:	
Soil Mineralogy - Practical	
2. Course Code:	
SolSMi32	
3. Semester / Year:	
Second Semester / Third Stage / 2025-2026	
4. Description Preparation Date:	
2/11/2025	
5. Available Attendance Forms:	
on campus classroom and laboratory Attendance	
6. Number of Credit Hours (Total) / Number of Units (Total):	
45hr	
7. Course Administrator's Name (Mention All, If More Than One Name):	
Name: Asst. lect. ISAM HNI HAMEED Email: ishani.uowasit.edu.iq	
8. Course Objectives:	
Course Objectives	☐ Identifying the major minerals constituting soil and their properties. ☐ Studying methods for separating different soil fractions, especially clay and sand. ☐ Identifying methods for removing organic matter, calcium carbonate, and iron oxides from soil samples. ☐ Studying the principles of X-ray diffraction and its use in diagnosing clay minerals. ☐ Training students on preparing samples for X-ray examination using different saturation methods. ☐ Identifying light and heavy minerals in the sand fraction. ☐ Measuring the surface charges of the clay fraction and interpreting the results. ☐ Developing students' laboratory and research skills in the field of soil mineralogy.
9. Teaching and Learning Strategies:	
Strategy	• Practical lectures • Laboratory learning • Scientific discussion • Cooperative learning • Continuous assessment
10. Course Structure	

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Identifying the concept of soil mineral analysis	Soil mineral analysis	Lecture	Test
2	3	Mastering the steps of clay separation	Clay separation	Practical laboratory	Test
3	3	Identifying methods of sand separation	Sand separation	Practical laboratory	Test
4	3	Understanding the removal of organic matter from the clay fraction	Removal of organic matter	Practical laboratory	Test
5	3	Identifying the removal of calcium carbonate	Removal of calcium carbonate	Practical laboratory	Test
6	3	Interpreting methods of iron oxide removal	Removal of iron oxides	Lecture and laboratory work	Test
7	3	Identifying X-rays and their applications	Study of minerals using X-rays	Lecture	Test
8	3	Preparing samples by magnesium saturation and air drying	Mg Saturation Air Dry	Practical laboratory	Test
9	3	Preparing samples by magnesium saturation with ethylene glycol	Mg + Ethylene Glycol	Practical laboratory	Test
10	3	Preparing samples by potassium saturation with air drying	K Saturation Air Dry	Practical laboratory	Test
11	3	Studying the effect of heating at 350°C	K Saturation + 350°C	Practical laboratory	Test
12	3	Studying the effect of heating at 550°C	K Saturation + 550°C	Practical laboratory	Test
13	3	Identifying types of mineral samples	Types of samples	Lecture	Test
14	3	Distinguishing light and heavy minerals in sand	Sand minerals	Practical laboratory	Test
15	3	Measuring the surface charges of the clay fraction	Measurement of surface charges	Practical laboratory	Test

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Soil Chemistry book, written by Dr. Kazem Mashhout 1986
Main references (sources)	

Recommended books and references (scientific journals, reports...)	The book (Soil Minerals) written by Prof. Dr. Salman Khalaf Issa 2021
Electronic References, Websites	

Course Description Form

1. Course Name:	
Soil Salinity - Theoretical	
2. Course Code:	
SolSSa31	
3. Semester / Year:	
Second Semester / Third Stage / 2025-2026	
4. Description Preparation Date:	
2/11/2025	
5. Available Attendance Forms:	
1. In-person attendance 2. Online attendance 3. Hybrid attendance 4. Practical laboratory attendance 5. Field visit attendance 6. Seminar and workshop attendance 7. Interactive classroom participation 8. Self-directed learning attendance 9. Group discussion participation 10. Research and project-based attendance	
6. Number of Credit Hours (Total) / Number of Units (Total):	
75/5 unit : 3	
7. Course Administrator's Name (Mention All, If More Than One Name):	
Name: Dr. Wisam Thamer Jabbar Al-Mayah Email: Walmayah@uowasit.edu.iq Name: _____ Email: _____	
8. Course Objectives:	
Course Objectives	11. To introduce students to the concept of soil salinity and the causes of saline and sodic soil formation. 12. To explain the effects of salts on the physical, chemical, and biological properties of soil. 13. To develop students' ability to diagnose and evaluate salinity and sodicity levels using laboratory and field analysis methods. 14. To provide students with knowledge about the impact of soil salinity on plant growth and agricultural production. 15. To train students in the calculation and classification of saline and sodic soils and waters according to scientific standards. 16. To introduce students to methods of reclamation and management of salt-affected soils. 17. To enhance students' skills in irrigation and drainage management to reduce salinity problems and conserve soil and water resources. 18.
9. Teaching and Learning Strategies:	
Strategy	19. Theoretical lectures 20. Interactive classroom discussion

21. Cooperative learning
22. Problem-based learning
23. Brainstorming
24. Practical and laboratory teaching
25. Field visits
26. E-learning
27. Project-based learning
28. Case study method
29. Self-directed learning
30. Scientific presentations and seminars

10. Course Structure

Week	Hours	Required Learning Outcomes	Credits	Learning Method	Evaluation on Method
First	2	To recognize the concepts of soil salinity and sodicity and the causes of their formation in different agricultural environments.	Introduction to Soil Salinity and its Agricultural and Environmental Importance	Interactive lectures	Exam
Second	2	To interpret the effects of salts on the physical, chemical, and biological properties of soil.	Formation and Development of Saline and Alkaline Soils	Interactive lectures	Exam
Third	2	To interpret the effects of salts on the physical, chemical, and biological properties of soil.	Sources of Salts in Soil and Water	Interactive lectures	Exam
Fourth	2	Identifying the sources and types of soil and water pollution	Physical Properties of Saline and Alkaline Soils	Problem-based learning	Exam
Fifth	2	To diagnose and classify saline and sodic soils and waters using established scientific criteria	Chemical Properties of Saline and Alkaline Soils	Problem-based learning	Exam
Sixth	2	Explaining the impact of pollutants on the agricultural environment and human health	The Effect of Salinity on Plant Growth and Agricultural Productio	Problem-based learning	Exam
Seventh	2	To perform basic laboratory analyses for soil and water salinity assessment and interpret the results.	Classification of Saline and Alkaline Soils and Water	Practical and laboratory learning	Exam
Eighth	2	To perform basic laboratory analyses for soil and water salinity assessment and interpret the results.	Methods of Measuring and Estimating Soil and Water Salinity	Practical and laboratory learning	Exam
Nineth	2	To evaluate the impact of soil salinity on plant growth and agricultural productivity.	Irrigation Water Management in Saline Lands	Practical and laboratory learning	Exam
Tenth	2	To evaluate the impact of soil salinity on plant growth and agricultural productivity.	Agricultural Drainage Systems and Their Role in Reducing Salinity	Practical and laboratory learning	Exam
Eleventh	2	To apply irrigation and drainage management practices to reduce salinity problems.	Reclamation of Saline and Alkaline Soils	Practical and laboratory learning	Exam
Twelfth	2	To apply irrigation and drainage management practices to reduce salinity problems.	Use of Chemical and Organic Amendments in Treating Salinity	Practical and laboratory learning	Exam

Thirteenth	2	To propose appropriate reclamation strategies for salt-affected soils to improve their productivity.	Sustainable Management of Salt-Affected Lands	Real-life case studies	Exam
Fourteenth	2	To apply principles of sustainable management for protecting soil and water resources from salinization and degradation.	Modern Applications and Technologies Used in Studying Soil Salinity	Real-life case studies	Exam
Fifteenth	Midterm exam	Midterm exam	Midterm exam	Midterm exam	Exam
11. Course Evaluation					
12. Learning and Teaching Resources					
Required Textbooks (Prescribed, if any)		31. <i>Soil Salinity and Reclamation of Salt-Affected Soils</i> – Dr. Abdul Qader Taha Al-Rawi. 32. <i>Saline and Sodic Soils and Their Management</i> – Dr. Abdul Jabbar Mohammed Salih.			
Core References		□ Diagnosis and Improvement of Saline and Alkali Soils – U.S. Salinity Laboratory Staff. □ Soil Salinity Assessment and Management – American Society of Civil Engineers (ASCE).			
Recommended References & Readings (Scientific Journals, Reports, etc.)		Water, Air, & Soil Pollution – Springer <i>Environmental Pollution</i> – Elsevier			
Online References		https://www.fao.org/ https://www.unep.org/			

Course Description Form

1. Course Name:					
Soil Salinity - Practical					
2. Course Code:					
SolSSa31					
3. Semester / Year:					
Second Semester / Third Stage / 2025-2026					
4. Description Preparation Date:					
2/11/2025					
5. Available Attendance Forms:					
Actual Attendance-					
6. Number of Credit Hours (Total) / Number of Units (Total):					
30 Theory + 45 Practical = 75 Total Hours / 3 Units					
7. Course Administrator's Name (Mention All, If More Than One Name):					
Name : Wafaa Awad Tuama Email: wafaa.awad@uowasit.edu.iq					
8. Course Objectives:					
1. Introduce students to the concept and nature of soil salinity 2. Study the impact of soil salinity on crop growth in the agricultural field`				Course Objectives	
9. Teaching and Learning Strategies:					
-1Measurement and Diagnosis Strategy (Inside the Laboratory) -2hemical Calculations and Equations Strategy -3Saline Soil Classificationstrategy -4Reclamation Solutions Strategy (Practical Application)					Strategy
10. Course Structure					
Week	Hours	Learing Outcomes	Topic \UnitName	Learning Metho	Evaluation
1	3	Memorization, Understanding,	Saline Soils: Nature and Function	Explanation, Models, Lecture	Exam

		Practical Application			
2	3	Memorization, Understanding, Practical Application	Soil Solution	Explanation, Models, Lecture	Exam
3	3	Memorization, Understanding, Practical Application	Methods of Estimating and Expressing Soil Salinity	Explanation, Models, Lecture	Exam
4	3	Memorization, Understanding, Practical Application	Estimation of Soil pH and Salinity	Explanation, Models, Lecture	Exam
5	3	Memorization, Understanding, Practical Application	Estimation of Soluble Potassium and Sodium in Soil	Explanation, Models, Lecture	Exam
6	3	Monthly Exam	Monthly Exam	Explanation, Models, Lecture	Exam
7	3	Memorization, Understanding, Practical Application	Estimation of Calcium and Magnesium in Soil	Explanation, Models, Lecture	Exam
8	3	Memorization, Understanding, Practical Application	Estimation of Anions in Soil	Explanation, Models, Lecture	Exam
9	3	Memorization, Understanding, Practical Application	Estimation of Total Calcium Carbonate in Soil	Explanation, Models, Lecture	Exam
10	3	Second Monthly Exam	Second Monthly Exam	Explanation, Models, Lecture	Exam
11	3	Memorization, Understanding, Practical Application	Estimation of Gypsum in Soil	Explanation, Models, Lecture	Exam
12	3	Comprehensive Exam	Comprehensive Exam	Explanation, Models, Lecture	Exam

11. Course Evaluation

12. Learning and Teaching Resources

Resource Category

Required Textbooks (Curriculum, if any)	Soil Salinity
Main References (Sources(	Diagnosis and Improvement of Saline and Alkali Soils (US Salinity Laboratory Staff - Handbook No. 60)
Recommended Supporting References (Scientific journals, reports	Iraqi Academic Scientific Journals

Electronic References, Internet Sites	
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Course Description Form

1. Course Name:	
Economics of Natural Resources - Theoretical	
2. Course Code:	
SOINRE32	
3. Semester / Year:	
Second Semester / Third Stage / 2025-2026	
4. Description Preparation Date:	
2/11/2025	
5. Available Attendance Forms:	
Attending	
6. Number of Credit Hours (Total) / Number of Units (Total):	
2	32
7. Course Administrator's Name (Mention All, If More Than One Name):	
Name: RAED MUNAEM SHAKER Name : MAKASED Email: ramunem@uowasit.edu.iq	
8. Course Objectives:	
Course Objectives	The learner should be able to understand the relationship between the fundamentals of economics and its connection to natural resources • The student should be able to identify and understand the most important characteristics and objectives of studying water resource economics. • The student should study some economic concepts related to the supply and demand relationship of natural resources. • The student should learn about water sources, their types, and how to utilize them optimally to meet various needs. • The student should provide an economic analysis of one of the most important natural resources, namely water, focusing on analyzing the determinants of water supply and demand, optimizing the use of this resource, its direct and indirect uses, and the factors affecting the water market • The student should describe the characteristics of water resource systems, the nature of developing these resources, and the means necessary to design a sound water policy.
9. Teaching and Learning Strategies:	
Strategy	aleasf aldhaha alhiwarwalniqash almuhadarataltafaeulia
10. Course Structure	

