Ministry of Higher Education and Scientific Research
Scientific Supervision and Evaluation Authority
Department of Quality Assurance and Academic Accreditation
Accreditation Department

GuideAcademic Program and Course Description

2026

Introduction:

The educational program is a coordinated and organized package of courses that include procedures and experiences organized into study modules. The primary purpose of the program is to build and refine the skills of graduates, making them qualified to meet the requirements of the labor market. It is reviewed and evaluated annually through internal or external audit procedures and programs, such as the External Examiner Program.

The academic program description provides a brief summary of the program's main features and courses, indicating the skills students are expected to acquire based on the program's objectives. The importance of this description is evident in that it represents the cornerstone for obtaining program accreditation. It is written by faculty members under the supervision of the academic committees in the academic departments.

This guide, in its second edition, includes a description of the academic program after updating the vocabulary and paragraphs of the previous guide in light of the new developments and changes in the educational system in Iraq, which included a description of the academic program in its traditional form (annual, semester) in addition to adopting the description of the academic program circulated pursuant to the letter of the Department of Studies TM3/2906 dated 5/3/2023 with regard to programs that adopt the Bologna process as the basis for their work.

In this context, we cannot but emphasize the importance of writing descriptions of academic programs and courses to ensure the smooth running of the educational process.

Concepts and terms:

Academic Program Description:

The academic program description provides a concise summary of the program's vision, mission, and objectives, including a precise description of the targeted learning outcomes according to specific learning strategies.

Course Description:

Provides a concise summary of the course's key features and the learning outcomes expected of the student, demonstrating whether the student has made the most of the available learning opportunities. It is derived from the program description.

Program vision:

Excellence and advancement in academic education, leadership in community service, and quality in scientific research in the fields of combating desertification..

Program message:

Contributing to achieving sustainable development by preparing specialized agricultural engineers qualified to work in the fields of soil science, water resources, and combating desertification. They are committed to professional ethics, highly competent in terms of science and practical skills, and capable of meeting the needs of the local, regional, and global labor market and serving the community at a competitive level through the development of scientific research skills.

Program objectives:

1. Qualifying specialized scientific cadres and educators with scientific competencies in the field of combating desertification, capable of facing the challenges of the profession, competing with their peers in society, and meeting the needs of the labor market..
2. Developing a modern and stimulating educational environment equipped with the latest technologies and advanced equipment that enables students to compete, innovate, and excel, and creates within them a desire to pursue continuous learning, self-development and skills, and the ability to enhance performance, work within a team, and make decisions in the field of combating desertification.
3. Qualifying a cadre familiar with agricultural legislation, legal and social issues, and adherence to work ethics and quality management related to agricultural fields, especially those related to soil sciences and combating desertification.
4. Managing and utilizing various resources and addressing problems in agricultural facilities and projects efficiently and effectively in the field

of soil sciences and combating desertification within the framework of conserving natural resources, biodiversity, and sustainable development.

Curriculum structure:

All courses/subjects included in the academic program according to the approved learning system (semester, year, Bologna track), whether required by (ministry, university, college, or scientific department), along with the number of academic units.

Learning outcomes:

A consistent set of knowledge, skills, and values acquired by the student after successfully completing the academic program. The learning outcomes for each course must be defined in a manner that achieves the program's objectives.

Teaching and learning strategies:

They are the strategies used by faculty members to develop student teaching and learning. They are plans followed to achieve learning objectives. They describe all classroom and extracurricular activities to achieve the program's learning outcomes.

Academic Program Description Form

University name:theuniversityNorthern Technology
College/Institute:Formation name
Scientific Department:Name of the scientific department
Name of academic or professional program:Bachelor'sIn desertification control techniques
Final certificate name:Bachelor'sIn the Department of Desertification Control Techniques

Academic system:annualOr semester or courses or Bologna
Description preparation date:1/7/2025
Date of filling out the file: 1/7/2025

the signature :
nameScientific Assistant:
Dr. Hesham Hashem Mohammed
the date :

the signature :
nameHead of Department:
Dr. Ahmed Faris Salem
the date :

Check the file before
Quality Assurance and University Performance Division
Name of the Director of the Quality Assurance and University Performance Division:
the date
the signature

Dean's approval

1. Program vision

to divide Techniques Combating desertification It is considered Pioneer in development And application Solutions sustainable To combat desertification And restore degraded lands, Which Contributes in protection the environment And strengthening Security Food and development Sustainable.

2. Program message

The Department of Desertification Control Technologies seeks to provide innovative research and develop effective technologies to combat desertification, through: Collaboration with academic and governmental institutions and local communitiesAnd toRaising awareness about the importance of conservation Soil and natural resources, promoting environmental sustainability through education, training and applied projectsAnd the constant endeavor to develop the faculty members and employees in the department and provide advisory and educational services in the department's specialized fields..

3. Program objectives

The Department of Desertification Control Technologies aims to graduate a cadre capable of working in the basic axes of desertification control sciences and sustainable development and keeping pace with scientific and technical progress through the development of educational plans and quality curricula, which contributes to the formation of academic and research cadres in the field of desertification control capable of contributing to community service, as follows:

1- Building a solid foundation of knowledge in the field of combating desertification among students and providing distinguished, high-quality educational programs that contribute to providing students with the fundamentals of knowledge and developing their analytical thinking skills to prepare pioneers from among creative and talented young people.

2- Diagnosis Signs desertification And use Programs Computing to predict With it.

3- resistance erosion Wind And install dunes Sandy.

4- harvest water How to account what maybe safe From it UsingorPrograms Computing.

5- to set varieties resistance For drought For the environment desert.

6- rationing waters Irrigation And more efficiency Use it.
7- re Use water The return (waters The sewers and exchange Healthy(.
8- Use Programs prediction and maps satellite in administration water superficiality And the hollow.

4. Program accreditation

nothing(Applied for program accreditation)

5. Other external influences

1. Family problems facing students negatively impact students' performance in the academic program.
2. Extracurricular activities help students achieve greater success in implementing the academic program.
3. The economic situation of students and their involvement in financially supportive jobs negatively impacts their academic performance.
4. A student's academic proficiency from his/her preparatory studies is one of the most important indicators of excellence in academic program performance.

6. Program structure

Program structure	Number of courses	Study unit	percentage	comments *
Institutional requirements(the university)	10	18	16.8	Basic course
College requirements	25	75	70.1	Essential and non-essential
Department requirements	52		63.41	Essential and non-essential
Summer training				
Other				

*** Notes may include whether the course is core or optional**

7. Program description				
Year/Level	Course code	Course name	Credit hours	
			theoretical	practical
Level 1	NTU100	Democracy and human rights	2	0
	NTU101	English language	2	0
	TAMO100	General Chemistry	2	3
	DES100	general plant	2	3
	DES101	Soil basics	2	3
	DES102	forests	2	3
	NTU102	computer	1	2
	NTU103	Arabic	2	0
	TAMO101	Occupational safety	2	0
	DES103	Plant physiology	2	3
	DES104	soil chemistry	2	3
	DES105	Nurseries and propagation	2	3
Level 2	NTU200	Baath regime crimes in Iraq	2	0
	NTU201	English language (2)	2	0
	TAMO200	biochemistry	2	3
	DES200	organic farming	2	3
	DES101	Fertility and fertilization	2	3
	DES202	Geographic Information Systems (GIS)GIS)	2	2
	NTU202	Computer (2)	1	1
	NTU203	Arabic	2	0
	DES203	Soil Physics	2	3
	DES204	Water management	2	3
	DES205	Fruit production in desert areas	2	3
Level 3	TAMO300	Area and geometry	1	3
	DES300	tissue culture	2	3
	DES301	Vegetable production		

	DES302	Irrigation and drainage basics	2	3
	DES303	Gardening basics	2	3
	TAMO301	Statistics, design and analysis of agricultural experiments	1	3
	DES304	soil maintenance	2	3
	DES305	Water harvesting	2	3
	DES306	Conditioned agriculture	2	3
	DES307	The relationship between water, soil and water	2	3
Level 4	TAMO400	Scientific research methodology	2	0
	DES400	Crop growth modeling	2	3
	DES401	Field irrigation methods	2	2
	DES402	land reclamation	2	2
	DES403	Wind erosion prediction models	2	3
	TAMO401	Labor market skills		
	DES404	Fluid motion modeling	2	3
	DES405	dryland plants	2	0
	DES406	Conservation agriculture	1	2
	DES407	Graduation research project	0	3
All subjects are listed in detail and according to the academic level.				

8. Expected learning outcomes of the program
knowledge
1.The student should be able toDisseminating knowledge about the causes of desertification and its impacts on the environment and local communities. 2.The student must be able to conductScientific studies and research to understand the phenomena associated with desertification and identify the factors affecting it. 3.The student should be able to enhanceCooperation between academic and research institutions to exchange knowledge and expertise in the field of combating desertification. 4.The student should be able to putEffective strategies to combat desertification, including sustainable agricultural techniques and the rehabilitation of degraded lands. 5.The student should be able to organizeWorkshops and training courses to raise the capacity of individuals and communities to combat desertification. 6.The student should be able toStudy and evaluate the impact of policies and programmes in place to combat desertification and make the necessary recommendations.
Skills
1.The student should be able to practice various thinking skills in a systematic and positive manner in diagnosing problems and issues that he faces during work and proposing appropriate solutions for them.. 2.The student should be able to extract the factors that explain the phenomena related to production.CAgricultural. 3.The student should be able to design appropriate production plans and irrigation projects to achieve food and water security and serve the goals of sustainable development.. 4. The student should be able to understand the interplay between water scarcity, desertification and climate change. 5.The student should be able toUse of modern technologies such as geographic information systems (GIS) and remote sensing in land monitoring and desertification. 6.The student should be able toDeveloping skills to manage water and soil resources sustainably to reduce the risks of desertification. 7. The student should be able to suggest appropriate solutions to specialized problems in the fields of soil science and water resources.
values
1.The student will be able to suggest ways to preserve the environment and water resources in the local community.

2.The student should be able to contribute to enhancing understanding and awareness of the meaning of professionalism in work and bearing legal, ethical and social responsibility.
3.The student should be able to deal efficiently and effectively in the field of work to transfer knowledge and skills to farmers and the general public.
4. The student must be able to bear the responsibility of completing the work efficiently and adhere to professional ethics.
5. The student should be able to evaluate ethical issues using critical thinking skills.

9. Teaching and learning strategies

YDependsThe programIt uses a set of modern methods aimed at achieving a deep understanding of scientific concepts and developing students' practical skills. These strategies include:

1. traditional theoretical education
2. brainstorming
3. Dialogue and discussion
4. Practical and applied education
5. Cooperative learning.
6. Technology-based learning.

10. Evaluation methods

- Oral tests.
- ExamsDaily.
- Practical exams.
- ExamsQuarterly.
- Final exams.
- ProjectsThe process.

11. Faculty

Faculty members(All faculty members in the scientific department are mentioned, along with the external and internal lecturers)

theRankScientific	Specialization		Special requirements/skills (if any)		Faculty preparation	
	general	private			angel	lecturer
teacher	Horticulture and landscape design	Horticulture and landscape design			angel	
teacher	Horticulture and landscape design	Horticulture and landscape design			angel	
teacher	Horticulture and landscape design	Horticulture and landscape design			angel	
teacher					angel	
Assistant Professor	Forest Sciences	Forest Sciences			angel	
Assistant Professor	Soil and water resources	Soil and water resources			angel	
Assistant Professor	computer	computer			angel	
Assistant Professor	Plant production techniques	Plant production			angel	

Professional development
Orientation of new faculty members
• Developing skills to enhance self-confidence and positively guide people towards a culture of quality, requirements, and a sense of responsibility,

as well as a belief in the spirit of teamwork and its role in achievement, and developing a sense of professionalism and moral deterrent.
- Evaluating curricula and plans in coordination with academic departments to ensure they meet labor market requirements.
- Developing student guidance and counseling skills.
- Provide a structured orientation program that introduces new members to the academic and administrative systems of the institution.
- Introduce them to department or college policies, such as teaching, research, and assessment requirements.
- Assign a mentor from among the most experienced faculty members to provide guidance and support on a personal and professional level.

Professional development for faculty members

- Developing educational skills by diversifying teaching methods, engaging positively with and practicing feedback, using educational technologies, and focusing on developing students' intellectual and competitive skills.
- Developing skills to address problems and phenomena affecting the educational process in college.
- Professional development for new faculty members is essential to ensuring quality education and enhancing their teaching and academic research skills.

12. Acceptance criteria

- Students are admitted to the college's program centrally through the Central Admissions Department at the Ministry of Higher Education and Scientific Research, according to the application channels approved by the Ministry.
- Students are distributed to the department’s program according to their grade and desire.
- To be physically and mentally fit according to the medical examination report.
- The student's GPA is according to the minimum GPAs approved by the Ministry.

13. The most important sources of information about the program

- The primary sources of program information are the committee of experts from the departments corresponding to the Department of Soil

Sciences and Water Resources and the Department of Environment and Water Resources, which is accredited as a scientific body by the Deans' Committee of the College of Agricultural Technology.

- A study prepared by the Scientific Committee and the Department Council and approved by the College Council, which includes proposals for updating agricultural specializations and emulating the most important international scientific departments.
- Local and regional market needs.

14. Program Development Plan

A plan for program development was developed after studying the comments of the internal reviewers by the faculty, the quality assurance committees, the department's academic committee, the department's council, the program's external review, and the students' comments through analyzing the students' questionnaires for the courses, the comments of the academic advisors, the analysis of the data of the questionnaires of the college's questionnaire committee, and the evaluation reports of the exam questions for all the program's courses, which are as follows:

- Insufficient summer training.
- Lack of a clear mechanism to help struggling students and motivate high achievers.
- Students' lack of familiarity with university regulations governing the educational process.
- The success rates for some courses do not match the normal distribution chart.

Program Skills Map																
				Required learning outcomes of the program												
year/Level	Course code	Course name	Essential or optional?	knowledge				Skills				values				
				A1	A2	A3	A4	for 1	for 2	for 3	For 4	C1	C2	C3	C4	
Level 1	NTU 100	Human rights and democracy	assistant			√		√				√				
	NTU 101	English language (1)	assistant		√					√		√				
	NTU 102	Computer1)	assistant			√				√			√			
	NTU 103	Arabic language (1)	assistant	√					√					√		
	NTU	elective	assistant	√					√			√				
	TAMO101	mathematics	assistant			√		√					√			
	TAMO 102	engineering drawing	assistant	√				√				√				
	TAMO 103	flat area	assistant		√				√			√				
	TAMO 104	General Chemistry	essential	√				√						√		
	TAMO	elective	optional		√					√			√			

	DES 101	**Soil principles**	**essential**	√				√				√			
	DES 102	**Soil Physics**	**essential**											√	
	DES 103	**forests**	**essential**	√				√					√		
	DES	**elective**	**optional**			√				√		√			
	DES	**elective**	**optional**	√				√					√		
	DES	**elective**	**optional**	√				√					√		
Level 2	**NTU 200**	**English language (2)**	**assistant**	√				√				√			
	NTU 201	**Computer (2)**	**assistant**	√					√				√		
	NTU 202	**Arabic language (2)**	**assistant**	√				√				√			
	NTU 203	**Baath regime crimes in Iraq**	**assistant**	√				√				√			
	NTU 204	**Professional ethics**	**assistant**	√				√				√			
	TAMO 201	**Organic Chemistry**	**essential**	√				√					√		

	TAMO 202	**Agricultural statistics**	**essential**		√			√				√			
	TAMO	**elective**	**optional**	√						√			√		
	DES 201	**dry farming**	**essential**		√					√		√			
	DES 202	**remote sensing**	**essential**		√			√				√			
	DES 203	**Water management**	**essential**	√				√					√		
	DES 204	**Fertility and fertilization**	**essential**		√			√						√	
	DES 205	**Geomorphology**	**essential**		√					√			√		
	DES 206	**Fruit production in desert areas**	**essential**	√					√				√		
	DES 207	**Summer Training (1)**	**essential**			√				√			√		
	DES	**elective**	**optional**		√					√				√	
	DES	**elective**	**optional**	√				√				√			
	DES	**elective**	**optional**		√					√				√	

Level 3	**TAMO 301**	**Calculator applications (3)**	**assistant**	√					√			√			
	TAMO 302	**biochemistry**	**essential**		√					√			√		
	TAMO	**elective**	**essential**	√				√				√			
	DES 301	**Wind erosion and ways to combat it**	**essential**	√				√				√			
	DES 302	**Desert land cultivation**	**essential**			√			√				√		
	DES 303	**Water harvesting**	**essential**	√				√				√			
	DES 304	**soil maintenance**	**essential**			√			√				√		
	DES 305	**Irrigation and drainage basics**	**essential**	√				√				√			
	DES 306	**Groundwater management**	**essential**			√			√				√		
	DES 307	**Sustainable development in desert areas**	**essential**		√			√				√			

	DES 308	**Summer Training (2)**		√				√					√		
	DES	**elective**	**essential**		√			√						√	
	DES	**elective**	**essential**	√					√				√		
	DES	**elective**	**essential**		√			√							
Level 4	**NTU 400**	**Scientific research methodology**	**assistant**		√			√						√	
	TAMO 401	**Design and analysis of experiments**	**essential**	√					√				√		
	TAMO 402	**Calculator applications (4)**	**assistant**		√			√				√			
	TAMO	**elective**	**essential**	√						√				√	
	DES 401	**Crop growth modeling**	**essential**			√			√			√			
	DES 402	**Field irrigation methods**	**essential**	√				√					√		
	DES 403	**land reclamation**	**essential**		√			√							

	DES 404	**Wind erosion prediction models**	**essential**		√				√					√	
	DES 405	**Fluid motion modeling**	**essential**			√				√			√		
	DES 406	**dryland plants**	**essential**		√			√				√			
	DES 407	**And the project**	**essential**		√			√					√		
	DES 408	**seminars**	**essential**	√					√					√	
	DES	**elective**	**optional**	√					√				√		
	DES	**elective**	**optional**	√					√				√		
	DES	**elective**	**optional**	√					√				√		

Please tick the boxes corresponding to the individual learning outcomes of the programme being assessed.

Course Description Form

1. Course name:	
Democracy and human rights	
2. Course code:	
NTU100	
3. the chapterAcademic/ year	
4. Description preparation date	
5. Available attendance forms	
6. Number of credit hours (total) / Number of units (total)	
7. Course Supervisor Name (List all names, if there is more than one)	
the name:Dr. Ahmed Faris Salem e-mail: ahmedalsawaf@ntu.edu.iq	
8. Course objectives	
Goals	1. The student should be able to understand and comprehend what is related to human rights, their types and rights in the heavenly religions. 2. The student should be able to identifyTypesHuman rights according to the Iraqi Constitution of 19732005. 3. The student should be able to identify the types of governments. 4. The student should be able to identify democratic and dictatorial governments and the concept of freedom and human rights.
9. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Dialogue and discussion. 4. Assign tasks and report. 5. Assign teamwork to reveal leadership skills.

10.Course structure					
week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	2 theoretical	The student should understand: First: Knowledge and understanding. Second: Intellectual skills. Third: Practical skills. Fourth: Values and attitudes.	Human rights, their definition and objectives.	Discussion method, lecture method	Short exams, homework assignments, discussions
the second	2 theoretical	The student should be :able to Define .1 the roots of human .rights Review .2 the most important historical milestones that contributed to the development of the concept of human rights	The roots of human rights and their development in human history. Human rights in ancient times.	Discussion method, lecture method	Short exams, homework assignments, discussions

		throughout .the ages Explain .3 how the concepts of justice, freedom, and equality were expressed in ancient .civilizations Identify .4 ancient documents and .principles Students should understand the concept of human rights as it appeared in pre-Christian civilizations.			
the third	2 theor etical	Identify the most important ancient laws that dealt .with rights Explain how justice and rights were practiced in Mesopotami an .civilization	Human Rights in Civilizationsold,E specially the civilization of Mesopotamia	Discuss ion method, lecture method	Short exams, homework assignments, discussions

		Explain how divine laws dealt with the concept of rights and .justice Identify human rights in Islam .			
Fourth	2 theor etical	The student will learn about: 1. The nature of society in medieval Europe, the Islamic world, and elsewhere, and its impact on the concept of rights. 2. How human rights were affected by feudal systems. 3. Important documents that emerged at that time. 4. The status of the individual and their social class and its relationship	Human rights in lawsDivine,With a focus on human rights in Islam	Discuss ion method, lecture method	Short exams, homework assignments, discussions

		to their rights.			
Fifth	2 theor etical	Students will learn how the idea of human rights developed within political and intellectual theories and distinguish between the positions of political schools of thought on individual and collective rights. They will learn about the role of philosophers and thinkers in shaping the modern concept of human rights. They will compare different political doctrines in their view of human rights.	Human rights in the Middle Ages. Human rights in doctrines, schools, and political theories. Human rights in corporations, their declarations, revolutions, and constitutions.	Discuss ion method, lecture method	Short exams, homework assignments, discussions

Sixth	2 theor etical	• Identify the most important historical milestones in the international recognition of human rights after World War II. • Explain the role of international organization s (the United Nations, the Council of Europe, the African Union, and the League of Arab States) in formulating and protecting rights. • Clarifies the principles of major international conventions and treaties • Reviews international and regional mechanisms	Human Rights in Contemporary and Modern History: International Recognition of Human Rights	Discuss ion method, lecture method	Short exams, homework assignments, discussions

		for monitoring the implementation of human rights			
Seventh	2 theoretical	The student will learn about: The concept of international and regional recognition of human rights and the motives behind its emergence after wars and global conflicts. The most prominent international conventions and covenants	International and regional recognition of human rights	Discussion method, lecture method	Short exams, homework assignments, discussions
The eighth	2 theoretical	• Students will learn about the concept of non-governmental organizations and their role in civil society.	NGOs and human rights	Discussion method, lecture method	Short exams, homework assignments, discussions

		• Students will learn to distinguish between different types of non-governmental organizations (local, national, international) working in the field of human rights. • Become familiar with the most prominent international organizations defending human rights.			
Ninth	2 theoretical	Students will be able to understand what these organizations are and what their role is in society. They will also be able to distinguish between	National Human Rights Organizations	Discussion method, lecture method	Short exams, homework assignments, discussions

		national and internationa l organization s working in the same field. They will understand that these institutions monitor rights, investigate violations, and report on the human rights situation.			
tenth	2 theoret ical	Students will learn about the fundamental rights guaranteed by the Iraqi constitution. They will understand the difference between the rights enshrined in theory in the constitution and their application	Human Rights in Iraqi Constitutions: Between Reality and Theory	Discuss ion method, lecture method	Short exams, homework assignments, discussions

		in everyday life. They will learn about the practical challenges facing the protection of human rights in Iraq.			
eleventh	2 theoretical	Students will learn about the concept of human rights and public freedoms as set out in the Universal Declaration of Human Rights. They will understand how rights and freedoms complement each other to form a system for the protection of human beings and their dignity. They will learn about the most important	The relationship between human rights and public freedoms in the Universal Declaration of Human Rights	Discussion method, lecture method	Short exams, homework assignments, discussions

		public freedoms, such as freedom of expression, freedom of religion, and freedom of movement.			
twelfth	2 theoretical	Students will learn about the concept of human rights and public freedoms as set out in regional conventions such as the European Convention on Human Rights, the African Charter on Human Rights, and others. They will understand how national constitutions regulate public freedoms and guarantee	The relationship between human rights and public freedoms in regional charters and national constitutions	Discussion method, lecture method	Short exams, homework assignments, discussions

		them as fundamental human rights. Recognize the similarities and differences between regional charters and n ational constitution s in protecting rights and freedoms.			
thirtee nth	2 theor etical	Analyze the importance of human rights in ensuring human survival and dignity. Compare individual and collective rights in terms of application and challenges. Discuss how collective rights defend	Essential human rights and collective human rights	Discuss ion method, lecture method	Short exams, homework assignments, discussions

		identity, culture, and diversity.			
fourteenth	2 theoretical	Students will learn about economic, social, and cultural human rights, such as the right to work, education, health, and adequate housing. They will understand civil and political human rights, such as the right to freedom, expression, political participation, and justice. They will learn about the fundamental differences between economic, social, and cultural rights and	Economic, social and cultural human rights and civil and political human rights	Discussion method, lecture method	Short exams, homework assignments, discussions

		civil and political rights.			
fifteenth	2 theoretical	Students will learn Understand contemporary human rights and the importance of integrating them with sustainable development goals.	Modern Human Rights: Facts indevelopment,The right to a clean environment	Discussion method, lecture method	Short exams, homework assignments, discussions

11. Course Evaluation	
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))	
12.Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	- Relying on the approved curricula issued by the Ministry - Relying on lectures prepared by the subject teacher - Human Rights, Children and Democracy / Maher Saleh Alawi
Main References (Sources)	- Consensus Democracy by Shaker Al-Anbari - The Concept of Contemporary Democracy by Ali Khalifa Al Kuwari
Recommended books and references (scientific journals, reports...)	Democracy: Roots and the Problem of Implementation: Muhammad Al-Ahmari
Electronic references and websites	/https://democraticac.de

Course Description Form

13.Course name:	
English language (1)	
14. Course code:	
NTU101	
15. the chapterAcademic/ year	
16. Description preparation date	
17. Available attendance forms	
1. Weekly lesson schedule (theoretical)). 2. Discussions, scientific seminars, and other extracurricular activities	
18. Number of credit hours (total) / Number of units (total)	
19.Course Supervisor Name (List all names, if there is more than one)	
the name:Mr. Omar Ahhmed Fathi e-mail: omar.ah.f@ntu.edu.iq	
20. Course objectives	
Goals	1. The student should be able to identify all English language skills and knowledge. 2. The student should be able to encourage and develop scientific research in the fields of the English language in general. 3. The student should have the ability to cooperate with local and international organizations in the field of English language development.
21.Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Dialogue and discussion. 4. Assign tasks and report. 5. Assign teamwork to reveal leadership skills.
22.Course structure	

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	2 theoretical	Student can identify agricultural scientific terms in English across all specializations.	Scientific terms in agriculture	Discussion method, lecture method	Short exams, homework assignments, discussions
the second	2 theoretical	Student can identify scientific terms in plant production.	Scientific terms in plant production	Discussion method, lecture method	Short exams, homework assignments, discussions
the third	2 theoretical	Student can identify scientific terms in animal production.	Scientific terms in animal production	Discussion method, lecture method	Short exams, homework assignments, discussions
Fourth	2 theoretical	Student can identify scientific terms in plant protection.	Scientific terms in plant protection	Discussion method, lecture method	Short exams, homework assignments, discussions
Fifth	2 theoretical	Monthly exam	Monthly exam	Discussion method, lecture method	Short exams, homework assignments, discussions

Sixth	2 theoretical	Student can identify scientific terms in food sciences.	Scientific terms in food sciences	Discussion method, lecture method	Short exams, homework assignments, discussions
Seventh	2 theoretical	Monthly exam	Monthly exam	Discussion method, lecture method	Short exams, homework assignments, discussions
The eighth	2 theoretical	Student can identify scientific terms in agricultural economic and social sciences.	Scientific terms in agricultural economic and social sciences	Discussion method, lecture method	Short exams, homework assignments, discussions
Ninth	2 theoretical	Student can identify scientific terms in agricultural biotechnology.	Scientific terms in agricultural biotechnology	Discussion method, lecture method	Short exams, homework assignments, discussions
tenth	2 theoretical	Student can identify scientific terms in soil sciences.	Scientific terms in soil and water sciences	Discussion method, lecture method	Short exams, homework assignments, discussions
eleventh	2 theoretical	Monthly exam	Monthly exam	Discussion method, lecture method	Short exams, homework

					assignments, discussions
twelfth thirteenth	2 theoretical	Student can identify scientific terms in agricultural engineering.	Scientific terms in agricultural engineering	Discussion method, lecture method	Short exams, homework assignments, discussions
fourteenth fifteenth	2 theoretical	Review of all English lectures delivered during the academic year.	Review article	Discussion method, lecture method	Short exams, homework assignments, discussions

23. Course Evaluation	
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))	
24.Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	Rapid Rewiw
Main References (Sources)	English Grammar
Recommended books and references (scientific journals, reports...)	Eurasea Article
Electronic references and websites	Lib.gin

Course Description Form

25.Course name:
Computer Principles (1)
26. Course code:
NTU102
27. the chapterAcademic/ year
28. Description preparation date
29. Available attendance forms
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities
30. Number of credit hours (total) / Number of units (total)
31.Course Supervisor Name (List all names, if there is more than one)
the name: Mr. Manhal Mohammed Bashir e-mail: manhalbasher@ntu.edu.iq
32. Course objectives

Goals	• The student should be able toUnderstanding the Calculator – Calculator Generations – Hardware and Software Components • The student should be able to identifyWith the most important basic information about computers, computer generations, and operating systems. • The student should be able to identifyOperating systemMS-Dos, system concept, system flag, disks, directories and their levels, files, internal and external commands.

33.Teaching and learning strategies

Strategy	1. Interactive lectures. 2. Brainstorming. 3. Dialogue and discussion. 4. Assign tasks and report. 5. Assign teamwork to reveal leadership skills.