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Course Description Form

1. Course Name:					
Land Reclamation - Theoretical					
2. Course Code:					
SolLRe41					
3. Semester / Year:					
Second Semester / Fourth Stage / 2025-2026					
4. Description Preparation Date:					
2/11/2025					
5. Available Attendance Forms:					
weekly					
6. Number of Credit Hours (Total) / Number of Units (Total):					
2 theoretical, 3 practical (75) hours / 3.5 units					
7. Course Administrator's Name (Mention All, If More Than One Name):					
Name: Dr layth saleem salman Email: lsalman@uowasit.edu.iq					
8. Course Objectives:					
Course Objectives	1-Preparing students for the purpose of evaluating and characterizing soils affected by salinity and other soil problems according to scientific concepts and foundations. 2- Giving them experience and skills related to most of the problems faced by soils and participating in land reclamation projects. 3- Making them a nucleus for raising awareness and managing most of the problems of agricultural lands to develop plans to solve these problems. 4- Training students on salinity calculations 5- Training students on standard washing calculations 6- Training students on laboratory washing experiments 7- Training students on field washing calculations 8- Training students on calculations of gypsum requirements 9- Training students on the effect of salinity on permeability.				
9. Teaching and Learning Strategies:					
Strategy	• Interactive lecture • Brainstorming • Dialogue and discussion • Field Training • Practical exercises • Field project • Self-education				
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
the first	5	For students to become familiar with concept of land reclamation and its cycle in agricultural production	Land Reclamation	Explanation, display pictures, lecture, practical experiments	Various exams
the second	5	For students to become familiar with concept of the problem of salinity and impact on agricultural production: problem of salinity in the world, the problem of salinity in Iraq, the problem of salinity in agricultural production.	Land Reclamation	Explanation, display pictures, lecture, practical experiments	Various exams

the third	5	Sources of salt components: sources of in nature and their accumulation in affected by salts, weathering of rocks, minerals, seas and oceans, volcanoes, and mechanisms of transfer of salts to soil.	Land Reclamation	Explanation, display pictures, lecture, practical experiments	Various exams
the fourth	5	Soil formation conditions affected by salt	Land Reclamation	Explanation, display pictures, lecture, practical experiments	Various exams
Fifth	5	For students to become familiar with problems and methods of reclaiming saline soils	Land Reclamation	Explanation, display pictures, lecture, practical experiments	Various exams
VI	5	For students to become familiar with problems and methods of reclaiming saline soils	Land Reclamation	Explanation, display pictures, lecture, practical experiments	Various exams
Seventh	5	For students to become familiar with problems and methods of reclaiming saline soils	Land Reclamation	Explanation, display pictures, lecture, practical experiments	Various exams
VIII	5	For students to become familiar with problems and methods of reclaiming limestone soils	Land Reclamation	Explanation, display pictures, lecture, practical experiments	Various exams
Ninth	5	For students to become familiar with problems and methods of reclaiming gypsum soils	Land Reclamation	Explanation, display pictures, lecture, practical experiments	Various exams
The tenth	5	For students to become familiar with problems and methods of reclaiming waterlogged soil	Land Reclamation	Explanation, display pictures, lecture, practical experiments	Various exams
eleventh	5	For students to become familiar with problems and methods of reclaiming desert soils	Land Reclamation	Explanation, display pictures, lecture, practical experiments	Various exams
twelveth	5	For students to become familiar with problems and methods of reclaiming saline soils	Land Reclamation	Explanation, display pictures, lecture, practical experiments	Various exams
Thirteenth	5	For students to become familiar with problems and methods of reclaiming arid soils	Land Reclamation	Explanation, display pictures, lecture, practical experiments	Various exams
fourteenth	5	Previous experiences in Iraqi reclamation	Land Reclamation	Explanation, display pictures, lecture, practical experiments	Various exams
Fifteenth	5	Recent experiences in the world in reclamation	Land Reclamation	Explanation, display pictures, lecture, practical experiments	Various exams

11. Course Evaluation

NO	Evaluation methods	Evaluation date	Degree	The ratio
.1	Report1	fourth week	2.5	2.5
.2	Report 2	The fifth week	2.5	2.5
.3	Short test (1) Quiz	the sixth week	2	2
.4	Short test (2) Quiz	The fourteenth week	2	2
.5	Short test (3) Quiz	The fifteenth week	1	1
.6	Semester test (1)	the sixth week	7.5	7.5
.7	Semester test (2)	The eleventh week is difficult	7.5	7.5
.8	Final theoretical test	Final semester exams	40	40
.9	Practical field project	The fifteenth week	5	5
.10	Field evaluation	The third and fifth week	2	2
.11	Short practical test (1) Quiz	The first week	1	1
.12	Short practical test (2) Quiz	fourth week	0.5	0.5
.13	A short practical test (3) Quiz	The fourteenth week	1	1
.14	Live drawings and homework	Weeks 6, 8, 9, 10, 11, 12 and 13	5.5	5.5
.15	Final practical test	Final semester exam	20	20

.16	the total	100	100%
12. Learning and Teaching Resources			
Required textbooks (curricular books, if any)	Ahmed Haider Al-Zubaidi, 1992, Land Reclamation, Theoretical Applied Foundations - The methodological book for fourth-year students in agricultural colleges.		
Main references (sources)	Land reclamation, Hadi Yasser Abboud		
Recommended books and references (scientific journals, reports...)	Ahmed Haider Al-Zubaidi, 1989, Soil salinity, theoretical and applied foundations - methodological book for fourth-year students in agricultural colleges.		
Electronic References, Websites			

Course Description Form

1. Course Name:					
Land Reclamation - Practical					
2. Course Code:					
SolLR41					
3. Semester / Year:					
Second Semester / Fourth Stage / 2025-2026					
4. Description Preparation Date:					
2/11/2025					
5. Available Attendance Forms:					
In person					
6. Number of Credit Hours (Total) / Number of Units (Total):					
Hours practical Number of Unit45					
7. Course Administrator's Name (Mention All, If More Than One Name):					
Name: M.M yahya ride karim Email: yaradhi@uowasit.edu.iq					
8. Course Objectives:					
Course Objectives			Introducing the student to the subject of land reclamation How does it affect agricultural		
9. Teaching and Learning Strategies:					
Strategy		1- Measuring soil and water salinity. 2- Estimating the degree of reaction (pH). 3- Applying methods of leaching saline soil. 4- Studying irrigation and drainage networks			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Credits	Learning Method	Evaluation on Method
First	3	Memorization, understanding, practical, application	Soil Sampling and Preparation for Analysis	Explanation, Model Presentation, and Lecture	Exam
Second	3	Memorization, understanding, practical, application	Sample Preparation	Explanation, Model Presentation, and Lecture	Exam
Third	3	Memorization, understanding, practical, application	Methods of Measuring Soil Salinity	Explanation, Model Presentation, and Lecture	Exam
Fourth	3	Memorization, understanding, practical, application	Experiment on Soil Salinity and Diagnosis of Soil Salinity	Explanation, Model Presentation, and Lecture	Exam
Fifth	3	Memorization, understanding, practical, application	Laboratory Diagnosis of Soil Salinity	Explanation, Model Presentation, and Lecture	Exam
Sixth	3	Memorization, understanding, practical, application	Monthly Exam	Explanation, Model Presentation, and Lecture	Exam
Seventh	3	Memorization, understanding, practical, application	Estimation of Percentage of Water Saturation	Explanation, Model Presentation, and Lecture	Exam
Eighth	3	Memorization, understanding, practical, application	Soil pH estimation	Explanation, Model	Exam

				Presentation, and Lecture	
Nineth	3	Memorization, understanding, practical, application	Experiment on crop tolerance to soil salinity	Explanation, Model Presentation, and Lecture	Exam
Tenth	3	Memorization, understanding, practical, application	Estimation of total dissolved salts and soil leaching	Explanation, Model Presentation, and Lecture	Exam
Eleventh	3	Memorization, understanding, practical, application	Conducting leaching experiments on saline soils	Explanation, Model Presentation, and Lecture	Exam
Twelfth	3	Memorization, understanding, practical, application	Calculations of leaching requirements for saline soils	Explanation, Model Presentation, and Lecture	Exam
Thirteenth	3	Memorization, understanding, practical, application	Second monthly exam	Explanation, Model Presentation, and Lecture	Exam
Fourteenth	3	Memorization, understanding, practical, application	Calculations of retention requirements for sodic soils	Explanation, Model Presentation, and Lecture	Exam
Fifteenth	3	Memorization, understanding, practical, application	A field trip to a reclamation project	Explanation, Model Presentation, and Lecture	Exam

11. Course Evaluation

- 1-Practical Tests 10
2-Reports and Studies 5
3-Attendance 5
4-Final Exam 20

12. Learning and Teaching Resources

Required Textbooks (Prescribed, if any)	Principles of land reclamation
Core References	
Recommended References & Readings (Scientific Journals, Reports, etc.)	Iraqi academic scientific journals
Online References	

Course Description Form

1. Course Name:					
Plant Nutrition - Theoretical					
2. Course Code:					
SolPNu41					
3. Semester / Year:					
First Semester / Fourth Stage / 2025-2026					
4. Description Preparation Date:					
2/11/2025					
5. Available Attendance Forms:					
In-person attendance					
6. Number of Credit Hours (Total) / Number of Units (Total):					
Practical: 45 hours / Number of units: 3					
7. Course Administrator's Name (Mention All, If More Than One Name):					
Name:Kahraman Hussain Habeeb Email; kahraman@uowasit.edu.iq					
8. Course Objectives:					
Course Objectives		☐ Introduce students to the science of plant nutrition. ☐ Enable students to classify nutrients and understand their relationship with soil and plants. ☐ Help students detail the benefits and toxicity of nutrients. ☐ Teach students how to prepare nutrient solutions. ☐ Enable students to evaluate the nutritional status of plants both in the field and in the laboratory.			
9. Teaching and Learning Strategies:					
Strategy		1. Explanation, demonstration, and conducting laboratory experiments . 2. Lecture method. 3. Student groups. 4. Practical lessons. 5. Field trips. 6. Self-learning method .			
10. Course Structure					
Week	Hou rs	Required Learning Outcomes	Credits	Learning Method	Evaluation on Method
First	3	Definition of plant nutrition, criteria of essential nutrients, and their importance.		Explanation, model presentation, and lecture	Exam
Second	3	Classification of nutrients based on concentration and physiological functions, and factors affecting them.		Explanation, model presentation, and lecture	Exam
Third	3	Organic matter: definition, types, and conditions for decomposition.		Explanation, model presentation, and lecture	Exam

Fourth	3	Foliar fertilization and its pathways inside the plant.		Explanation and conduct of a laboratory experiment	Exam
Fifth	3	The limiting factor for plant growth.		Explanation, model presentation, and lecture	Exam
Sixth	3	First Monthly Exam		Explanation, model presentation, and lecture	Exam
Seventh	3	Soilless agriculture: definition, importance, and historical background.		Explanation, model presentation, and lecture	Exam
Eighth	3	Types of soilless agriculture and the advantages of each type.		Explanation, model presentation, and lecture	Exam
Ninth	3	Preparation of nutrient solutions.		Explanation, model presentation, and lecture	Exam
Tenth	3	The effect of macronutrients on the plant.		Explanation, model presentation, and lecture	Exam
Eleventh	3	The effect of micronutrients on the plant.		Explanation, model presentation, and lecture	Exam
Twelfth	3	Second Monthly Exam		Explanation, model presentation, and lecture	Exam
Thirteenth	3	Comprehensive Exam		Explanation, model presentation, and lecture	Exam

11. Course Evaluation

- 1- Theoretical Quizzes Exams 10 Marks
- 2- Practical Exams 10 Marks
- 3- 3. Reports and Studies 10 Marks
- 4- Midterm / Term Exam 10 Marks
- 5- Attendance 10 Marks
- 6- Final Exam 50 Marks
- 7- Total Mark 100 Marks

12. Learning and Teaching Resources

Required Textbooks (Prescribed, if any)	☐ <i>Plant Nutrition (Part One)</i> – Nour El-Din Shawqi ☐ <i>Plant Nutrition (Part Two)</i> – Nour El-Din Shawqi
Core References	I- The Internet
Recommended References & Readings (Scientific Journals, Reports, etc.)	• Iraqi Academic Scientific Journals
Online References	Plant Nutrition

Course Description Form

1. Course Name:					
Plant Nutrition - Practical					
2. Course Code:					
SolPNu41					
3. Semester / Year:					
First Semester / Fourth Stage / 2025-2026					
4. Description Preparation Date:					
2/11/2025					
5. Available Attendance Forms:					
In-person attendance					
6. Number of Credit Hours (Total) / Number of Units (Total):					
Practical: 45 hours / Number of units: 3					
7. Course Administrator's Name (Mention All, If More Than One Name):					
Name: Asst. Lect. Behar Alaa Majeed Email: BeharalRubace@uowasit.edu.iq					
8. Course Objectives:					
Course Objectives		☐ Introduce students to the science of plant nutrition. ☐ Enable students to classify nutrients and understand their relationship with soil and plants. ☐ Help students detail the benefits and toxicity of nutrients. ☐ Teach students how to prepare nutrient solutions. ☐ Enable students to evaluate the nutritional status of plants both in the field and in the laboratory.			
9. Teaching and Learning Strategies:					
Strategy		7. Explanation, demonstration, and conducting laboratory experiments . 8. Lecture method. 9. Student groups. 10. Practical lessons. 11. Field trips. 12. Self-learning method .			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Credits	Learning Method	Evaluation Method
First	3	Definition of plant nutrition, criteria of essential nutrients, and their importance.		Explanation, model presentation, and lecture	Exam
Second	3	Classification of nutrients based on concentration and physiological functions, and factors affecting them.		Explanation, model presentation, and lecture	Exam
Third	3	Organic matter: definition, types, and conditions for decomposition.		Explanation, model presentation, and lecture	Exam

Fourth	3	Foliar fertilization and its pathways inside the plant.		Explanation and conduct of a laboratory experiment	Exam
Fifth	3	The limiting factor for plant growth.		Explanation, model presentation, and lecture	Exam
Sixth	3	First Monthly Exam		Explanation, model presentation, and lecture	Exam
Seventh	3	Soilless agriculture: definition, importance, and historical background.		Explanation, model presentation, and lecture	Exam
Eighth	3	Types of soilless agriculture and the advantages of each type.		Explanation, model presentation, and lecture	Exam
Ninth	3	Preparation of nutrient solutions.		Explanation, model presentation, and lecture	Exam
Tenth	3	The effect of macronutrients on the plant.		Explanation, model presentation, and lecture	Exam
Eleventh	3	The effect of micronutrients on the plant.		Explanation, model presentation, and lecture	Exam
Twelfth	3	Second Monthly Exam		Explanation, model presentation, and lecture	Exam
Thirteenth	3	Comprehensive Exam		Explanation, model presentation, and lecture	Exam

11. Course Evaluation

- 8- Theoretical Quizzes Exams 10 Marks**
9- Practical Exams 10 Marks
10- 3. Reports and Studies 10 Marks
11- Midterm / Term Exam 10 Marks
12- Attendance 10 Marks
13- Final Exam 50 Marks
14- Total Mark 100 Marks

12. Learning and Teaching Resources

Required Textbooks (Prescribed, if any)	☐ <i>Plant Nutrition (Part One)</i> – Nour El-Din Shawqi ☐ <i>Plant Nutrition (Part Two)</i> – Nour El-Din Shawqi
Core References	2- The Internet
Recommended References & Readings (Scientific Journals, Reports, etc.)	Iraqi Academic Scientific Journals
Online References	Plant Nutrition

Course Description Form

1. Course Name:					
Soil and Water Conservation - Theoretical					
2. Course Code:					
SolSWC42					
3. Semester / Year:					
First Semester / Fourth Stage / 2025-2026					
4. Description Preparation Date:					
2/11/2025					
5. Available Attendance Forms:					
weekly					
6. Number of Credit Hours (Total) / Number of Units (Total):					
1 theoretical, 3 practical (75) hours / 3.5 units					
7. Course Administrator's Name (Mention All, If More Than One Name):					
Name: Dr layth saleem salman Asst. Lect Hasanain Mohammed Mahmood Email: lsalman@uowasit.edu.iq Email : hassanenm800@uowasit.edu.iq					
8. Course Objectives:					
Course Objectiv	1- That the student gets to know the concept of soil conservation and water conservation and understand and understand what is related to soil and water conservation and its relationship to soil science and water resources. 2- The student should classify the sources of water in nature and how to benefit from them. Know the most important methods of soil conservation and water harvesting 3- The student will separate between wind erosion and water erosion, revealing the types of wind and wind erosion and how to control it and reduce its damage 4- The student will analyze the frequency of floods and calculate the water collected from them. Be familiar with the most important sources of water. The student will be able to control erosion and preserve the soil from erosion. 5- The student should evaluate the reasons that lead to the construction of earth dams and water harvesting and to the failure or demolition of the dam.				
9. Teaching and Learning Strategies:					
Strategy	• Interactive lecture • Brainstorming • Dialogue and discussion • Field Training • Practical exercises • Field project • Self-education				
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
the first	5	Learn about an introduction to soil and water conservation and its economic and environmental importance	Soil conservation	Explanation, display pictures, lecture, practical experiments	Various exams
the second	5	Identify fronts and precipitation	Soil conservation	Explanation, display pictures, lecture, practical experiments	Various exams
the third	5	Identify the types of sewage	Soil conservation	Explanation, display pictures, lecture, practical experiments	Various exams

the fourth	5	Identify the types of water erosion, mechanics of its occurrence, and ways to control it	Soil conservation	Explanation, display pictures, lecture, practical experiments	Various exams
Fifth	5	Identify the types of wind erosion, mechanics of its occurrence, and ways to control it	Soil conservation	Explanation, display pictures, lecture, practical experiments	Various exams
VI	5	Identify the relationship between erosion and the productive capacity of soil	Soil conservation	Explanation, display pictures, lecture, practical experiments	Various exams
Seventh	5	Learn about water conservation and water resources development	Soil conservation	Explanation, display pictures, lecture, practical experiments	Various exams
VIII	5	Identifying erosion as one of the factors of environmental pollution	Soil conservation	Explanation, display pictures, lecture, practical experiments	Various exams
Ninth	5	Identify grassy or vegetated waterways	Soil conservation	Explanation, display pictures, lecture, practical experiments	Various exams
The tenth	5	Terraces	Soil conservation	Explanation, display pictures, lecture, practical experiments	Various exams
eleventh	5	Identify small earth dams and water reservoirs	Soil conservation	Explanation, display pictures, lecture, practical experiments	Various exams
twelveth	5	Small earth dams and water reservoirs	Soil conservation	Explanation, display pictures, lecture, practical experiments	Various exams
Thirteenth	5	The student will be familiar with planning soil and water management system (type of tillage)	Soil conservation	Explanation, display pictures, lecture, practical experiments	Various exams
fourteenth	5	Identify the characteristics of rainfall related to soil and water conservation	Soil conservation	Explanation, display pictures, lecture, practical experiments	Various exams
Fifteenth	5	Learn about the water cycle	Soil conservation	Explanation, display pictures, lecture, practical experiments	Various exams

11. Course Evaluation

NO	Evaluation methods	Evaluation date	Degree	The ratio
.17	Report 1	fourth week	2.5	2.5
.18	Report 2	The fifth week	2.5	2.5
.19	Short test (1) Quiz	the sixth week	2	2
.20	Short test (2) Quiz	The fourteenth week	2	2
.21	Short test (3) Quiz	The fifteenth week	1	1
.22	Semester test (1)	the sixth week	7.5	7.5
.23	Semester test (2)	The eleventh week is difficult	7.5	7.5
.24	Final theoretical test	Final semester exams	40	40
.25	Practical field project	The fifteenth week	5	5
.26	Field evaluation	The third and fifth week	2	2
.27	Short practical test (1) Quiz	The first week	1	1
.28	Short practical test (2) Quiz	fourth week	0.5	0.5
.29	A short practical test (3) Quiz	The fourteenth week	1	1
.30	Live drawings and homework	Weeks 6, 8, 9, 10, 11, 12 and 13	5.5	5.5
.31	Final practical test	Final semester exam	20	20
.32	the total		100	100%

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Soil and Water Conservation, written by Dr. Nabil Ibrahim Al-Tayef and Dr. Fahih Hassan Ahmed Al-Hadithi, 1992, Ministry of Higher Education and Scientific Research - University of Baghdad
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Main references (sources)	Soil Conservation, written by Helmut Kunke and Anson Bertrand, 19 Ministry of Higher Education and Scientific Research - University of Mosul
Recommended books and references (scientific journals, reports...)	Iraqi academic scientific journals
Electronic References, Websites	Peer-reviewed scientific journals

Course Description Form

1. Course Name:	
Soil and Water Conservation - Practical	
2. Course Code:	
SolSWC42	
3. Semester / Year:	
First Semester / Fourth Stage / 2025-2026	
4. Description Preparation Date:	
2/11/2025	
5. Available Attendance Forms:	
In-person Attendance	
6. Number of Credit Hours (Total) / Number of Units (Total):	
45 Practical Hours	
7. Course Administrator's Name (Mention All, If More Than One Name):	
Isam Hani Hameed ishani@uowasit.edu.iq	
8. Course Objectives:	
Course Objectives	Identify the concept of soil and water conservation and its relationship with soil science and water resources. Understand soil conservation methods, water harvesting, and the maintenance of soil moisture. Distinguish between water erosion and wind erosion and the methods used to control them. Analyze runoff and flood frequency and estimate accumulated water practically. Recognize terraces, grassed waterways, small earthen dams, and their practical applications.

9. Teaching and Learning Strategies:

Strategy

Interactive lectures.
Brainstorming, dialogue, and discussion.
Practical and field training.
Presentation of models, images, and practical applications.
Practical reports and self-learning.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or Topic	Learning Method	Assessment Method
1st	3	Introduce the student to the concept of soil and water conservation and its economic and environmental importance.	Introduction to soil and water conservation	Explanation, model presentation, and lecture	Daily quiz
2nd	3	Introduce the student to fronts, precipitation, and their role in soil and water conservation.	Fronts and precipitation	Explanation, model presentation, and lecture	Report
3rd	3	Identify types of runoff, methods of estimation, and their relationship with soil and water loss.	Runoff and its estimation methods	Explanation, model presentation, and lecture	Daily quiz
4th	3	Identify types of water erosion, its mechanism of occurrence, and control methods.	Water erosion	Explanation, model presentation, and lecture	Report
5th	3	Identify types of wind erosion, its mechanism of occurrence, and control methods.	Wind erosion	Explanation, model presentation, and lecture	Daily quiz
6th	3	Understand the relationship between erosion and soil productivity and its effect on land management.	Erosion and soil productivity	Explanation, model presentation, and lecture	Report
7th	3	Introduce methods of water conservation and development of field water resources.	Water conservation and water resource development	Explanation, model presentation, and lecture	Report
8th	3	Assess the student's understanding of previous soil and water conservation topics.	Monthly exam		Exam

9th	3	Identify erosion as one of the factors of environmental pollution and soil degradation.	Erosion and environmental pollution	Explanation, model presentation, and lecture	Report
10th	3	Understand the design of grassed waterways and their importance in reducing surface runoff.	Grassed waterways	Explanation, model presentation, and lecture	Daily quiz
11th	3	Identify terraces, their types, and their role in reducing soil erosion.	Terraces	Explanation, model presentation, and lecture	Report
12th	3	Recognize small earthen dams, water reservoirs, and methods of use.	Small earthen dams and water reservoirs	Explanation, model presentation, and lecture	Daily quiz
13th	3	Understand planning for soil and water management systems and their relationship with tillage types.	Soil and water management and tillage types	Explanation, model presentation, and lecture	Report
14th	3	Identify rainfall characteristics related to soil and water conservation.	Rainfall characteristics	Explanation, model presentation, and lecture	Daily quiz
15th	3	Final assessment of soil and water conservation topics and their practical applications.	Monthly exam		Exam

11. Course Evaluation

Practical Tests: 5
 Reports and Studies: 5
 Midterm Exam: 10
 Final Exam: 20

12. Learning and Teaching Resources

Required Textbooks (Curricular, if any)	Soil and Water Conservation, Dr. Nabil Ibrahim Al-Taif and Dr. Faleh Hassan Ahmed Al-Hadithi, 1992, Ministry of Higher Education and Scientific Research - University of Baghdad.
Main References (Sources)	Higher Education and Scientific Research - University of Mosul.
Recommended Supporting Books and References (Scientific Journals, Reports, etc.)	Iraqi academic scientific journals and reports related to soil and water conservation.
Electronic References and Websites	Peer-reviewed scientific journals and relevant academic websites.