34.Course structure

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the firs	1 theoretical 1 practic	The importance of computers in our daily lives and economy Understanding information technology and learning about computer parts and components	Introduction to computers / computer systems / information technology / types of computers / input units / central processing unit / output units	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the second	1 theoretical 1 practical	Learning about computers and types of memory	Main memory and its types / Data storage in memory / Factors affecting computer performance	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the thir	1 theoretical 1 practic	Learn how data is represented, the units of measurement used, and learn about software and compilers, and types of	Definition of software and its types / Systems software: operating systems / Programming languages and programming systems /	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments,

		operating systems.	Application software.	practical: Assignment and report	discussions
Fourth	1 theoretical 1 practic	Students should be able to recognize the Windows system and learn about window movement and how to control it.	Introduction toWindows / Features / Turning on the device / Shutting down the device / Using the mouse / Components of the Windows screen: Taskbar: Icons: and their types (standard and general).	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Fifth	1 theoretical 1 practic	The student should be able to recognize how to use the control panel and how to make the necessary adjustments to it.	Control Panel / Desktop Control / Screen Saver / Window Colors and Fonts / Display Settings / Adjust Screen Colors / Modify Time and Date / Volume / Change Mouse Buttons / Control Double-Click Speed / Change Mouse Pointer / Control Mouse Speed / Install and Uninstall Programs	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

Sixth	1 theoretical 1 practic	The student should be able to know how to operate applications and programs.	Minimize and maximize the window / close it permanently / close it temporarily / move the window / control the window size / methods for running applications and programs	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Seventl	1 theoretical 1 practic	The student should be able to know how to organize the start menu and delete and add items from it.	Sort list itemsstart / delete start menu items / add submenu to start menus / add new button to start menu	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
The eighth	1 theoretical 1 practic	The student should be able to know basic information about the operating system and how to work on it.	Basic System Information / Turn off unwanted applications	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme	Short exams, homework assignments,

				nt and report	discussi ons
Ninth	1 theoreti cal 1 practic	The student should be able to recognize the primary and secondary icons in the operating system.	Windows ExplorerWindows Explorer / My Computer Icon / My Computer Window Parts	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme nt and report	Short exams, homew ork assignm ents, discussi ons
tenth	1 theoreti cal 1 practic	The student should be able to understand how to work with the recycle bin, how to retrieve files from it, and how to work with them.	Recycle Bin (delete, restore and empty the Recycle Bin) / Iconmy document	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme nt and report	Short exams, homew ork assignm ents, discussi ons
eleventh	1 theoreti cal 1 practic	The student should be able to identify files and folders and how to display the properties of a file or folder.	Defining Files and Folders / Identifying Files and Folders / Properties of Defining Files and Folders	theoretical :Auditory methods: writing on the board method, direct	Short exams, homew ork assignm

				dialogue method practical: Assignment and report	ents, discussions
twelfth	1 theoretical 1 practic	The student should be able to create and delete files, rename each file, or create a shortcut to an application or file.	Create files and folders / Rename files and folders / Move a file or folder / Copy a file or folder / Search for a file or folder / Create a shortcut icon for an application or file	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
thirteenth	1 theoretical 1 practic	The student should be able to use the calculator and the notes or drawing icon.	Calculator / Notebook / Notebook / Use the notebook to edit and create the file Painter / Screen Components	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
fourteenth	1 theoretical 1 practic	The student should be able to create drawings, save them, and use	Create drawings / Specify foreground and background colors / Choose brush stroke size /	theoretical :Auditory methods: writing on the board	Short exams, homew

		them as desktop wallpaper.	Select and select the drawing tool / Save the drawing / Make the drawing a desktop background / Finish the drawing Entertainment programs Media player	method, direct dialogue method practical: Assignment and report	ork assignments, discussions
fifteenth	1 theoretical 1 practic	The student should be able to recognize the types of viruses that infect computers, the symptoms of a virus infection, and how to protect against them.	Viruses / Reason for the name / Definition / Methods of virus spread / Symptoms of virus infection / Methods of protection / Types of viruses Computer crimes / Theft / Hackers	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

35. Course Evaluation

Grades are distributed out of 100 based on the tasks assigned to the student, such as daily preparation, daily oral tests, monthly or written tests, reports, etc.

36.Learning and Teaching Resources

Required textbooks (curriculum books, if available)	Remember all the textbooks if any.
Main References (Sources)	Mention references (sources) if any.
Recommended books and references (scientific journals, reports...)	Write the name of the recommended reference for each course.
Electronic references and websites	Remember the websites (such as the department's YouTube channel or any link that can be used according to the evaluator's specialization)

Course Description Form

37.Course name:
Arabic language
38. Course code:
NTU103
39. the chapterAcademic/ year
40. Description preparation date
41. Available attendance forms
1. Weekly lesson schedule (theoretical)). 2. Discussions, scientific seminars, and other extracurricular activities
42. Number of credit hours (total) / Number of units (total)
43.Course Supervisor Name (List all names, if there is more than one)
the name:M.M. Amna Maher Aziz e-mail: amina.mahir@ntu.edu.iq
44. Course objectives

Goals	1. The student must be able toCorrect reading. 2. The student will be able toCorrect writing and good use of punctuation. 3. The student must be able toThat the student acquires the ability to use the Arabic language correctly.. 4. The student should be able to separate elements from their groups or mixtures. 5. The student should be able to pronounceWith correct Arabic words, structures and styles in an interesting way 6. Accustoming the student to expressing his ideas clearly and correctly.
45.Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Dialogue and discussion. 4. Assign tasks and report. 5. Assign teamwork to reveal leadership skills.

46. Course structure					
week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	2 theoretical	1. Identify types of linguistic errors. 2. Differentiating between the open taa and the closed taa	Introduction to linguistic errors- The closed taa and the open taa	Discussion method, lecture method	Short exams, homework assignments, discussions
the second	2 theoretical	1. Differentiating between writing the extended alif and the short alif and the places where the two alifs are written 2. Differentiating between solar and lunar letters	Rules for writing the extended and shortened alif - solar and lunar letters	Discussion method, lecture method	Short exams, homework assignments, discussions
the third	2 theoretical	Differentiate betweenDad and Tha	Dad and Tha	Discussion method, lecture method	Short exams, homework assignments,

					discussi ons
Fourth	2 theoreti cal	Enabling the student toWriting the hamzaCorrect writing	Writing the hamza	Discussion method, lecture method	Short exams, homew ork assignm ents, discussi ons
Fifth	2 theoreti cal	Get to knowSignsPunc tuationAnd write it in the correct place	punctuation marks	Discussion method, lecture method	Short exams, homew ork assignm ents, discussi ons
Sixth	2 theoreti cal	1. Identify the noun and the verb and state the sign of each. 2. Differentiating between nouns and verbs	Noun, verb, and the difference between them	Discussion method, lecture method	Short exams, homew ork assignm ents,

		3. Explaining the types of verbs 4. Differentiating between types of verbs			discussions
Seventh	2 theoretical	Recognizing the types of objects and differentiating between them	Effects	Discussion method, lecture method	Short exams, homework assignments, discussions
The eighth	2 theoretical	Enabling the student to write numbers correctly	number	Discussion method, lecture method	Short exams, homework assignments, discussions
Ninth	2 theoretical	Get to know Common language errorsAnd avoid it	Common language errors applications	Discussion method, lecture method	Short exams, homework

					assignments, discussions
tenth	2 theoretical	Get to know Common language errorsAnd avoid it	Common language errors applications	Discussion method, lecture method	Short exams, homework assignments, discussions
eleventh	2 theoretical	1. Differentiating between the letter noon and the letter tanween 2. Recognizing the meanings of prepositions	Noon and Tanween - Meanings of Prepositions	Discussion method, lecture method	Short exams, homework assignments, discussions
twelfth	2 theoretical	Get to know Formal aspects of administrative discourse	Formal aspects of administrative discourse	Discussion method, lecture method	Short exams, homework

					assignments, discussions
thirteenth	2 theoretical	Getting to know the language of administrative discourse	Language of administrative discourse	Discussion method, lecture method	Short exams, homework assignments, discussions
fourteenth	2 theoretical	Getting to know the language of administrative discourse	Language of administrative discourse	Discussion method, lecture method	Short exams, homework assignments, discussions
fifteenth	2 theoretical	Get to knowModelsFrom administrative correspondence	Models From administrative correspondence	Discussion method, lecture method	Short exams, homework

					assignments, discussions

47. Course Evaluation	
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))	
48.Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	Required books: General Arabic Language Book for Technical Universities(Dr. Safaa Kazim MakkiandDr. Lama Mohammed Younis
Main References (Sources)	1- Clear Dictation: Abdul Majeed Al-Naimi, Daham Al-Kayyal, Dar Al-Mutanabbi Library, Baghdad, 6th edition, 1987 AD. 2- Lessons in language, grammar and spelling for state employees: Ismail Hamoud Atwan and others, Ministry of Education Press No. (3), Baghdad, 2nd ed., 1984 AD. 3- Arabic Language for the Third Intermediate Grade: Fatima Nazim Al-Attabi, and others, 1st ed., 2018 AD. 4- General Arabic for Non-Specialization Departments: Abdul Qader Hassan Amin and others, Ministry of Higher Education and Scientific Research, 2nd ed., 2000. Inspired by Arabic Literature: Hafal Muhammad Amin, Saadoun Press, Baghdad.
Recommended books and references (scientific journals, reports...)	Lessons in language, grammar and spelling for state employees, Ismail Hamoud Atwan and others, Ministry of Education Press No. (3), Baghdad, 2nd ed., 1984 AD.
Electronic references and websites	

Course Description Form

49.Course name:	
Mathematics	
50. Course code:	
TAMO101	
51. the chapterAcademic/ year	
52. Description preparation date	
53. Available attendance forms	
54. Number of credit hours (total) / Number of units (total)	
55.Course Supervisor Name (List all names, if there is more than one)	
the name: e-mail:	
56. Course objectives	
Goals	1. The student should be able to identifyWith the most important basic information about mathematics 2. The student must be able toTo solve mathematical problems 3. The student must be able toOn solving trigonometric functions. 4. The student should have a complete knowledge of differential and integral calculus. 5. The student should be able toSolving logarithmic functions
57.Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Dialogue and discussion. 4. Assign tasks and report. 5. Assign teamwork to reveal leadership skills.
58.Course structure	

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	1 theoretical	The student should be able to define area, know its types and names, and how to use measuring tools.	theoretical: Logarithms - natural logarithm	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
the second	1 theoretical	The student should be able to measure distances and their conditions and how to erect and dismantle poles.	theoretical: Exponential function - Trigonometric function - Trigonometric facts - Compound angles	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
the third	1 theoretical	The student should be able to identify types of measurement errors, ways to overcome them, and correct measurements in distances.	theoretical: Differential Calculus - Derivative Laws - Higher Order Derivatives	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments,

					discussi ons
Fourth	1 theoreti cal	The student should be able to understand the types of obstacles they face in measuring distances.	theoretical: Equation of a straight line (tangent and normal)	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homew ork assignm ents, discussi ons
Fifth	1 theoreti cal	The student should be able to draw maps, identify each type of map, and know how to zoom in and out on maps.	theoretical: Derivative of trigonometric functions	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homew ork assignm ents, discussi ons
Sixth	1 theoreti cal	The student should be able to identify flat maps, their tools, advantages, disadvantages, and conditions of use.	theoretical: Derivative of exponential functions - Derivative of logarithmic functions	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homew ork assignm ents,

					discussi ons
Sevent h	1 theoreti cal	The student should be able to measure the area of a flat map using various methods.	Midterm exam	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homew ork assignm ents, discussi ons
The eighth	1 theoreti cal	Students should be able to measure areas using the surface area method and the rotation method.	theoretical: Applications of the derivative (velocity and acceleration)	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homew ork assignm ents, discussi ons
Ninth	1 theoreti cal	The student should be able to divide the land into triangles and measure the area using the field method.	theoretical: Applications of the derivative (inflection points)	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homew ork assignm ents,

					discussi ons
tenth	1 theoreti cal	The student should be able to place columns on the map using the Smaison rule.	theoretical: Integral Calculations - Integration Laws - Definite Integration Integration - Laws of Integration - Definite Integration	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homew ork assignm ents, discussi ons
eleven th	1 theoreti cal	The student should be able to use squares on the map to divide it into triangles and measure them.	theoretical: Integration methods - integration by substitution - integration by parts	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homew ork assignm ents, discussi ons
twelfth	1 theoreti cal	The student should be able to use drafting scales	theoretical: Integration methods - integration by partial fractions	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homew ork assignm ents,

					discussi ons
thirtee nth	1 theoreti cal	The student should be able to identify types of compasses and determine directions and angles of all kinds.	theoretical: Finding the area under the curve - the approximate method - using integration calculations	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homew ork assignm ents, discussi ons
fourtee nth	1 theoreti cal	The student should be able to use a compass to read angles between sides.	theoretical: Finding the area between two curves	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homew ork assignm ents, discussi ons
fifteen th	1 theoreti cal	The student should be able to use a compass to determine interior angles and directions of polygons.	theoretical: Volume of a Rotating Body and Numerical Integration Numerical integration	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homew ork assignm ents,

					discussi ons
59. Course Evaluation					
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))					
60.Learning and Teaching Resources					
Required textbooks (curriculum books, if available)					
Main References (Sources)	Mathematics for Machine Learning author MP Deisenroth, A. A. Faisal and C. S. Ong				
Recommended books and references (scientific journals, reports...)	Mathematical Handbook of Formulas and Table 1300 Math Formulas				
Electronic references and websites	https://mathblog.com/mathematics-books				

Course Description Form

61.Course name:	
Engineering drawing	
62. Course code:	
TAMO102	
63. the chapterAcademic/ year	
64. Description preparation date	
65. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
66. Number of credit hours (total) / Number of units (total)	
67.Course Supervisor Name (List all names, if there is more than one)	
the name:M.M. Omar Ahmed Fathy e-mail: omar.ah.f@ntu.edu.iq	
68. Course objectives	
Goals	1. The student should be able to understand all the geometric properties or shapes in a clear way. 2. The student should be able to use the tools required in engineering drawing correctly. 3. The student should be able to apply the basics of engineering operations. 4. The student should be able to deduce the projections and isometric views of each geometric shape and identify its dimensions.
69.Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Dialogue and discussion. 4. Field training. 5. Practical exercises. 6. Field project. 7. Self-learning.

70.Course structure					
week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	3hours	The student will be able to understand the concepts and fundamentals of surveying.	practical:A general idea about the subject of engineering drawing - its importance - learning how to use engineering drawing tools - drawing the frame of the painting and the title	practical: Assignment and report	Short exams, homework assignments, discussions
the second	3hours	The student will learn how to use measuring tapes, chains, stakes, pegs, strings, and plumb bobs, as well as how to use and maintain these tools.	practical: Types of fonts - Arabic geometric letters - illustrative examples	practical: Assignment and report	Short exams, homework assignments, discussions
the third	3hours	The student will learn the standard units used in surveying and the types of measurement systems and	practical: Constructing a perpendicular to a straight line from a point on it and outside it - bisecting a straight line - bisecting a given angle -	practical: Assignment and report	Short exams, homework assignments,

		their conversions.	drawing a straight line parallel to another - dividing a straight line		discussi ons
Fourth	3hours	Students will learn the standard units used in surveying and the types of measurement systems and their conversions.	practical: Draw a circle passing through the vertices of the exterior and interior angles of a triangle - find the center of the circle or arc. Draw a tangent to a circle from a given point on its circumference and outside..	practical: Assignme nt and report	Short exams, homew ork assignm ents, discussi ons
Fifth	3hours	Students will learn how to use a scale and its types and how to extract actual dimensions from maps using a scale.	practical: Draw an arc with a known radius that touches two circles from the outside and inside and from the outside and inside	practical: Assignme nt and report	Short exams, homew ork assignm ents, discussi ons
Sixth	3hours	Students will learn -Correction for differences in tape length -Correcting for differences in elevation	practical: Camera Section Drawing - Perspective Drawing of a Circle at 30 or 40 Degrees	practical: Assignme nt and report	Short exams, homew ork assignm ents,

		between two points Correcting errors in orientation			discussi ons
Sevent h	3hours	Students will learn to extract dimensions, areas, and all field work	practical:The Three Projects (Practical Exercises)	practical: Assignme nt and report	Short exams, homew ork assignm ents, discussi ons
The eighth	3hours	Students will learn about the types and parts of a compass, methods of observation with a compass, as well as correcting compass observations and drawing polygons.	practical:Find the third location from other locations		Short exams, homew ork assignm ents, discussi ons
Ninth	3hours	Students will learn how to interpret and read maps Students will learn about the parts of a theodolite,	practical:Drawing models of the three projections	practical: Assignme nt and report	Short exams, homew ork assignm

		its uses, and how to use it in practice.			ents, discussi ons
tenth	3hours	Knowledge and application practical	practical:Drawing models of the three projections	practical: Assignme nt and report	Short exams, homework assignment, discussions
elevent h	3hours	Students will learn what AutoCAD is and its uses.	practical:Practical exercises for drawing shapes	practical: Assignme nt and report	Short exams, homew ork assignm ents, discussi ons
twelfth	3hours	Students will learn how to use drawing commands (lines, circles, rectangles, arcs, polygons, segments, etc.). They will also learn how to use modification commands to copy, move, rotate, and expand drawings	practical:Drawing sectors and practical exercises on them	practical: Assignme nt and report	Short exams, homew ork assignm ents, discussi ons

		and many other uses.			
thirteenth	3hours	Students will learn how to draw squares and rectangles and how to draw triangles of various types with specific shapes.	practical:Drawing of all types of sewers and irrigation canals	practical: Assignment and report	Short exams, homework assignments, discussions
fourteenth	3hours	Students will be able to create blueprints for farms, fields, and poultry houses.	practical:Drawing sections of dams and reservoirs	practical: Assignment and report	Short exams, homework assignments, discussions
fifteenth	3hours	Knowledge and application practical	practical:How to draw ink drawings and how to use ink pens	practical: Assignment and report	Short exams, homework assignments,

					discussi ons

71. Course Evaluation
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))

72.Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	AutoCAD 2014
Main References (Sources)	Mention references (sources) if any.
Recommended books and references (scientific journals, reports...)	Textbook of Engineering Drawing k. Venkata Reddy, 2008
Electronic references and websites	English: https://www.google.iq/books/edition/%D8%A7%D9%84%D8%B1%D8%B3%D9%85_%D8%A7%D9%84%D9%87%D9%86%D8%AF%D8%B3%D9%8A_%D8%A8%D8%A7%D8%B3%D8%AA%D8%AE%D8%AF%D8%A7/llnIDwAAQBAJ?hl=ar&gbpv=1&dq=%D8%A8%D8%B1%D9%86%D8%A7%D9%85%D8%AC%20%D8%A7%D9%88%D8%AA%D9%88%D9%83%D8%A7%D8%AF&pg=PA17&printsec=frontcover

Course Description Form

73.Course name:	
Flat area	
74. Course code:	
TAMO103	
75. the chapterAcademic/ year	
76. Description preparation date	
77. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
78. Number of credit hours (total) / Number of units (total)	
79.Course Supervisor Name (List all names, if there is more than one)	
the name:Dr. Ahmed Faris Salem e-mail: ahmedalsawaf@ntu.edu.iq	
80. Course objectives	
Goals	1. The student should be able toLearn about space, its divisions, types and uses. 2. The student should be able toLearn how to take measurements, set up columns, and project them. 3. The student should have knowledge of errors, their types, and ways to overcome them. 4. The student should be able toLearn about mapping and drawing scales 5. The student should be able toIdentify obstacles and impediments in measuring distances and recording them in the field notebook.
81.Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Dialogue and discussion. 4. Field training. 5. Practical exercises.

	6. Field project. Self-learning.

82.Course structure

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	1 theoretical 3 practical	The student should be able to define area, know its types and names, and how to use measuring tools.	theoretical:Definition of area - its divisions - its types - its uses - field notebook practical: Field exercise using the field notebook on campus	theoretical: Auditory methods: writing on the board method, direct dialogue method practical:Assignment and report	Short exams, homework assignments, discussions
the second	1 theoretical 3 practical	The student should be able to measure distances and their conditions and how to erect and dismantle poles.	theoretical: Measuring distances - its cases - erecting and lowering columns practical: Field exercises in measuring distances with different tools and using a field notebook	theoretical: Auditory methods: writing on the board method, direct dialogue method practical:Assignment and report	Short exams, homework assignments, discussions
the third	1 theoretical 3 practical	The student should be able to identify types of measurement errors, ways to overcome them, and correct	theoretical: Types of errors and ways to overcome them in measuring distances	theoretical: Auditory methods: writing on the board method, direct	Short exams, homework assignm

		measurements in distances.	practical: Correcting errors in measuring distances from the previous week	dialogue method practical:Assignment and report	ents, discussions
Fourth	1 theoretical 3 practical	The student should be able to understand the types of obstacles they face in measuring distances.	theoretical: Obstacles and obstacles in measuring distances practical: Draw a polygon around a building to overcome the drawn obstacles.	theoretical: Auditory methods: writing on the board method, direct dialogue method practical:Assignment and report	Short exams, homework assignments, discussions
Fifth	1 theoretical 3practical	The student should be able to draw maps, identify each type of map, and know how to zoom in and out on maps.	theoretical: Mapping - Types of maps - Map scales - Methods of reducing and enlarging maps practical: From the above information, draw a map of a specific location in the institute, while training the students on some symbols and terms in mapping.	theoretical: Auditory methods: writing on the board method, direct dialogue method practical:Assignment and report	Short exams, homework assignments, discussions
Sixth	1 theoretical 3	The student should be able to identify flat maps, their tools,	theoretical:Flat panel scanning - tools - advantages - disadvantages - conditions of use	theoretical: Auditory methods: writing on the board	Short exams, homewo

	practical	advantages, disadvantages, and conditions of use.	practical: Learn about the flat plate, its tools, and lifting beams using the beam + front cross method.	method, direct dialogue method practical:Assignment and report	rk assignments, discussions
Seventh	1 theoretical 3 practical	The student should be able to measure the area of a flat map using various methods.	theoretical: Methods of using the flat plate - the beam method - the front cross method practical: Reverse rotation and intersection method	theoretical: Auditory methods: writing on the board method, direct dialogue method practical:Assignment and report	Short exams, homework assignments, discussions
The eighth	1theoretical 3 practical	Students should be able to measure areas using the surface area method and the rotation method.	theoretical: Flat plate methods - Rotation method - Reverse intersection method practical: Exercises in measuring areas by dividing them into triangles	theoretical: Auditory methods: writing on the board method, direct dialogue method practical:Assignment and report	Short exams, homework assignments, discussions
Ninth	1theoretical 3 practical	The student should be able to divide the land into triangles and measure the	theoretical: Measuring areas using the field method - dividing the plot of land into triangles - erecting	theoretical: Auditory methods: writing on the board method, direct	Short exams, homework

		area using the field method.	columns at equal intervals practical: Exercises in measuring areas by erecting columns at equal distances + two centimeters	dialogue method practical:Assignment and report	assignments, discussions
tenth	1theoretical 3 practical	The student should be able to place columns on the map using the Smaison rule.	theoretical: Smyson's rule - placing columns at unequal intervals practical:Exercises on measuring areas by erecting columns at unequal intervals	theoretical: Auditory methods: writing on the board method, direct dialogue method practical:Assignment and report	Short exams, homework assignments, discussions
eleventh	1theoretical 3 practical	The student should be able to use squares on the map to divide it into triangles and measure them.	theoretical:Measurements on a map - Dividing the land into triangles - Using squares practical: Map exercises to measure areas by dividing them into triangles + squares	theoretical: Auditory methods: writing on the board method, direct dialogue method practical:Assignment and report	Short exams, homework assignments, discussions
twelfth	1theoretical 3 practical	The student should be able to use drafting scales	theoretical: Using the planning scale practical: Use a surveying device to	theoretical: Auditory methods: writing on the board method,	Short exams, homewo

			measure areas on maps.	direct dialogue method practical:Assignment and report	rk assignments, discussions
thirteenth	1theoretical 3 practical	The student should be able to identify types of compasses and determine directions and angles of all kinds.	theoretical: Prismatic Compass - Magnetic and True North - Angles of All Kinds practical: Getting to know the prismatic compass - its parts - its uses - taking readings from it	theoretical: Auditory methods: writing on the board method, direct dialogue method practical:Assignment and report	Short exams, homework assignments, discussions
fourteenth	1theoretical 3 practical	The student should be able to use a compass to read angles between sides.	theoretical: Reading angles between sides using a compass practical: Draw a polygon around a building and mark its corners.	theoretical: Auditory methods: writing on the board method, direct dialogue method practical:Assignment and report	Short exams, homework assignments, discussions
fifteenth	1theoretical 3 practical	The student should be able to use a compass to determine interior angles	theoretical:Calculating interior angles and directions of polygons using a compass	theoretical: Auditory methods: writing on the board method, direct	Short exams, homework

		and directions of polygons.	practical:Perform calculations from the previous week and draw a map of the building.	dialogue method practical:Assignment and report	assignments, discussions

83. Course Evaluation	
Grades are distributed out of 100 based on the tasks assigned to the student, such as daily preparation, daily oral tests, monthly or written tests, reports, etc.	
84.Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	Remember all the textbooks if any.
Main References (Sources)	Mention references (sources) if any.
Recommended books and references (scientific journals, reports...)	Scientific journals, reports and research related to f area.
Electronic references and websites	All sites related to space and topography

Course Description Form

85.Course name:	
General Chemistry	
86. Course code:	
TAMO 104	
87. the chapterAcademic/ year	
Decisions	
88. Description preparation date	
89. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
90. Number of credit hours (total) / Number of units (total)	
91.Course Supervisor Name (List all names, if there is more than one)	
the name:M.M. Omar Ahmed Fathy e-mail: omar.ah.f@ntu.edu.iq	
92. Course objectives	
Goals	1. The student should be able toLearn basic concepts such as atomic structure, electronic structure, ions, and intermolecular forces.. 2. The student should be able to knowproceduresSafety and prevention in laboratories. 3. The student should be able to identify elements and their groups. 4. The student should be able to separate elements from their groups or mixtures. 5. The student should be able to do theAccurate analysisTo learn how to collect and extract a sample, analyze statistics, and use advanced technological measurements.
93.Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming.

	3. Laboratory practical training. 4. Dialogue and discussion. 5. Assign tasks and report. 6. Assign teamwork to reveal leadership skills.

94.Course structure

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	1 theoretical 3 practical	theoretical:The student learns about the concept of chemistry, its types and importance. practical:He is familiar with the method of separating the elements of the first group.	theoretical:Periodic table of elements practical:introduction and instructionsGeneral information about the theoretical basis for the precipitation of elements	theoretical: Auditory methods: writing on the board method, direct dialogue method practical:Assignment and report	Short exams, homework assignments, discussions
the second	1 theoretical 3 practical	theoretical:The student learns about the atomic structure of the elements. practical:He is familiar with the method of separating the elements of the first group.	theoretical:Atomic structure practical:Elements sectionRFirst group	theoretical: Auditory methods: writing on the board method, direct dialogue method practical:Assignment and report	Short exams, homework assignments, discussions
the third	1 theoretical	theoretical:The student learns	theoretical:Electronic distribution of	theoretical: Auditory methods: writing on	Short exams,

	3 practical	how electrons are distributed. practical:Try the application for the first group of unknown	atoms in the periodic table practical:Know how to separate the elements of the first group/unknown	the board method, direct dialogue method practical:As signment and report	homewo rk assignm ents, discussi ons
Fourth	1 theoreti cal 3 practic	theoretical:The student learns about the equivalence theory and its foundations. practical:The student masters the separation of the elements of the second group.A	theoretical:valence electron theory practical:Knows how to separate the elements of the second groupA	theoretical: Auditory methods: writing on the board method, direct dialogue method practical:As signment and report	Short exams, homewo rk assignm ents, discussi ons
Fifth	1 theoreti cal 3 practical	theoretical:The student learns about the theory of connections, their types and importance. practical:The student performs a practical application.To the anonymous groupSecondA	theoretical:LinksCh emical practical:Knows how to separate the elements of the second groupATo unknown	theoretical: Auditory methods: writing on the board method, direct dialogue method practical:As signment and report	Short exams, homewo rk assignm ents, discussi ons
Sixth	1 theoreti cal	theoretical: The student will be able to identify the	theoretical: Acids, bases and salts	theoretical: Auditory methods: writing on	Short exams,

	3 practical	types of chemical solutions. practical: The student masters separating the elements of the third group.NYesB	practical: Separate the elements of the groupB	the board method, direct dialogue method practical:Assignment and report	homework assignments, discussions
Seventh	1 theoretical 3 practical	theoretical: The student learns about oxidation-reduction reactions and how they occur. practical: The student carries out a practical application of the second group's unknown.B	theoretical: Reduction and oxidation reactions practical: Separate the elements of the groupB for unknown	theoretical: Auditory methods: writing on the board method, direct dialogue method practical:Assignment and report	Short exams, homework assignments, discussions
The eighth	1 theoretical 3 practical	theoretical:The student learns the methods of titrating chemical solutions. practical: The student masters the separation of the elements of the third group.	theoretical: Balance in acidic and basic media practical: Separation of the elements of the third group	theoretical: Auditory methods: writing on the board method, direct dialogue method practical:	Short exams, homework assignments, discussions

				Assignment and report	
Ninth	1 theoretical 3 practical	theoretical:The student learns about electric potential and how it occurs. practical: The student carries out a practical application of the unknown of the third group.	theoretical: Standard electrical potential practical: Separate the elements of the third group/unknown	theoretical: Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
tenth	1 theoretical 3 practical	theoretical: The student will be able to identify the concept and importance of nuclear chemistry. practical:The student masters the separation of the elements of the fourth group.	theoretical: nuclear chemistry practical: Separation of the elements of the fourth group	theoretical: Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
eleventh	1 theoretical 3 practical	theoretical: The student learns what is meant by non-metallic elements and how to benefit from them.	theoretical: Predominant non-metallic elements practical: Group 4 elements/unknown	theoretical: Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions

		practical: The student carries out a practical application of the unknown of the fourth group.		practical:As signment and report	
twelfth	1 theoreti cal 3 practical	theoretical: The student will be able to identify the noble gases and their types. practical: The student masters the separation and detection of anions.	theoretical: noble gases practical: Separation and detection of anions	theoretical: Auditory methods: writing on the board method, direct dialogue method practical: Assignme nt and report	Short exams, homework assignments, discussions
thirtee nth	1 theoreti cal 3 practica l	theoretical: The student learns what halogens are and what their properties are. practical: The student performs a practical application of the unknown anions.	theoretical: Halogens, their properties and preparation, general properties of the six group elements practical: Anion separation / unknown	theoretical: Auditory methods: writing on the board method, direct dialogue method practical: Assignme nt and report	Short exams, homework assignments, discussions

fourteenth	1 theoretical 3 practical	Theory: The student should be able to identify the properties of the fifth group. practical: The student masters the separation of the elements of the fifth group.	theoretical: General properties of the elements in Group 5 practical: Separation of the elements of the fifth group	theoretical: Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
fifteenth	1 theoretical 3 practical	theoretical: The student learns the characteristics of the fourth group. practical: The student carries out a practical application of the unknown of the fifth group.	theoretical: General properties of the elements in Group 4 practical: Group 5 elements separation/unknown	theoretical: Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

95. Course Evaluation

((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))

96.Learning and Teaching Resources

Required textbooks (curriculum books, if available)	General Chemistry, 2014 Principles of General Chemistry, Dr. Mohi El-Din Al-Bakoush 2024
Main References (Sources)	Quantitative of inorganic chemistry Vogel, 1973
Recommended books and references (scientific journals, reports...)	Foundations of Analytical Chemistry Dr. Thabet Al-Ghabsha, Dr. Mu'ayyad Qasim Al-Abaji

Electronic references and websites	https://praxilabs.com/arabic/blog/6-most-important-chemistry-laws/

Course Description Form

97.Course name:	
Soil basics	
98. Course code:	
DES101	
99. the chapterAcademic/ year	
100. Description preparation date	
101. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
102. Number of credit hours (total) / Number of units (total)	
103. Course Supervisor Name (List all names, if there is more than one)	
the name:M.M. Omar Younis Hassan e-mail: mti.lec224.omar@ntu.edu.iq	
104. Course objectives	
Goals	1. The student should be able to identify the components of soil, its origin and development. 2. The student should be able to identify the physical, chemical and biological properties of soil. 3. The student should be able to identify soil problems such as salinity and alkalinity and how to treat them. 4. The student should be able to collect soil samples from the field, divide them for laboratory analysis, and conduct analyses.BasicFor soil.
105. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report.