Course Description Form

1. Course Name:	
Soil-Water-Plant Relations - Theoretical	
2. Course Code:	
SolSW41	
3. Semester / Year:	
Second Semester / Fourth Stage / 2025-2026	
4. Description Preparation Date:	
2/11/2025	
5. Available Attendance Forms:	
In-person attendance	
6. Number of Credit Hours (Total) / Number of Units (Total):	
Theoretical: 30 hours Practical: 20 hours Units: 3.	
7. Course Administrator's Name (Mention All, If More Than One Name):	
Name: Dr. Zahraa Khalid Kamil Email: Zakameel@uowasit.edu.iq	
8. Course Objectives:	
- Determine the effect of water on soil properties, including soil structure and composition. - Study the effect of soil moisture on cultivability and nutrient retention. - Understand how soil properties affect water absorption and storage. - Study surface runoff and soil infiltration and their effects on river water and groundwater. - Understand the environmental effects of soil-water-plant relationships.	Course Objectives
9. Teaching and Learning Strategies:	
1. Explanation and clarification 2. Lecture method 3. Student groups 4. Practical lessons 5. Scientific field trips 6. Self-learning method	Strategy

10. Course Structure

Evaluation Method	Learning Method	Unit / Topic	Required Learning Outcomes	Hours	Week
Examination	Explanation, model presentation, and lecture	Soil properties: soil texture, soil structure, and their relationship to plant growth.	The student will understand the concept of physical soil properties and their relationship to plants.	5	1
Examination	Explanation, model presentation, and lecture	Plant water requirements; evaporation and transpiration.	The student will understand the processes of evaporation and transpiration.	5	2
Examination	Explanation, model presentation, and lecture	Plant water-use efficiency; water supply and plant behavior.	The student will learn how to calculate water quantity and how it is used.	5	3
Examination	Explanation, model presentation, and lecture	Soil air and temperature and their relationship to plant growth and behavior.	The student will understand thermal regimes and their effects on plant growth.	5	4
Examination	Explanation, model presentation, and lecture	Soil colloids: their nature and applied importance.	The student will understand soil moisture regimes.	5	5
Examination	Explanation, model presentation, and lecture	Ion exchange and nutrient availability to plants.	The student will understand nutrient availability.	5	6
Examination	Explanation, model presentation, and lecture	Ion transport from soil to roots; soil-solution intensity and quantity; root growth.	The student will understand how ions move within the soil.	5	7
Examination	Explanation, model presentation, and lecture	Salt stress and its relationship to plant growth.	The student will understand the effect of salts on plant growth.	5	8
Examination	Explanation, model presentation, and lecture	Nutritional stress and its relationship to plant growth.	The student will understand the effects of environmental stresses.	5	9
Examination	Explanation, model presentation, and lecture	Water and water potential in the soil-plant-atmosphere system.	The student will understand the effect of water potential.	5	10
Examination	Explanation, model presentation, and lecture	Micronutrients and their relationship to plant growth, activity, and exudates.	The student will understand the importance of plant nutrients.	5	11

Examination	Explanation, model presentation, and lecture	Biological groups in soil and their relationship to plant growth.	The student will understand biological groups in soil.	5	12
11. Course Evaluation					
1. Theoretical examinations: 25% 2. Practical examinations: 15% 3. Reports and studies: 10% 4. Final examination: 50%					
12. Learning and Teaching Resources					
1. Soil-Water-Plant Relations 2. Lectures			Required textbooks (methodological, if any)		
			Main references (sources)		
Iraqi academic scientific journals			Recommended supporting books and references (scientific journals, reports, etc.)		
			Electronic references and websites		

Course Description Form

1. Course Name:	
Soil-Water-Plant Relations - Practical	
2. Course Code:	
SolSW41	
3. Semester / Year:	
Second Semester / Fourth Stage / 2025-2026	
4. Description Preparation Date:	
2/11/2025	
5. Available Attendance Forms:	
Actual presence	
6. Number of Credit Hours (Total) / Number of Units (Total):	
45 practical, number of units: 3	
7. Course Administrator's Name (Mention All, If More Than One Name):	
Name: Ali Hussein Abbas Email: alhussei@uowasit.edu.iq	Name : Asmaa Hussein Alawy Email: ashusseini@uowasit.edu.iq
8. Course Objectives:	
Course Objectives	1. Understanding soil water properties. 2. Studying the relationship between water and plant growth. 3. Analyzing water movement in the soil. 4. Applying soil water management techniques. 5. Understanding the impact of environmental factors.
9. Teaching and Learning Strategies:	

Strategy	A. Cognitive Objectives • Understanding the types of water in the soil. • Understanding the movement of water within the soil. • Differentiating between soils based on their water retention capacity. • Understanding the relationship between water and plant growth. B. Skills Objectives • Measuring soil moisture. • Conducting simple experiments on soil permeability. • Observing plant growth under different irrigation conditions. • Analyzing the results and relating them to the plant's condition.
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10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
First	3	Students will learn about water potential and how to measure it.	Methods for Estimating Water Potential in Leaves	Explanation, model presentation, and lecture	Daily Exam
Second	3	Students will learn about root types and their differences in various plant tissues.	Comparison of Root System Growth and Development in Different Soil Textures	Explanation, model presentation, and lecture	Daily Exam
Third	3	Students will learn about methods of measuring, classifying, and dividing plant tissues.	Methods for Measuring Soil Texture	Laboratory experiments	Report
Fourth	3	Students will learn how density affects roots, the relationship between them, and how to improve this characteristic.	The Effect of Soil Bulk Density on Root Growth and the Relationship Between Them	Explanation, model presentation, and lecture	Report
Fifth	3	Students will apply methods measuring bulk density.	Methods for Measuring Bulk Density	Laboratory experiments	Report

Sixth	3	Students will learn methods for measuring water potential in soil and plants.	Estimating Water Potential in Plants and Soils and the Relationship Between Them	Explanation, model presentation, and lecture	Daily Exam
Seventh	3	Students will apply methods for measuring water potential.	Methods for Measuring Water Potential	Laboratory and field experiments	Report
Eighth	3		Monthly Exam		Monthly Exam
Ninth	3	The student will understand the effect of aeration on roots and soil ions.	The Effect of Aeration Root Growth and Absorption Efficiency	Explanation, model presentation, and lecture	Report
Tenth	3	The student will identify the types of salts and their impact on roots and ions.	The Effect of Salts on Root System Development and Ion Absorption	Explanation, model presentation, and lecture	Daily Exam
Eleven	3	The student will apply methods for measuring ions and salts.	Methods for Measuring Ions	Laboratory experiments	Report
Twelfth	3	The student will understand measurement methods, their advantages, and disadvantages.	Measuring the Transpiration Rate of Plants	Explanation, model presentation, and lecture	Daily Exam
Thirteenth	3	The student will understand methods for measuring leaf area and the efficiency of the root system in transpiration, as well as the influencing internal and external environmental conditions.	Measuring the Effect of Total Leaf Area and Root System Efficiency on the Transpiration Rate	Explanation, model presentation, and lecture	Daily Exam

Fourteenth	3		Monthly Exam		Monthly Exam
11. Course Evaluation					
1. Practical Tests: 5 2. Reports and Studies: 5 3. Midterm Exam: 10 4. Final Exam: 20					
12. Learning and Teaching Resources					
Required textbooks (curricular books, if any)			The relationship between soil, water, and plants		
Main references (sources)					
Recommended books and references (scientific journals, reports...)			Iraqi academic scientific journals		
Electronic References, Websites					

Course Description Form

1. Course Name:					
Soil Survey and Classification - Theoretical					
2. Course Code:					
0013401					
3. Semester / Year:					
First Semester / Fourth Stage / 2025-2026					
4. Description Preparation Date:					
2/11/2025					
5. Available Attendance Forms:					
In-person attendance					
6. Number of Credit Hours (Total) / Number of Units (Total):					
Theoretical: 30 hours + Practical: 45 hours / Number of units: 3					
7. Course Administrator's Name (Mention All, If More Than One Name):					
Name: Prof. Dr. Hashim Hanin Karim Email: hashim.hanin@uomisan.edu.iq					
Name: Asst. Lect. Afrah Mahdi					
8. Course Objectives:					
Course Objectives		Introduce students to the principles and importance of soil survey and classification.			
		Enable students to identify the soil properties used in field description.			
		Explain the relationship between soil-forming factors, soil genesis, and classification.			
		Train students to use Soil Taxonomy and classify soils to the subgroup level.			
		Develop students' field skills in soil description, mapping, and reporting.			
9. Teaching and Learning Strategies:					
Strategy		1. Explanation, demonstration, and field-based practical training.			
		2. Interactive lectures and guided discussion.			
		3. Student groups and practical field exercises.			
		4. Report writing and map interpretation assignments.			
		5. Slide presentations and classroom applications.			
		6. Self-learning through approved references and local case studies.			
10. Course Structure					
Week	Hou rs	Required Learning Outcomes	Credits	Learning Method	Evaluation Method
First	3	Concept of soil survey, its objectives, types, and importance.		Explanation, model presentation, and lecture	Exam / Discussion
Second	3	Soil-forming factors and their role in soil genesis and classification.		Lecture, discussion, and practical demonstration	Exam / Report
Third	3	Field description of soil profiles and diagnostic morphological properties.		Explanation and board presentation	Exam / Report
Fourth	3	Soil survey tools, field equipment, and methods of collecting field data.		Interactive lecture and practical training	Exam / Assignment
Fifth	3	Principles, objectives, and levels of soil classification systems.		Explanation, model presentation, and lecture	Exam / Report

Sixth	3	First Monthly Exam		Explanation, review, and discussion	Monthly Exam
Seventh	3	Soil Taxonomy: historical development, structure, categories, and nomenclature.		Lecture and slide presentation	Exam / Discussion
Eighth	3	Diagnosis and naming of taxonomic units using field and laboratory data.		Practical application and guided discussion	Exam / Report
Ninth	3	Classification of major soil orders, suborders, and great groups.		Explanation and practical exercise	Exam / Assignment
Tenth	3	Stages of soil survey, mapping units, and interpretation of survey maps.		Field project and map interpretation	Exam / Report
Eleventh	3	Remote sensing and GIS applications in soil survey and land evaluation.		Lecture, discussion, and practical application	Exam / Report
Twelfth	3	Second Monthly Exam		Explanation, review, and discussion	Monthly Exam
Thirteenth	3	Comprehensive review of soil survey reports and Iraqi soil survey applications.		Review, discussion, and final evaluation	Comprehensive Exam

11. Course Evaluation

- 1- Theoretical quizzes and short exams 10 Marks
- 2- Practical exams 10 Marks
- 3- Reports and studies 10 Marks
- 4- Midterm / term exam 10 Marks
- 5- Attendance and participation 10 Marks
- 6- Final exam 50 Marks
- 7- Total mark 100 Marks

12. Learning and Teaching Resources

Required Textbooks (Prescribed, if any)	Soil Taxonomy, USDA, latest edition Soil Survey Manual, USDA, latest edition
Core References	Approved local references in soil survey and classification
Recommended References & Readings (Scientific Journals, Reports, etc.)	Iraqi academic scientific journals and local soil survey reports
Online References	USDA NRCS Soil Survey resources; FAO soil classification and land evaluation resources