	6. Assign teamwork to reveal leadership skills.

106. Course structure

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	2 theoretical 3 practical	theoretical:The student demonstrates the concepts of soil science. practical:The student distinguishes the soil	theoretical:Introduction to Soil Science Concepts practical:Soil sample collection from the field	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments , discussions
the second	2 theoretical 3 practical	theoretical:The student learns about the formation of soil. practical:The student learns to describe the soil profile.	theoretical:Soil formation and development practical:Soil section description	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments , discussions
the third	2 theoretical	theoretical:The student learns about soil formation processes.	theoretical:Soil formation processes	theoretical :Auditory methods: writing on the board method,	Short exams, homework

	3 practical	practical:The student identifies soil texture.	practical:soil texture determination	direct dialogue method practical: Assignment and report	assignments, discussions
Fourth	2 theoretical 3 practical	theoretical:The student explains the physical properties of soil. practical:The student measures the degree of soil reaction.	theoretical:Physical properties of soil practical:Soil reaction estimation	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Fifth	2 theoretical 3 practical	theoretical:The student learns about soil structure. practical:The student measures the percentage of carbonates in the soil.	theoretical:soil building practical:Estimating the percentage of calcium carbonate in soil	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Sixth	2 theoretical	theoretical:The student learns about soil temperature.	theoretical:soil temperature practical:	theoretical :Auditory methods: writing on	Short exams,

	3 practical	practical: The student measures the percentage of carbonates and bicarbonates in the soil.	Estimation of carbonates and bicarbonates in soil	the board method, direct dialogue method practical: Assignment and report	homework assignments, discussions
Seventh	2 theoretical 3 practical	theoretical: The student distinguishes the type of soil water. practical:The student measures the moisture content.	theoretical: Soil water classification practical:Soil moisture content measurement	theoretical: Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
The eighth	2 theoretical 3 practical	theoretical: The student distinguishes the chemical properties of soil. practical: The student measures the percentage of sodium and potassium in the soil.	theoretical: Colloids and Soil Chemical Properties practical: Sodium and potassium estimation	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

Ninth	2 theoretical 3 practical	theoretical:The student explains the organic colloids. practical:The student measures the organic matter.	theoretical:Organocolloids practical:Soil organic matter estimation	theoretical:Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
tenth	2 theoretical 3 practical	theoretical:The student is familiar with the biological properties of soil. practical:The student discovers humic compounds.	theoretical:biological properties of soil practical:Estimation of humic compounds in soil	theoretical:Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
eleventh	2 theoretical 3 practical	theoretical:The student learns about soil salinity and alkalinity. practical:The student determines the salinity of the soil.	theoretical:Salinity and alkalinity in soil practical:Soil salinity estimation	theoretical:Auditory methods: writing on the board method, direct dialogue method practical: Assignme	Short exams, homework assignments, discussions

				nt and report	
twelfth	2 theoretical 3 practical	theoretical:The student learns aboutThe impact of salinity on agricultural production practical:The student measuressoil cationic capacity	theoretical:The impact of salinity on agricultural production practical:Estimation of soil cation capacity	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments , discussions
thirteenth	2 theoretical 3 practical	theoretical:The student is familiar withImportant nutrients in soil practical:The student discovers the extraction of ready-made elements from the soil.	theoretical:Important nutrients in soil practical:Extraction of ready-made elements from soil	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments , discussions
fourteenth	2 theoretical 3 practical	theoretical:The student learns aboutPhosphorus and potassium in soil practical:The student measures	theoretical:Phosphorus and potassium in soil practical:Phosphorus estimation in soil	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments , discussions

		phosphorus in the soil.		practical: Assignment and report	
fifteenth	2 theoretical 3 practical	theoretical:The student is familiar withClassification of Iraqi soils practical:The student measures trace elements.	theoretical:Classification of Iraqi soils practical:Micronutrient assessment	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments , discussions

107. Course Evaluation	
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))	
108. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	Principles of Soil Science Dr. Abdullah Al-Ani (1982)
Main References (Sources)	Soil interfacial chemistry, soil chemistry
Recommended books and references (scientific journals, reports...)	Sposito, G.(2008) The chemistry of soil. Oxford University Press.
Electronic references and websites	

Course Description Form

109. Course name:	
Soil Physics	
110. Course code:	
DES102	
111. the chapterAcademic/ year	
First semester	
112. Description preparation date	
113. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
114. Number of credit hours (total) / Number of units (total)	
115. Course Supervisor Name (List all names, if there is more than one)	
the name:M.M. Omar Younis Hassan e-mail: **mti.lec224.omar@ntu.edu.iq**	
116. Course objectives	
Goals	1. The student should be able to understandMethodsModern irrigation to maintain good soil properties and increase soil moisture content. 2. The student should be able to know the usageoptimumFor water to irrigate the soil to enter the agricultural sector with outstanding efficiency.
117. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report. 6. Assign teamwork to reveal leadership skills.
118. Course structure	

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	2 theoretical 3 practical	theoretical:Shows the student the concept of irrigation and mathematical relationships. practical:Enabling the student to solve the rates	theoretical:Sports relations practical:Mathematical relationships for soil components and soil water equivalent depth	theoretical: Auditory methods: writing on the board method, direct dialogue method practical:Assignment and report	Short exams, homework assignments, discussions
the second	2 theoretical 3 practical	theoretical:Explains to the student the equivalent depth and its importance. practical:Explains to the student the basics of measuring humidity.	theoretical:Equivalent depth with mathematical problems practical:Methods of measuring soil moisture	theoretical: Auditory methods: writing on the board method, direct dialogue method practical:Assignment and report	Short exams, homework assignments, discussions
the third	2 theoretical 3 practical	theoretical:Shows the student the concepts of motion. practical:Shows the student how to measure field capacity and wilting point.	theoretical:Physical concepts of motion and its laws practical:Field capacity and permanent wilting point measurement	theoretical: Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments,

				practical:Assignment and report	discussions
Fourth	2 theoretical 3 practical	theoretical:Shows the student how to calculate soil texture using the hydrometer method. practical:Demonstrates measurement methods using multiple methods.	theoretical:Soil texture estimation (hydrometer method) practical:Applications of tissue analysis - Solving mathematical problems for tissue using the hydrometer method	theoretical: Auditory methods: writing on the board method, direct dialogue method practical:Assignment and report	Short exams, homework assignments, discussions
Fifth	2 theoretical 3 practical	theoretical:Shows the student how to calculate soil texture using the absorbent method. practical:Demonstrates measurement methods using multiple methods.	theoretical:Soil texture assessment (pipet method) practical:Applications of tissue analysis - Solving mathematical problems for tissue using the absorbent method	theoretical: Auditory methods: writing on the board method, direct dialogue method practical:Assignment and report	Short exams, homework assignments, discussions
Sixth	2 theoretical 3 practical	theoretical:Shows the student the importance of apparent density. practical:Enabling the student to	theoretical:Bulk density estimation practical:Laboratory estimation of bulk density (solutions to mathematical questions on how	theoretical: Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments,

		understand bulk density	to find bulk density)	practical:Assignment and report	discussions
Seventh	2 theoretical 3 practical	theoretical: Enabling the student to understand soil structure practical: Explain to the student the forms of soil structure.	theoretical: soil building practical:Solutions to mathematical problems on the topic: Laboratory work on finding Atterberg limits	theoretical: Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
The eighth	2 theoretical 3 practical	theoretical: Explain to the student the importance of soil aggregates. practical: Shows the basics of finding clusters	theoretical: Applications on the stability of clusters practical: Applications on the stability of clusters with solutions to problems	theoretical: Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Ninth	2 theoretical 3 practical	theoretical: Shows the student the importance of soil texture. practical:	theoretical: Soil texture practical: How to make dry and wet palm trees	theoretical: Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments,

		Enabling the student to calculate the plant's water requirement		practical: Assignment and report	discussions
tenth	2 theoretical 3 practical	theoretical: It enables the student to know the limits of Atterberg. practical: Explains to the student the calculation of the limits of elasticity, liquidity, and elasticity index.	theoretical: Applications on the limits of plasticity practical: Mathematical applications and solutions to examples of plasticity and liquidity limits	theoretical: Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
eleventh	2 theoretical 3 practical	theoretical: Shows the student how water enters the soil. practical: Shows the student ways to measure efforts.	theoretical: soil water efforts practical: Applications in soil water efforts	theoretical: Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
twelfth	2 theoretical 3 practical	theoretical: The student can measure water conductivity. practical: Shows the student the	theoretical: Saturated water conductivity practical: Applications of water conductivity	theoretical: Auditory methods: writing on the board method, direct	Short exams, homework assignm

		importance of water conductivity.		dialogue method practical:Assignment and report	ents, discussions
thirteenth	2 theoretical 3 practical	theoretical: Shows sprinkler irrigation systems practical: Illustrates strip irrigation systems	theoretical: strip irrigation practical: Strip irrigation arrangement and its types	theoretical: Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
fourteenth	2 theoretical 3 practical	theoretical: Shows the importance of water conductivity of the horizontal soil column practical: It illustrates the importance of water conductivity.	theoretical: Saturated water conductivity - horizontal soil column practical: Applications of saturated water conductivity in a horizontal soil column	theoretical: Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
fifteenth	2 theoretical 3 practical	theoretical: Explain to the student the tightness of the soil. practical:	theoretical: Moisture tension units practical: Writing units and their equivalents	theoretical: Auditory methods: writing on the board method, direct	Short exams, homework

		Shows how to measure soil tension with a pressure gauge.		dialogue method practical: Assignment and report	assignments, discussions

119. Course Evaluation	
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))	
120. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	Black, CA1965.Metbook of soil analysis, part1&2. Amer, Soc, Agron. Ins. USA
Main References (Sources)	Central Library College Library
Recommended books and references (scientific journals, reports...)	SSSAJAmerican Journal of Agriculture
Electronic references and websites	Central Library Scientific search engines - Internet

Course Description Form

121. Course name:	
Forests	
122. Course code:	
DES103	
123. the chapterAcademic/ year	
124. Description preparation date	
125. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
126. Number of credit hours (total) / Number of units (total)	
127. Course Supervisor Name (List all names, if there is more than one)	
the name:M.M. Samir Farhan Ayoub e-mail: Samir.f.ayoub@ntu.edu.iq	
128. Course objectives	
Goals	1. The student must be able to understand and comprehendFoundationsPlant classification and a brief history of plant classification and its stages of development. 2. The student should be able to nameTypesfromtreesForests according to the International Rules of Botanical Nomenclature 3. The student should be able to identify and know the methods of diagnosis.treesForests and their classification.
129. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report. 6. Assign teamwork to reveal leadership skills.

130. Course structure					
week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	2 theoretical 3 practical	The student should be able to define forests, their economic importance, and their relationship to humans.	theoretical: The economic importance of forests, definition of forest, relationship of forest to humans practical: Identifying forest treesThe physical characteristics of each species in the field	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the second	2 theoretical 3 practical	The student should be able to understand the basics of geographical distribution and the reasons for their spread.	theoretical: Geographical distribution of forests, distribution of forests and reasons for their spread, vertical distribution of forests practical: Propagation facilities, seed collection and extraction, collection dates and storage methods, the importance of machines and equipment used in seed collection	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

the third	2 theoretical 3 practical	The student should be able to understand the different classifications of forest trees according to genus and species.	theoretical: Different classifications of forest trees, classification of forests according to genera, species, source, propagation methods, purpose practical: Forest nurseries, their benefits, types, scattering methods, preparation of scattering and individualization methods.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Fourth	2 theoretical 3 practical	Students should be able to identify the economic benefits of forests in terms of production and protection.	theoretical: Benefits of forests - productive, protective, tourism, social benefits practical: Reproductive characteristics of trees	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Fifth	2 theoretical 3 practical	Students should be able to identify methods of propagating and collecting forest seeds and	theoretical: Forest nurseries, seed testing, propagation methods, seed collection and extraction, factors	theoretical :Auditory methods: writing on the board method, direct	Short exams, homework

		factors affecting seed viability.	affecting seed viability practical: Service operations and preparation of individualization graves, various individualization environments, preparation of individualization graves and continued maintenance of prose graves.	dialogue method practical: Assignment and report	assignments, discussions
Sixth	2 theoretical 3 practical	Students should be able to identify the factors affecting forest planning and the forms and methods of planting seedlings.	theoretical:Forest planning - Factors affecting forest planning - Planting dates - Planning forms - Planting methods practical:A scientific visit to the forests and nurseries near the area and the preparation of models	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Seventh	2 theoretical 3 practical	Students should be able to understand the composition of forests and their most important characteristics	theoretical: Forests, their composition, advantages, disadvantages practical: Forest planning and planting methods,	theoretical :Auditory methods: writing on the board method, direct	Short exams, homework assignm

		and disadvantages.	machines and devices used in planning, types of planting methods and their application	dialogue method practical: Assignment and report	ents, discussions
The eighth	2 theoretical 3 practical	Students should be able to understand and comprehend the methods of pruning and thinning and their importance for forest trees and the ecosystem.	theoretical: Pruning and thinning in forests, the importance of pruning and thinning, types of pruning and thinning practical:Learn about other forest trees, their types, characteristics, benefits, and see examples of them, display slides or movies.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Ninth	2 theoretical 3 practical	The student should be able to identify methods of forest tree maintenance, their importance, and the vital factors that affect them.	theoretical: Forest conservation - the importance of forest conservation, stages of its development - harmful biological factors (humans, animals, diseases, insects and jungles) practical:Pruning and thinning operations, definition and	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

			types, showing slides or films		
tenth	2 theoretical 3 practical	The student should be able to identify non-vital factors that are harmful to forests, their main causes, and methods of protection against them.	theoretical:abiotic factorsHarmful - The importance of studying harmful abiotic factors and their impact on forests - Abiotic factors (climate factors, fires, toxic gases) practical:Forest Conservation, Practical Application on Fire Suppression	theoretical:Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
eleventh	2 theoretical 3 practical	The student should be able to define the forest environment and the environmental factors that affect it.	theoretical:Forest environment definition - the effect of forests on temperature, wind, and humidity. practical:Separation processes, separating media, separating time, separating methods.	theoretical:Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
twelfth	2 theoretical 3 practical	Students should be able to measure the vital characteristics of forest trees and the methods used to	theoretical: Forest measurements, tree height, tree diameter and tree volumes - growth and age of trees.	theoretical:Auditory methods: writing on the board method, direct	Short exams, homework assignm

		measure each characteristic.	practical: Forest measurements, height, diameter, growth, age. Instruments used in measurements.	dialogue method practical: Assignment and report	ents, discussions
thirteenth	2 theoretical 3 practical	Students should be able to define the process of forest investment and how to turn forests into tourist and recreational areas while protecting trees from illegal logging.	theoretical: Forest investment, its importance, definition, cutting trees, cleaning trunks, transporting and hauling trees. practical: Scientific films, the importance of forests and their investment	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
fourteenth	2 theoretical 3 practical	Students should be able to understand the wood manufacturing process, the characteristics of the wood used, and the methods of manufacturing.	theoretical: Wood technology and wood industries - wood properties - wood manufacturing. practical:Tree felling, felling stages, cutting, felling, cleaning and chopping operations	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
fifteenth	2 theoretical	Scientific visit to a wood factory.	theoretical: Show slides or scientific trip. practical:	theoretical :Auditory methods: writing on the board	Short exams, homew

	3 practical	Scientific trip for students to forests.	Identifying forest treesThe physical characteristics of each species in the field	method, direct dialogue method practical: Assignment and report	ork assignments, discussions

131. Course Evaluation
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))

132. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	Public Forests / Younis Mohammed Qasim Al-Alusi
Main References (Sources)	
Recommended books and references (scientific journals, reports...)	Classification of forest trees Dr. Daoud Mohammed Daoud
Electronic references and websites	

Course Description Form

133. Course name:	
Dry climate	
134. Course code:	
DES104	
135. the chapterAcademic/ year	
136. Description preparation date	
137. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
138. Number of credit hours (total) / Number of units (total)	
139. Course Supervisor Name (List all names, if there is more than one)	
the name:M.M. Samir Farhan Ayoub e-mail: Samir.f.ayoub@ntu.edu.iq	
140. Course objectives	
Goals	1- The student should be able to identify the elements of the climate of dry regions. 2- The student should be able to identify the relationship between the elements of dry areas and the phenomenon of desertification. 3- The student should be able to identify the classification of climatic zones in the world. 4- The student should be able to identify the characteristics of soil, water, temperature and light in arid areas. 5- To be for the studentThe ability to read temperatures, weather, and rainfall in meteorology 6- The student should be able to identify treatments for desertification and solar radiation.

	7- The student should be able to identify the characteristics of groundwater in deserts.
141. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical training. 4. Dialogue and discussion. 5. Assign tasks and report. 6. Assign teamwork to reveal leadership skills.

142. Course structure **(Remember all theoretical and practical vocabulary)**

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	2 theoretical	theoretical: The student should be able to define climatology and its branches.	theoretical: Introduction to Climatology.	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
the second	2 theoretical	theoretical: Students should be able to define regions, their types, and the characteristics of each.	theoretical: Climatic regions and the characteristics of each region, including the definition of the region, the characteristics of the region, and the	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments,

			various water elements.		discussi ons
the third	2 theoreti cal	theoretical: Students should be able to identify the topography of tropical climate regions and the distribution of water and land in relation to latitude.	theoretical: Location of the place in relation to latitude, distribution of water and land, terrain, tropical climate region, monsoon region, polar region	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homew ork assignm ents, discussi ons
Fourth	2 theoreti cal	theoretical: Students should be able to identify the extent of arid regions along circular latitudes and their characteristics.	theoretical: Dry climate region, Mediterranean region, the dry region extends along the 18th parallel latitude-30 North of the Equator, characteristics of the dry region	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homew ork assignm ents, discussi ons
Fifth	2 theoreti cal 3 practic	theoretical: Students should be able to identify the temperature range between winter and summer, night and day, low rainfall, high	theoretical: High temperature range, between winter and summer, night and day, little rain, high evaporation rates, few plants and their types.	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homew ork assignm ents,

		evaporation and its rates, and the scarcity and types of vegetation.			discussi ons
Sixth	2 theoreti cal	theoretical: Students should be able to classify arid desert climate regions, define them, and identify their characteristics and rainfall.	theoretical: Classification of the most important dry desert climate regions, definition, characteristics, and rainfall.	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homew ork assignm ents, discussi ons
Seventh	2 theoreti cal	theoretical: Students should be able to identify the components of the atmosphere, low pressure systems, and thunderstorms. Atmospheric humidity and condensation.	theoretical: atmosphere Solar and terrestrial radiation. Atmospheric pressure. Wind. Air masses. Fronts and depressions. Low pressure and thunderstorms. Humidity and condensation.	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homew ork assignm ents, discussi ons
The eighth	2 theoreti cal	theoretical: Students should able to identify	theoretical: Climatic regions and the characteristics of each region, including the definition of the region, the	theoretical :Auditory methods: writing on the board method, direct	Short exams, homew ork assignm

			characteristics of the region, and the various water elements.	dialogue method	ents, discussi ons
Ninth	2 theoreti cal	theoretical: Students should be able to identify the topography of tropical climate regions and the distribution of water and land in relation to latitude.	theoretical: Location of the place in relation to latitude, distribution of water and land, terrain, tropical climate region, monsoon region, polar region	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homew ork assignm ents, discussi ons
tenth	2 theoreti cal	theoretical: Students should be able to identify the topography of tropical climate regions and the distribution of water and land in relation to latitude.	theoretical: Dry climate region, Mediterranean region, the dry region extends along the 18th parallel latitude-30 North of the Equator, characteristics of the dry region	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homew ork assignm ents, discussi ons
eleventh	2 theoreti cal	theoretical: Students should be able to identify the extent of arid regions at circular latitudes and	theoretical: High temperature range, between winter and summer, night and day, little rain, high evaporation rates, few plants and their types	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homew ork assignm

		their characteristics.			ents, discussi ons
twelfth	2 theoreti cal	theoretical: Students should be able to classify arid climate regions, define them, identify their characteristics, and identify their rainfall.	theoretical: Classification of the most important dry desert climate regions, definition, characteristics, and rainfall.	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homew ork assignm ents, discussi ons
thirteent h	2 theoreti cal	theoretical: Students should be able to identify the components of the atmosphere, depressions, and thunderstorms. Atmospheric humidity and condensation.	theoretical: atmosphere Solar and terrestrial radiation. Atmospheric pressure. Wind. Air masses. Fronts and depressions. Low pressure and thunderstorms. Humidity a condensation.	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homew ork assignm ents, discussi ons
fourteen th	2 theoreti cal	theoretical: Students should be able to define regions, their types, and the	theoretical: Climatic regions and the characteristics of each region, including the	theoretical :Auditory methods: writing on the board method,	Short exams, homew

		characteristics of each.	definition of the region, the characteristics of the region, and the various water elements.	direct dialogue method	ork assignm ents, discussi ons
fifteenth	2 theoreti cal	theoretical: Students should be able to identify the topography of tropical climate regions and the distribution of water and land in relation to latitude.	theoretical: Location of the place in relation to latitude, distribution of water and land, terrain, tropical climate region, monsoon region, polar region	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homew ork assignm ents, discussi ons

143. Course Evaluation	
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))	
144. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	Environmental Science and Philosophy / Dr. Ayoub Abu Diya
Main References (Sources)	
Recommended books and references (scientific journals, reports...)	
Electronic references and websites	

Course Description Form

145. Course name:	
soil chemistry	
146. Course code:	
DES105	
147. the chapterAcademic/ year	
First semester	
148. Description preparation date	
149. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
150. Number of credit hours (total) / Number of units (total)	
151. Course Supervisor Name (List all names, if there is more than one)	
the name:M.M. Omar Younis Hassan e-mail: **mti.lec224.omar@ntu.edu.iq**	
152. Course objectives	
Goals	1. The student should be able to understand and comprehend the chemical properties of soil. 2. The student will be able to choose the appropriateness of the factors affecting knowledge and study of the most important chemical reactions that occur in the soil. 3. The student should be able to identify and know the basics of detecting the type of minerals that control dissolution and precipitation. 4. The student should be able to identify the factors affecting chemical reactions.
153. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report.

	6. Assign teamwork to reveal leadership skills.

154. Course structure

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	2 theoretical 3 practical	theoretical: Introducing the student to the types of elements that make up the Earth's crust practical: The student collects different soil samples.	theoretical: About the chemical composition of the Earth's crust practical: The student plans to collect comprehensive field samples and prepare them for chemical analysis.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the second	2 theoretical 3 practical	theoretical: The student identifies the close relationship between the three soil phases. practical: The student learns the basic units.	theoretical: The student understands the relationship of soil chemistry to other sciences. practical: Basic and scientific units	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the third	2 theoretical	theoretical: The student identifies the most important elements that make up the	theoretical: Metal part chemistry practical:	theoretical :Auditory methods: writing on the board method,	Short exams, homew

	3 practical	compounds in the Earth's crust. practical: Measures total dissolved salts in the soil	Estimation methodsPHSoil and total dissolved salts	direct dialogue method practical: Assignment and report	ork assignments, discussions
Fourth	2 theoretical 3 practical	theoretical: The student learns about the most important sources of organic matter. practical: The cation exchange capacity is extracted by saturation with sodium acetate.	theoretical: Sources of organic matter practical: cation exchange capacity	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Fifth	2 theoretical 3 practical	theoretical: The student learns about the physical and chemical properties of humus through the color of the soil. practical: Ammonium oxalate is used in the determination of activated	theoretical: Physical and chemical properties of humus practical: Active calcium carbonate	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

		calcium carbonate.			
Sixth	2 theoretical 3 practical	theoretical: The student determines the nature of the chemical composition of the soil solution from ionic species. practical: The student estimates gypsum in the soil using acetone.	theoretical: Chemical composition of soil solution practical: Gypsum in soil	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Seventh	2 theoretical 3 practical	theoretical:The student explains the process of losing an electron or a proton. practical:Calculates the regulatory capacity in the soil through the readings of thePH	theoretical:Acid-base neutralization reactions practical: Organizational capacityFor soil	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
The eighth	2 theoretical 3 practical	theoretical:The student explains the phenomenon that occurs between the solid and liquid	theoretical:electrical double layer practical:Soil erosion	theoretical :Auditory methods: writing on the board method, direct	Short exams, homework

		phases of the soil. practical:The soil moisture content is calculated through the readings of thePH		dialogue method practical: Assignment and report	assignments, discussions
Ninth	2 theoretical 3 practical	theoretical:The student describes the process of ion exchange using the law of mass action. practical:The student makes a soil extract.	theoretical:Properties of ion exchange practical:Calculation of exchangeable ions in soil	theoretical:Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
tenth	2 theoretical 3 practical	theoretical:The student describes physicochemical equations (Freundlich, Langmuir) and chemical equations (Kerr, Fanslow, Capon). practical:The student makes a soil extract.	theoretical: Physicochemical equations (Freundlich, Langmuir) and chemical equations (Kerr, Fanslow, Capon) practical:Calculation of exchangeable ions in soil	theoretical:Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

eleven nth	2 theoretical 3 practical	theoretical:The student is studying the process of dissolving a gas.CO2in the water practical:Calcium is measured in soil extract by titration with theEDTA	theoretical:systemCO2-H2O CACO3-CO2-H2O practical:Calculation of exchangeable ions in soil	theoretical:Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
twelfth	2 theoretical 3 practical	theoretical:Explain to the student the nature of ionization of phosphoric acid. practical:Measure the dissolved chloride in the soil extract by titration with silver nitrate.	theoretical:The nature of ionization of phosphoric acid practical: Calculation of exchangeable ions in soil	theoretical:Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
thirteenth	2 theoretical 3 practical	theoretical:The student draws solubility diagrams to determine which metal controls solubility. practical:Extracts humic compounds in	theoretical:Dissolution diagrams for carbonate minerals practical:soil organic compounds	theoretical:Auditory methods: writing on the board method, direct dialogue method practical: Assignme	Short exams, homework assignments,

		the soil by neutralizing them.with sodium bicarbonate solution		nt and report	discussi ons
fourte enth	2 theoreti cal 3 practica l	theoretical:The student explains the importance ofPHSoil and its most important sources of acidity practical:Calcul ates the ionic strength of mono-, di-, and ternary compounds.	theoretical:The importance of studyingPHSoil and what are the most important sources of acidity in the soil? practical:Ionic strength in soil	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme nt and report	Short exams, homew ork assignm ents, discussi ons
fiftee nth	2 theoreti cal 3 practica l	theoretical:The student identifies the location and sources of salinity. practical:Calcul ates the activity factor for mono-, di- and tri-components.	theoretical:Sources of soil salinity practical:Soil activity factor	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme nt and report	Short exams, homew ork assignm ents, discussi ons
155. Course Evaluation					
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))					
156. Learning and Teaching Resources					

Required textbooks (curriculum books, if available)	Soil Chemistry Books by Dr. Kazem Mashhout 1986
Main References (Sources)	Central Library College Library
Recommended books and references (scientific journals, reports...)	The book (Soil Minerals) written by Prof. Dr. Salman Khalaf Issa
Electronic references and websites	Central Library Scientific search engines - Internet

Course Description Form

157. Course name:	
Sports	
158. Course code:	
NTU104	
159. the chapterAcademic/ year	
First semester	
160. Description preparation date	
161. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
162. Number of credit hours (total) / Number of units (total)	
163. Course Supervisor Name (List all names, if there is more than one)	
the name: e-mail:	
164. Course objectives	
Goals	1. The student should be able to identifyWith the most important basic information about types of sports 2. The student should be able toKnowing the classification of sports. 3. The student should be able to deal withIn sportsmanship
165. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical training. 4. Dialogue and discussion. 5. Assign tasks and report. 6. Assign teamwork to reveal leadership skills.

166. Course structure					
week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	1 theoretical 1 practical	The student should be able to understand the basic concepts of sports, their types, and their importance.	theoretical: Sports: definition, importance and types practical: Sports: definition, importance and types	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the second	1 theoretical 1 practical	The student should be able to understand the mechanics of body movement and the effects of each movement.	theoretical: Mechanism of human body movement practical: Mechanism of human body movement	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the third	1 theoretical 1 practical	The student should be able to recognize common sports injuries and how to treat them.	theoretical: Common sports injuries practical: Common sports injuries	theoretical :Auditory methods: writing on the board method, direct	Short exams, homework

				dialogue method practical: Assignment and report	assignments, discussions
Fourth	1 theoretical 1 practical	The student should be familiar with the rules of basketball.	theoretical: basketball practical:basketball	theoretical :Auditory methods: writing on the board method, direct dialogue method practical:Assignment a report	Short exams, homework assignments, discussions
Fifth	1 theoretical 1 practical	Students will be able to understand the rules of basketball.	theoretical: Basketball Laws practical:Basketball Laws	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Sixth	1 theoretical 1 practical	Students will be able to understand the basic skills of table tennis.	theoretical:Table tennis (table tennis), basic skills	theoretical :Auditory methods: writing on the board method,	Short exams, homew

			practical:Table tennis (table tennis), basic skills	direct dialogue method practical: Assignment and report	ork assignments, discussions
Seventh	1 theoretical 1 practical	Students should be able to identify the basic skills involved in volleyball.	theoretical: volleyball practical: volleyball	theoretical:Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
The eighth	1 theoretical 1 practical	Students should be able to identify the basic skills involved in swimming and the rules governing the sport.	theoretical: Swimming practical: Swimming	theoretical:Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Ninth	1 theoretical	Students should be able to identify the basic skills	theoretical: tennis practical:	theoretical:Auditory methods: writing on	Short exams,

	1 practical	involved in tennis and the rules governing the sport.	tennis	the board method, direct dialogue method practical: Assignment and report	homework assignments, discussions
tenth	1 theoretical 1 practical	Students should be able to identify the basic skills of handball, its rules, and common mistakes.	theoretical: handball practical: handball	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
eleventh	1 theoretical 1 practical	Students should be able to identify the rules of handball.	theoretical: Handball Law practical: Handball Law	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

twelfth	1 theoretical 1 practical	Students should be able to identify the basic skills of athletics and ways to avoid common mistakes in this sport.	theoretical: Athletics practical: Athletics	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
thirteenth	1 theoretical 1 practical	Students should be able to identify the basic skills of soccer, the dimensions of the field, and the distance between the lines of play.	theoretical: soccer practical: soccer	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
fourteenth	1 theoretical 1 practical	Students should be able to identify how to manage sports competitions and contests and the rules governing each.	theoretical: Management of sports competitions and contests practical: Management of sports competitions and contests	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme	Short exams, homework assignments,

				nt and report	discussi ons
fiftee nth	1 theoreti cal 1 practical	Students should be able to identify sports rules and regulations.	theoretical:Sports laws and regulations practical:Sports laws and regulations	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme nt and report	Short exams, homew ork assignm ents, discussi ons

167. Course Evaluation	
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))	
168. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	Sports material binder
Main References (Sources)	
Recommended books and references (scientific journals, reports...)	
Electronic references and websites	

Course Description Form

169. Course name:	
Natural Resource Economics	
170. Course code:	
TAMO151	
171. the chapterAcademic/ year	
First semester	
172. Description preparation date	
173. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
174. Number of credit hours (total) / Number of units (total)	
175. Course Supervisor Name (List all names, if there is more than one)	
the name: Mr. Omar Ahmed Fathy e-mail: omar.ah.f@ntu.edu.iq	
176. Course objectives	
Goals	1. The student should be able to understand economic and natural resources, their types and importance. 2. The student should be able to identify how to exploitATo optimally utilize natural resources and explain their use 3. The student should have knowledgewith resourcesThe landLoss, human and water 4. The student should be able toGet to knowWays to conserve these resources and the demand and supply for them.
177. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical training 4. Dialogue and discussion. 5. Assign tasks and report. 6. Assign teamwork to reveal leadership skills.