Course Description Form

1. Course Name:					
Soil Survey and Classification - Practical					
2. Course Code:					
0013401					
3. Semester / Year:					
First Semester / Fourth Stage / 2025-2026					
4. Description Preparation Date:					
2/11/2025					
5. Available Attendance Forms:					
Physical attendance					
6. Number of Credit Hours (Total) / Number of Units (Total):					
Practical hours			Number of units		
7. Course Administrator's Name (Mention All, If More Than One Name):					
Name: Asst. Lect. Behar Alaa Majeed			Email: BeharalRubace@uowasit.edu.iq		
8. Course Objectives:					
Course Learning Objectives		Introduce students to the concept of practical soil survey and the field description of a soil profile. Distinguish the main and subordinate genetic horizons and their field symbols. Measure horizon boundaries in terms of depth, distinctness, and topography. Use the Munsell guide to determine soil color and interpret its field significance. Estimate texture, structure, consistence, coarse fragments, and accumulations in the soil profile.			
9. Teaching and Learning Strategies:					
Strategy		Explanation and demonstration with field and laboratory applications. Lecture method. Student groups. Practical lessons. Scientific field trips. Self-learning method.			
10. Course Structure					
Week	Hou rs	Required Learning Outcomes	Unit or Topic Name	Learning Method	Assessm ent Method
First	3	Knowledge, understanding, and practical application	Introduction to practical soil survey, fieldwork tools, and the method of opening and describing a soil profile.	Explanation, model demonstration, and lecture	Exam

Second	3	Knowledge, understanding, and practical application	Soil profile and the main genetic horizons O, A, E, B, C, and R, and their relation to pedon description.	Explanation, model demonstration, and lecture	Exam
Third	3	Knowledge, understanding, and practical application	Subordinate horizon symbols, accumulations, and modifications and their significance in field soil description.	Explanation, model demonstration, and lecture	Exam
Fourth	3	Knowledge, understanding, and practical application	Horizon boundaries: depth, distinctness, and topography between one horizon and another.	Explanation, model demonstration, and lecture	Exam
Fifth	3	Knowledge, understanding, and practical application	Soil color and the Munsell system, including the determination of Hue, Value, and Chroma.	Explanation, model demonstration, and lecture	Exam
Sixth			Monthly Exam		Exam
Seventh	3	Knowledge, understanding, and practical application	Soil texture and field estimation, with distinction among sand, silt, and clay.	Explanation, model demonstration, and lecture	Exam
Eighth	3	Knowledge, understanding, and practical application	The textural triangle and classification of samples into different textural classes.	Explanation, model demonstration, and lecture	Exam
Ninth	3	Knowledge, understanding, and practical application	Coarse fragments, rock pieces, and gravel, and estimation of their percentage in soil.	Explanation, model demonstration, and lecture	Exam
Tenth	3	Knowledge, understanding, and practical application	Soil structure in terms of type, grade, and size, and its effect on soil properties.	Explanation, model demonstration, and lecture	Exam
Eleventh	3	Knowledge, understanding, and practical application	Soil consistence under dry, moist, and wet conditions.	Explanation, model demonstration, and lecture	Exam
Twelfth			Second Monthly Exam		Exam
Thirteenth			Comprehensive exam in soil profile description and pedon report preparation.	Explanation, model demonstration, and lecture	Exam

11. Course Evaluation

Theoretical tests: 5 marks
Practical tests: 5 marks

Reports and studies: 5 marks
Semester exam: 5 marks
Final exam: 20 marks

12. Learning and Teaching Resources

Required textbooks (Methodological, if any)	Practical Soil Survey handout Field Guide for Soil Profile Description
Main references (Sources)	Soil Survey Manual Field Book for Describing and Sampling Soils
Recommended supporting books and references (Scientific journals, reports, etc.)	Iraqi academic scientific journals
Electronic references and websites	Soil Survey, USDA-NRCS, FAO

Course Description Form

1. Course Name:					
Hydrology and Water Resources - Theoretical					
2. Course Code:					
SolHyd41					
3. Semester / Year:					
First Semester / Fourth Stage / 2025-2026					
4. Description Preparation Date:					
2/11/2025					
5. Available Attendance Forms:					
Actual Attendant					
6. Number of Credit Hours (Total) / Number of Units (Total):					
30 theoretical 45 practical units 3.5					
7. Course Administrator's Name (Mention All, If More Than One Name):					
akjwad@uowasit.edu.iq Name: Dr. Ali Jawad Kadhim Email: Name: Asst. Lect . Hasanain Mohammed Mahmood Email: hassanenm800@uowasit.edu.iq					
8. Course Objectives:					
Course Objectives		The objectives of a hydrology course are to provide students with a comprehensive understanding of the principles and processes related to the distribution, movement, and properties of water on Earth.			
9. Teaching and Learning Strategies:					
Strategy		Lectures: Traditional classroom lectures are often used to present fundamental concepts, theories, and principles of hydrology. Lectures provide an opportunity for instructors to convey information, discuss theoretical frameworks, and highlight key concepts. Laboratory Work: Hands-on laboratory sessions allow students to apply theoretical knowledge to practical situations. In hydrology courses, students may engage in activities such as water quality testing, flow measurements, and experiments related to hydrological processes. Fieldwork: Field trips or fieldwork exercises provide students with direct exposure to real-world hydrological environments. This could include visits to watersheds, rivers, lakes, or groundwater monitoring sites to observe and analyze hydrological features and processes.			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Credits	Learning Method	Evaluation on Method
First	2	Hydrological Cycle	Hydrology	Theoretical	Exam
Second	2	Precipitation	Hydrology	Theoretical	Exam
Third	2	Surface runoff infiltration	Hydrology	Theoretical	Exam

Fourth	2	Run off factors	Hydrology	Theoretical	Exam
Fifth	2	Types of hydrological streams	Hydrology	Theoretical	Exam
Sixth	2	First Mid t exam	Hydrology	Theoretical	Exam
Seventh	2	Floods	Hydrology	Theoretical	Exam
Eighth	2	Water storage	Hydrology	Theoretical	Exam
Ninth	2	Water balance	Hydrology	Theoretical	Exam
Tenth	2	Aquifers	Hydrology	Theoretical	Exam
Eleventh	2	Hydrograph	Hydrology	Theoretical	Exam
Twelfth	2	Important ground water	Hydrology	Theoretical	Exam
Thirteenth	2	Groundwater movement	Hydrology	Theoretical	Exam
Fourteenth	2	Second mid t exam	Hydrology	Theoretical	Exam
Fifteenth	2	Review	Hydrology	Theoretical	Exam
11. Course Evaluation					
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports etc					
12. Learning and Teaching Resources					
Required Textbooks (Prescribed, if any)			Applied Hydrology Ray K. lensley et.al New York, USA		
Core References					
Recommended References & Readings (Scientific Journals, Reports, etc.)			International Journal of Hydrology Science and Technology		
Online References					

Course Description Form

1. Course Name:					
Desertification - Theoretical					
2. Course Code:					
SolDes32					
3. Semester / Year:					
Second Semester / Fourth Stage / 2025-2026					
4. Description Preparation Date:					
2/11/2025					
5. Available Attendance Forms:					
Weekly actual attendance					
6. Number of Credit Hours (Total) / Number of Units (Total):					
45 theoretical hours + 30 practical hours = 75 total hours / 3 units					
7. Course Administrator's Name (Mention All, If More Than One Name):					
Name: Mohanad Ismail Khalabas Email: albwmoanad@uowasit.edu.iq Name: Hiba Khalaf Razzaq Email: hibaaluraishd@uowasit.edu.iq					
8. Course Objectives:					
Course Objectives	1- Enabling students to understand the concept of desertification, its classifications, and its main indicators. 2- Studying the geographical and climatic distribution of desertification in arid and semi-arid environments. 3- Identifying the natural and human factors that accelerate soil degradation and land productivity decline. 4- Training students to monitor and assess desertification using field observations, maps, models, and satellite imagery. 5- Introducing sustainable strategies for combating desertification, stabilizing sand movement, and protecting agricultural lands.				
9. Teaching and Learning Strategies:					
Strategy	- Interactive lectures - Dialogue and discussion - Display of pictures, maps, models, and satellite images - Field and practical applications - Reports and student activities - Self-learning and scientific reading				
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
the first	3	Memorization, understanding, and practical application	Desertification: concept and classification criteria	Explanation, display of pictures and models, lecture, and practical applications	Various exams, reports, and activities
the second	3	Memorization, understanding, and practical application	Monitoring desertification via satellite imagery	Explanation, display of pictures and models, lecture, and practical applications	Various exams, reports, and activities
the third	3	Memorization, understanding, and practical application	Principles of mapping areas affected by desertification	Explanation, display of pictures and models, lecture, and	Various exams, reports, and activities

				practical applications	
the fourth	3	Memorization, understanding, and practical application	Agricultural techniques in arid environments	Explanation, display of pictures and models, lecture, and practical applications	Various exams, reports, and activities
Fifth	3	Memorization, understanding, and practical application	Water sources and changes in arid and semi-arid environments	Explanation, display of pictures and models, lecture, and practical applications	Various exams, reports, and activities
VI	3	First monthly exam	First monthly exam	Explanation, display of pictures and models, lecture, and practical applications	Various exams, reports, and activities
Seventh	3	Memorization, understanding, and practical application	Environmental sensitivity to desertification and soil degradation	Explanation, display of pictures and models, lecture, and practical applications	Various exams, reports, and activities
VIII	3	Memorization, understanding, and practical application	Manifestations of soil erosion	Explanation, display of pictures and models, lecture, and practical applications	Various exams, reports, and activities
Ninth	3	Memorization, understanding, and practical application	Morphology of sand dune deposits and deposition mechanisms	Explanation, display of pictures and models, lecture, and practical applications	Various exams, reports, and activities
The tenth	3	Second monthly exam	Second monthly exam	Explanation, display of pictures and models, lecture, and practical applications	Various exams, reports, and activities
eleventh	3	Memorization, understanding, and practical application	Desertification control and sand movement stabilization methods	Explanation, display of pictures and models, lecture, and practical applications	Various exams, reports, and activities
twelveth	3	Memorization, understanding, and practical application	Economic impacts on areas affected by desertification	Explanation, display of pictures and models, lecture, and practical applications	Various exams, reports, and activities
Thirteenth	3	Memorization, understanding, and practical application	Measures taken to combat desertification in the Arab world and their obstacles	Explanation, display of pictures and models, lecture, and practical applications	Various exams, reports, and activities
fourteenth	3	Third monthly exam	Third monthly exam	Explanation, display of pictures and models, lecture, and	Various exams, reports, and activities

				practical applications	
Fifteenth	3	Comprehensive exam	Comprehensive exam	Explanation, display of pictures and models, lecture, and practical applications	Various exams, reports, and activities

11. Course Evaluation

NO	Evaluation methods	Evaluation date	Degree	The ratio
1	Report 1	fourth week	5	5%
2	Report 2	eighth week	5	5%
3	Short test (1) Quiz	sixth week	5	5%
4	Short test (2) Quiz	tenth week	5	5%
5	Semester test (1)	sixth week	7.5	7.5%
6	Semester test (2)	eleventh week	7.5	7.5%
7	Practical field activities	Weeks 3-13	15	15%
8	Final exam	Final exam period	50	50%
9	Total	-	100	100%

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Principles of Desertification
Main references (sources)	Dryland Ecohydrology, by Paolo D'Odorico and Amilcare Porporato Basics of Desertification
Recommended books and references (scientific journals, reports...)	Iraqi academic scientific journals, scientific reports, and studies related to desertification and drylands.
Electronic References, Websites	UNCCD, FAO, and scientific websites related to desertification, drylands, and remote sensing.