178. Course structure					
week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the firs	2 theoretical	theoretical: The student learns about the methods and techniques used to study and explore natural resources.	theoretical: Research methods in economic resources	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
the second	2 theoretical	theoretical: Explains to the student the characteristics of natural resources.	theoretical: Characteristics of Natural Resource Economics - Classification of Natural Resources	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
the thir	2 theoretical	theoretical: Learn how to use the land and determine the best ways to use it.	theoretical: Natural Resource Economics - Concepts and Properties of the Earth	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments,

					discussi ons
Fourth	2 theoreti cal	theoretical: Understands how the population is distributed and how resources are distributed fairly.	theoretical: Land use intensity and factors affecting it	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homew ork assignm ents, discussi ons
Fifth	2 theoreti cal	theoretical: Distinguish between the natural and economic supply of land.	theoretical: Display land resources and increase the economic supply of land	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homew ork assignm ents, discussi ons
Sixth	2 theoreti cal	theoretical:Kno w the definition of rent and explain its types	theoretical:The economic and social importance of agricultural land rent	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homew ork assignm ents,

					discussi ons
Seventl	2 theoreti cal	theoretical: midterm exam	theoretical: midterm exam	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homew ork assignm ents, discussi ons
The eighth	2 theoreti cal	theoretical:Expl ains the factors affecting agricultural land values.	theoretical: Evaluation of agricultural land resources and factors affecting land value	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homew ork assignm ents, discussi ons
Ninth	2 theoreti cal	theoretical:Expl ains the concept of possession and the factors affecting it.	theoreticalAgricult ural land tenure: its concept and the factors affecting it	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homew ork assignm ents,

					discussi ons
tenth	2 theoreti cal	theoretical: Determines farmer needs and plans for agricultural land development.	theoretical: Characteristics of land tenure and its importance	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homew ork assignm ents, discussi ons
elevent h	2 theoreti cal	theoretical: The student knows the agricultural land resources, their types and importance.	theoretical: Agricultural land resources in Iraq and their divisions	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homew ork assignm ents, discussi ons
twelfth	2 theoreti cal	theoretical: Understands human resources, decision analysis and management skills development.	theoretical: EconomicsHuman Resources	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homew ork assignm ents,

					discussi ons
thirtee nth	2 theoreti cal	theoretical:midt erm exam	theoretical: midterm exam	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homew ork assignm ents, discussi ons
fourtee nth	2 theoreti cal	theoretical: The student learns the basic concepts of the workforce and helps in developing the workforce.	theoretical: Agricultural Labor Force and Human Resources in Iraq	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homew ork assignm ents, discussi ons
fifteent h	2 theoreti cal	theoretical: The student learns the concepts of agricultural policy.	theoretical: agricultural policy	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homew ork assignm ents,

					discussi ons

179. Course Evaluation	
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))	
180. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	Land Economics and Agrarian Reform, Dr. Abdel Khaleq Mohamed
Main References (Sources)	The Economics of Agricultural Reform, Dr. Abdul Wahab Matar Al-Dahri
Recommended books and references (scientific journals, reports...)	Natural Resources and Environmental Economics, Dr. Hamad bin Mohammed Al Sheikh
Electronic references and websites	nothing

Course Description Form

181. Course name:	
Agricultural guidance	
182. Course code:	
TAMO152	
183. the chapterAcademic/ year	
184. Description preparation date	
185. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
186. Number of credit hours (total) / Number of units (total)	
187. Course Supervisor Name (List all names, if there is more than one)	
the name: Mr. Ziad Amer Mustafa e-mail: mti.Iec96.Zeyad@ntu.edu.iq	
188. Course objectives	
Goals	1. The student should be able to understand the concept of agricultural extension. 2. The student should be able to identify the role of agricultural extension in agriculture to achieve high rates in Production Agricultural.
189. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report. 6. Assign teamwork to reveal leadership skills.

190. Course structure

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method

the first	2 theoretical	theoretical: Learn about agricultural extension concepts	theoretical:Agricultural Extension, Introduction, Definition, Philosophy of Agricultural Extension	theoretical: Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
the second	2 theoretical	theoretical: Identify the objectives and role of extension in rural development	theoretical: Objectives of agricultural extension, role of agricultural extension in rural development, position of agricultural extension among agricultural sciences	theoretical: Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
the third	2 theoretical	theoretical: Learn about guidance systems and their administrative organization	theoretical: Agricultural extension systems, principles of administrative organization functions of agricultural extension.	theoretical: Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions

Fourth	2 theoretical	theoretical: Learn about guidance systems	theoretical: Agricultural extension organization in Iraq	theoretical: Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
Fifth	2 theoretical	theoretical: Introduction to Communication	theoretical: Contact, communication elements, adoption	theoretical: Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
Sixth	2 theoretical	theoretical: Identifying methods and aids for agricultural guidance	theoretical:Methods and aids for agricultural guidance	theoretical: Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
Seventh	2 theoretical	theoretical: midterm exam	theoretical:midterm exam	theoretical: Auditory methods:	Short exams,

				writing on the board method, direct dialogue method	homework assignments, discussions
The eighth	2 theoretical	theoretical: Learn about leadership and its types	theoretical: Leadership, definition of leadership, types of leadership according to the method followed in leadership	theoretical: Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
Ninth	2 theoretical	theoretical: Understanding leadership and its relationship to guidance work	theoretical: Types of leadership according to the metaphors method, leadership and its relationship to guidance work, characteristics of a leader in rural society	theoretical: Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
tenth	2 theoretical	theoretical: Identifying social change and its causes	theoretical: Social change and its causes	theoretical: Auditory methods: writing on the board method, direct	Short exams, homework

				dialogue method	assignments, discussions
eleventh	2 theoretical	theoretical: Identifying the levels, obstacles, and motivators of change	theoretical: Levels of change, obstacles and incentives for change in the field of agricultural extension	theoretical: Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
twelfth	2 theoretical	theoretical: Learn the principles of agricultural extension planning	theoretical: Guidance program plans/guidance planning, guidance planning principles	theoretical: Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
thirteenth	2 theoretical	theoretical: Understanding the concept of education and learning	theoretical: Learning and teaching, concept of learning, teaching and learning process	theoretical: Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments,

					discussi ons
fourteen th	2 theoreti cal	theoretical: Learn about agricultural extension concepts	theoretical: Counseling education theories, adult education, adult characteristics	theoretical: Auditory methods: writing on the board method, direct dialogue method	Short exams, homewo rk assignm ents, discussi ons
fifteenth	2 theoreti cal	theoretical: exam	theoretical: exam	theoretical: Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions

191. Course Evaluation
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))

192. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	Samarrai and Jadari Agricultural Extension Science
Main References (Sources)	Agricultural Extension and its Role in Rural Development, Al-Samarrai
Recommended books and references (scientific journals, reports...)	Various books and magazines
Electronic references and websites	Various websites

Course Description Form

193. Course name:	
General plant	
194. Course code:	
DES151	
195. the chapter Academic/ year	
196. Description preparation date	
197. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
198. Number of credit hours (total) / Number of units (total)	
199. Course Supervisor Name (List all names, if there is more than one)	
the name:Dr. Mohamed Salem Ahmed e-mail: mohameedsa66@ntu.edu.iq	
200. Course objectives	
Goals	1. The student should be able to understand and comprehend what is related to plant anatomy and its relationship to the sciences.Other. 2. The student should be able to know the most important scientific methods for learning about plant anatomy and knowing the diversity of plant tissues. 3. The student should be able to identify plant cells and all their components. 4. The student should be able to explain the functions of plant tissues and their relationship to cells.
201. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report. 6. Assign teamwork to reveal leadership skills.

202. Course structure					
week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	2 theoretical 3 practical	The student should be able to define the plant kingdom and classify plants in terms of type, genus, and species.	theoretical: plant kingdom practical: Plant classification - Plant kingdom - Species and varieties	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the second	2 theoretical 3 practical	The student should be able to identify vascular plants, their types, and their characteristics.	theoretical: vascular plantsTrachoophyta Vascular plants practical: Morphological form of the plant - parts of the plant	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the third	2 theoretical 3 practical	The student should be able to understand the process of pollination and fertilization that occurs in	theoretical: Flowering Plants - Pollination and Fertilization practical:	theoretical :Auditory methods: writing on the board method, direct	Short exams, homework

		flowering plants and types of flowers.	To differentiate between monocotyledonous and dicotyledonous plants	dialogue method practical: Assignment and report	assignments, discussions
Fourth	2 theoretical 3 practical	Students should be able to identify methods of seed germination and the components and types of flowers.	theoretical: Flower - Fruit - Seeds and their germination practical: AngiospermsAngiosperm and Gyniosperm	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Fifth	2 theoretical 3 practical	Students should be able to identify types of plant tissues, their functions, and their locations.	theoretical: Plant tissues - types practical: Leg dissection under the microscope	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Sixth	2 theoretical	Students should be able to identify the components of the vegetative	theoretical: The vegetative part of the plant - the structure of the stem	theoretical :Auditory methods: writing on the board	Short exams, homew

	3 practical	system and the function of each part in the life of a plant.	practical: Leg dissection under the microscope	method, direct dialogue method practical: Assignment and report	ork assignments, discussions
Seventh	2 theoretical 3 practical	Students should be able to identify the components and types of roots and how they absorb nutrients from the soil.	theoretical: Root sum - root zones practical: Leg dissection under the microscope	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
The eighth	2 theoretical 3 practical	Students should be able to identify the components of plant leaves and their role in photosynthesis.	theoretical: Paper composition practical: Seed and flower anatomy	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

Ninth	2 theoretical 3 practical	The student should be able to identify the stages of plant cell division.	theoretical: Plant cell - stages of division practical: Seed germination in practice	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
tenth	2 theoretical 3 practical	The student should be able to identify the types of stomata and their role in the processes of transpiration and exudation.	theoretical: Stomata and their shapes - Stomata of desert plants and their effect on transpiration practical: Examination of the forms of stomata in different plants and desert plants	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
eleventh	2 theoretical 3 practical	The student should be able to identify the types, varieties, and forms of algae.	theoretical: Algae - Types - Shapes - Lichens practical: Plant cell (division and reproduction)	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme	Short exams, homework assignments,

				nt and report	discussi ons
twelft h	2 theoreti cal 3 practical	The student should be able to identify the types of bacteria, their components, and the importance of each type.	theoretical: Bacteria and their forms - bacteria associated with seeds (nitrogenization and bacterial nodules) practical: Examination of samples of algae and lichens under a microscope	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme nt and report	Short exams, homew ork assignm ents, discussi ons
thirte enth	2 theoreti cal 3 practical	The student should be able to identify the types, forms, and roles of fungi.	theoretical: Fungi - types and shapes practical: Examination and drawing of the shapes and types of bacteria	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme nt and report	Short exams, homew ork assignm ents, discussi ons
fourte enth	2 theoreti cal 3 practical	The student should be able to identify the mushroom, its components, and its importance.	theoretical: mushroom practical: Examination and drawing of fungal forms	theoretical :Auditory methods: writing on the board method, direct	Short exams, homew ork assignm

				dialogue method practical: Assignment and report	ents, discussions
fifteenth	2 theoretical 3 practical	The student should be able to identify the mycorrhiza, its components, and its importance.	theoretical: Root fungi (mycorrhizae) practical: Discussing reports	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

203. Course Evaluation	
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))	
204. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	Plant Morphology and Anatomy, Abdullah Rashid Al-Daiji and Muhammad Abdo Al-Awdat (1992)
Main References (Sources)	General Plant, Hussein Al-Arousi and Osama Abdel Hamid Al-Manoufi
Recommended books and references (scientific journals, reports...)	
Electronic references and websites	https://exa.unne.edu.ar/biologia/fisiologia.vegetal/PlantPhysiologyTaiz2002.pdf

Course Description Form

205. Course name:	
Principles of animal production	
206. Course code:	
DES152	
207. the chapter Academic/ year	
208. Description preparation date	
209. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
210. Number of credit hours (total) / Number of units (total)	
211. Course Supervisor Name (List all names, if there is more than one)	
the name: e-mail:	
212. Course objectives	
Goals	1. The student should be able to classify animals in the animal kingdom. 2. The student should be able to identify the visual specifications.and performance productiveFor global and local cattle breeds 3. The student should be able to know the nature of animal housing and its types. 4. The student should be able to identify the most important diseases that affect cattle and sheep.
213. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report. 6. Assign teamwork to reveal leadership skills.

214. Course structure					
week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the firs	2 theoretical 3 practical	The student should be able to understand the economic importance of livestock and the daily, monthly, or seasonal field operations carried out on farm animals.	theoretical: The economic importance of livestock practical: Field operations carried out daily, monthly or seasonally on farm animals	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the second	2 theoretical 3 practical	The student should be able to understand the animal kingdom and its classification, milking and milking methods, and preparing cows for milking.	theoretical: Animal kingdom and its classification practical: Milking, milking methods, and preparing cows for the milking process	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the thir	2 theoretical 3 practical	The student should be able to identify the origin of cows, their place in the animal kingdom,	theoretical: Origin of cows, position in the animal kingdom, global breeds of cows, Iraqi cows	theoretical :Auditory methods: writing on the board method, direct	Short exams, homework

		global breeds of cows, and Iraqi cows.	practical: Average rainfall in stations	dialogue method practical: Assignment and report	assignments, discussions
Fourth	2 theoretical 3 practical	The student should be able to identify the origin of sheep, global and local breeds of sheep and goats.	theoretical: Origin of sheep, global and local breeds of sheep and goats practical: Intensity-duration analysis	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Fifth	2 theoretical 3 practical	Students should be able to identify the origin of buffalo, global and local breeds, general, physiological, and reproductive characteristics, types of buffalo, and meat and milk production.	theoretical: The origin of buffalo, global and local breeds, general, physiological and reproductive characteristics, types of buffalo and their meat and milk production practical: Morphological analysis of basins	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Sixth	2 theoretical	Students should be able to identify factors affecting the	theoretical: Factors affecting the productive efficiency of cows	theoretical :Auditory methods: writing on	Short exams,

	3 practical	productive efficiency of cows and sheep (genetic and environmental factors).	and sheep (genetic and environmental factors) practical: Discharge measurement in rivers	the board method, direct dialogue method practical: Assignment and report	homework assignments, discussions
Seventh	2 theoretical 3 practical	The student should be able to understand the economic importance of the poultry industry.	theoretical: The economic importance of the poultry industry practical:Separation of hydrographs	theoretical:Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
The eighth	2 theoretical 3 practical	The student should be able to identify the types and breeds of laying hens, broilers, and dual-purpose chickens.	theoretical:Types and breeds of laying, meat and dual-purpose chickens practical:Frequency analysis of flood	theoretical:Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

Ninth	2 theoretical 3 practical	The student should be able to understand poultry farming projects (hatcheries, poultry farms, breeding farms, and mother farms).	theoretical:Poultry industry projects (hatchery, poultry farms, parent and mother farms) practical:Scientific visit to the Animal Wealth Division	theoretical:Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
tenth	2 theoretical 3 practical	The student should be able to understand the basics of chicken breeding.	theoretical:Basics of chicken farming practical:	theoretical:Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
eleventh	2 theoretical 3 practical	The student should be able to understand the design of poultry slaughterhouses.	theoretical:poultry slaughterhouse design practical:Flood routing	theoretical:Auditory methods: writing on the board method, direct dialogue method practical: Assignme	Short exams, homework assignments,

				nt and report	discussi ons
twelfth	2 theoreti cal 3 practical	The student should be able to identify turkeys and waterfowl, the importance of breeds, and the importance of production.	theoretical:Turkeys and waterfowl, the importance of breeds and the importance of production practical:Measurem ent of flow in Aquifers	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme nt and report	Short exams, homew ork assignm ents, discussi ons
thirtee nth	2 theoreti cal 3 practical	The student should be able to identify fish, their types, classification, and where they are found.	theoretical:Fish, types, classification, and locations practical:See page in hydraulic structures	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme nt and report	Short exams, homew ork assignm ents, discussi ons
fourtee nth	2 theoreti cal 3 practical	The student should be able to identify the external appearance and biological measurements of fish.	theoretical:External appearance and biological measurements of fish practical:Flow line	theoretical :Auditory methods: writing on the board method, direct	Short exams, homew ork assignm

				dialogue method practical: Assignment and report	ents, discussions
fifteent	2 theoretical 3 practical	The student should be able to identify the fish environment.	theoretical: Fish environment practical: Average rainfall in stations	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

215. Course Evaluation	
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))	
216. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	Principles of Animal Production, authored by Prof. Dr. Naguib Tawfiq Ghazal, Prof. Dr. Nahel Mohammed Ali Suleiman, and Prof. Dr. Rady Khattab Abdullah, 2000
Main References (Sources)	Principles of Animal Production, authored by Prof. Dr. Muhammad Ali Makki Al-Rubaie, 2020, Al-Noor Library
Recommended books and references (scientific journals, reports...)	https://www.arabimpactfactor.com/pages/tafaseljournal.php?id=8466 &date=2022
Electronic references and websites	https://lejan6olabia.site123.me/ https://agr.aswu.edu.eg/sections/animal-and-poultry-production/ https://coagri.uobaghdad.edu.iq/?page_id=15013

Course Description Form

217. Course name:	
Plant physiology	
218. Course code:	
DES153	
219. the chapterAcademic/ year	
First semester	
220. Description preparation date	
221. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
222. Number of credit hours (total) / Number of units (total)	
223. Course Supervisor Name (List all names, if there is more than one)	
the name:Dr. Mohamed Salem Ahmed e-mail: mohameedsa66@ntu.edu.iq	
224. Course objectives	
Goals	أ- The student must be able toGeneral plant identification. ب- The student should be able to identifyThe relationship between soil components and plant condition ت- The student should be able to identify and know the typeThe relationship of the plant with soil water, air, soil temperature and moisture stress. ث- The student should be able to knowGeneral plant physiology
225. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report. 6. Assign teamwork to reveal leadership skills.

226. Course structure					
week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	1 theoretical 3 practical	The student should be able to explain the concept of a plant cell—its components, functions, and characteristics.	theoretical: Plant cell - its components - its functions - its characteristics practical: Learn about laboratory tools and how to prepare chemical solutions.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	**Short exams, homework assignments, discussions**
the second	1 theoretical 3 practical	The student should be able to identify types of solutions—their concentration, solute and solvent, acids, bases, and salts.	theoretical: Types of solutions - their concentration - solute and solvent - acids - bases - salts. practical: Microscope and cell examination - use of light microscope.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	**Short exams, homework assignments, discussions**
the third	1 theoretical 3 practical	Students should be able to understand and comprehend the concepts of diffusion and osmosis.	theoretical: InfluenceROsmosis practical: Detection of some materials in the	theoretical :Auditory methods: writing on the board method, direct	**Short exams, homework**

			cell: carbohydrates - proteins - oils.	dialogue method practical: Assignment and report	**assignments, discussions**
Fourth	1 theoretical 3 practical	The student should be able to explain the concepts of water pressure, absorption, permeability, how they occur, and the factors that influence them.	theoretical: Water potential, infiltration and permeability practical: Experiments applying the laws of diffusion, membrane permeability, and absorption	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	**Short exams, homework assignments, discussions**
Fifth	1 theoretical 3 practical	The student should be able to understand the importance of water, its physical properties, and methods of water absorption.	theoretical: The importance of water - physical properties - methods of water absorption. practical: Experiments that demonstrate mesophilicity, osmotic pressure, and plasma	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	**Short exams, homework assignments, discussions**
Sixth	1 theoretical	The student should be able to understand and comprehend the	theoretical:nutrient absorption practical: Experiments	theoretical :Auditory methods: writing on the board	**Short exams, homew**

	3 practical	concept of nutrient absorption and how it occurs.	demonstrating water transport in xylem and root pressure	method, direct dialogue method practical: Assignment and report	**ork assignments, discussions**
Seventh	1 theoretical 3 practical	The student should be able to understand how sap rises in wood and its importance to plants.	theoretical: Ascent of plant sap in wood (ascending xylem) practical: Experiments illustrating the process of transport in the phloem	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	**Short exams, homework assignments, discussions**
The eighth	1 theoretical 3 practical	The student should be able to explain the concept of transport in the bark, how it occurs, the factors that influence it, and its importance to plants.	theoretical: phloem transport (descending tissue) practical: Study of stomata and the process of transpiration, and experiments that demonstrate the occurrence of transpiration in leaves.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	**Short exams, homework assignments, discussions**

Ninth	1 theoretical 3 practical	Students should be able to explain the concepts of transpiration, estimate the transpiration coefficient and rate, and explain the mechanism of stomatal opening and closing.	theoretical: Transpiration process - Estimation of transpiration coefficient and rate - Mechanism of opening and closing stomata. practical: Study of photosynthesis - Methods of measuring photosynthesis.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	**Short exams, homework assignments, discussions**
tenth	1 theoretical 3 practical	The student should be able to analyze the process of photosynthesis and its mechanisms in green plastids.	theoretical: Photosynthesis process - source of oxygen molecule - light reactions. practical: Experiments that demonstrate the process of breathing	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	**Short exams, homework assignments, discussions**
eleventh	1 theoretical 3 practical	The student should be able to explain the relationship between photosynthesis and cellular respiration in the metabolic balance of plants.	theoretical:Photosynthesis - Dark reactions - Fixation methodsCO2- Factors affecting the process of photosynthesis. practical: Growth measurements: leaf area - wet and dry weight	theoretical :Auditory methods: writing on the board method, direct dialogue method	**Short exams, homework assignments,**

				practical: Assignment and report	**discussions**
twelfth	1 theoretical 3 practical	The student should be able to explain the process of cellular respiration and its importance in energy production for plants.	theoretical: Respiration process. Importance - Formation of pyruvic acid - Krebs cycle. practical: Total yield, biological yield, and yield per plant measurements	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	**Short exams, homework assignments, discussions**
thirteenth	1 theoretical 3 practical	The student should be able to analyze the role of plant hormones (auxins, cytokinins, gibberellins, abscisic acid, ethylene) in growth and development.	theoretical: plant growth regulators practical: Applications of growth regulators in agriculture	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	**Short exams, homework assignments, discussions**
fourteenth	1 theoretical 3 practical	Students should be able to evaluate the impact of environmental and agricultural factors on growth and	theoretical: Plant growth and factors affecting it. practical: Plant tissue culture experiments	theoretical :Auditory methods: writing on the board method, direct	**Short exams, homework assign**

		productivity from a physiological perspective.		dialogue method practical: Assignment and report	**ments, discussions**
fifteenth	1 theoretical 3 practical	Students should be able to explain plant responses to environmental stresses (drought, salinity, heat, cold).	theoretical: Plant response to environmental stress conditions - drought - heat stress - low temperature damage. practical: Scientific films about plant physiology.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	**Short exams, homework assignments, discussions**

227. Course Evaluation

((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))

228. Learning and Teaching Resources

Required textbooks (curriculum books, if available)	
Main References (Sources)	Fundamentals of Plant Nurseries and plant propagation
Recommended books and references (scientific journals, reports...)	
Electronic references and websites	Central Library Scientific search engines - Internet

Course Description Form

229. Course name:	
Field crops	
230. Course code:	
DES154	
231. the chapterAcademic/ year	
232. Description preparation date	
233. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
234. Number of credit hours (total) / Number of units (total)	
235. Course Supervisor Name (List all names, if there is more than one)	
the name: Mr. Ziad Amer Mustafa e-mail: .Iec96.Zeyad@ntu.edu.iq	
236. Course objectives	
Goals	1. The student should be able to distinguish field crop seeds. 2. The student should be able to identify soil service processes. 3. The student should be able to identify crop service operations.
237. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report. 6. Assign teamwork to reveal leadership skills.
238. Course structure	

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	2 theoretical 3 practical	The student should be able to explain the concept of field crops and their economic, nutritional, and industrial importance.	theoretical: field crops practical: Distinctive plant specifications	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the second	2 theoretical 3 practical	The student should be able to classify field crops according to groups (cereals, legumes, fibers, oilseeds, fodder).	theoretical: Field crop division practical: Crop seed discrimination	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the third	2 theoretical 3 practical	Students should be able to explain the phenological stages of growth in cereal crops (wheat, barley, corn).	theoretical: Botanical description of the most important field crop families practical: crop seed germination	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments,

				practical: Assignment and report	discussions
Fourth	2 theoretical 3 practical	The student should be able to identify the environmental requirements (soil, climate) for each group of crops.	theoretical: Environmental factors and their relationship to field crop growth practical: Soil service operations	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Fifth	2 theoretical 3 practical	Students should be able to analyze the basic agricultural processes involved in growing cereal crops (plowing, sowing, fertilizing, irrigation).	theoretical: Grain cultivation techniques practical: Field training on sowing or calibrating seeders	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Sixth	2 theoretical 3 practical	Students should be able to compare the productive characteristics of legume crops (beans, lentils,	theoretical: Agricultural and nutritional characteristics of legumes. practical:	theoretical :Auditory methods: writing on the board method, direct	Short exams, homework

		chickpeas, soybeans).	Study legume seed samples and compare their sizes.	dialogue method practical: Assignment and report	assignments, discussions
Seventh	2 theoretical 3 practical	Students should be able to explain the agricultural role of legumes in improving soil fertility through biological nitrogen fixation.	theoretical: Radical contract and vital stabilization. practical: Observation of root nodules in leguminous crops under a microscope.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
The eighth	2 theoretical 3 practical	Students should be able to analyze the physiological characteristics of fiber crops (cotton, flax) and their cultivation requirements.	theoretical: Fiber productivity and quality. practical: Identify samples of cotton and linen fibers.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Ninth	2 theoretical	Students should be able to distinguish oil crops (sunflower,	theoretical: The economic value of oil crops. practical:	theoretical :Auditory methods: writing on the board	Short exams, homew

	3 practical	sesame, canola) in terms of requirements and productivity.	Extracting vegetable oils using simple methods.	method, direct dialogue method practical: Assignment and report	ork assignments, discussions
tenth	2 theoretical 3 practical	Students should be able to explain the morphological and productive characteristics of fodder crops (clover, barley, corn, sorghum).	theoretical: Nutritional and productive characteristics of feed. practical: Identification of fresh and dried forage plant samples.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
eleventh	2 theoretical 3 practical	Students should be able to explain the impact of agricultural practices (fertilization, irrigation, pest control) on improving crop productivity.	theoretical: Integrated crop management. practical: An experimental study on crop response to fertilization.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

twelfth	2 theoretical 3 practical	Students should be able to analyze production problems and challenges facing field crop cultivation (drought, salinity, pests).	theoretical: The impact of environmental stresses on crops. practical: Observing stress symptoms on plants in the field or laboratory.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
thirteenth	2 theoretical 3 practical	Students should be able to apply modern and sustainable agricultural practices in field crop management.	theoretical: Sustainable agriculture and resource conservation. practical: Implementation of a pilot crop rotation system.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
fourteenth	2 theoretical 3 practical	Students should be able to design integrated crop management programs to increase production efficiency.	theoretical: Integrated crop management. practical: Prepare a plan for managing a specific crop.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme	Short exams, homework assignments,

				nt and report	discussi ons
fifteen th	2 theoreti cal 3 practical	Students should be able to assess the impact of climate change and agricultural management on the productivity and quality of field crops.	theoretical: Climate change and smart agriculture. practical: Discussion of a case study on crop cultivation under changing climatic conditions.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme nt and report	Short exams, homew ork assignm ents, discussi ons

239. Course Evaluation	
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))	
240. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	Principles of field crops Dr. Majeed Mohsen Al-Ansari Dr. Abdul Majeed Ahmed Al-Younes
Main References (Sources)	Field Crops Production Books by Mohsen Al-Janabi
Recommended books and references (scientific journals, reports...)	
Electronic references and websites	

Course Description Form

241. Course name:	
Geologic	
242. Course code:	
DES155	
243. the chapterAcademic/ year	
First semester	
244. Description preparation date	
245. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
246. Number of credit hours (total) / Number of units (total)	
247. Course Supervisor Name (List all names, if there is more than one)	
the name:M.M. Omar Younis Hassan e-mail: Mti.lec224.omar@ntu.edu.iq	
248. Course objectives	
Goals	1. The student should be able to identify soil geology and its branches. 2. The student should be able to identify the branches. Basic Geology and the contributions of Arab scientists in the science of the earth. 3. The student should be able to identify the covers. the earth And chemical bonds. 4. The student should be able to identify crystals, minerals, rocks and water in nature.
249. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report.

	6. Assign teamwork to reveal leadership skills.

250. Course structure

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	2 theoretical 3 practical	Students will be able to define geology and describe its branches.	Theory: Introduction to geology. Practical: Familiarization with laboratory and field work tools.	theoretical: Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the second	2 theoretical 3 practical	Students will be able to explain the stages of the Earth's formation and interpret its geological evolution.	Theory: The origin of the Earth and its geological evolution. Practical: Exercises in drawing cross-sections of the Earth and its structure.	theoretical: Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the third	2 theoretical	Students will be able to distinguish minerals according to	Theory: Minerals: definition, physical and chemical properties.	theoretical: Auditory methods: writing on the board	Short exams, homewo

	3 practical	their physical and chemical properties.	Practical: Identification of simple mineral samples.	method, direct dialogue method practical:Assignment and report	rk assignments, discussions
Fourth	2 theoretical 3 practical	Students will be able to classify igneous rocks and explain how they are formed.	Theory: Igneous rocks: types, formation methods, examples. Practical: Studying igneous rock slices under a microscope.	theoretical: Auditory methods: writing on the board method, direct dialogue method practical:Assignment and report	Short exams, homework assignments, discussions
Fifth	2 theoretical 3 practical	Students will be able to describe types of sedimentary rocks and explain the conditions under which they are formed.	Theory: Sedimentary rocks: their origin, economic importance. Practical: Distinguishing sedimentary samples (limestone, sandstone, etc.).	theoretical: Auditory methods: writing on the board method, direct dialogue method practical:Assignment and report	Short exams, homework assignments, discussions
Sixth	2 theoretical 3 practical	Students will be able to distinguish between metamorphic rocks and	Theory: Metamorphic rocks: definition, examples, properties.	theoretical: Auditory methods: writing on the board method, direct	Short exams, homework

		explain their transformation processes.	Practical: Observations on metamorphic samples.	dialogue method practical: Assignment and report	assignments, discussions
Seventh	2 theoretical 3 practical	Students will be able to explain the rock cycle and its relationship to geological processes.	Theoretical: The rock cycle and its relationship to geological processes. Practical: Drawing the rock cycle.	theoretical: Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
The eighth	2 theoretical 3 practical	Students will be able to describe the layers of the Earth (crust, mantle, core) and their characteristics.	Theoretical: Internal structure of the Earth (crust, mantle, core). Practical: Three-dimensional models of Earth's layers.	theoretical: Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Ninth	2 theoretical 3 practical	Students will be able to explain the theory of plate tectonics and relate it to continental drift.	Theoretical: Geomorphology: internal and external processes affecting the Earth's surface. Practical:	theoretical: Auditory methods: writing on the board method, direct	Short exams, homework assignm

			Analysis of satellite images/topographic maps.	dialogue method practical:Assignment and report	ents, discussions
tenth	2 theoretical 3 practical	Students will be able to analyze the causes of earthquakes and volcanoes and explain their effects.	Theoretical: Tectonic plates and continental drift. Practical: Drawing tectonic maps.	theoretical: Auditory methods: writing on the board method, direct dialogue method practical:Assignment and report	Short exams, homework assignments, discussions
eleventh	2 theoretical 3 practical	Students will be able to explain the geomorphological processes that influence the formation of the Earth's surface.	Theoretical: Earthquakes and volcanoes: causes and effects. Practical: Studying seismic and volcanic maps.	theoretical: Auditory methods: writing on the board method, direct dialogue method practical:Assignment and report	Short exams, homework assignments, discussions
twelfth	2 theoretical 3 practical	Students will be able to explain the relationship between geology, groundwater, and soil.	Theory: Geomorphology: internal and external processes affecting the Earth's surface. Practical:	theoretical: Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments,

			Analysis of satellite images/topographic maps.	practical:Assignment and report	discussions
thirteenth	2 theoretical 3 practical	Students will be able to identify the most important mineral and energy resources and their economic applications.	Theory: Mineral and energy resources: coal, oil, gas. Practical: Study of economic geological samples.	theoretical: Auditory methods: writing on the board method, direct dialogue method practical:Assignment and report	Short exams, homework assignments, discussions
fourteenth	2 theoretical 3 practical	Students will be able to relate geological concepts to agricultural, environmental, and engineering applications.	Theoretical: Applied geology in agriculture, the environment, and engineering. Practical: Field visit/practical report.	theoretical: Auditory methods: writing on the board method, direct dialogue method practical:Assignment and report	Short exams, homework assignments, discussions
fifteenth	2 theoretical 3 practical	Students will be able to integrate their knowledge of geology and apply it to solve practical problems.	General review + discussion of practical reports + final exam.	theoretical: Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments,

				practical: Assignment and report	discussions

251. Course Evaluation	
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))	
252. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	General Geology
Main References (Sources)	
Recommended books and references (scientific journals, reports...)	
Electronic references and websites	

Course Description Form

253. Course name:
Soil management
254. Course code:
DES156
255. the chapter Academic/ year
First semester
256. Description preparation date
257. Available attendance forms
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities
258. Number of credit hours (total) / Number of units (total)
259. Course Supervisor Name (List all names, if there is more than one)
the name:Mr. Omar Younis Hassan e-mail: Mti.lec224.omar@ntu.edu.iq
260. Course objectives

Goals	1. The student should be able to understand and comprehend what is related to soil formation factors and formation processes. 2. The student should be able to identify the morphological characteristics of soil, how to collect soil data from the field, and prepare the samples taken for estimation. 3. The student should be able to measure morphological characteristics in the field, such as color, structure, and humidity. 4. The student should be able to measure the chemical properties of the soil.-colloids-organic matter-exchange capacitance-ion exchange- ph - EC
261. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report.

	6. Assign teamwork to reveal leadership skills.

262. Course structure

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	2 theoretical 3 practical	The student should be able to define the concept of soil management and its importance in sustainable agricultural production.	theoretical: What is soil, the purpose of its study, soil science, its branches, and the basic components of soil. practical: Soil laboratory, definition, tools and equipment used in it, definition of occupational safety requirements and conditions that must be applied	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the second	2 theoretical 3 practical	The student should be able to distinguish the physical, chemical, and biological components of soil and their role in soil fertility.	theoretical: Weathering, its types, factors, and composition of the parent material. practical: Methods of collecting samples, soil type and procedures adopted in its characterization, training on conducting a qualitative description of some	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments , discussions

			morphological characteristics of color, texture and structure		
the third	2 theoretical 3 practical	The student should be able to explain physical processes in soil such as aeration, moisture, and heat.	theoretical: Soil formation and development, soil formation factors practical: Preparing plants for laboratory procedures and analyses	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	**Short exams, homework assignments, discussions**
Fourth	2 theoretical 3 practical	Students will be able to analyze chemical reactions in soil and their effect on nutrient availability.	theoretical: Soil morphology, soil texture, soil horizons, soil color, other morphological properties. practical: Physical properties, moisture content estimation, preparation of saturated dough and identification of its properties.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	**Short exams, homework assignments, discussions**
Fifth	2 theoretical 3 practical	Students should be able to evaluate the role of microorganisms in improving soil fertility and	theoretical: Physical properties of soil and their relationship to plant growth. practical:	theoretical :Auditory methods: writing on the board method, direct	**Short exams, homework**

		recycling nutrients.	Bulk density, true density.	dialogue method practical: Assignment and report	**assignments, discussions**
Sixth	2 theoretical 3 practical	Students should be able to identify indicators of soil degradation such as salinization, compaction, and erosion.	theoretical: Physical properties of soil and their relationship to plant growth. practical: Mechanical analysis of soil by absorbent and hydrostatic methods to estimate texture.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	**Short exams, homework assignments, discussions**
Seventh	2 theoretical 3 practical	Students should be able to explain methods of combating soil degradation and maintaining soil productivity.	theoretical: Liquid phase of soil, soil-water relationship, water constants, soil water classification. practical: Training on preparing standard solutions	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	**Short exams, homework assignments, discussions**
The eighth	2 theoretical 3 practical	Students will be able to apply methods of analyzing soil samples in the laboratory to	theoretical: Soil colloids, clay minerals. practical:	theoretical :Auditory methods: writing on the board method,	**Short exams, homework**

		assess their fertility.	Training on preparing soil suspensions and extracts.	direct dialogue method practical: Assignment and report	**assignments, discussions**
Ninth	2 theoretical 3 practical	Students will be able to develop integrated fertilization strategies to increase the efficiency of nutrient use.	theoretical: Chemical properties of soil, soil reaction, ion exchange, cation exchange capacity. practical: Chemical properties of soil,PH and EC	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	**Short exams, homework assignments, discussions**
tenth	2 theoretical 3 practical	Students should be able to explain methods for improving the physical properties of soil (such as adding organic amendments and agricultural gypsum).	theoretical: Organic matter in soil, its sources, importance, components, and decomposition. practical: organic matter, calcium carbonate	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	**Short exams, homework assignments, discussions**
eleventh	2 theoretical 3 practical	Students should be able to analyze the role of irrigation and drainage techniques in	theoretical: Soil salinity, sources of salinity, causes of salinity, classification of saline soils,	theoretical :Auditory methods: writing on the board method,	**Short exams, homew**

		soil management and fertility maintenance.	reclamation of saline soil, inspection of salinity, etc. practical: Estimation of some nutrients in the soil, potassium, sodium.	direct dialogue method practical: Assignment and report	**ork assign ments, discussi ons**
twelfth	2 theoretical 3 practical	Students should be able to evaluate agricultural practices (crop rotation, tillage, plant cover) in soil improvement.	theoretical: Soil fertility, macro and micro nutrients, their importance, sources, and deficiency symptoms. practical: Dynamic properties of soil.	theoretical:Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	**Short exams, homew ork assign ments, discussi ons**
thirteenth	2 theoretical 3 practical	Students should be able to discuss the role of sustainable soil management in coping with climate change.	theoretical: The relationship between soil, water and plants. practical: Learn about the types of fertilizers and fertilization methods.	theoretical:Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	**Short exams, homew ork assign ments, discussi ons**
fourteenth	2 theoretical	Students should be able to prepare an integrated soil management	theoretical: Soil classification practical: Conducting an	theoretical:Auditory methods: writing on the board	**Short exams, homew**

	3 practical	plan for a specific agricultural system.	experiment in the field of soil regeneration.	method, direct dialogue method practical: Assignment and report	**ork assign ments, discussi ons**
fiftee nth	2 theoreti cal 3 practical	Students should be able to prepare an integrated soil management plan for a specific agricultural system.	theoretical: For Iraqi soil practical: Use of information technology in the study and classification of soil, review of reports submitted by students.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	**Short exams, homew ork assign ments, discussi ons**

263. Course Evaluation
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))

264. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	
Main References (Sources)	
Recommended books and references (scientific journals, reports...)	
Electronic references and websites	

Course Description Form

265. Course name:
English language (2)
266. Course code:
NTU200
267. the chapterAcademic/ year
268. Description preparation date
269. Available attendance forms
1. Weekly lesson schedule (theoretical)). 2. Discussions, scientific seminars, and other extracurricular activities
270. Number of credit hours (total) / Number of units (total)
271. Course Supervisor Name (List all names, if there is more than one)
The name:Mr. Omar Ahmed Fathy e-mail: omar.ah.f@ntu.edu.iq
272. Course objectives

Goals	1. The student should be able to identify all English language skills and knowledge. 2. The student should be able to encourage and develop scientific research in the fields of the English language in general. 3. The student should have the ability to cooperate with local and international organizations in the field of English language development.
273. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Dialogue and discussion. 4. Assign tasks and report. 5. Assign teamwork to reveal leadership skills.
274. Course structure	

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first the second	2 theoretical	Parts of speech, sentence and phrase in English, comprehension	Speech parts, sentences in English, comprehension	Discussion method, lecture method	Short exams, homework assignments, discussions
the third	2 theoretical	The student should be able to recognize proper nouns, indefinite nouns, material nouns, plural nouns, moral nouns, countable and uncountable nouns, definite and indefinite articles.	Proper, common, material, collective, abstract, countable and uncountable nouns, a, an, the.	Discussion method, lecture method	Short exams, homework assignments, discussions
Fourth + Fifth	2 theoretical	The student should be able to identify pronouns and their types: personal, accusative, genitive, possessive, reflexive, demonstrative, relative pronouns, and interrogative pronouns.	Pronouns: types, personal (subject, objective), possessive, reflexive, demonstrative, interrogative, and relative pronouns.	Discussion method, lecture method	Short exams, homework assignments, discussions

Sixth	2 theoretical	The student should be able to identify auxiliary verbs and their types.	Auxiliary verbs, types	Discussion method, lecture method	Short exams, homework assignments, discussions
Seventh	2 theoretical	The student should be able to identify the tenses in the active voice: simple tense: present, past, future.	Tenses in active voice case: simple tense: present, past, future	Discussion method, lecture method	Short exams, homework assignments, discussions
The eighth	2 theoretical	The student should be able to know the continuous tense: present, past, and future.	Continuous tense: present, past, future	Discussion method, lecture method	Short exams, homework assignments, discussions
Ninth	2 theoretical	The student should be able to know the perfect tense: present, past, and continuous.	Perfect tense: present, past, future	Discussion method, lecture method	Short exams, homework assignments, discussions
tenth	2 theoretical	The student should be able to know Perfect Continuous Tense: Present, Past, Future	Continuous perfect tense: present, past, future	Discussion method, lecture method	Short exams, homework assignments, discussions

eleventh + twelfth	2 theoretical	The student should be able to know Adjectives: proper nouns, possessive adjectives, descriptive adjectives, long adjectives, short adjectives, comparative adjectives and similes	Adjectives: names, possessive, descriptive, long, and short adjective. Comparison and similarity	Discussion method, lecture method	Short exams, homework assignments, discussions
thirteenth + fourteenth	2 theoretical	The student should be able to identify the sounds in the English language: consonants, vowels.	English sounds: constants, vowels	Discussion method, lecture method	Short exams, homework assignments, discussions
fifteenth	2 theoretical	A comprehensive review of all the material's vocabulary	Review of the article	Discussion method, lecture method	Short exams, homework assignments, discussions
Course Evaluation					
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))					
275. Learning and Teaching Resources					
Required textbooks (curriculum books, if available)	Rapid Rewiw				
Main References (Sources)	English Grammar				

Recommended books and references (scientific journals, reports...)	Eurasea Article
Electronic references and websites	Lib.gin

Course Description Form

276. Course name:	
Computer Principles (2)	
277. Course code:	
NTU201	
278. the chapterAcademic/ year	
First semester	
279. Description preparation date	
280. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
281. Number of credit hours (total) / Number of units (total)	
282. Course Supervisor Name (List all names, if there is more than one)	
the name:M.M. Manhal Mohammed Bashir e-mail: manhalbasher@ntu.edu.iq	
283. Course objectives	
Goals	1. The student must be able to:Introduction to the Calculator - Generations of the Calculator - Hardware and Software Components 2. The student should be able to identify With the most important basic information about computers, computer generations, and operating systems. 3. The student should be able to know: Operating system MS-Dos, system concept, system flag, disks, directories and their levels, files, internal and external commands.
284. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical training. 4. Dialogue and discussion. 5. Assign tasks and report. 6. Assign teamwork to reveal leadership skills.

285. Course structure					
week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	1 theoretical 1 practical	The importance of computers in our daily and economic lives Knowledge of information technology and learning the parts and units of a computer	Introduction to computer Basic Concepts in Information Technology computer system information technology Types of computers computer parts Input and output units memory CPU	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the second	1 theoretical 1 practical	Learn about computer hardware and memory types	Equipment Computer and logic units Recorders control unit Input unit units of tax Memory, Storage, and Performance Main memory types	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the third	1 theoretical 1 practical	Learn how to represent data, what units of measurement are, learn about software and	Data representation in memory Memory unit Secondary memory and its types	theoretical :Auditory methods: writing on the board method,	Short exams, homework

		translators, and learn about types of operating systems.	storing data in memory Computer performance Software Systems software (programming languages) Translations, Interpreters, Operating Systems Types of operating systems Application software	direct dialogue method practical: Assignment and report	assignments, discussions
Fourth	1 theoretical 1 practical	Exam on the subject	Theoretical exam (1)	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Fifth	1 theoretical 1 practical	Getting to know Windows	Windows (windows) Use the mouse, minimize and maximize windows, close windows	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments,

				practical: Assignment and report	discussions
Sixth	1 theoretical 1 practical	Learn about moving windows and how to control them.	Move windows from one place to another, control window size, taskbar, date and time	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Seventh	1 theoretical 1 practical	Learn about the main Windows icons	Start keyStart Menu Programs Programs My documentsMy Document	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
The eighth	1 theoretical 1 practical	Learn about non-essential shortcut icons	Desktop Create a shortcut icon for an application or file Recycle Bin Windows Explorer Formatting floppy disks	theoretical :Auditory methods: writing on the board method, direct	Short exams, homework assignm

				dialogue method practical: Assignment and report	ents, discussions
Ninth	1 theoretical 1 practical	Identify the operations performed on the file	File arrangement Select, select folder, create folder, rename, delete file, copy file, move file	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
tenth	1 theoretical 1 practical	Screen and mouse settings explained	Screen settings Stop screen Change mouse pointer Mouse speed control Double-click speed control	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
eleventh	1 theoretical 1 practical	Knowing how to install and remove programs from your hard drive	Software Installation and Uninstallation Disk Information, Request Help	theoretical :Auditory methods: writing on the board method, direct	Short exams, homework assignm

				dialogue method practical: Assignment and report	ents, discussions
twelfth	1 theoretical 1 practical	Exam on the subject	Monthly exam (2)	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
thirteenth	1 theoretical 1 practical	Knowledge and practical application	Calculator / Notebook / Notebook / Use the notebook to edit and create the file Painter / Screen Components	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
fourteenth	1 theoretical 1 practical	Learn how to create and manage graphics.	Create drawings / Specify foreground and background colors / Choose brush stroke size / Select and select the drawing tool / Save the drawing /	theoretical :Auditory methods: writing on the board method, direct	Short exams, homework assignm

			Make the drawing a desktop background / Finish the drawing Entertainment programs Media player	dialogue method practical: Assignment and report	ents, discussions
fifteenth	1 theoretical 1 practical	Learn about types of viruses and ways to protect against them	Viruses / Reason for the name / Definition / Methods of virus spread / Symptoms of virus infection / Methods of protection / Types of viruses Computer crimes / Theft / Hackers	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

286. Course Evaluation

((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))

287. Learning and Teaching Resources

Required textbooks (curriculum books, if available)	Metzeelaer and Scharpf/Benjamin/Cummings Pub. 1995
Main References (Sources)	Library, scientific websites on the Internet, viewing lectures from other universities
Recommended books and references (scientific journals, reports...)	Internet
Electronic references and websites	

Course Description Form

288. Course name:
Arabic language
289. Course code:
NTU202
290. the chapterAcademic/ year
291. Description preparation date
292. Available attendance forms
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities
293. Number of credit hours (total) / Number of units (total)
294. Course Supervisor Name (List all names, if there is more than one)
the name:Mr. Amna Maher Aziz e-mail: amina.mahir@ntu.edu.iq
295. Course objectives

Goals	1. The student should be able to understand and comprehend what is related to the chemical properties of soil. 2. The student will be able to choose the appropriateness of the factors affecting knowledge and study of the most important chemical reactions that occur in the soil. 3. The student should be able to identify and know the basics of detecting the type of minerals that control dissolution and precipitation. 4. The student should be able to identify the factors affecting chemical reactions.
296. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report. 6. Assign teamwork to reveal leadership skills.

297. Course structure					
week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the firs	2 theoretical	1. Identify types of linguistic errors. 2. Differentiating between the open taa and the closed taa	Introduction to linguistic errors-The closed taa and the open taa	theoretical :Auditory methods: writing on the board method, direct dialogue method	**Short exams, homework assignments, discussions**
the second	2 theoretical	1. Differentiating between writing the extended alif and the short alif and the places where the two alifs are written 2. Differentiating between solar and lunar letters	Rules for writing the extended and shortened alif - solar and lunar letters	theoretical :Auditory methods: writing on the board method, direct dialogue method	**Short exams, homework assignments, discussions**
the third	2 theoretical	Differentiate betweenDad and Tha	Dad and Tha	theoretical :Auditory methods: writing on the board method, direct dialogue method	**Short exams, homework assignments,**

					discussi ons
Fourth	2 theoreti cal	Enabling the student to Writing the hamza Correct writing	Writing the hamza	theoretical :Auditory methods: writing on the board method, direct dialogue method	**Short exams, homew ork assign ments, discussi ons**
Fifth	2 theoreti cal	Get to know Signs Punctuation And write it in the correct place	punctuation marks	theoretical :Auditory methods: writing on the board method, direct dialogue method	**Short exams, homew ork assign ments, discussi ons**
Sixth	2 theoreti cal	1. Identify the noun and the verb and state the sign of each. 2. Differentiating between nouns and verbs	Noun, verb, and the difference between them	theoretical :Auditory methods: writing on the board method, direct dialogue method	**Short exams, homew ork assign ments,**

		3. Explaining the types of verbs 4. Differentiating between types of verbs			**discussi ons**
Seventl	2 theoreti cal	Recognizing the types of objects and differentiating between them	Effects	theoretical :Auditory methods: writing on the board method, direct dialogue method	**Short exams, homew ork assign ments, discussi ons**
The eighth	2 theoreti cal	Enabling the student to write numbers correctly	number	theoretical :Auditory methods: writing on the board method, direct dialogue method	**Short exams, homew ork assign ments, discussi ons**
Ninth	2 theoreti cal	Get to know Common language errorsAnd avoid it	Common language errors applications	theoretical :Auditory methods: writing on the board method, direct	**Short exams, homew ork**

				dialogue method	**assign ments, discussi ons**
tenth	2 theoreti cal	Get to know Common language errors And avoid it	Common language errors applications	theoretical :Auditory methods: writing on the board method, direct dialogue method	**Short exams, homew ork assign ments, discussi ons**
eleven h	2 theoreti cal	1. Differentiating between the letter noon and the letter tanween 2. Recognizing the meanings of prepositions	Noon and Tanween - Meanings of Prepositions	theoretical :Auditory methods: writing on the board method, direct dialogue method	**Short exams, homew ork assign ments, discussi ons**
twelfth	2 theoreti cal	Get to know Formal aspects of administrative discourse	Formal aspects of administrative discourse	theoretical :Auditory methods: writing on the board method, direct	**Short exams, homew ork**

				dialogue method	**assign ments, discussi ons**
thirteen th	2 theoreti cal	Getting to know the language of administrative discourse	Language of administrative discourse	theoretical :Auditory methods: writing on the board method, direct dialogue method	**Short exams, homew ork assign ments, discussi ons**
fourtee nth	2 theoreti cal	Getting to know the language of administrative discourse	Language of administrative discourse	theoretical :Auditory methods: writing on the board method, direct dialogue method	**Short exams, homew ork assign ments, discussi ons**
fifteen h	2 theoreti cal	Get to know Models From administrative correspondence	Models From administrative correspondence	theoretical :Auditory methods: writing on the board method, direct	**Short exams, homew ork**

				dialogue method	**assign ments, discussi ons**

298. Course Evaluation	
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))	
299. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	Required books: General Arabic Language Book for Technical Universities(Dr. Safaa Kazim MakkiandDr. Lama Mohammed Younis
Main References (Sources)	5- Clear Dictation: Abdul Majeed Al-Naimi, Daham Al-Kayyal, Dar Al-Mutanabbi Library, Baghdad, 6th edition, 1987 AD. 6- Lessons in language, grammar and spelling for state employees: Ismail Hamoud Atwan and others, Ministry of Education Press No. (3), Baghdad, 2nd ed., 1984 AD. 7- Arabic Language for the Third Intermediate Grade: Fatima Nazim Al-Attabi, and others, 1st ed., 2018 AD. 8- General Arabic for Non-Specialization Departments: Abdul Qader Hassan Amin and others, Ministry of Higher Education and Scientific Research, 2nd ed., 2000. Inspired by Arabic Literature: Hafal Muhammad Amin, Al-Saadoun Press, Baghdad.
Recommended books and references (scientific journals, reports...)	Lessons in language, grammar and spelling for state employees, Ismail Hamoud Atwan and others, Ministry of Education Press No. (3), Baghdad, 2nd ed., 1984 AD.
Electronic references and websites	

Course Description Form

300. Course name:	
Baath regime crimes in Iraq	
301. Course code:	
NTU203	
302. the chapter Academic/ year	
303. Description preparation date	
304. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
305. Number of credit hours (total) / Number of units (total)	
306. Course Supervisor Name (List all names, if there is more than one)	
the name: Dr. Ahmed Fares Al-Sawaf e-mail: ahmedalsawaf@ntu.edu.iq	
307. Course objectives	
Goals	1. The student must be able to understand and comprehend.theBasic concepts related to the definition of crimes, their types and divisions. 2. The student must be able to:Defining the crimes and violations of the former regime and the types of international crimes 3. The student must be able to:Defining mass grave crimes and violations of Iraqi laws 4. The student must be able to:Addressing environmental crimes, the destruction of cities, demographic change policies, and extrajudicial detention.
308. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Dialogue and discussion. 4. Assign tasks and report.

			5. Assign teamwork to reveal leadership skills.		
309. Course structure					
week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the firs	2 theoretical	theoretical: The student should be familiar with the concept of crimes and their types.	theoretical: - Crimes of the Ba'ath regime according to the Iraqi High Criminal Court Law of 2005 - The concept of crimes and their types - Definition of crime in language and terminology	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
the second	2 theoretical	theoretical: The student should be able to identify the crimes of the Baath regime according to the Criminal Court.	theoretical: - Crime sections - Crimes of the Ba'ath regime as documented by the Iraqi Supreme Criminal Court Law of 2005	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
the third	2 theoretical	theoretical: The student should be able to identify the types of international crimes.	theoretical: - Types of international crimes - DecisionsIssuedFrom the	theoretical :Auditory methods: writing on the board method, direct	Short exams, homework

			Supreme Criminal Court	dialogue method	assignments, discussions
Fourth	2 theoretical	theoretical: The student should be able to distinguish between psychological and social crimes.	theoretical: − Psychological and social crimes and their effects. − Psychological crimes − Mechanisms of psychological crimes Psychological effects of crimes	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
Fifth	2 theoretical	theoretical: The student should be able to identify social crimes and the Baath regime's position on religion.	theoretical: - Social crimes - Militarization of society The Baath regime's position on religion	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
Sixth	2 theoretical	theoretical: The student should be able to identify violations of Iraqi laws and their forms.	theoretical: − Violations of Iraqi laws Images of human rights violations and crimes of power	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
Seventh	2 theoretical	theoretical: The student should be able to identify political and	theoretical: Some decisions on the political and military violations of the Baath regime	theoretical :Auditory methods: writing on the board method,	Short exams, homework

		military violations.		direct dialogue method	assignments, discussions
The eighth	2 theoretical	theoretical: The student should be able to identify prison and detention centers.	theoretical: Baath regime prisons and detention centers	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
Ninth	2 theoretical	theoretical: The student should be able to identify the environmental crimes of the Baath regime.	theoretical: Environmental crimes of the systemResurrection In Iraq	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
tenth	2 theoretical	theoretical: The student should be able to understand war pollution and mine explosions.	theoretical: War pollution, radioactivity, and mine explosions	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
eleventh	2 theoretical	theoretical: The student should be able to identify the scorched earth policy.	theoretical: - Destruction of cities and villages scorched earth policy	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions

twelfth	2 theoretical	theoretical: The student should be able to identify how to clear palm groves.	theoretical: − draining the marshes Bulldozing palm groves, trees and crops	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
thirteenth	2 theoretical	theoretical: The student should be able to identify mass graves.	theoretical: − Mass grave crimes − theTMass graves corporal	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
fourteenth	2 theoretical	theoretical: The student should be able to identify the mass graves committed by the Baath regime.	theoretical: Mass graves and genocide committed by the Baath regime	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
fifteenth	2 theoretical	My theory: The student should be able to chronologically classify genocide graves.	theoretical: Chronological classification of genocide graves in Iraq	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
310. Course Evaluation					

((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))	
311. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	
Main References (Sources)	Private publicationsCrimes and Penal Codeand available human rightsinCollege Library and University Central Library
Recommended books and references (scientific journals, reports...)	
Electronic references and websites	Human rights websites.

Course Description Form

312. Course name:	
Professional ethics	
313. Course code:	
NTU204	
314. the chapterAcademic/ year	
First semester	
315. Description preparation date	
1\7\2025	
316. Available attendance forms	
1. Weekly lesson schedule (theoretical). 2. Discussions, scientific seminars, and other extracurricular activities	
317. Number of credit hours (total) / Number of units (total)	
318. Course Supervisor Name (List all names, if there is more than one)	
the name:Dr. Ahmed Fares Al-Sawaf e-mail: ahmedalsawaf@ntu.edu.iq	
319. Course objectives	
Goals	1. Introducing students to the concepts of occupational safety and health and their importance in protecting people, property, and the environment.. 2. Identify the types of hazards (electrical, mechanical, chemical, physical, biological, etc.) and ways to prevent them.. Providing students with knowledge of local and international regulations and laws related to occupational safety and health..
320. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Dialogue and discussion. 4. Assign tasks and report. 5. Assign teamwork to reveal leadership skills.