Course Description Form

1. Course Name:

Desertification - Practical

2. Course Code:

SolDes32

3. Semester / Year:

Second Semester / Fourth Stage / 2025-2026

4. Description Preparation Date:

2/11/2025

5. Available Attendance Forms:

Actual Attendance-

6. Number of Credit Hours (Total) / Number of Units (Total):

30Theory + 45
Practical = 75 Total
Hours / 3 Units

7. Course Administrator's Name (Mention All, If More Than One Name):

Name : Wafaa Awad Tuama
Email: wafaa.awad@uowasit.edu.iq

8. Course Objectives:

- Studying the geographical and climatic distribution
- Studying the geographical and climatic distribution

9. Teaching and Learning Strategies:

1. Soil Erosion Quantifying and Equations Strategy
2. Land Degradation Mapping Strategy (Using Remote Sensing & (GIS)
3. Anti-Desertification and Rehabilitation Strategy (Practical Application)

10. Course Structure

Week	Hours	Learning Outcomes	Topic \UnitName	Learning Method	Evaluation
1	3	Memorization, Understanding, Practical Application	Desertification Concept and Classification Criteria	Explanation, Models, Lecture	Exam
2	3	Memorization, Understanding, Practical Application	Monitoring Desertification via Satellite Imagery	Explanation, Models, Lecture	Exam
3	3	Memorization, Understanding, Practical Application	Principles of Mapping Areas Affected by Desertification	Explanation, Models, Lecture	Exam
4	3	Memorization, Understanding, Practical Application	Agricultural Techniques in Arid Environments	Explanation, Models, Lecture	Exam
5	3	Memorization, Understanding, Practical Application	Water Sources and Changes in Arid/Semi-Arid Environments	Explanation, Models, Lecture	Exam
6	3	Monthly Exam	First Monthly Exam	Explanation, Models, Lecture	Exam
7	3	Memorization, Understanding, Practical Application	Describing Environmental Sensitivity to Desertification and Soil Degradation	Explanation, Models, Lecture	Exam
8	3	Memorization, Understanding, Practical Application	Manifestations of Soil Erosion	Explanation, Models, Lecture	Exam
9	3	Memorization, Understanding, Practical Application	Morphology of Sand Dune Deposits and Deposition Mechanisms	Explanation, Models, Lecture	Exam
10	3	Second Monthly Exam	Second Monthly Exam	Explanation, Models, Lecture	Exam
11	3	Memorization, Understanding, Practical Application	Desertification Control and Sand Movement Stabilization Methods	Explanation, Models, Lecture	Exam
12	3	Memorization, Understanding, Practical Application		Explanation, Models, Lecture	Exam

			Economic Impacts on Areas Affected by Desertification		
13	3	Memorization, Understanding, Practical Application	Measures Taken to Combat Desertification in the Arab World and Their Obstacles	Explanation, Models, Lecture	Exam
14	3	Second Monthly Exam	Second Monthly Exam	Explanation, Models, Lecture	Exam
15	3	Comprehensive Exam	Comprehensive Exam	Explanation, Models, Lecture	Exam
11. Course Evaluation					
12. Learning and Teaching Resources					
Resource Category					
Required Textbooks (Curriculum, if any)			Principles of Desertification		
Main References (Sources)			dryland Ecohydrology (by Paol D'Odorico & Amilcare Porporato)		
Recommended Supporting References (Scientific) journals, reports.			Iraqi Academic Scientific Journals		
Electronic References, Internet Sites			Basics of Desertification		

Course Description Form

1. Course Name:

Soil Microbiology - Theoretical

2. Course Code:

SolSMi42

3. Semester / Year:

First Semester / Fourth Stage / 2025-2026

4. Description Preparation Date:

2/11/2025

5. Available Attendance Forms:
6. Number of Credit Hours (Total) / Number of Units (Total):

Total Hours: 75 (Theory: 30, Practical: 45)

Total Units: 3

7. Course Administrator's Name (Mention All, If More Than One Name):

.1Dr. Noor Al-Huda Jawad Kadhim (nkadhim@uowasit.edu.iq)

8. Course Objectives:

Course Learning Objectives: Introduction to Ecology

1. Introduction to Ecology

Introduce students to the fundamental concepts, scope, and significance of the field of Ecology.

2. Climatic Factors and Soil Relations

Classify various climatic factors and analyze their specific, interconnected relationships with soil characteristics and development.

Analyze the distinct advantages and disadvantages of key climatic factors (e.g., temperature, wind, and frost) on ecosystems.

3. Environmental Pollution

Understand the underlying causes, sources, and diverse types of environmental pollution affecting the biosphere.

4. Global Environmental Challenges

Evaluate critical and contemporary environmental issues, with a specific focus on Desertification and Global Warming.

9. Teaching and Learning Strategies:

Here is the translation of your proposed model into a well-structured, professional English format, aligned from left to right.

Soil Microbiology: Teaching and Learning Strategies Model

To achieve the best educational outcomes for the "Soil Microbiology" course, learning strategies must integrate deep theoretical knowledge with vital hands-on laboratory applications.

Below is the proposed model for the teaching and learning strategies designed for this course:

First: Teaching Strategies

These are the methods and tools used by the instructor to deliver the scientific content:

1. Interactive Lecturing

- Utilizing presentation slides (PowerPoint) supported by microscopic images and live videos showcasing the movement of microorganisms.
- Posing thought-provoking questions during the lecture (e.g., "What would happen to soil ecosystems if root nodule bacteria ceased to function?").

2. Inquiry-Based Learning

- Guiding students to investigate specific agricultural issues (such as soil fertility degradation) and exploring how microorganisms can be utilized as a biological remedy.

3. Modeling and Demonstration

- Presenting live soil samples, root nodules, and magnified 3D plastic models of various bacteria and fungi to solidify abstract biological concepts.

Second: Learning Strategies

These are the active tasks and activities performed by the students to ensure deep understanding and skill mastery:

1. Hands-on Lab Learning

- **Isolation and Purification:** Empowering students to independently isolate microorganisms from various diverse soil samples.
- **Bio-assays and Biochemical Tests:** Conducting laboratory experiments to detect urea hydrolysis or biological nitrogen fixation processes.

2. Collaborative Learning

- Dividing students into small working groups to prepare comprehensive technical reports on specific biogeochemical cycles (such as the Sulfur Cycle or Carbon Cycle) and presenting their findings to their peers.

Strategy

3. Concept Mapping

- Designing mental and conceptual maps that visually link different types of soil microorganisms to their specific biochemical functions and cycles within the soil ecosystem.

10. Course Structure

Evaluation Method	Teaching Method	Unit/Subject Name	Required Learning Outcomes	Hours	Week
Exam	Explanation, models, and lecture	Historical overview, definition, and importance of studying soil microbiology.	Soil Microbiology	5	1
Exam	Explanation, models, and lecture	Classifications of soil microorganisms.	Soil Microbiology	5	2
Exam	Explanation, models, and lecture	Microbial groups: Bacteria and Fungi.	Soil Microbiology	5	3
Exam	Explanation, models, and lecture	Algae, Actinomycetes, and Protozoa.	Soil Microbiology	5	4
Exam	Explanation, models, and lecture	Mycorrhiza (Root Fungi).	Soil Microbiology	5	5
Exam	Explanation, models, and lecture	Organic Matter: Carbon cycle and enzymatic activity in soil.	Soil Microbiology	5	6
Exam	-	First Monthly Exam	Soil Microbiology	5	7
Exam	Explanation, models, and lecture	Biological transformations of Nitrogen: N-cycle, urea hydrolysis, ammonification, mineralization, immobilization, and C/N ratio.	Soil Microbiology	5	8
Exam	Explanation, models, and lecture	Biological transformations of Phosphorus (P).	Soil Microbiology	5	9
Exam	Explanation, models, and lecture	Biological transformations of Sulfur: S-cycle, mineralization, microbial assimilation, oxidation, and reduction of inorganic sulfur compounds.	Soil Microbiology	5	10
Exam	Explanation, models, and lecture	Biological transformations of Iron: Oxidation, reduction, and decomposition of organic iron compounds.	Soil Microbiology	5	11
Exam	Explanation, models, and lecture	Microbial relationships: The Rhizosphere and microbial activity in the root zone.	Soil Microbiology	5	12
Exam	Explanation, models, and lecture	Pesticide degradation in soil.	Soil Microbiology	5	13
Exam	-	Second Monthly Exam	Soil Microbiology	5	14

11. Course Evaluation

Theoretical Exams: 25%*
 ** Practical Exams: 15%*
 *Reports and Studies: 10%
 *Final Examination: 50%

12. Learning and Teaching Resources

Details	Resource Type
Applications in Microbiology	Required Textbooks

Subject-related books and scientific research papers	Main References	
Scientific journals and specialized reports	Recommended Support	Be
Relevant websites and online databases	Electronic Resources	

Course Description Form

1. Course Name:					
Soil Microbiology - Practical					
2. Course Code:					
SolSMi42					
3. Semester / Year:					
First Semester / Fourth Stage / 2025-2026					
4. Description Preparation Date:					
2/11/2025					
5. Available Attendance Forms:					
In-person attendance					
6. Number of Credit Hours (Total) / Number of Units (Total):					
Practical: 45 hours / Number of units: 3					
7. Course Administrator's Name (Mention All, If More Than One Name):					
Name: Asst. Lect. Buraq Musa Sadeq Email: BuAlghuribawi@uowasit.edu.iq					
8. Course Objectives:					
Course Objectives	*Introducing the student to the nature of microorganisms. * Studying the different types of microorganisms. * Studying the role of microorganisms in treating polluted soil. * Utilizing microorganisms in the agricultural field.				
9. Teaching and Learning Strategies:					
Strategy	A. Cognitive Goals * Enabling the student to understand the nature of microorganisms. * Enabling the student to differentiate between different types of microorganisms. * Enabling the student to differentiate between the main groups of soil microorganisms in terms of structure and characteristics. * Learning how to utilize microorganisms to improve soil fertility and reduce dependence on chemical fertilizers (bio-fertilization). * Enabling the student to understand the effect of physical and chemical factors on activity and distribution of these organisms. B. Skill-Based Goals * Microscopic diagnosis of bacteria and fungi. * Culturing bacteria and fungi.				
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
First	5	(Memorizing, understanding, practical application)	Safety and security instructions in microbiology laboratories	(Explanation, demonstration, lecture)	Exam
Second	5	(Memorizing, understanding, practical application)	Apparatus and tools used in microbiology laboratories	(Explanation, demonstration, lecture)	Exam
Third	5	(Memorizing, understanding, practical application)	Principles and uses of microscope in studying bacteria	(Explanation, demonstration, lecture)	Exam

Fourth	5	(Memorizing, understanding, practical application)	Microscope care and maintenance in the laboratory	(Explanation, demonstration, lecture)	Exam
Fifth	5	(Memorizing, understanding, practical application)	Applications of isolating bacteria from different environments into pure cultures	(Explanation, demonstration, lecture)	Exam
Sixth	5	(Memorizing, understanding, practical application)	Monthly Exam	(Explanation, demonstration, lecture)	Exam
Seventh	5	(Memorizing, understanding, practical application)	Preparation and formulation of bacterial culture media	(Explanation, demonstration, lecture)	Exam
Eighth	5	(Memorizing, understanding, practical application)	Methods for detecting infection with Mycorrhizal fungi	(Explanation, demonstration, lecture)	Exam
Ninth	5	(Memorizing, understanding, practical application)	Techniques for purifying bacteria on different culture media	(Explanation, demonstration, lecture)	Exam
Tenth	5	(Memorizing, understanding, practical application)	Nitrogen-fixing organisms	(Explanation, demonstration, lecture)	Exam
Eleventh	5	(Memorizing, understanding, practical application)	Gram differential staining techniques, procedures for staining endospores	(Explanation, demonstration, lecture)	Exam
Twelfth	5	(Memorizing, understanding, practical application)	Second Monthly Exam	(Explanation, demonstration, lecture)	Exam
Thirteenth	5	(Memorizing, understanding, practical application)	Biological characteristics of microorganisms	(Explanation, demonstration, lecture)	Exam
Fourteenth	5	(Memorizing, understanding, practical application)	Methods of collecting soil samples for the purpose of conducting laboratory bacterial examination	(Explanation, demonstration, lecture)	Exam
Fifteenth	5	(Memorizing, understanding, practical application)	Comprehensive Exam	(Explanation, demonstration, lecture)	Exam

11. Course Evaluation

Theoretical Exams: 10
 Practical Exams:10
 Reports and Studies:10
 Term/Semester Exam:10
 Attendance:10
 Final Exam:50

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Principles of Microbiology
Main references (sources)	
Recommended books and references (scientific journals, reports...)	Iraqi Academic Scientific Journals
Electronic References, Websites	