321. Course structure					
week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the firs	2 theoretical	theoretical: The student should be able to define ethics and law.	theoretical: Ethics and Law	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments , discussions
the second	2 theoretical	theoretical: The student should be able to define ethics and ethical analysis.	theoretical: Ethics and moral analysis	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments , discussions
the thir	2 theoretical	theoretical: The student should be able to defineEthics and professions	theoretical: Ethics and professions	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments , discussions
Fourth	2 theoretical	theoretical: The student should be able to identify	theoretical: Anonymity, security, privacy, and civil liberties	theoretical :Auditory methods: writing on the board	Short exams, homework

		privacy and civil liberties.		method, direct dialogue method	assignments , discussions
Fifth	2 theoreti cal	theoretical: The student should be able to identify intellectual property rights and computer technology.	theoretical: Intellectual Property Rights and Computer Technology	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments , discussions
Sixth	2 theoreti cal	theoretical: The student should be able to defineThe concept of cybercrime and Iraqi law	theoretical: The concept of cybercrime and the corresponding Iraqi law	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments , discussions
Seventl	2 theoreti cal	theoretical: The student should be able to identify types of attacks on computer systems.	theoretical: Types of attacks on computer systems	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments , discussions
The eighth	2 theoreti cal	theoretical: exam	theoretical: exam	theoretical :Auditory methods: writing on	Short exams,

				the board method, direct dialogue method	homework assignments , discussions
Ninth	2 theoretical	theoretical: The student should be able to identify the motives behind computer crimes.	theoretical: Motives of computer crimes	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments , discussions
tenth	2 theoretical	theoretical: The student should be able to identify the social costs and consequences.	theoretical: Social costs and consequences	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments , discussions
eleventh	2 theoretical 3 practic	theoretical: The student should be able to understand computer crime prevention strategies.	theoretical: Computer Crime Prevention Strategies	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme	Short exams, homework assignments , discussions

				nt and report	
twelfth	2 theoretical 3 practica	theoretical: The student should be able to defineElectronic Crimes Law	theoretical: Iraqi Cybercrime Law	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments , discussions
thirteenth	2 theoretical	Theoretical: Students should be able to define the concept of cybercrime and the corresponding Iraqi law.	Theoretical: The concept of cybercrime and the corresponding Iraqi law	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments , discussions
fourteenth	2 theoretical	Theoretical: Students should be able to define the costs and social consequences.	Theoretical: Costs and social consequences	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments , discussions
fifteenth	2 theoretical	Theoretical: Students should be able to define the motives behind computer crimes.	Theoretical: Motives for computer crimes	theoretical :Auditory methods: writing on the board method, direct	Short exams, homework assignments

				dialogue method	, discussions

322. Course Evaluation
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))

323. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	
Main References (Sources)	
Recommended books and references (scientific journals, reports...)	
Electronic references and websites	

Course Description Form

324. Course name:
Organic Chemistry
325. Course code:
TAMO201
326. the chapterAcademic/ year
First semester
327. Description preparation date
328. Available attendance forms
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities
329. Number of credit hours (total) / Number of units (total)
330. Course Supervisor Name (List all names, if there is more than one)
the name:Mr. Omar Ahmed Fathy e-mail: omar.ah.f@ntu.edu.iq
331. Course objectives

Goals	1. Gaining student awarenessImportantlyOrganic chemistry at the industrial and agricultural levels 2. To provide the student with a broad and balanced foundation of knowledge and skills in organic chemistry. 3. Developing students' ability to apply their chemical knowledge and skills to solve theoretical and practical problems in chemistry that serve sustainable development goals.
332. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report. 6. Assign teamwork to reveal leadership skills.
333. Course structure	

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	2 theoretical 3 practical	theoretical: The student learns the concept of organic chemistry and its importance in various areas of life. practical: The student determines the melting point.	theoretical: General principles of organic chemistry. practical: Set the degree of integrationR.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the second	2 theoretical 3 practical	theoretical: The student is familiar with the importance of the specific properties, naming and reactions of alkanes. practical: The student determines the boiling point.	theoretical: Saturated hydrocarbons (alkanes) practical: Setting the boiling point	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the third	2 theoretical 3 practical	theoretical: The student learns about the types of alkenes and how to prepare them. practical:	theoretical: Unsaturated hydrocarbons (alkenes) practical: Purification of liquid organic	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions

		The student uses a simple distillation apparatus.	compounds by simple distillation	practical: Assignment and report	
Fourth	2 theoretical 3 practical	theoretical: The student understands the types of reactions involving alkenes and dienes. practical: The student learns about the types of solvents used for recrystallization.	theoretical: Alkene reactions and diene types practical: Recrystallization + Scientific Visit	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Fifth	2 theoretical 3 practical	theoretical: The student learns about the types of alkynes in terms of nomenclature and method of preparation. practical: The student learns how to purify organic compounds by sublimation.	theoretical: Alkynes (acetylenes) practical: sublimation	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

Sixth	2 theoretical 3 practical	theoretical:The student learns about the physical and chemical properties of aromatic compounds and how to name them. practical: The student performs a practical procedure on how to extract solid and liquid organic compounds by solvent extraction.	theoretical:Properties and nomenclature of aromatic compounds practical: Solvent extraction	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Seventh	2 theoretical 3 practical	theoretical:The student understands the methods of preparing aromatic compounds and the types of their reactions. practical: Methane gas preparation in the laboratory	theoretical: Preparation and reactions of aromatic compounds. practical: Methane gas preparation	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
The eighth	2 theoretical	theoretical:The student learns the properties and naming of	theoretical: Properties and nomenclature of	theoretical :Auditory methods: writing on	Short exams,

	3 practical	alcohols and phenols. practical: The student learns how to prepare biotin.	alcohols and phenols practical: Biotin preparation	the board method, direct dialogue method practical: Assignment and report	homework assignments, discussions
Ninth	2 theoretical 3 practical	theoretical:The student is familiar with the methods of preparing and reacting alcohols and phenols. practical: The student carries out a practical application to prepare acetylene gas.	theoretical: Preparation and reactions of alcohols and phenols practical: Preparation of acetylene gas	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
tenth	2 theoretical 3 practical	theoretical:The student learns about ethers, how to prepare them, and the types of their reactions. practical: The student carries out a practical application to detect types of alcohols.	theoretical: Ethers practical: Study of the properties of alcohols	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

eleventh	2 theoretical 3 practical	theoretical: The student learns how to name and prepare aldehydes. practical: The student performs a practical application on how to distinguish between aldehydes and ketones.	theoretical: Preparation, nomenclature, and reactions of aldehydes practical: Aldehyde and ketone detection reaction	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
twelfth	2 theoretical 3 practical	theoretical: The student learns how to name, react, and prepare ketones. practical: The student performs a practical procedure on how to prepare acetone.	theoretical: Preparation, naming, and reactions of ketones practical: Acetone preparation	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
thirteenth	2 theoretical 3 practical	theoretical: The student learns about carboxylic acids and studies their chemical properties. practical: The student tries a practical	theoretical: Properties and nomenclature of carboxylic acids practical: Preparation of propanoic acid	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions

		application on how to prepare propanoic acid.		practical: Assignment and report	
fourteenth	2 theoretical 3 practical	theoretical: The student understands the types of reactions and methods of preparing carboxylic acids. practical: The student applies how to prepare propane aldehyde.	theoretical: Reactions and preparation of carboxylic acids practical: Preparation of propane dehyde	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
fifteenth	2 theoretical 3 practical	theoretical: The student understands the importance of amines. practical: The student is familiar with methods of detecting elements.	theoretical: Amines practical: Reveal the elements	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

334. Course Evaluation
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))

335. Learning and Teaching Resources	
Required textbooks	Organic Chemistry Authored by: Prof. Dr. Salem Hamid Hussein, Prof. Dr. Sami Abdul Ali, Asst. M. Khaled Fathi Al-Shahri / University of Mosul (2013) Dar Al-Kutub for Printing and Publishing

(curriculum books, if available)	
Main References (Sources)	Organic Chemistry, authored by: Dr. Badie Ali Ahmed, Dr. Salem Hamed, and Mr. Khaled Fathi Al-Shahri, printed in Mosul University Press (1991).
Recommended books and references (scientific journals, reports...)	Principles of Organic Chemistry, authored by Prof. Dr. Mohamed Magdy Wasil/Cairo Fundamentals of Organic Chemistry, authored by Prof. Dr. Mohamed Magdy Wasil
Electronic references and websites	https://arabian-chmistry.com https://scholar.google.com

Course Description Form

336. Course name:					
Agricultural statistics					
337. Course code:					
TAMO202					
338. the chapter Academic/ year					
339. Description preparation date					
1\7\2025					
340. Available attendance forms					
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities					
341. Number of credit hours (total) / Number of units (total)					
342. Course Supervisor Name (List all names, if there is more than one)					
the name:Dr. AsaadIbrahimMustafa e-mail:					
343. Course objectives					
Goals	1. The student should be able to define science. Statistics. 2. To be able to understand methods of measuring variance, averages and tests.F,T,Z 3. The student should be able to know how toFindDifferences and averages when making comparisonsStatistics.				
344. Teaching and learning strategies					
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report. 6. Assign teamwork to reveal leadership skills.				
345. Course structure					
week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method

the first	2 theoretical 3 practical	theoretical: The student should be able to define the principle of statistics. practical: Solving exercises and mathematical problems in statistics	theoretical: Introduction to Statistics practical: Exercises on the principles of statistics	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the second	2 theoretical 3 practical	theoretical: The student should be able to identify statistical symbols. practical: The student should be able to solve statistical exercises.	theoretical: Statistical symbols practical: Statistical symbol exercises	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the third	2 theoretical 3 practical	theoretical: The student should be familiar with the topic of frequency distribution. practical: The student should be able to solve frequency distribution exercises.	theoretical: Frequency distribution table practical: Exercises on frequency distribution tables	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

Fourth	2 theoretical 3 practical	theoretical: The student should be able to interpret the ascending and descending frequency distribution table. practical: The student should be able to solve exercises on the topic of ascending and descending frequency distribution.	theoretical: Ascending and descending frequency distribution table practical: Exercises on ascending and descending frequency distribution tables	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Fifth	2 theoretical 3 practical	theoretical: The student should be able to understand and comprehend the curve, gradient, and polygon. practical: The student should be able to create a curve, a gradient, and a polygon.	theoretical: Curve, gradient, and polygon practical: Curve, gradient, and polygon construction exercises	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Sixth	2 theoretical 3 practical	theoretical: The student should be able to define the average scale.	theoretical: mediation scale practical: Mediating and	theoretical :Auditory methods: writing on the board method,	Short exams, homework

		practical: The student should be able to solve multiple exercises on the topic of the mediation scale.	dispersing scale exercises	direct dialogue method practical: Assignment and report	assignments, discussions
Seventh	2 theoretical 3 practical	monthly exam	theoretical: Monthly Exam 1 practical: Monthly Exam 1	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
The eighth	2 theoretical 3 practical	theoretical: The student should be able to know the basics of the standard grade. practical: The student should be able to know the methods of solving mathematical problems on the topic of exchange and combinations.	theoretical: Standard score, probability practical: Exchange exercises, combinations, standard score	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

Ninth	2 theoretical 3 practical	theoretical: The student should be able to understand and comprehend the normal distribution method and test statistical hypotheses. practical: The student should be able to Solve various exercises on the topic of normal distribution.	theoretical: Normal distribution and hypothesis testing practical: Normal distribution exercises	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
tenth	2 theoretical 3 practical	theoretical: The student should be able to know what the test is.T practical: The student should be able toKnowing the best ways to calculate the testT	theoretical: a test T practical: Test exercises T	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
eleventh	2 theoretical 3 practical	theoretical: The student should be able to know what the test is.Z practical: The student should be able	theoretical: a test Z practical: Test exercises Z	theoretical :Auditory methods: writing on the board method, direct	Short exams, homework assignments, discussions

		toKnowing the best ways to calculate the testZ		dialogue method practical: Assignment and report	
twelfth	2 theoretical 3 practical	theoretical: The student should be able to define correlation and gradient and what are the characteristics of each. practical: The student should be able to Solving mathematical problems on the topics of correlation and suicide	theoretical: Correlation and regression practical: Correlation and regression exercises	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
thirteenth	2 theoretical 3 practical	Monthly Exam 2	Monthly Exam 2	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

fourteenth	2 theoretical 3 practical	theoretical: The student should be able to understand and comprehend the news of the chi-square and what its uses are.h practical: The student should be able to Solving statistical problems on the topicX2	theoretical: Chi-square test practical: Test exercisesX2	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
fifteenth	2 theoretical 3 practical	monthly exam	monthly exam	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

346. Course Evaluation	
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))	
347. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	Principles of Statistics Dr. Khashe' Al-Rawi 2000
Main References (Sources)	Relying on the approved curricula issued by the Ministry

	Relying on the curricula prepared by the subject teacher
Recommended books and references (scientific journals, reports...)	1. Relying on the approved curricula issued by the Ministry. 2. Relying on the curricula prepared by the subject teacher.
Electronic references and websites	1. Relying on the approved curricula issued by the Ministry. 2. Relying on the curricula prepared by the subject teacher.

Course Description Form

348. Course name:	
Dry lands farming	
349. Course code:	
DES201	
350. the chapterAcademic/ year	
First semester	
351. Description preparation date	
1\7\2025	
352. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
353. Number of credit hours (total) / Number of units (total)	
354. Course Supervisor Name (List all names, if there is more than one)	
the name:Dr. Mohamed Salem Ahmed e-mail: mohameedsa66@ntu.edu.iq	
355. Course objectives	
Goals	1. The student should be able to understand and comprehend what is related to dry areas and their nature. 2. The student should be able to identify the available technologies to combat drought. 3. The student should be able to identify the nature of plants, their types, and the extent of their impact on the environment of these areas.
356. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report. 6. Assign teamwork to reveal leadership skills.
357. Course structure	

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	2 theoretical 3 practical	The student should be able to define drought and the nature of dry farming: drought and dry and semi-dry areas, the nature of drought and its causes, and dry areas in the world.	theoretical: Drought and the nature of dryland agriculture: Drought and arid and semi-arid regions, the nature of drought and its causes, dry regions of the world practical: The nature of rainfed agriculture: an introduction to the rainfed regions in Iraq and an explanation of the nature of the climate and plants there..	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the second	2 theoretical 3 practical	Students should be able to identify the factors affecting production in dry farming: vegetation, soil, climate, temperatures, light energy, atmospheric pressure, wind, rainfall, Cloud seeding and rainmaking	theoretical: Factors affecting production in dry farming: plants, soil, climate, temperature, light energy, atmospheric pressure, wind, rainfall, Cloud condensation and rain projection in agricultural fields: methods of implementation,	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

		in agricultural areas: methods of implementation , requirements for implementation , existing uses of cloud seeding and rainmaking.	requirements for implementing the condensation process, existing uses of cloud condensation and rain projection. practical: Screening of a documentary film on the tasks and studies of the International Center for Agriculture in the Dry Areas (ICARDA).ICARDA).		
the third	2 theoretical 3 practical	The student should be able to understand and comprehend the climate classification of the Arab world: agricultural climate regions in the Arab world, the role of water in plant growth: the importance of water for plants, factors affecting water absorption by plants, transpiration	theoretical: Climatic classification of the Arab world: agricultural climatic regions in the Arab world, The role of water in plant growth: the importance of water to plants, factors affecting water absorption by plants, transpiration practical: Classification of plants according to their resistance to water stress, and environmental factors that affect	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

			the plant's need for water.		
Fourth	2 theoretical 3 practical	Students should be able to explain the concept of drought (water stress): its effects on plants, plant adaptation to water stress.	theoretical: Drought (water stress): its effects on plants, plant adaptation to water stress practical: Methods for measuring plant resistance to water stress.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Fifth	2 theoretical 3 practical	monthly exam	monthly exam	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Sixth	2 theoretical 3 practical	The student should be able to explain the concept of drought and the nature of dry farming: drought and arid and semi-arid regions, the	theoretical:Drought and the nature of dryland agriculture: Drought and arid and semi-arid regions, the nature of drought and its causes, dry regions of the world	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments,

		nature of drought and its causes, and arid regions in the world.	practical: Diagnosis of individual factors causing water tensile strength	practical: Assignment and report	discussions
Seventh	2 theoretical 3 practical	Students should be able to understand drought (water stress): its effects on plants, plant adaptation to water stress.	theoretical: Drought (water stress): its effects on plants, plant adaptation to water stress practical: The importance of organic matter in rainfed agriculture, and the reasons for the lack of organic matter in rainfed agricultural areas.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
The eighth	2 theoretical 3 practical	Students should be able to explain the term crop cultivation under dry farming conditions. Field operations and agricultural mechanization in dry farming.	theoretical: Crop cultivation under dry farming conditions Field operations and agricultural mechanization in dry farming, practical: Elements of investment in rainfed agriculture	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Ninth	2 theoretical	Students should be able to identify the appropriate equipment and	theoretical: Equipment and machinery suitable for crop production in dry farming	theoretical :Auditory methods: writing on the board	Short exams, homew

	3 practical	machinery for crop production in dry farming	practical: Rainfed Agriculture: Nursery Preparation, Sowing, Harvesting, Advantages and Justifications for Limited and Unlimited Cropping.	method, direct dialogue method practical: Assignment and report	ork assignments, discussions
tenth	2 theoretical 3 practical	monthly exam	monthly exam	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
eleventh	2 theoretical 3 practical	Students should be able to understand and comprehend agricultural processes in dry farming, fertilization under dry farming conditions	theoretical:Agricultural operations in dry farming, fertilization under dry farming conditions Pests in dry farming, weeds, insects practical:	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme	Short exams, homework assignments,

		Pests in dry farming, weeds, insects	Human errors and their impact on erosion, and methods of erosion control and soil conservation	nt and report	discussi ons
twelft h	2 theoreti cal 3 practical	Students should be able to explain the concept of moisture conservation and soil maintenance: factors affecting soil moisture conservation, methods used to conserve moisture, methods of soil maintenance against erosion, damage caused by erosion.	theoretical: Moisture conservation and soil maintenance: factors affecting soil moisture conservation, methods used in moisture conservation, methods of soil protection from erosion, damages of erosion practical: Conservation agriculture: definition, methods, benefits of adopting conservation agriculture, requirements for its implementation, and a presentation of extensive practical experiences in the Arab world in general and Iraq in particular.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme nt and report	Short exams, homew ork assignm ents, discussi ons

thirteenth	2 theoretical 3 practical	Students should be able to define farming in dry farming: municipal farming, mechanical farming, modern trends in farming, mulch farming, stuble mulch farming, minimum tillage	theoretical: Agriculture in dry farming: municipal agriculture, mechanical agriculture, modern trends in agriculture, soil surface mulch cultivationmulch, stuble mulch farming, minimum tillage practical: Pasture and livestock development in rainfed agriculture	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
fourteenth	2 theoretical 3 practical	Students should be able to identify the appropriate equipment and machinery for crop production in dry farming.	theoretical: Equipment and machinery suitable for crop production in dry farming practical: Screening of documentaries from the International Center for Agriculture in the Dry Areas	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
fifteenth	2 theoretical 3 practical	Students should be able to understand and comprehend the term “climatic classification of	theoretical: Climatic classification of the Arab world: agricultural	theoretical :Auditory methods: writing on the board method,	Short exams, homework

		the Arab world": agricultural climate regions in the Arab world, the role of water in plant growth: the importance of water for plants, factors affecting water absorption by plants, transpiration.	climatic regions in the Arab world, The role of water in plant growth: the importance of water to plants, factors affecting water absorption by plants, transpiration practical: Examples of ideal crop rotations for dry areas	direct dialogue method practical: Assignment and report	assignments, discussions

358. Course Evaluation	
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))	
359. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	Lectures prepared by the subject instructor
Main References (Sources)	Dry farming, its foundations, elements and investment / Dr. Abdullah Qasim
Recommended books and references (scientific journals, reports...)	
Electronic references and websites	

Course Description Form

360. Course name:	
remote sensing	
361. Course code:	
DES202	
362. the chapterAcademic/ year	
First semester	
363. Description preparation date	
1\7\2025	
364. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
365. Number of credit hours (total) / Number of units (total)	
366. Course Supervisor Name (List all names, if there is more than one)	
the name:Mr. Manhal Mohammed Bashir e-mail: manhalbasher@ntu.edu.iq	
367. Course objectives	
Goals	1. The student should be able to explain the theoretical foundations of remote sensing and the principles of electromagnetic radiation and its interaction with objects and surfaces.. 2. The student should be able to distinguish between the types of sensors and satellites and their technical characteristics.. 3. The student should be able to employ remote sensing data from space and air in the study of natural, environmental and agricultural phenomena.. 4. The student should be able to analyze and process satellite images using specialized software to extract spatial information.. 5. The student will be able to apply remote sensing techniques in the fields of monitoring environmental changes, managing natural resources, and monitoring vegetation cover..
368. Teaching and learning strategies	

Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report. 6. Assign teamwork to reveal leadership skills.

369. Course structure

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the firs	2 theoretical 3 practical	Explain the basic concepts of forestry science and its applications in different fields.	theoretical: History of remote sensing practical: Airdas program interface.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the second	2 theoretical 3 practical	Students should be able to explain the basic concepts of forestry science and its applications in different fields for environmental purposes.	theoretical: Remote sensing model and its physical basis practical: Satellite image review	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

the third	2 theoretical 3 practical	Students should be able to identify the characteristics of information collected by remote sensing devices and their most important applications.	theoretical: Advantages of information collected by remote sensing devices and their most important applications practical: Study area cut	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Fourth	2 theoretical 3 practical	Students will be able to explain the concept of color theory.	theoretical: color theory practical: Applications in the study area	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Fifth	2 theoretical 3 practical	Students will be able to identify methods of data interpretation (digital and visual interpretation).	theoretical: Data interpretation methods (numerical interpretation and visual interpretation) practical: Geographical correction	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme	Short exams, homework assignments,

				nt and report	discussions
Sixth	2 theoretical 3 practical	Students should be able to identify the spectral reflectance properties of plants.	theoretical: Spectral reflectance properties of plants practical: Spectral, radiometric, and spatial sensing	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Seventh	2 theoretical 3 practical	Students should be able to understand and comprehend the spectral reflectance properties of soils.	theoretical: Spectral reflectance properties of soils practical: Spectral, Radiometric and Spatial Sensing (Applications)	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
The eighth	2 theoretical 3 practical	Students should be able to explain the concept of spectral reflectance properties of water (clear and	theoretical: Spectral reflectance properties of water (clear and polluted) and snow practical:	theoretical :Auditory methods: writing on the board method, direct	Short exams, homework assignm

		polluted) and snow.	Collect bands of area and distance measurements using programs	dialogue method practical: Assignment and report	ents, discussions
Ninth	2 theoretical 3 practical	Students should be able to explain the concept of satellites and how they work	theoretical: satellites practical: Collect bands of area and distance measurements using programs (applications)	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
tenth	2 theoretical 3 practical	Students should be able to distinguish between American, French, and Indian satellites	theoretical: American, French and Indian satellites practical: Undirected classification	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
eleventh	2 theoretical	Students should be able to identify the advantages of information	theoretical: Advantages of information collected from	theoretical :Auditory methods: writing on the board	Short exams, homew

	3 practical	collected from satellite-borne sensors and radar	sensors on board satellites and radar practical: Directed classification	method, direct dialogue method practical: Assignment and report	ork assignments, discussions
twelfth	2 theoretical 3 practical	Students should be able to identify the methods used to improve space data and compare them in terms of quality of work	theoretical: Methods for improving spatial data practical: Directed Classification (Applications)	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
thirteenth	2 theoretical 3 practical	Students should be able to identify methods of classifying space data	theoretical: Methods of classifying spatial data practical: Map production	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

fourteenth	2 theoretical 3 practical	Students should be able to identify the most important applications used in remote sensing in forests	theoretical: Remote sensing applications in forests practical: Map production (application)	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
fifteenth	2 theoretical 3 practical	exam	exam	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

370. Course Evaluation	
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))	
371. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	Principles of Remote Sensing and Visual Interpretation Dr. Hekmat Subhi Al-Daghestani
Main References (Sources)	Remote sensing interpretation
Recommended books and references (scientific journals, reports...)	Remote Sensing Basics Book And applications, Dr. Nabil Sobhi Al-Daghestani
Electronic references and websites	http://www.ersi.ca/ Earth Resource Surveys Inc.

Course Description Form

372. Course name:	
Water management	
373. Course code:	
DES203	
374. the chapterAcademic/ year	
First semester	
375. Description preparation date	
1\7\2025	
376. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
377. Number of credit hours (total) / Number of units (total)	
378. Course Supervisor Name (List all names, if there is more than one)	
the name:M.M. Omar Younis Hassan e-mail: Mti.lec224.omar@ntu.edu.iq	
379. Course objectives	
Goals	1. The student should be able to understand the basic principles of water resources management and their types.. 2. The student will be able to analyze surface and groundwater sources and evaluate their efficiency.. 3. The student will be able to design and implement strategies for optimal water use in agricultural and industrial activities.. 4. The student will be able to assess the impact of human activities on water resources and water quality..
380. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion.

	5. Assign tasks and report. 6. Assign teamwork to reveal leadership skills.

381. Course structure

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	2 theoretical 3 practical	The student should be able to define the concept of water management and its importance in the sustainability of water resources and agriculture.	theoretical: Introduction to Water Management . practical: Average rainfall at stations	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the second	2 theoretical 3 practical	The student should be able to distinguish between different sources of water (surface water, groundwater, treated wastewater).	theoretical: hydrological cycle practical: Tension and extension analysis	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the third	2 theoretical	Students should be able to explain the characteristics of water	theoretical: Hydrological measurements	theoretical :Auditory methods: writing on the board	Short exams,

	3 practical	resources and the factors that determine their availability in terms of location and time.	practical: Morphological analysis of basins	method, direct dialogue method practical: Assignment and report	homework assignments, discussions
Fourth	2 theoretical 3 practical	Students should be able to analyze the natural and human factors that affect water consumption.	theoretical: Rainfall practical: River discharge measurement	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Fifth	2 theoretical 3 practical	Students should be able to evaluate the efficiency of water use in agricultural systems.	theoretical: absorption and storage practical: Hydrogram separation	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

Sixth	2 theoretical 3 practical	Students should be able to compare different irrigation methods (surface, sprinkler, drip) in terms of efficiency and suitability.	My theory: evaporation and transpiration practical:Flood frequency analysis	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Seventh	2 theoretical 3 practical	Students should be able to evaluate strategies for harvesting rainwater and runoff.	theoretical:torrents practical:Hydrological facility	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
The eighth	2 theoretical 3 practical	Students should be able to explain the relationship between soil, water, and plants and its impact on water management.	theoretical:water flow practical:Flood control	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme	Short exams, homework assignments, discussions

				nt and report	
Ninth	2 theoretical 3 practical	Students will be able to analyze water salinity and quality issues and their impact on agriculture.	theoretical:Surface water hydrology hydrography practical:Flow measurement in groundwater aquifers	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
tenth	2 theoretical 3 practical	Students will be able to identify wastewater treatment methods for reuse.	theoretical:Statistical methods in hydrology practical:Average rainfall in the oceans	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
eleventh	2 theoretical 3 practical	Students will be able to design an irrigation system suitable for a specific crop or area.	theoretical:water Al-Jawfiyah practical:Leakage in the hydraulic structure	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions

				practical: Assignment and report	
twelfth	2 theoretical 3 practical	Students will be able to analyze water challenges in the context of climate change.	theoretical:ground water level practical:Properties of groundwater layers	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
thirteenth	2 theoretical 3 practical	Students will be able to propose sustainable solutions for managing water demand in different sectors.	theoretical: Darcy low practical: Tension and extension analysis	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
fourteenth	2 theoretical 3 practical	Students will be able to prepare an integrated plan for water resource management in a specific	theoretical: Well characteristics practical: Morphological analysis of basins	theoretical :Auditory methods: writing on the board method, direct	Short exams, homework

		agricultural or urban area.		dialogue method practical: Assignment and report	assignments, discussions
fifteenth	2 theoretical 3 practical	Students will be able to discuss the role of reservoirs and dams in water management.	theoretical: river water practical: River discharge measurement	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

382. Course Evaluation	
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))	
383. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	Lectures prepared by the course instructors
Main References (Sources)	
Recommended books and references (scientific journals, reports...)	Modern water management approach
Electronic references and websites	

Course Description Form

384. Course name:	
Fertility and fertilization	
385. Course code:	
DES204	
386. the chapterAcademic/ year	
387. Description preparation date	
1\7\2025	
388. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
389. Number of credit hours (total) / Number of units (total)	
390. Course Supervisor Name (List all names, if there is more than one)	
the name:M.M. Ziad Amer Mustafa e-mail: mti.Iec96.Zeyad@ntu.edu.iq	
391. Course objectives	
Goals	1. The student should be able to understand the basics of soil fertility and the factors affecting agricultural production.. 2. The student should be able to identify the different components of soil and measure its chemical, physical and biological fertility.. 3. The student will be able to assess the needs of plants for primary and secondary nutrients.. 4. The student should be able to design organic and chemical fertilization programs according to the type of soil and crops.
392. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report.

	6. Assign teamwork to reveal leadership skills.

393. Course structure

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	2 theoretical 3 practical	The student should be able to define the concept of soil fertility and its relationship to agricultural growth and productivity.	theoretical: World and Food - Soil Fertility - Fertilizers and Their Role in Increasing Production and Meeting the Growing Need for Food practical: Calculating the amount of fertilizer added to conduct a fertility experiment	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the second	2 theoretical 3 practical	The student should be able to distinguish between the major and minor nutrients necessary for plant growth.	theoretical: Nutrients and their importance to plants, major elements, minor elements, nutrient availability, types of availability, factors affecting it. practical: Foundations and rules of fertility survey	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

the third	2 theoretical 3 practical	The student should be able to explain the role of nitrogen, phosphorus, and potassium in plants and soil.	theoretical: Symptoms of malnutrition, primary and secondary practical: Fertility calendar	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Fourth	2 theoretical 3 practical	Students should be able to analyze the movement of nutrients in the soil and their effect on plant availability.	theoretical: Fertilization principles, types of fertilizers, their quantities, time of application, and methods of application practical: Fertility calendar	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Fifth	2 theoretical 3 practical	Students should be able to evaluate factors affecting soil fertility such as pH, salinity, and organic matter content.	theoretical: Inorganic fertilizers and their use barriers, depending on their type and use practical: Foundations and rules of fertility survey	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme	Short exams, homework assignments, discussions

				nt and report	
Sixth	2 theoretical 3 practical	Students should be able to compare different types of fertilizers (chemical, organic, bio).	theoretical: Nitrogen, phosphate and potassium fertilizers (simple, compound and complete), their types and properties. practical: Descriptive tests for nitrogen fertilizers	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Seventh	2 theoretical 3 practical	Students should be able to conduct soil analysis tests to estimate its nutrient content.	theoretical: Mixed fertilizers, their importance, and the disadvantages of mixing different types of fertilizers. practical: Nitrogen Readiness Guide	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
The eighth	2 theoretical 3 practical	Students should be able to explain methods of fertilizer application (mixing with soil, foliar fertilization, irrigation).	theoretical: Manufacture of various fertilizers in Iraq and the world. practical: Descriptive tests for phosphate fertilizers	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions

				practical: Assignment and report	
Ninth	2 theoretical 3 practical	Students should be able to design a comprehensive fertilization program for different agricultural crops.	theoretical: Fertilizer application methods and related calculations practical: Phosphorus Readiness Guide	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
tenth	2 theoretical 3 practical	Students should be able to determine the fertilizer requirements of crops at different stages of growth.	theoretical: Different organic fertilizers, liquid fertilizers, their types, advantages and disadvantages. practical: Descriptive tests for potassium fertilizers	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
eleventh	2 theoretical 3 practical	Students should be able to discuss the impact of over-fertilization on the environment and pollution.	theoretical: Residual effect of fertilizers in the soil: nitrogen, phosphate, potassium, and organic matter. practical:	theoretical :Auditory methods: writing on the board method, direct	Short exams, homework

			Potassium Readiness Guide	dialogue method practical: Assignment and report	assignments, discussions
twelfth	2 theoretical 3 practical	Students should be able to analyze the relationship between soil fertility and agricultural practices (crop rotation, organic cover).	theoretical: Hydroponics, the quantitative relationships between plants and their nutrients. practical: Micronutrient Readiness Guide	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
thirteenth	2 theoretical 3 practical	Students should be able to evaluate the role of biofertilizers in improving soil fertility and agricultural sustainability.	theoretical: Nutritional requirements, fertilization research. practical: Plant analysis and fertility calendar	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
fourteenth	2 theoretical 3 practical	Students should be able to analyze the relationship between soil fertility and	theoretical: Presentation of soil fertility, study of soil fertility problems. practical:	theoretical :Auditory methods: writing on the board method,	Short exams, homework

		agricultural practices (crop rotation, organic mulching).	exam	direct dialogue method practical: Assignment and report	assignments, discussions
fifteenth	2 theoretical 3 practical	Students should be able to prepare an integrated plan for soil fertility and fertilization in a specific production system.	theoretical: Iraqi soil fertility, the reality of Iraqi soil fertilization, and future prospects practical: Discussion of experimental reports	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

394. Course Evaluation	
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))	
395. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	Course lectures prepared by the course teacher
Main References (Sources)	Awad Kazim Mashhut (1987) Fertilization and soil fertility, Ministry of Higher Education and Scientific Research, University of Basra. Al-Naimi, Saadullah (1999) Fertilizers and Soil Fertility, Ministry of Higher Education and Scientific Research, University of Mosul
Recommended books and references (scientific journals, reports...)	Awad, Kazem Mashhut, 1984. Scientific tests of fertilizers and soil fertility. University of Basra.
Electronic references and websites	Soil Science Society of America Library Genesis

Course Description Form

396. Course name:	
Geomorphology	
397. Course code:	
DES205	
398. the chapterAcademic/ year	
399. Description preparation date	
1\7\2025	
400. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
401. Number of credit hours (total) / Number of units (total)	
402. Course Supervisor Name (List all names, if there is more than one)	
the name:Mr. Omar Younis Hassan e-mail: Mti.lec224.omar@ntu.edu.iq	
403. Course objectives	
Goals	1. The student should be able to understand the basic principles of geomorphology and the evolution of landforms.. 2. The student should be able to identify the natural processes that shape the Earth's surface, such as erosion, sedimentation, and volcanoes.. 3. The student will be able to analyze and interpret topographic maps and satellite images relevant to geomorphology.. 4. The student should be able to study the topographic patterns of plains, mountains, valleys, and water bodies..
404. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report.