Course Description Form

1. Course Name:					
Soil Management - Theoretical					
2. Course Code:					
SolSMA42					
3. Semester / Year:					
Second Semester / Fourth Stage / 2025-2026					
4. Description Preparation Date:					
2/11/2025					
5. Available Attendance Forms:					
presence					
6. Number of Credit Hours (Total) / Number of Units (Total):					
45 orking hours, 3 units					
7. Course Administrator's Name (Mention All, If More Than One Name):					
Name: Ali Hussein Abbas Email: alhussei@uowasit.edu.iq					
8. Course Objectives:					
Course Objectives	1. Identifying the basic properties of soil (physical and chemical). 2. Mastering practical soil sampling and analysis techniques. 3. Applying soil fertility improvement and management methods. 4. Diagnosing and addressing soil problems such as salinity and erosion. 5. Developing awareness of soil conservation and its sustainable use.				
9. Teaching and Learning Strategies:					
Strategy	1. Identifying the basic properties of soil (physical and chemical). 2. Mastering practical soil sampling and analysis techniques. 3. Applying soil fertility improvement and management methods. 4. Diagnosing and addressing soil problems such as salinity and erosion. 5. Developing awareness of soil conservation and its sustainable us				
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
First	3	Introducing the student to the required characteristics and methods of drawing an administrative map.	Administrative Map	Explanation, model presentation, and lecture	Daily exam
Second	3	How to classify land according to its productivity, characteristics, and levels.	Classification of Agricultural Land Suitability	Explanation, model presentation, and lecture	Dail yexam
Third	3	Defining land reclamation, sustainability, and management.	Management of Reclaimed Soils	Explanation, model presentation, and lecture	a report
Fourth	3	Defining crop rotation, its division methods, and how to use crops to conserve soil.	Implementation of Crop Rotation	Explanation, model presentation, and lecture	a report
Fifth	3	Understanding tillage methods and which plows are suitable based on soil characteristics.	Soil Preparation (Tillage)	Explanation, model presentation, and lecture	Daily exam
Sixth	3	Understanding irrigation, methods, and how to maintain soil moisture and appropriate water quantities.	Irrigation Scheduling	Explanation, model presentation, and lecture	a report
Seventh	3	Introducing the student to soil problems and how to solve and sustain them.	Soil Problems in Iraq	Explanation, model presentation, and lecture	a report
Eighth	3		Monthly Exam		exam

Ninth	3	Understanding soil classes, their locations, and productivity.	Classification of Iraqi Soils and Their Productive Capacity	Explanation, model presentation, and lecture	a report
Tenth	3	Understanding the problems in land, mapping, and management (social and economic problems) related to agriculture.	Key Characteristics and Management Challenges	Explanation, model presentation, and lecture	Daily exam
Eleventh	3	Methods of evaluating land, required characteristics, and levels.	Evaluation of Desert Soils	Explanation, model presentation, and lecture	a report
Twelfth	3	How to evaluate and differentiate between soil types and their levels.	Evaluation of Calcareous and Gypsum Soils	Explanation, model presentation, and lecture	Daily exam
Thirteenth	3	Understanding soil management (sandy and clay) and improving soil characteristics.	Management of Clay and Sandy Soils and Their Characteristics	Explanation, model presentation, and lecture	a report
Fourteenth	3	Understanding the tasks of soil surveying, how to name soils in Iraq, and the difference between local and international nomenclature.	Surveying Tasks and Altitude Designation	Explanation, model presentation, and lecture	Daily exam
Fifteenth	3		Monthly Exam		exam

11. Course Evaluation

1. Practical Tests: 5
2. Reports and Studies: 5
3. Midterm Exam: 10
4. Final Exam: 20

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)

Main references (sources)

Books related to the topic and scientific research

Recommended books and references (scientific journals, reports...)

Electronic References, Websites

Course Description Form

1. Course Name:					
Soil Management - Practical					
2. Course Code:					
SolSMa42					
3. Semester / Year:					
Second Semester / Fourth Stage / 2025-2026					
4. Description Preparation Date:					
2/11/2025					
5. Available Attendance Forms:					
weekly					
6. Number of Credit Hours (Total) / Number of Units (Total):					
2 theoretical, 3 practical (75) hours / 3.5 units					
7. Course Administrator's Name (Mention All, If More Than One Name):					
Name: Dr layth saleem salman Email: lsalman@uowasit.edu.iq					
8. Course Objectives:					
Course Objectives	1- Graduating students who possess knowledge of the relationship between soil classification and land classification. 2- Graduating students who possess knowledge of land types and their relationship to agricultural production 3- Graduating students who possess knowledge of the general conditions of plant production and their relationship to soil management and improving productivity to ensure the best productivity and protect the soil from deterioration. 4- Graduating students who possess knowledge of Iraqi soil problems and how to manage them. 5- Graduating students who possess knowledge in preparing the administrative program and the administrative map 6- Training students to prepare agricultural courses 7- How to employ soil specializations to serve the subject of soil management 3- Increasing the student's knowledge of how to evaluate land 8 - Increase the student's knowledge of different land uses 9- Detecting types of deterioration and methods for evaluating them 10- How to identify and reduce Iraqi soil problems and ways to manage them				
9. Teaching and Learning Strategies:					
Strategy	• Interactive lecture • Brainstorming • Dialogue and discussion • Field Training • Practical exercises • Field project • Self-education				
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
the first	5	the relationship between pedological sciences and soil management	Soil management and land uses	Explanation, display of pictures, lecture, and practical experiments	Various exams
the second	5	Methods of measuring areas and drawing scale	Soil management and land uses	Explanation, display of pictures, lecture, and practical experiments	Various exams

the third	5	Soil fertility tasks, productivity and management Legal description of the farm	Soil management and land uses	Explanation, display of pictures, lecture, and practical experiments	Various exams
the fourth	5	Managing soil physical properties Plant harvesting rules	Soil management and land uses	Explanation, display of pictures, lecture, and practical experiments	Various exams
Fifth	5	Managing soil chemical properties and land reclamation Land classification and administrative map	Soil management and land uses	Explanation, display of pictures, lecture, and practical experiments	Various exams
VI	5	Drawing a map of pedological problems Land uses	Soil management and land uses	Explanation, display of pictures, lecture, and practical experiments	Various exams
Seventh	5	Soil surveying tasks in its management How to benefit from survey reports	Soil management and land uses	Explanation, display of pictures, lecture, and practical experiments	Various exams
VIII	5	Administrative land classification Preparing an administrative map	Soil management and land uses	Explanation, display of pictures, lecture, and practical experiments	Various exams
Ninth	5	Soil classification tasks in its management	Soil management and land uses	Explanation, display of pictures, lecture, and practical experiments	Various exams
The tenth	5	Iraqi soils, their productive capacity, and the most important administrative characteristics	Soil management and land uses	Explanation, display of pictures, lecture, and practical experiments	Various exams
eleventh	5	Land evaluation according to the land suitability guide	Soil management and land uses	Explanation, display of pictures, lecture, and practical experiments	Various exams
twelfth	5	Objectives of the soil management program	Soil management and land uses	Explanation, display of pictures, lecture, and practical experiments	Various exams
Thirteenth	5	Iraqi soils, their productive capacity, the most important characteristics and administrative problems	Soil management and land uses	Explanation, display of pictures, lecture, and practical experiments	Various exams
fourteenth	5	Types of Iraqi soils and their problems Foundations of modern management using "precision agriculture" techniques:	Soil management and land uses	Explanation, display of pictures, lecture, and practical experiments	Various exams
Fifteenth	5	Smart management	Soil management and land uses	Explanation, display of pictures, lecture, and practical experiments	Various exams

11. Course Evaluation

NO	Evaluation methods	Evaluation date	Degree	The ratio
33.	Report1	fourth week	2.5	2.5
34.	Report 2	The fifth week	2.5	2.5
35.	Short test (1) Quiz	the sixth week	2	2
36.	Short test (2) Quiz	The fourteenth week	2	2
37.	Short test (3) Quiz	The fifteenth week	1	1
38.	Semester test (1)	the sixth week	7.5	7.5
39.	Semester test (2)	The eleventh week is difficult	7.5	7.5
40.	Final theoretical test	Final semester exams	40	40
41.	Practical field project	The fifteenth week	5	5
42.	Field evaluation	The third and fifth week	2	2
43.	Short practical test (1) Quiz	The first week	1	1
44.	Short practical test (2) Quiz	fourth week	0.5	0.5
45.	A short practical test (3) Quiz	The fourteenth week	1	1
46.	Live drawings and homework	Weeks 6, 8, 9, 10, 11, 12 and 13	5.5	5.5
47.	Final practical test	Final semester exam	20	20
48.	the total		100	%100

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Soil Management and Land Use 1990, written by Dr. Walid Khaled Al-Akidi
Main references (sources)	Soil management in planning and land uses 1999, written by Dr. Muhammad Khader Abbas
Recommended books and references (scientific journals, reports...)	Curriculum development is recommended
Electronic References, Websites	-

Course Description Form

1. Course Name:					
Modern Irrigation Systems Technologies - Theoretical					
2. Course Code:					
SolSIT42					
3. Semester / Year:					
First Semester / Fourth Stage / 2025-2026					
4. Description Preparation Date:					
2/11/2025					
5. Available Attendance Forms:					
Actual Presence					
6. Number of Credit Hours (Total) / Number of Units (Total):					
30 theoretical 45 practical 3 credits					
7. Course Administrator's Name (Mention All, If More Than One Name):					
afalobaidi@uowasit.edu.iq Name: Afrah Mahdi Saleh Email:					
Name: Dr. Zahra Khalid Kamel Email:					
8. Course Objectives:					
Course Objectives		1- Researches the concept of modern irrigation systems technologies. 2- Researches ancient and modern irrigation technologies and the difference between them. 3- The student evaluates the cost of maintaining irrigation and drainage projects. 4- The student's knowledge of the philosophy of modern irrigation technologies. 5- Study the components of modern irrigation systems and methods of maintaining them. 6- Introducing the student to the importance of rationalizing water consumption and water harvesting.			
9. Teaching and Learning Strategies:					
Strategy		1-Explanation and clarification 2- Lecture method 3- Student groups 4- Practical lessons 5- Scientific trips 6 - Self-learning method			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Credits	Learning Method	Evaluation on Method
First	4	Explanation, presentation of the model and lecture	Modern irrigation technology	Introduction, irrigation network, basics of irrigation system design	Exam
Second	4	Explanation, presentation of the model and lecture	Modern irrigation technology	Design factors, water consumption, irrigation interval, and irrigation depth	Exam
Third	4	Explanation, presentation of the model and lecture	Modern irrigation technology	Surface irrigation. Surface irrigation mechanism, water balance in irrigation	Exam
Fourth	4	Explanation, presentation of the model and lecture	Modern irrigation technology	Strip irrigation, design assumptions and determinants, rate and depth of flow.	Exam
Fifth	4	Explanation, presentation of the model and lecture	Modern irrigation technology	Line irrigation, considerations and assumptions	Exam
Sixth	4	Explanation, presentation of the model and lecture	Modern irrigation technology	Philosophy of modern irrigation technologies,	Exam

				water requirements under modern irrigation systems	
Seventh	4	Explanation, presentation of the model and lecture	Modern irrigation technology	Sprinkler irrigation, components of the sprinkler irrigation system, types of sprinkler irrigation systems	Exam
Eighth	4	Explanation, presentation of the model and lecture	Modern irrigation technology	Uniformity of spray water distribution, overlapping spray patterns, consistency coefficient of water distribution under sprinklers	Exam
Ninth	4	Explanation, presentation of the model and lecture	Modern irrigation technology	Hydraulics of flow in pipes, permissible change in pressure	Exam
Tenth	4	Explanation, presentation of the model and lecture	Modern irrigation technology	Drip irrigation, the main parts of the drip irrigation system, drippers	Exam
Eleventh	4	Explanation, presentation of the model and lecture	Modern irrigation technology	Hydraulic drippers, wet area	Exam
Twelfth	4	Explanation, presentation of the model and lecture	Modern irrigation technology	Design water requirement for drip irrigation,	Exam
Thirteenth	4	Explanation, presentation of the model and lecture	Modern irrigation technology	Advantages and disadvantages of sprinkler and drip irrigation. Maintaining the sprinkler and drip irrigation system	Exam
Fourteenth	4	Explanation, presentation of the model and lecture	Modern irrigation technology	Center pivot irrigation, its components, advantages and disadvantages, type and characteristics of the sprinkler package used to distribute water	Exam
Fifteenth	4	Explanation, presentation of the model and lecture	Modern irrigation technology	Rationalization of water consumption, water harvesting and its importance.	Exam
11. Course Evaluation					
				1-Theoretical tests	25
				2- Practical tests	15
				3- Reports and studies	10
				4- Final exam	50
12. Learning and Teaching Resources					
Required Textbooks (Prescribed, if any)			1-Modern irrigation technologies and other topics in the water -issue, written by Dr. Issam Khudair Al-Hadithi, Dr. Ahmed Madloul Al-Kubaisi, and Dr. Yas Khudair Al-Hadithi, 2010. Ministry of Higher Education and Scientific Research. Anbar University. 2- Field Irrigation Systems Engineering 1992, written by Dr. Ahmed Youssef Hajim and Haqqi Ismail Yassin. Ministry of Higher Education and Scientific Research, University of Mosul, College of Engineering.		
Core References			1-Field Irrigation Systems Engineering 1992, written by Dr. Ahmed Youssef Hajim and Haqqi Ismail Yassin. Ministry of Higher Education and Scientific Research, University of Mosul, College of Engineering. 2- Irrigation, its basics and applications, written by Dr. Nabil Ibrahim Al-Taif and Dr. Issam Khudair Al-Hadithi 1988, Ministry of Higher Education and Scientific Research, University of Baghdad.		
Recommended References & Readings (Scientific Journals, Reports, etc.)			Iraqi academic scientific journals		
Online References			Library Genesis Soil Science Society Of America		

Course Description Form

1. Course Name:					
Modern Irrigation Systems Technologies - Practical					
2. Course Code:					
SolSIT42					
3. Semester / Year:					
First Semester / Fourth Stage / 2025-2026					
4. Description Preparation Date:					
2/11/2025					
5. Available Attendance Forms:					
In person					
6. Number of Credit Hours (Total) / Number of Units (Total):					
Hours practical Number of Unit 345					
7. Course Administrator's Name (Mention All, If More Than One Name):					
yaradhi@uowasit.edu.iq Name: M.M yahya radhi karim Email:					
8. Course Objectives:					
Course Objectives			Introducing the student to the subject of Modern Irrigation Systems Technologies How to improve the efficiency of water resource use maintain sustainability		
9. Teaching and Learning Strategies:					
Strategy		1-Training students to operate modern irrigation systems. 2-Identifying and maintaining the components of an irrigation network. 3-Measuring discharge, pressure, and irrigation efficiency. 4 - Conducting field experiments in laboratories or educational fields			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Credits	Learning Method	Evaluation on Method
First	3	Memorization, understanding, practical, application	Importance of Irrigation and a Brief History of Water Resources in Iraq	Explanation, Model Presentation, and Lecture	Exam
Second	3	Memorization, understanding, practical, application	Water Conveying and Supply Systems to the Field - Transfer Station Transmission Station - Field Distribution Station	Explanation, Model Presentation, and Lecture	Exam
Third	3	Memorization, understanding, practical, application	Practical Applications of Strip Irrigation	Explanation, Model Presentation, and Lecture	Exam
Fourth	3	Memorization, understanding, practical, application	Furrow Irrigation: Characteristics of Water Drop in Furrow Irrigation	Explanation, Model Presentation, and Lecture	Exam
Fifth	3	Memorization, understanding, practical, application	Methods of Water Control Surface runoff in furrow irrigation	Explanation, Model Presentation, and Lecture	Exam

Sixth	3	Memorization, understanding, practical, application	Monthly Exam	Explanation, Model Presentation, and Lecture	Exam
Seventh	3	Memorization, understanding, practical, application	Practical applications of furrow irrigation	Explanation, Model Presentation, and Lecture	Exam
Eighth	3	Memorization, understanding, practical, application	Sprinkler irrigation: Accessories and supplementary equipment for sprinkler irrigation systems. Water distribution in sprinkler irrigation systems	Explanation, Model Presentation, and Lecture	Exam
Ninth	3	Memorization, understanding, practical, application	Hydraulic flow in pipes	Explanation, Model Presentation, and Lecture	Exam
Tenth	3	Memorization, understanding, practical, application	Drip irrigation	Explanation, Model Presentation, and Lecture	Exam
Eleventh	3	Memorization, understanding, practical, application	Design water requirements for drip irrigation	Explanation, Model Presentation, and Lecture	Exam
Twelfth	3	Memorization, understanding, practical, application	Calculations of leaching requirements for saline soils	Explanation, Model Presentation, and Lecture	Exam
Thirteenth	3	Memorization, understanding, practical, application	Second monthly exam	Explanation, Model Presentation, and Lecture	Exam
Fourteenth	3	Memorization, understanding, practical, application	Practical applications of drip irrigation	Explanation, Model Presentation, and Lecture	Exam
Fifteenth	3	Memorization, understanding, practical, application	Scientific Excursion	Explanation, Model Presentation, and Lecture	Exam

11. Course Evaluation

- 1- Practical Tests 10
- 2-Reports and Studies 5
- 3-Attendance 5
- 4-Final Exam 20

12. Learning and Teaching Resources

Required Textbooks (Prescribed, if any)	Modern Irrigation Systems Technologies
Core References	
Recommended References & Readings (Scientific Journals, Reports, etc.)	Iraqi academic scientific journals
Online References	

Course Description Form

1. Course Name:					
Fertilizer Technologies – Theoretical					
2. Course Code:					
SolFeT42					
3. Semester / Year:					
Second Semester / Fourth Stage / 2025-2026					
4. Description Preparation Date:					
2/11/2025					
5. Available Attendance Forms:					
Actual presence					
6. Number of Credit Hours (Total) / Number of Units (Total):					
2 theoretical 30 practical 45 =75 hrs units 3					
7. Course Administrator's Name (Mention All, If More Than One Name):					
Name: Prof. Dr. Mahdi Wasmey Scheib Email: malaiedy@wasit.edu.iq					
8. Course Objectives:					
Course Objectives	- The student gets to know the classification and types of fertilizers and their importance - For the student to learn about methods of adding fertilizers - The student should separate the positive and negative aspects of fertilizer and its harm to plants - For the student to recognize pollution from chemical fertilizers - The student should evaluate soil fertility				
9. Teaching and Learning Strategies:					
Strategy	1-Explanation and clarification 2- Lecture method 3- Student groups 4- Practical lessons 5- Scientific trips 6 - Self-learning method				
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
First	2	Fertilizers, their types and classification (fertilizers concepts).	Fertilizer technology	Explanation, presentation of the model and lecture	the exam
the second	2	Mineral fertilizers: Nitrogen fertilizers, their types and behavior in the soil and their manufacture	Fertilizer technology	Explanation, presentation of the model and lecture	the exam
the third	2	Phosphate fertilizers, their types, behavior in soil, and manufacturing	Fertilizer technology	Explanation, presentation of the model and lecture	the exam
the fourth	2	Potassium fertilizers, their types and their behavior in the soil and their manufacture/Sulphur, calcium and magnesium fertilizers Sulfat, calcium and magnesium fertilizers	Fertilizer technology	Explanation, presentation of the model and lecture	the exam

Fifth	2	Its types, behavior in soil and production	Fertilizer technology	Explanation, presentation of the model and lecture	the exam
Sixth	2	Micronutrient Fertilizers, their types, behavior in soil, and manufacturing	Fertilizer technology	Explanation, presentation of the model and lecture	the exam
Seventh	2	Organic fertilizers (types and methods of preparation) Organic fertilizers	Fertilizer technology	Explanation, presentation of the model and lecture	the exam
Eighth	2	Biofertilizers, their preparation and methods of adding them	Fertilizer technology	Explanation, presentation of the model and lecture	the exam
Ninth	2	Liquid fertilizers and methods of preparing them	Fertilizer technology	Explanation, presentation of the model and lecture	the exam
The tenth	2	Nano fertilizers (types and methods of preparation) Nano fertilizers	Fertilizer technology	Explanation, presentation of the model and lecture	the exam
Eleventh	2	Fertilizers Evaluation, Mixing and manufacturing	Fertilizer technology	Explanation, presentation of the model and lecture	the exam
Twelfth	2	Analytical Fertilizer analysis and evaluation/environmental problems associated with the use of fertilizers (pollution).	Fertilizer technology	Explanation, presentation of the model and lecture	the exam
Thirteenth	2	Economics of using fertilizers	Fertilizer technology	Explanation, presentation of the model and lecture	the exam
fourteenth	2	Techniques of using chemical fertilizers in Iraqi agriculture	Fertilizer technology	Explanation, presentation of the model and lecture	the exam
Fifteenth	2	Fertilizers - type of irrigation systems and types of fertilizers that can be added The movement of fertilizer and elements in the soil and their impact on plant growth	Fertilizer technology	Explanation, presentation of the model and lecture	the exam

11. Course Evaluation

1-Theoretical tests 25
2- Practical tests 15
3- Reports and studies 10
4- Final exam 50

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	11- Fertilizer Technologies. 2012. Dr. Nour El-Din Shawqi Ali.
Main references (sources)	1- Soil fertility. 2014. Dr.. Nour El-Din Shawky Ali Dr. hamd allah Suleiman 2- Soil Fertility 1988 Dr. Kazem Mashhout Awad
Recommended books and references (scientific journals, reports...)	Iraqi academic scientific journals
Electroni References, Websites	Soil Science Society Of America Library Genesis

Course Description Form

1. Course Name:					
Fertilizer Technologies – Practical					
2. Course Code:					
SolFeT42					
3. Semester / Year:					
Second Semester / Fourth Stage / 2025-2026					
4. Description Preparation Date:					
2/11/2025					
5. Available Attendance Forms:					
on campus classroom and laboratory Attendance					
6. Number of Credit Hours (Total) / Number of Units (Total):					
45 hr					
7. Course Administrator's Name (Mention All, If More Than One Name):					
Name: Asst. lect. ISAM HNI HAMEED Email: ishani.uowasit.edu.iq					
8. Course Objectives:					
Course Objectives		- Introducing students to the types of fertilizers, their properties, and the different methods of their application. - Training students to calculate the quantities of fertilizers required for fields, pots, and fertilizer mixtures. - Developing students' laboratory skills in estimating the available nutrients in soil and fertilizers. - Identifying organic, nitrogenous, phosphate, and potash fertilizers and their importance in plant nutrition. - Equipping students with the ability to evaluate fertilizer quality and efficiency.			
9. Teaching and Learning Strategies:					
Strategy		- Practical lectures - Laboratory learning - Scientific discussion - Cooperative learning - Continuous assessment			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Identifying laboratory safety rules	Laboratory work instructions	Lecture and practical demonstration	Test

2	3	Understanding fertilizer types and classification	General introduction to fertilizers, their classification, and application methods	Lecture and discussion	Oral test
3	3	Calculating fertilizer requirements for the field	Calculating fertilizer quantities required for the field	Practical experiment	Practical evaluation
4	3	Calculating fertilizer quantities for pots	Calculating fertilizer quantities for pots	Practical training	Practical assignment
5	3	Evaluating fertilizer quality	Fertilizer evaluation	Discussion	Practical report
6	3	Calculating fertilizer mixtures	Calculating fertilizer quantities in fertilizer mixtures	Practical application	Quiz
7	3	Mastering fertilizer mixing processes	Calculating fertilizer quantities in fertilizer mixtures	Solving mathematical problems	Assignment
8	3	Identifying organic fertilizers	Organic fertilizers	Practical lecture	Discussion
9	3	Calculating quantities of organic fertilizers	Calculating the required amounts of organic fertilizers	Practical application	Test
10	3	Estimating available nitrogen	Determination of available nitrogen	Laboratory experiment	Practical report
11	3	Identifying nitrogen fertilizers	Nitrogen fertilizers	Practical lecture	Oral test
12	3	Studying urea fertilizer and its properties	Urea fertilizer	Lecture and discussion	Assignment
13	3	Estimating available phosphorus	Determination of available phosphorus	Laboratory experiment	Practical report
14	3	Identifying phosphate fertilizers	Phosphate fertilizers	Lecture and practical explanation	Test
15	3	Identifying potassium fertilizers	Potassium fertilizers	Practical lecture	Test

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Fertilizer Technologies — authored by Nour Al-Din Shawqi (20
Main references (sources)	Soil Fertility — Dr. Kadhim Mashhout Awwad (1988) Soil Fertility — Dr. Nour Al-Din Shawqi and Dr. Hamdallah Suleiman (2015)
Recommended books and references (scientific journals, reports...)	Iraqi Academic Journals
Electronic References, Websites	