	6. Assign teamwork to reveal leadership skills.

405. Course structure

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	2 theoretical 3 practical	The student should be able to define geomorphology and explain its practical importance.	Theory: Introduction to geomorphology – definition, origin, importance, branches. Practical: Identifying topographic maps and their symbols.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the second	2 theoretical 3 practical	The student should be able to explain the evolution of the Earth's surface over geological time.	Theory: The origin of the Earth's surface and its evolution through geological eras. Practical: Exercise in identifying surface features using maps.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the third	2 theoretical 3 practical	The student should be able to explain the role of internal processes in	Theory: Internal processes (tectonic movements, earthquakes, volcanoes).	theoretical :Auditory methods: writing on the board method,	Short exams, homework

		shaping the terrain.	Practical: Analysis of maps showing areas of volcanic and seismic activity.	direct dialogue method practical: Assignment and report	assignments, discussions
Fourth	2 theoretical 3 practical	The student should be able to distinguish between types of weathering and their effects.	Theory: External processes (weathering and erosion). Practical: Study of rock samples affected by weathering.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Fifth	2 theoretical 3 practical	Students should be able to describe the manifestations of erosion by flowing water.	Theory: Water erosion: its forms and results. Practical: Drawing cross-sections of valleys and rivers.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Sixth	2 theoretical	Learning outcomes: Students should be able to	Theory: Wind erosion and its forms. Practical:	theoretical :Auditory methods: writing on	Short exams,

	3 practical	analyze the manifestations of erosion, transport, and wind deposition.	Identifying satellite images of sand dune areas.	the board method, direct dialogue method practical: Assignment and report	homework assignments, discussions
Seventh	2 theoretical 3 practical	Students should be able to explain the role of ice in shaping the Earth's surface.	Theory: Glacial erosion. Practical: Analysis of images showing the shapes created by glaciers.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
The eighth	2 theoretical 3 practical	Students should be able to explain the shapes resulting from the action of waves and ocean currents.	Theory: Marine erosion and coastal shapes. Practical: Study of maps and images of sea coasts.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

Ninth	2 theoretical 3 practical	Students will be able to classify landforms according to different geomorphological processes.	Theory: Shapes created by combined processes (rivers, wind, sea). Practical: Applied exercise on classifying landforms.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
tenth	2 theoretical 3 practical	Students will be able to explain the characteristics of landforms in arid environments.	Theoretical: Surface forms in arid regions. Practical: Analysis of maps and satellite images of the desert.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
eleventh	2 theoretical 3 practical	Students will be able to compare landforms in different environments.	Theoretical: Surface forms in humid regions. Practical: Study of the topography of humid regions using maps.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme	Short exams, homework assignments, discussions

				nt and report	
twelfth	2 theoretical 3 practical	Students will be able to explain surface features using topographic maps.	Theory: Geomorphology and topographic maps. Practical: Training in reading and analyzing topographic maps.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
thirteenth	2 theoretical 3 practical	Students should be able to relate geomorphology to environmental and agricultural problems.	Theory: Applications of geomorphology in agriculture and the environment. Practical: Study of practical cases of erosion and desertification problems.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
fourteenth	2 theoretical 3 practical	Students should be able to apply geomorphology in the fields of urban and engineering planning.	Theory: Applications of geomorphology in planning and engineering. Practical: Discussion of examples of engineering	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions

			projects related to geomorphology.	practical: Assignment and report	
fifteenth	2 theoretical 3 practical	Students should be able to integrate their knowledge and analyze geomorphological problems in an applied manner.	Theory + Practical: General review – discussion of project reports – final exam.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

406. Course Evaluation
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))

407. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	
Main References (Sources)	
Recommended books and references (scientific journals, reports...)	
Electronic references and websites	

Course Description Form

408. Course name:	
Fruit production in desert areas	
409. Course code:	
DES206	
410. the chapterAcademic/ year	
411. Description preparation date	
412. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
413. Number of credit hours (total) / Number of units (total)	
414. Course Supervisor Name (List all names, if there is more than one)	
the name: Dr. Faris Faisal Abdul Ghani e-mail: faris.faisal.701@ntu.edu.iq	
415. Course objectives	
Goals	1. The student should be able to identify the environment suitable for fruit production in desert areas. 2. The student should be able to identify the methods of cultivation. Trees Fruit in desert areas. 3. The student should be able to identify: Types Fruits that can be produced in desert areas 4. The student should be able to know information related to fruit cultivation in desert areas.
416. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming.

	3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report. 6. Assign teamwork to reveal leadership skills.

417. Course structure

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	2 theoretical 3 practical	The student should be able to explain the importance of fruit production in desert environments.	**Theory:** Introduction to fruit production in desert areas – importance and challenges. **Practical:** Discussion of local examples of fruit orchards in dry environments.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the second	2 theoretical 3 practical	The student should be able to describe the characteristics of desert soil and climate and their impact on fruit growth.	**Theory**: Climate and soil characteristics in desert areas. **Practical:** Taking soil samples from different areas and examining them.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

the third	2 theoretical 3 practical	Students should be able to identify the most suitable varieties for cultivation in arid regions.	**Theory:** Selecting species and varieties suitable for desert conditions. **Practical:** Identifying plant samples and images of drought-resistant varieties.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Fourth	2 theoretical 3 practical	Students should be able to design a preliminary plan for establishing a desert fruit orchard.	**Theory:** Establishing fruit orchards in desert areas (planning, leveling, digging). **Practical:** Practice drawing a plan for establishing a desert orchard.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Fifth	2 theoretical 3 practical	Students should be able to apply modern irrigation methods suitable for desert conditions.	**Theory:** Modern irrigation systems (drip irrigation – sprinkler irrigation). **Practical:** Operate a drip irrigation system and experiment	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme	Short exams, homework assignments, discussions

			with water distribution.	nt and report	
Sixth	2 theoretical 3 practical	Students will be able to accurately estimate the water requirements of fruit trees.	**Theory:** Irrigation water management under conditions of water scarcity. **Practical:** Calculating irrigation requirements for a specific fruit crop.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Seventh	2 theoretical 3 practical	Students will be able to prepare a fertilization program suitable for desert conditions.	**Theoretical:** Fertilizers and their role in fruit production in desert environments. **Practical:** Preparing fertilizer solutions for irrigation application (fertigation).	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
The eighth	2 theoretical 3 practical	Students will be able to diagnose salinity problems and propose appropriate solutions.	**Theoretical:** The effect of salinity on fruit production. **Practical:** Testing soil and irrigation water salinity and	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions

			analyzing the results.	practical: Assignment and report	
Ninth	2 theoretical 3 practical	Students will be able to perform practical horticultural maintenance operations.	**Theory:** Agricultural operations (pruning, thinning, horticultural services). **Practical:** Practical application of pruning in fruit trees.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
tenth	2 theoretical 3 practical	Students should be able to diagnose pests and diseases and develop integrated control plans.	**Theory:** Pest and disease resistance in desert environments. **Practical:** Examination of infected plant samples and identification of the type of infection.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
eleventh	2 theoretical 3 practical	Students should be able to explain the role of biotechnology in supporting desert fruit production.	**Theory:** Biotechnology and production of stress-resistant seedlings. **Practical:**	theoretical :Auditory methods: writing on the board method, direct	Short exams, homework

			Visit to a tissue culture laboratory/mini-experiment in vegetative propagation.	dialogue method practical: Assignment and report	assignments, discussions
twelfth	2 theoretical 3 practical	Students should be able to identify the most important desert fruit crops and their characteristics.	**Theory:** Major fruit crops in desert regions (dates, pomegranates, olives). **Practical:** Study a sample of the fruits or leaves of these crops.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
thirteenth	2 theoretical 3 practical	Students should be able to apply post-harvest techniques to reduce waste.	**Theory:** Post-harvest management of fruit crops in hot environments. **Practical:** Simple preservation and storage experiment for some fruit.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
fourteenth	2 theoretical	Students should be able to propose strategies for sustainable fruit	**Theory:** Sustainability in fruit production in deserts (renewable	theoretical :Auditory methods: writing on the board	Short exams, homework

	3 practical	production in deserts.	energy – water reuse). **Practical:** Discussion of case studies of farms that rely on solar energy or treated water.	method, direct dialogue method practical: Assignment and report	assignments, discussions
fifteenth	2 theoretical 3 practical	Students should be able to integrate their theoretical and practical knowledge to solve fruit production problems in deserts.	Final exam	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

418. Course Evaluation	
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))	
419. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	
Main References (Sources)	
Recommended books and references (scientific journals, reports...)	
Electronic references and websites	

Course Description Form

420. Course name:	
Tractors and Farming equipment	
421. Course code:	
DES251	
422. the chapterAcademic/ year	
423. Description preparation date	
424. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
425. Number of credit hours (total) / Number of units (total)	
426. Course Supervisor Name (List all names, if there is more than one)	
the name:M.M. Samir Farhan Ayoub e-mail: Samir.f.ayoub@ntu.edu.iq	
427. Course objectives	
Goals	1- The student should be able to identify the types of agricultural tractors. 2- The student should be able to identify the parts of agricultural equipment and how each one works.. 3- The student should be able to know how to perform periodic maintenance on agricultural equipment.. 4- The student should be able to identify the type of tractor needed for each agricultural operation and its relationship to the type of soil..
428. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report. 6. Assign teamwork to reveal leadership skills.

429. Course structure					
week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	2 theoretical practical 3	The student should be able to define the concept of agricultural mechanization and the importance of using tractors and agricultural machinery.	theoretical/The importance of agricultural mechanization in agricultural production. Types of agricultural mechanization. Agricultural locomotive, definition and types. practical/General driving safety rules. Learn to drive a tractor.	theoretical/ Auditory methods, writing on the board method, direct dialogue method PracticalAssigning tasks and reports	Tests and reports
the second	2 theoretical practical 3	The student should be able to distinguish between types of agricultural plows, their parts, and their uses.	theoretical/Main parts of a locomotive (engine and its fixed and moving parts). Transportation and mechanical energy. practical/Identify the main parts of the tractor (engine and parts).	theoretical/ Auditory methods, writing on the board method, direct dialogue method practical/Assigning tasks and reports	Tests and reportsAssignment of duties
the third	2 theoretical practical 3	The student should be able to explain the principles of internal	theoretical/Fuel system for diesel and gasoline engines, system parts.	theoretical/ Auditory methods, writing on the board	Tests and reportsAssig

		combustion engines used in agricultural tractors. Knowledge and application	practical/Identify fuel system parts and diesel and gasoline engines.	method, direct dialogue method practical/As signing tasks and reports	nment of duties
Fourth	2 theoreti cal practical 3	Students should be able to explain the principles of internal combustion engines used in agricultural tractors.	theoretical/Air purification and exhaust system, parts of the system and the function of each part practical/Air and exhaust system - parts - maintenance.	theoretical/ Auditory methods, writing on the board method, direct dialogue method practical/As signing tasks and reports	Tests and reportsAssig nment of duties
Fifth	2 theoreti cal practical 3	Students should be able to analyze transmission systems in agricultural tractors.	theoretical/Tractor cooling and lubrication system, system parts practical/Cooling system parts - operation - parts - maintenance.	theoretical/ Auditory methods, writing on the board method, direct dialogue method practical/As signing tasks and reports	Tests and reportsAssig nment of duties

Sixth	2 theoretical practical 3	Students should be able to describe steering, braking, and hydraulic lifting systems in tractors.	theoretical/A general idea about God's relationship with agricultural lands, and how to connect it to the tractor. practical/Lubrication system parts - operation - maintenance.	theoretical/ Auditory methods, writing on the board method, direct dialogue method practical/As signing tasks and reports	Tests and reportsAssignment of duties
Seventh	2 theoretical practical 3	Students will be able to explain the mechanism of power take-off (PTO) and its agricultural uses.	theoretical/Soil preparation plow, tillage plow, disc plow, their parts and the function of each part. practical/Identify transmission devices (clutch, gearbox), their parts, and the function of each part.	theoretical/ Auditory methods, writing on the board method, direct dialogue method practical/As signing tasks and reports	Tests and reportsAssignment of duties
The eighth	2 theoretical practical 3	Students will be able to explain the mechanism of soil preparation equipment (disc harrows, rakes, subsoilers).	theoretical/Chisel plough, rotary plough, subsoiler, their parts and function of each part. practical/Means of transportation and mechanical energy, and identification of the devices used to	theoretical/ Auditory methods, writing on the board method, direct dialogue method practical/As signing	Tests and reportsAssignment of duties

			harness the power of agricultural tractors.	tasks and reports	
Ninth	2 theoretical practical 3	The student should be able to analyze the operation of seeders and planters.	theoretical/Leveling equipment (disc harrows, toothed harrows), their types, importance of each part, and leveling and adjustment machines and equipment, their types and function of each part. practical/Daily and seasonal maintenance of agricultural tractors.	theoretical/ Auditory methods, writing on the board method, direct dialogue method practical/Assigning tasks and reports	Tests and reportsAssignment of duties
tenth	2 theoretical practical 3	The student should be able to explain the operation of post-harvesting machines (harrows, sprayers, fertilizers).	theoretical/Sowing equipment, grain seeds, their parts, and the function of each part. Fertilized seeds, their parts, and the function of each part.. practical/Pest control and tillage equipment, its types, parts and function of each part.	theoretical/ Auditory methods, writing on the board method, direct dialogue method practical/Assigning tasks and reports	Tests and reportsAssignment of duties
eleventh	2 theoretical practical 3	The student should be able to evaluate the efficiency of harvesters and	theoretical/ Types of coarse and concentrated materials and their importance in animal nutrition	theoretical/ Auditory methods, writing on the board method,	Tests and reportsAssig

		compare their performance.	practical/Learn how to connect plows to a tractor.	direct dialogue method practical/As signing tasks and reports	nment of duties
twelfth	2 theoretical practical 3	The student should be able to discuss the role of agricultural mechanization in increasing productivity and reducing costs.	theoretical/ How to organize and calibrate seeds, mathematical problems, and sowing methods.. practical/Identify disc combs, their types, parts, and the function of each part.	theoretical/ Auditory methods, writing on the board method, direct dialogue method practical/As signing tasks and reports	Tests and reportsAssig nment of duties
thirteenth	2 theoretical practical 3	The student should be able to distinguish between different types of tractors (crawler, wheel) and their main parts and functions.	theoretical/ Irrigation equipment (water channel switches), its parts and the function of each part. practical/Toothed combs, their types, parts, and the function of each part.	theoretical/ Auditory methods, writing on the board method, direct dialogue method practical/As signing tasks and reports	Tests and reportsAssig nment of duties
fourteenth	2 theoretical practical 3	The student should be able to define the concept of agricultural mechanization and the	theoretical/ Maintenance of tillage, grading and seeding equipment. practical/	theoretical/ Auditory methods, writing on the board method, direct	Tests and reportsAssig nment of duties

		importance of using tractors and agricultural machinery.	Identify leveling and adjustment machines and equipment, their types, and the function of each part.	dialogue method practical/As signing tasks and reports	
fifteenth	2 theoretical practical 3	The student should be able to prepare a comprehensive report on the use of tractors and agricultural machinery in a specific production system.	theoretical/ Preparatory week before the final exam practical/ exam	theoretical/ Auditory methods, writing on the board method, direct dialogue method practical/As signing tasks and reports	Tests and reportsAssignment of duties

430. Course Evaluation	
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))	
431. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	Lectures prepared by the course instructors
Main References (Sources)	Agricultural machinery and equipment Yassin Al-Tahhan - Mohammed Al-Nama
Recommended books and references (scientific journals, reports...)	Agricultural Technology Fundamentals / Agricultural Tractors 2018
Electronic references and websites	file:///C:/Users/pc/Downloads/%D8%A7%D9%84%D8%AC%D8%B1%D8%A7%D8%B1%D8%A7%D8%AA%20%D8%A7%D9%84%D8%B2%D8%B1%D8%A7%D8%B9%D9%8A%D8%A9%20%D9%88%D8%AA%D8%B1%D9%83%D9%8A%D8%A8%D9%87%D8%A7%20%D8%A7%D9%84%D8%B9%D8%A7%D9%85.pdf

Course Description Form

432. Course name:	
agricultural pests	
433. Course code:	
DES252	
434. the chapterAcademic/ year	
435. Description preparation date	
1\7\2025	
436. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
437. Number of credit hours (total) / Number of units (total)	
438. Course Supervisor Name (List all names, if there is more than one)	
the name:M.M. Omar Ahmed Fathy e-mail: omar.ah.f@ntu.edu.iq	
439. Course objectives	
Goals	1. The student is able to understand and comprehendThe economic importance of insects and diseases. 2. Enabling the student to knowHow to diagnose agricultural pests and how to combat them.
440. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report. 6. Assign teamwork to reveal leadership skills.
441. Course structure	

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	2 theoretical practical 3	The student should be able to understand the economic importance of insects and methods of controlling them (natural, physical, mechanical, biological, legislative, and chemical).	theoretical/ The economic importance of insects and methods of controlling them (natural, physical, mechanical, biological, legislative and chemical) practical/ Classification of insects, their characteristics, and the most important insect orders: Ortoptera (grasshoppers and caterpillars), Equatoria (locusts), Hemiptera (aphids), Hemiptera (cakes), Ciliates (thrips), Crustaceans (beetles), Lepidoptera (butterflies, moths), Diptera (flies, mosquitoes), Hymenoptera (bees, wasps) {{	theoretical /Auditory methods, writing on the board method, direct dialogue method PracticalA ssigning tasks and reports	Tests and reports
the second	2 theoretical	Students should be able to understand	theoretical/	theoretical /Auditory methods,	Tests and

	practical 3	common pests (grasshoppers, locusts, aphids, whiteflies, earthworms, red spider mites).	Common pests (grasshoppers, aphids, whiteflies, earthworms, mealybugs, red spider mites) practical/ Pictures of chemical pesticides (dry formulations, liquid formulations, gaseous formulations), pest control tools (spraying tools and fumigation tools), how to use and maintain them, the spraying process, its definition, and types of spraying.	writing on the board method, direct dialogue method practical/ Assigning tasks and reports	reports Assign ment of duties
the third	2 theoreti cal practical 3	Students should be able to explain the pests of wheat, barley, and corn (bread, seedworm, earworm, aphids, corn stalk borer)	theoretical/Pests of wheat, barley and corn (bread, seed worm, ear bug, aphid, corn stalk bug) practical/Cotton and bean pests (scientific name - description - damage - prevention and treatment methods).	theoretical /Auditory methods, writing on the board method, direct dialogue method practical/ Assigning tasks and reports	Tests and reports Assign ment of duties

Fourth	2 theoretical practical 3	The student should be able to identify pests of cotton and beans (cotton leafworm, cotton bollworm, red spider mite, black bean bug).	theoretical/Cotton and bean pests (cotton leafworm, cotton thorn and rosette worm, red spider mite, black bean borer) practical/Botanical description of alfalfa crop	theoretical /Auditory methods, writing on the board method, direct dialogue method practical/ Assigning tasks and reports	Tests and reports Assignment of duties
Fifth	2 theoretical practical 3	The student should be able to identify pests of the cucurbit family (scientific name, description, damage, prevention and treatment methods).	theoretical/Cucurbitaceae family (chip beetle, cucumber beetle, melon fly) practical/Pests of the cucurbit family (scientific name - description - damage - prevention and treatment methods).	theoretical /Auditory methods, writing on the board method, direct dialogue method practical/ Assigning tasks and reports	Tests and reports Assignment of duties
Sixth	2 theoretical practical 3	The student should be able to identify pests of the Solanaceae family (potato tuber moth, tomato fruit worm).	theoretical/Pests of the Solanaceae family (potato tuber moth, tomato fruitworm) practical/Botanical description of the broad bean crop	theoretical /Auditory methods, writing on the board method, direct dialogue method practical/ Assigning	Tests and reports Assignment of duties

				tasks and reports	
Seventh	2 theoretical practical 3	The student should be able to understand and comprehend pests of figs, pomegranates, and grapes (fig fly, fig leaf worm, pomegranate worm, grape leaf worm, grape cluster worm).	theoretical/Fig, pomegranate and grape pests (fig fly, fig leafworm, pomegranate worm, grape leafworm, grape bunch worm) practical/Pests of the nightshade family (scientific name - description - damage - methods of prevention and treatment).	theoretical /Auditory methods, writing on the board method, direct dialogue method practical/ Assigning tasks and reports	Tests and reports Assignment of duties
The eighth	2 theoretical practical 3	Students should be able to identify pests of the nightshade family (scientific name, description, damage, prevention and treatment methods).	theoretical/fodder beet crop practical/Pests of figs, pomegranates and grapes (scientific name - description - damage - prevention and treatment methods).	theoretical /Auditory methods, writing on the board method, direct dialogue method practical/ Assigning tasks and reports	Tests and reports Assignment of duties
Ninth	2 theoretical practical 3	Students should be able to explain olive and palm tree pests (olive bark beetle, olive fruit fly, palm weevil,	theoretical/Olive and palm pests (olive scale, olive borer, palm borer, palm canker, dust spider)	theoretical /Auditory methods, writing on the board method, direct dialogue method	Tests and reports Assign

		palm canker, dust mite).	practical/Botanical description of white corn crop	practical/ Assigning tasks and reports	ment of duties
tenth	2 theoretical practical 3	Students should be able to identify stem borers, their types, and how to control them. Agricultural rodents... Birds harmful to agricultural production.	theoretical/Stem borers, their types and control... agricultural rodents... birds harmful to agricultural production. practical/Botanical description of yellow corn crop	theoretical /Auditory methods, writing on the board method, direct dialogue method practical/ Assigning tasks and reports	Tests and reports Assign ment of duties
eleventh	2 theoretical practical 3	Students should be able to recognize some definitions and terms in plant pathology, plant diseases of economic importance... Classification of plant diseases	theoretical/Some definitions and terms in plant pathology, plant diseases of economic importance... Classification of plant diseases practical/Olive and palm weevil (scientific name - description - damages - prevention and treatment methods).	theoretical /Auditory methods, writing on the board method, direct dialogue method practical/ Assigning tasks and reports	Tests and reports Assign ment of duties
twelfth	2 theoretical practical 3	Students should be able to identify the most important fungal diseases (rust and smut	theoretical/The most important fungal diseases (rust and scald on wheat and barley, powdery mildew	theoretical /Auditory methods, writing on the board method,	Tests and reports Assign

		on wheat and barley, powdery mildew on grapes, downy mildew on cucurbits, seedling death, fusarium wilt, cotton food poisoning, and palm pollen blindness).	on grapes, downy mildew on cucurbits, seedling death, Fusarium wilt, cotton botulism, and palm pollen blindness) practical/Leg borers (description - damage)	direct dialogue method practical/ Assigning tasks and reports	ment of duties
thirteenth	2 theoretical practical 3	Students should be able to understand and comprehend the most important bacterial diseases (soft rot on vegetables, angular leaf spot on cotton, bacterial blight on apples and pomegranates, and olive knot).	theoretical/The most important bacterial diseases (soft rot on vegetables, angular spots on cotton, bacterial burn on apples and pomegranates, and olive branch knot). practical/Agricultural rodents (structural characteristics, habits and character, the most important rodents of economic and agricultural importance, their control)	theoretical /Auditory methods, writing on the board method, direct dialogue method practical/ Assigning tasks and reports	Tests and reports Assign ment of duties
fourteenth	2 theoretical practical 3	The student should be able to explain the most important viral diseases (tomato mosaic, tomato leaf curl	theoretical/The most important viral diseases (tomato mosaic, tomato leaf curl and yellowing, lines on barley)	theoretical /Auditory methods, writing on the board method, direct	Tests and reports Assign

		and yellowing, and stripes on barley).	practical/Birds harmful to agricultural production (harmful species, agricultural damage)	dialogue method practical/ Assigning tasks and reports	ment of duties
fifteenth	2 theoretical practical 3	Students should be able to identify insects of economic importance and methods of controlling them (natural, physical, mechanical, biological, legislative, chemical).	theoretical/Insects of economic importance and methods of controlling them (natural, physical, mechanical, biological, legislative, chemical) practical/The most important bacterial diseases (cause - symptoms and signs of infection - control) The most important viral diseases (cause - symptoms and signs of infection - control)	theoretical /Auditory methods, writing on the board method, direct dialogue method practical/ Assigning tasks and reports	Tests and reports Assign ment of duties

442. Course Evaluation	
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))	
443. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	Lectures prepared by the course instructors
Main References (Sources)	
Recommended books and references (scientific journals, reports...)	
Electronic references and websites	

Course Description Form

444. Course name:	
Nurseries and propagation	
445. Course code:	
DES253	
446. the chapterAcademic/ year	
447. Description preparation date	
1\7\2025	
448. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
449. Number of credit hours (total) / Number of units (total)	
450. Course Supervisor Name (List all names, if there is more than one)	
the name:Mr. Ziad Amer Mustafa e-mail: mti.Iec96.Zeyad@ntu.edu.iq	
451. Course objectives	
Goals	1. The student should be able toDefinition of nursery - Types of nurseries - Nurseries of economic importance and nursery planning - Nursery facilities 2. The student should be able toDetermine the methods of reproduction (sexual reproduction - seed layers, root production, mutual influences between scions and roots, layering - types of layers and vegetative reproduction: by cuttings - treatment with hormones).
452. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report. 6. Assign teamwork to reveal leadership skills.

453. Course structure					
week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the firs	2 theoretical practical 3	The student should be able to explain the concept of nurseries, their types, and their economic importance, and choose the appropriate land for establishing them.	theoretical/ Definition of nursery - Types of nurseries - Economic importance of nurseries. practical/ Choosing a Nursery Land - Planning a Nursery Land	theoretical /Auditory methods, writing on the board method, direct dialogue method PracticalA ssigning tasks and reports	Tests and reports
the second	2 theoretical practical	The student should be able to explain the steps involved in planning a nursery, identify its basic facilities, and use agricultural tools.	theoretical/ Nursery Planning - Nursery Facilities practical/ Nursery equipment and tools	theoretical /Auditory methods, writing on the board method, direct dialogue method practical/ Assigning tasks and reports	Tests and reports Assign ment of duties
the thir	2 theoretical practical	Students should be able to distinguish between methods of sexual reproduction	theoretical/ Sexual reproduction - seed propagation, root production. practical/	theoretical /Auditory methods, writing on the board method, direct	Tests and reports Assign

		and examine seed germination, vitality, and cultivation.	Seed germination - Seed vitality - Planting seeds in the nursery.	dialogue method practical/ Assigning tasks and reports	ment of duties
Fourth	2 theoreti cal practical	Students should be able to explain the causes of seed dormancy and apply methods to break dormancy.	theoretical/ Seed dormancy - its types practical/ Installation processes and chemical and mechanical treatments to break the dormancy phase.	theoretical /Auditory methods, writing on the board method, direct dialogue method practical/ Assigning tasks and reports	Tests and reports Assign ment of duties
Fifth	2 theoreti cal practical	Students should be able to explain methods of propagation by cuttings and the use of hormones with sterilization of agricultural environments.	theoretical/ Vegetative propagation: by cuttings - hormone treatment practical/ Sterilization of agricultural environments and soil - Types of agricultural environments.	theoretical /Auditory methods, writing on the board method, direct dialogue method practical/ Assigning tasks and reports	Tests and reports Assign ment of duties
Sixth	2 theoreti cal practical	The student should be able to explain the concept of numbering and	theoretical/ Increased punctuation - Types of punctuation.	theoretical /Auditory methods, writing on the board	Tests and reports

		apply it practically to increase plants.	practical/ Increase green plants	method, direct dialogue method practical/ Assigning tasks and reports	Assign ment of duties
Seventl	2 theoreti cal practicall	The student should be able to explain methods of grafting and grafting and perform ornamental plant propagation operations.	theoretical/ Increase by grafting and grafting practical/ Propagation of ornamental plants	theoretical /Auditory methods, writing on the board method, direct dialogue method practical/ Assigning tasks and reports	Tests and reports Assign ment of duties
The eighth	2 theoreti cal practicall	The student should be able to distinguish between methods of propagation by suckers and roots and prepare different cuttings.	theoretical/ Increased number of cancers and roots practical/ Mind Preparation - Woody - Semi-Woody - Recipe	theoretical /Auditory methods, writing on the board method, direct dialogue method practical/ Assigning tasks and reports	Tests and reports Assign ment of duties

Ninth	2 theoretical practical	Students should be able to explain the compatibility between scions and rootstocks and perform grafting and budding in practice.	theoretical/ Interactions between grafts and roots practical/ Carrying out grafting and installation operations in the nursery	theoretical /Auditory methods, writing on the board method, direct dialogue method practical/ Assigning tasks and reports	Tests and reports Assignment of duties
tenth	2 theoretical practical	Students should be able to analyze incompatibility issues and perform various propagation methods in practice.	theoretical/ Compatibility and incompatibility between taste and origin practical/ Propagation using cuttings, suckers, buds and roots	theoretical /Auditory methods, writing on the board method, direct dialogue method practical/ Assigning tasks and reports	Tests and reports Assignment of duties
eleventh	2 theoretical practical	The student should be able to discuss tissue culture techniques and apply fertilization methods in nurseries.	theoretical/ Production of plant tissue culture seedlings practical/ Carrying out animal and chemical fertilization operations in the nursery	theoretical /Auditory methods, writing on the board method, direct dialogue method practical/ Assigning	Tests and reports Assignment of duties

				tasks and reports	
twelfth	2 theoretical practical	The student should be able to explain callus formation and perform various pruning operations.	theoretical/ Callus formation for seedling production practical/ Pruning operations in the nursery	theoretical /Auditory methods, writing on the board method, direct dialogue method practical/ Assigning tasks and reports	Tests and reports Assignment of duties
thirteenth	2 theoretical practical	Students should be able to implement propagation methods using cuttings, bark, and roots, and apply fertilization.	theoretical/ Propagation by cuttings, bark and roots practical/ Carrying out animal and chemical fertilization operations in the nursery	theoretical /Auditory methods, writing on the board method, direct dialogue method practical/ Assigning tasks and reports	Tests and reports Assignment of duties
fourteenth	2 theoretical practical	Students should be able to analyze ornamental plant propagation methods and use growth regulators to stimulate them.	theoretical/ Propagation of ornamental plants. practical/ Using growth regulators to encourage plant growth	theoretical /Auditory methods, writing on the board method, direct dialogue method	Tests and reports Assignment of duties

				practical/ Assigning tasks and reports	
fifteent	2 theoreti cal practical	Students should be able to summarize their knowledge and apply tissue culture techniques in practice.	theoretical/ Preparatory week before the final exam practical/ Practical propagation by tissue culture	theoretical /Auditory methods, writing on the board method, direct dialogue method practical/ Assigning tasks and reports	Tests and reports Assign ment of duties

454. Course Evaluation	
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))	
455. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	Lectures prepared by the course instructors
Main References (Sources)	
Recommended books and references (scientific journals, reports...)	
Electronic references and websites	

Course Description Form

456. Course name:	
Forage crops and pasture	
457. Course code:	
DES254	
458. the chapter Academic/ year	
459. Description preparation date	
1\7\2025	
460. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
461. Number of credit hours (total) / Number of units (total)	
462. Course Supervisor Name (List all names, if there is more than one)	
the name: Mr. Omar Ahmed Fathy e-mail: omar.ah.f@ntu.edu.iq	
463. Course objectives	
Goals	1. The student will be able to understand and comprehend what forage crops are. 2. Enabling the student to know the methods of growing forage crops. 3. Enabling the student to become familiar with the most important sources of fodder. 4. Enabling the student to detect and know the palatability of feed. 5. The student can judge the quality of forage crops.
464. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report. 6. Assign teamwork to reveal leadership skills.

465. Course structure					
week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	2 theoretical practical 3	The student should be able to explain the importance of fodder crops and classify them according to plant families.	theoretical/The importance of forage crops, their history, and some definitions related to forage crops practical/Forage crop classification: Poaceae family	theoretical /Auditory methods, writing on the board method, direct dialogue method PracticalA ssigning tasks and reports	Tests and reports
the second	2 theoretical practical 3	The student should be able to describe the jute crop, its importance, and its botanical characteristics.	theoretical/Jet crop practical/Botanical description of the jatropha crop	theoretical /Auditory methods, writing on the board method, direct dialogue method practical/ Assigning tasks and reports	Tests and reports Assign ment of duties
the third	2 theoretical practical 3	The student should be able to distinguish between perennial and annual jute crops in terms	theoretical/Annual jet crop practical/Botanical description of the annual jasmine crop	theoretical /Auditory methods, writing on the board method, direct	Tests and reports Assign

		of botanical characteristics.		dialogue method practical/ Assigning tasks and reports	ment of duties
Fourth	2 theoretical practical 3	The student should be able to identify alfalfa and describe its botanical characteristics.	theoretical/alfalfa crop practical/Botanical description of alfalfa crop	theoretical /Auditory methods, writing on the board method, direct dialogue method practical/ Assigning tasks and reports	Tests and reports Assign ment of duties
Fifth	2 theoretical practical 3	The student should be able to explain the importance of sorghum and distinguish its botanical characteristics.	theoretical/Kart crop practical/Botanical description of the carob crop	theoretical /Auditory methods, writing on the board method, direct dialogue method practical/ Assigning tasks and reports	Tests and reports Assign ment of duties
Sixth	2 theoretical practical 3	The student should be able to describe faba beans in terms	theoretical/Broad bean crop	theoretical /Auditory methods, writing on the board	Tests and reports

		of growth and characteristics.	practical/Botanical description of the broad bean crop	method, direct dialogue method practical/ Assigning tasks and reports	Assign ment of duties
Sevent h	2 theoreti cal practical 3	Students should be able to explain the characteristics of millet crops and their importance as fodder.	theoretical/millet crop practical/Botanical description of millet crop	theoretical /Auditory methods, writing on the board method, direct dialogue method practical/ Assigning tasks and reports	Tests and reports Assign ment of duties
The eighth	2 theoreti cal practical 3	Students should be able to distinguish fodder beet crops in terms of their botanical characteristics and uses.	theoretical/fodder beet crop practical/Botanical description of fodder beet crop	theoretical /Auditory methods, writing on the board method, direct dialogue method practical/ Assigning tasks and reports	Tests and reports Assign ment of duties

Ninth	2 theoretical practical 3	Students should be able to explain the importance of white corn and describe its botanical characteristics.	theoretical/white corn crop practical/Botanical description of white corn crop	theoretical /Auditory methods, writing on the board method, direct dialogue method practical/ Assigning tasks and reports	Tests and reports Assignment of duties
tenth	2 theoretical practical 3	The student should be able to describe the yellow corn crop and explain its role as animal feed.	theoretical/yellow corn crop practical/Botanical description of yellow corn crop	theoretical /Auditory methods, writing on the board method, direct dialogue method practical/ Assigning tasks and reports	Tests and reports Assignment of duties
eleventh	2 theoretical practical 3	The student should be able to distinguish between coarse and concentrated materials and apply methods for their manufacture.	theoretical/ Types of coarse and concentrated materials and their importance in animal nutrition practical/How to manufacture coarse and concentrated feed materials	theoretical /Auditory methods, writing on the board method, direct dialogue method practical/ Assigning	Tests and reports Assignment of duties

				tasks and reports	
twelfth	2 theoretical practical 3	The student should be able to explain the types of feed mixtures and implement methods for their cultivation.	theoretical/Feed mixtures and their quality. practical/Methods of growing fodder mixtures	theoretical /Auditory methods, writing on the board method, direct dialogue method practical/ Assigning tasks and reports	Tests and reports Assign ment of duties
thirteenth	2 theoretical practical 3	Students should be able to explain the importance of silage and apply the steps for its preparation.	theoretical/Al-Drees practical/How to make drees	theoretical /Auditory methods, writing on the board method, direct dialogue method practical/ Assigning tasks and reports	Tests and reports Assign ment of duties
fourteenth	2 theoretical practical 3	Students should be able to explain the role of silage in animal nutrition and apply the methods for its production.	theoretical/silage practical/How to make silage	theoretical /Auditory methods, writing on the board method, direct dialogue method	Tests and reports Assign ment of duties

				practical/ Assigning tasks and reports	
fifteenth	2 theoretical practical 3	Students should be able to explain the role of pastures in animal production and gain practical field experience.	theoretical/The importance of pastures in livestock production practical/Field increase in forage crop fields	theoretical /Auditory methods, writing on the board method, direct dialogue method practical/ Assigning tasks and reports	Tests and reports Assignment of duties

466. Course Evaluation	
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))	
467. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	Lectures prepared by the course instructors
Main References (Sources)	Forage and Pasture Crops - Ali Al-Azzam
Recommended books and references (scientific journals, reports...)	Forage and Pasture Crops Mohamed SayedAnd AbdullahQasim Al-Fakhri
Electronic references and websites	ICARDA, Arab Organization for Agricultural Development

Course Description Form

468. Course name:	
Tissue Culture	
469. Course code:	
DES255	
470. the chapterAcademic/ year	
471. Description preparation date	
1\7\2025	
472. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
473. Number of credit hours (total) / Number of units (total)	
474. Course Supervisor Name (List all names, if there is more than one)	
the name: Dr. Muhammad Salem Ahmed e-mail: mohameedsa66@ntu.edu.iq	
475. Course objectives	
Goals	1. The student should be able to understand the basics and techniques of tissue culture and its role in improving plant production.. 2. The student should be able to prepare and sterilize nutrient media to ensure successful tissue culture.. 3. The student will be able to use plant tissue culture techniques and preserve the genetic characteristics of plants.. 4. The student should be able to apply different methods of culturing plant organs (leaves, buds, roots).
476. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report.

	6. Assign teamwork to reveal leadership skills.

477. Course structure

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	2 theoretical 3 practical	The student should be able to explain the concept of tissue culture and its importance, and identify the tools used in it.	Theory: Introduction to tissue culture – its history and importance Practical: Familiarization with laboratory tools and equipment	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the second	2 theoretical 3 practical	The student should be able to describe the requirements of a tissue culture laboratory and apply the principles of sterilization.	Theory: Components of a tissue culture laboratory – design requirements Practical: Sterilization and the principles of aseptic technique	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the third	2 theoretical 3 practical	The student should be able to explain the components of the nutrient medium and	Theory: The chemical composition of nutrient media Practical:	theoretical :Auditory methods: writing on the board method,	Short exams, homework

		prepare the medium in practice.	Preparation of the nutrient medium (MS Medium)	direct dialogue method practical: Assignment and report	assignments, discussions
Fourth	2 theoretical 3 practical	The student should be able to explain the role of growth regulators and control their concentrations in the nutrient medium.	Theory: Plant growth regulators and their role in tissue culture Practical: Adding growth regulators to the nutrient medium	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Fifth	2 theoretical 3 practical	The student should be able to apply various sterilization techniques in the tissue culture laboratory.	Theory: Different sterilization methods (thermal, chemical) Practical: Sterilization of tools, media, and surfaces	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Sixth	2 theoretical	The student should be able to select suitable plant	Theoretical: Techniques for taking and	theoretical :Auditory methods: writing on	Short exams,

	3 practical	parts and cultivate them in nutrient media.	culturing plant parts (explants) Practical: Culturing plant parts in the nutrient medium	the board method, direct dialogue method practical: Assignment and report	homework assignments, discussions
Seventh	2 theoretical 3 practical	The student should be able to analyze the response of the cultivated parts to growth conditions and monitor their development.	Theoretical: Response of plant parts to environmental conditions Practical: Monitoring the growth of plant parts in the medium	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
The eighth	2 theoretical 3 practical	The student should be able to explain the process of callus formation and implement it in practice.	Theory: Callus formation – stages and influencing factors Practical: Stimulating callus formation in practice	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

Ninth	2 theoretical 3 practical	The student should be able to understand the process of plant organ regeneration and apply it in practice.	Theory: Plant organogenesis Practical: Formation of branches and roots from callus	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
tenth	2 theoretical 3 practical	Students should be able to explain the concept of somatic embryos and their practical production.	Theory: Somatic embryogenesis Practical: Production of somatic embryos in the laboratory	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
eleventh	2 theoretical 3 practical	Students should be able to carry out the precise propagation of certain economic plants.	Theory: Plant propagation by tissue culture Practical: Propagation of model plants (potatoes/bananas)	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme	Short exams, homework assignments, discussions

				nt and report	
twelfth	2 theoretical 3 practical	Students should be able to analyze the phenomenon of genetic changes resulting from tissue culture.	Theoretical: Somaclonal variation Practical: Observation of differences between tissue culture plants	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
thirteenth	2 theoretical 3 practical	Students should be able to explain methods of genetic resource conservation and the application of cryopreservation.	Theoretical: Preservation of genetic resources through tissue culture Practical: Cryopreservation techniques (Cryopreservation)	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
fourteenth	2 theoretical 3 practical	Students should be able to evaluate the role of tissue culture in improving and producing healthy plants.	Theory: Applications of tissue culture in plant improvement Practical: Practical training in producing disease-free plants	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions

				practical: Assignment and report	
fifteenth	2 theoretical 3 practical	Students should be able to integrate theoretical knowledge and practical skills into a comprehensive applied project.	Theory: Comprehensive review and preparation for the final exam Practical: Mini-project (tissue culture of a selected plant)	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

478. Course Evaluation	
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))	
479. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	Lectures prepared by the course instructors
Main References (Sources)	
Recommended books and references (scientific journals, reports...)	
Electronic references and websites	Fundamentals and Applications of Plant Tissue Culture / 978-620-5-63448-6 / 9786205634486 / 6205634481(noor-publishing.com)

Course Description Form

480. Course name:	
Biochemistry	
481. Course code:	
TAMO302	
482. the chapterAcademic/ year	
483. Description preparation date	
1\7\2025	
484. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
485. Number of credit hours (total) / Number of units (total)	
486. Course Supervisor Name (List all names, if there is more than one)	
the name:M.M. Omar Ahmed Fathy e-mail: omar.ah.f@ntu.edu.iq	
487. Course objectives	
Goals	1. The student should be able to understand and comprehend what is related to food components and their weakness. 2. The student should be able to know and learn the modern principles and methods of studying biochemistry and using modern techniques in scientific studies in laboratories.
488. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report. 6. Assign teamwork to reveal leadership skills.
489. Course structure	

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	2 theoretical 3 practical	theoretical:It explains the concept of cell science and the general properties of the cell. practical: Apply safety rules and specifications in laboratories	Theory: The cell and its components practical:Laboratory Safety	theoretical:Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the second	2 theoretical 3 practical	theoretical: Explains the nature of solutions and pH in the body practical: Describes carbohydrates and their types	Theory: Water and pH My work: Carbohydrates and their types	theoretical:Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the third	2 theoretical 3 practical	theoretical:Familiar with the nature of carbohydrates and their biological and physiological functions	My theory: Carbohydrates Practical: Solubility test and Molisch test	theoretical:Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments,

		practical: General carbohydrate tests		practical: Assignment and report	discussions
Fourth	2 theoretical 3 practical	theoretical:Recognizes derived monosaccharides, oligosaccharides practical: Carbohydrate tests	theoretical:Carbohydrate classification practical: Reductive tests for carbohydrates	theoretical:Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Fifth	2 theoretical 3 practical	theoretical:Explains the composition, functions, and classification of fats. practical: Descriptive tests for carbohydrates	theoretical:Fats practical: Sucrose hydrolysis, iodine test, and hydrolysis	theoretical:Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Sixth	2 theoretical 3 practical	theoretical:Recognizes conjugated lipids practical: Fats	theoretical:Compound fats practical: Lipid tests	theoretical:Auditory methods: writing on the board method, direct	Short exams, homework

				dialogue method practical: Assignment and report	assignments, discussions
Seventh	2 theoretical 3 practical	theoretical:It covers the most important derived fats and fatty acids (saturated and unsaturated). practical: Tests to detect glycerol	theoretical:derived fats practical:a test Acrolein for the detection of cholesterol	theoretical:Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
The eighth	2 theoretical 3 practical	theoretical:Learn about amino properties and the classification of amino acids. practical: Buffered solutions	theoretical:Amino acids. practical: pHph	theoretical:Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Ninth	2 theoretical	theoretical:Understand peptides and bonds in proteins	theoretical:Peptides practical: Amino acids	theoretical:Auditory methods: writing on the board	Short exams, homew

	3 practical	practical: General and functional amino acids		method, direct dialogue method practical: Assignment and report	ork assignments, discussions
tenth	2 theoretical 3 practical	theoretical:Understand proteins and their biological and physiological functions practical: Detection of amino acids and bioactive compounds on sulfur	theoretical:Biological functions of proteins practical:Amino acids	theoretical:Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
eleventh	2 theoretical 3 practical	theoretical:The student learns about plasma proteins. practical:	theoretical:Plasma proteins practical:Millon test and xanthoprotic test	theoretical:Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

twelfth	2 theoretical 3 practical	theoretical:The student understands enzymes and their properties. practical: Functional tests of proteins	theoretical:enzymes practical:proteins	theoretical:Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
thirteenth	2 theoretical 3 practical	theoretical:The student explains vitamins and their classification. practical: The student explains the concept of biuret.	theoretical:vitamins practical:Puret	theoretical:Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
fourteenth	2 theoretical 3 practical	theoretical: practical: Precipitation of proteins with heavy metal salts	theoretical:Mineral elements practical:proteins	theoretical:Auditory methods: writing on the board method, direct dialogue method practical: Assignme	Short exams, homework assignments,

				nt and report	discussi ons
fifteen th	2 theoreti cal 3 practical	theoretical:The student explains the body's metabolism. practical: A scientific visit to a biochemistry laboratory	theoretical:metabol ism practical:Problem solving	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme nt and report	Short exams, homew ork assignm ents, discussi ons

490. Course Evaluation	
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))	
491. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	Dalali, Basil Kamel,1994Fundamentals of Biochemistry, Dar Al-Kutub for Printing and Publishing, Mosul, Iraq
Main References (Sources)	Dalali, Basil Kamel,1994Fundamentals of Biochemistry, Dar Al-Kutub for Printing and Publishing, Mosul, Iraq
Recommended books and references (scientific journals, reports...)	1- Voet, D. Voet JG. Biochemistry. 2- Nelson, DL, Lehninger Principles of Biochemistry. 3- Robyt. J.F., White, B.J. Biochemical Techniques (Theory and Practice).
Electronic references and websites	US Food and Drug Administration

Course Description Form

492. Course name:	
Harvesting of Water	
493. Course code:	
DES303	
494. the chapter Academic/ year	
495. Description preparation date	
1\7\2025	
496. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
497. Number of credit hours (total) / Number of units (total)	
498. Course Supervisor Name (List all names, if there is more than one)	
the name: Mr. Omar Younis Hassan e-mail: Mti.lec224.omar@ntu.edu.iq	
499. Course objectives	
Goals	1. The student should be able to identify the concept of water harvesting and its importance in water resources management.. 2. The student should be able to identify renewable and non-renewable water sources and methods of exploiting them.. 3. The student should be able to analyze methods and techniques for harvesting surface and groundwater.. 4. The student will be able to design and implement simple water harvesting projects in different environments..
500. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion.

	5. Assign tasks and report. 6. Assign teamwork to reveal leadership skills.

501. Course structure

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	2 theoretical 3 practical	The student should be able to define the concept of water accumulation and analyze the hydrological characteristics of catchments.	theoretical: The concept and definition of water harvesting practical: Hydrological diagram of the watershed area Hydrological characteristics of the region	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the second	2 theoretical 3 practical	Students should be able to explain hydrological aspects and apply surface runoff models.	theoretical: Hydrological aspects of water harvesting practical: Runoff models for large and small catchments Water collection method Water collection method	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the third	2 theoretical	Students should be able to distinguish between water harvesting	theoretical: Water collection methods and techniques	theoretical :Auditory methods: writing on the board	Short exams,

	3 practical	methods and techniques and analyze methods for improving surface runoff.	practical: How to improve surface runoff of a watershed area	method, direct dialogue method practical: Assignment and report	homework assignments, discussions
Fourth	2 theoretical 3 practical	Students should be able to explain methods for stimulating surface runoff and identify catchment areas.	theoretical: Methods of stimulating surface runoff practical: Determine the watershed area	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Fifth	2 theoretical 3 practical	Students should be able to identify suitable areas and plan a preliminary collection system.	theoretical: Identify suitable areas for water collection practical: System planning and design	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

Sixth	2 theoretical 3 practical	Students should be able to explain the steps involved in designing systems and applying the water collection process.	theoretical: Planning and design of water collection systems practical: Water collection	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Seventh	2 theoretical 3 practical	Students should be able to explain water storage techniques and apply a practical system design.	theoretical: Collected water storage practical: System planning and design	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
The eighth	2 theoretical 3 practical	Students should be able to analyze the importance of water harvesting and its economic and social benefits.	theoretical: The importance and benefits of water harvesting practical: Water collection	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme	Short exams, homework assignments,

				nt and report	discussi ons
Ninth	2 theoreti cal 3 practical	Students should be able to apply hydrological aspects in system design.	theoretical: Hydrological aspects of water harvesting practical: System planning and design	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme nt and report	Short exams, homew ork assignm ents, discussi ons
tenth	2 theoreti cal 3 practical	Students should be able to explain the steps of implementation, maintenance, and application of the harvesting process.	theoretical: Implementation, operation and maintenance of water collection systems practical: Water collection	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme nt and report	Short exams, homew ork assignm ents, discussi ons
eleven th	2 theoreti cal 3 practical	Students should be able to assess the social and economic dimensions of water harvesting projects.	theoretical: social and economic issues practical: System planning and design	theoretical :Auditory methods: writing on the board method, direct	Short exams, homew ork assignm

				dialogue method practical: Assignment and report	ents, discussions
twelfth	2 theoretical 3 practical	Students will be able to conduct a cost-benefit analysis of water harvesting projects.	theoretical: Cost-benefit analysis of water harvesting practical: Water collection	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
thirteenth	2 theoretical 3 practical	Students will be able to prepare an economic feasibility study and apply storage methods.	theoretical: Economic feasibility analysis practical: Collected water storage	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
fourteenth	2 theoretical	Students will be able to analyze the benefits through a case study.	theoretical: Benefits of water collection	theoretical :Auditory methods: writing on the board	Short exams, homew

	3 practical		practical: Case study	method, direct dialogue method practical: Assignment and report	ork assignments, discussions
fifteenth	2 theoretical 3 practical	Students will be able to estimate and analyze costs within a practical project.	theoretical: Water collection costs practical: Water collection cost analysis	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

502. Course Evaluation
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))

503. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	
Main References (Sources)	
Recommended books and references (scientific journals, reports...)	
Electronic references and websites	

Course Description Form

504. Course name:	
Soil conservation	
505. Course code:	
DES304	
506. the chapterAcademic/ year	
507. Description preparation date	
1\7\2025	
508. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
509. Number of credit hours (total) / Number of units (total)	
510. Course Supervisor Name (List all names, if there is more than one)	
the name: Dr. Ahmed Faris Salem e-mail: ahmedalsawaf@ntu.edu.iq	
511. Course objectives	
Goals	1. The student should be able to identify the elements.administrationWater in arid areas. 2. The student should be able to understand the relationship between plants, the ecosystem, and climate elements in arid regions. 3. The student must be able to:Learn about the plant succession, climatic zones and environmental types of Iraq.
512. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report. 6. Assign teamwork to reveal leadership skills.
513. Course structure	

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	2 theoretical 3 practical	The student should be able to explain the concept of soil and water conservation and analyze rainfall data.	theoretical: Introduction - The Concept of Soil and Water Conservation Introduction practical: Rainfall data analysis	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the second	2 theoretical 3 practical	The student should be able to explain the characteristics of rain and apply methods for measuring surface runoff.	theoretical: Rain - Types of Rain - Physical Properties of Rain - Physics of Precipitation practical: The logical way to measure maximum surface flow rate	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the third	2 theoretical 3 practical	The student should be able to analyze the factors affecting surface runoff and calculate the depth of disturbance.	theoretical: Surface Runoff - Factors Affecting Surface Runoff practical: A direct method for calculating the	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments,

			depth of surface disturbance	practical: Assignment and report	discussions
Fourth	2 theoretical 3 practical	Students should be able to compare methods of analyzing surface runoff and apply physical models of erosion.	theoretical: Surface runoff analysis methods practical: Water Erosion Forecasting/Physically Based Models	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Fifth	2 theoretical 3 practical	Students should be able to explain water erosion and its types and apply statistical models to predict it.	theoretical: Water erosion - concept - types - mechanisms practical: Water Erosion Forecasting/Statistically Based Models	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Sixth	2 theoretical 3 practical	Students should be able to explain the universal equation and apply the K and	theoretical: Global soil loss equation practical:	theoretical :Auditory methods: writing on the board method, direct	Short exams, homework

		R factors in the field.	General equation for soil loss due to water erosion - factorK, R	dialogue method practical: Assignment and report	assignments, discussions
Seventh	2 theoretical 3 practical	Students should be able to evaluate erosion control methods and apply the S and L factor equations.	theoretical: Methods of combating water erosion practical: General equation for soil loss due to water erosion - two factorsSandL	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
The eighth	2 theoretical 3 practical	Students should be able to explain wind erosion and apply water erosion equations in practice.	theoretical: The relationship between erosion and soil productivity practical: General equation for soil loss due to water erosion - factorPandC	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Ninth	2 theoretical	Students should be able to explain wind erosion and apply water	theoretical: Wind erosion - concept - mechanisms	theoretical :Auditory methods: writing on the board	Short exams, homew

	3 practical	erosion equations in practice.	practical: Application of the general equation for the percentage of soil loss due to water erosion in the field	method, direct dialogue method practical: Assignment and report	ork assignments, discussions
tenth	2 theoretical 3 practical	Students should be able to explain wind erosion mechanisms and calculate them using the general equation.	theoretical: Wind erosion - concept - mechanisms practical: General equation for wind erosion	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
eleventh	2 theoretical 3 practical	Students should be able to evaluate wind erosion control methods and relate them to field observations.	theoretical: Ways to Combat Wind Erosion - Wind Erosion Control practical: Field trip to observe the manifestations of water erosion	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

twelfth	2 theoretical 3 practical	Students should be able to identify institutions and facilities and apply the WEE equation.	theoretical: Soil and water institutions, permanent and temporary facilities for soil and water conservation practical: General equation for wind erosionWEE	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
thirteenth	2 theoretical 3 practical	Students should be able to prepare a plan for soil and water conservation and apply equations in the field.	theoretical: Soil and Water Conservation Planning practical: Application of the general equation for wind erosion (WEE) in the field	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
fourteenth	2 theoretical 3 practical	Students should be able to analyze the problem of sand dunes and apply methods to control them in practice.	theoretical: Sand dunes and methods of controlling them practical: Application of the general equation for wind erosion (WEE) in the field	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme	Short exams, homework assignments,

				nt and report	discussi ons
fifteen th	2 theoreti cal 3 practical	Students should be able to discuss methods of combating wind erosion and evaluate solutions through applied educational materials.	theoretical: Ways to Combat Wind Erosion - Wind Erosion Control practical: Films and slides on wind erosion	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme nt and report	Short exams, homew ork assignm ents, discussi ons

514. Course Evaluation	
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))	
515. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	
Main References (Sources)	Fundamentals of Database Systems 6th edition Ramez Elmasri
Recommended books and references (scientific journals, reports...)	Data Modeling Fundamentals: A Practical Guide for IT Data Modeling Essentials
Electronic references and websites	https://www.pdfdrive.com/

Course Description Form

516. Course name:	
Principals of Irrigation and drainage	
517. Course code:	
DES305	
518. the chapterAcademic/ year	
519. Description preparation date	
1\7\2025	
520. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
521. Number of credit hours (total) / Number of units (total)	
522. Course Supervisor Name (List all names, if there is more than one)	
the name: Mr. Samir Farhan Ayoub e-mail: Samir.f.ayoub@ntu.edu.iq	
523. Course objectives	
Goals	1. The student should be able to explain the importance of water reuse and its role in achieving water security and environmental sustainability.. 2. The student should be able to distinguish between reclaimed water sources and different reuse techniques.. 3. The student should be able to analyze the health and environmental standards related to water reuse.. 4. The student should be able to apply water treatment methods and techniques to prepare it for agricultural and industrial use..
524. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion.

	5. Assign tasks and report. 6. Assign teamwork to reveal leadership skills.

525. Course structure

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	2 theoretical	The student should be able to define recycled water and explain its various sources.	theoretical: The concept of recycled water. The water sources used are surface runoff, wastewater, and high groundwater.	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
the second	2 theoretical	The student should be able to identify and evaluate methods of reusing irrigation water.	theoretical: Methods used to reuse all types of irrigation water	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
the third	2 theoretical	The student should be able to describe treatment processes and identify basic criteria for reuse.	theoretical: Wastewater treatment processes, standards and principles of reuse methods	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
Fourth	2 theoretical	Students should be able to analyze	theoretical: Poor quality irrigation water	theoretical :Auditory methods:	Short exams,

		pollution standards and explain methods for reusing poor-quality water.	(pollution standards, reuse criteria and methods. Types of suitable irrigation methods)	writing on the board method, direct dialogue method	homework assignments, discussions
Fifth	2 theoretical	Students should be able to evaluate appropriate irrigation methods for low-quality water and apply them in practical situations.	theoretical: Poor quality irrigation water (pollution standards, reuse criteria and methods. Types of suitable irrigation methods)	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
Sixth	2 theoretical	Students should be able to explain low-cost technology applications and compare them with traditional methods.	theoretical: Low-cost technology for water reuse	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
Seventh	2 theoretical	Students will be able to identify the characteristics of wastewater and its sources of pollution.	theoretical: Wastewater, wastewater. Wastewater properties: components and sources of pollutants in wastewater.	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
The eighth	2 theoretical	Students will be able to compare different treatment methods and explain the role	theoretical: Wastewater treatment processes. Water disposal and reuse methods. Selection	theoretical :Auditory methods: writing on the board method,	Short exams, homework

		of oxidation ponds.	of treatment methods. Treatment stages. Oxidation and stabilization lakes.	direct dialogue method	assignments, discussions
Ninth	2 theoretical	Students will be able to evaluate the advantages and disadvantages associated with oxidation ponds.	theoretical: Advantages and importance of oxidation lakes. Disadvantages of oxidation lakes.	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
tenth	2 theoretical	Students should be able to analyze the factors affecting the operational efficiency of oxidation ponds.	theoretical: Sanitation Considerations Factors Affecting the Operation of Oxidation Lakes.	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
eleventh	2 theoretical	Students should be able to define sludge and explain its types and methods of reuse.	theoretical: Sludge Reuse Sludge (Solid Sediment) What is Sludge and Its Types	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
twelfth	2 theoretical	Students should be able to analyze the chemical composition of sludge and evaluate its suitability for	theoretical: Its chemical composition. Use of sludge as fertilizer.	theoretical :Auditory methods: writing on the board method, direct	Short exams, homework

		use in agriculture.		dialogue method	assignments, discussions
thirteenth	2 theoretical	Students should be able to discuss the biological and toxicological risks associated with the reuse of water and sludge.	theoretical: Risks of using treated wastewater and sludge in irrigation and agriculture, biological hazards, toxins and hazards of toxic materials.	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
fourteenth	2 theoretical	Students should be able to explain reuse applications in agriculture, industry, and groundwater recharge.	theoretical: Reuse of wastewater for groundwater recharge and renewal, and agricultural and industrial water use.	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
fifteenth	2 theoretical	Students should be able to evaluate tertiary treatment techniques and analyze the benefits of water reuse.	theoretical: Use of tertiary treatment (filtration, absorption, reverse osmosis) Article: Wastewater use, recycling and its benefits.	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions

526. Course Evaluation	
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))	
527. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	
Main References (Sources)	Fundamentals of Database Systems 6th edition Ramez Elmasri

Recommended books and references (scientific journals, reports...)	Data Modeling Fundamentals: A Practical Guide for IT Data Modeling Essentials
Electronic references and websites	https://www.pdfdrive.com/

Course Description Form

528. Course name:	
Groundwater management	
529. Course code:	
DES306	
530. the chapter Academic/ year	
531. Description preparation date	
1\7\2025	
532. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
533. Number of credit hours (total) / Number of units (total)	
534. Course Supervisor Name (List all names, if there is more than one)	
the name:M.M. Omar Younis Hassan e-mail: Mti.lec224.omar@ntu.edu.iq	
535. Course objectives	
Goals	1. The student should be able to identify the elements.administrationWater in arid areas. 2. The student should be able to understand the relationship between plants, the ecosystem, and climate elements in arid regions. 3. The student must be able to:Learn about the plant succession, climatic zones and environmental types of Iraq.
536. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report.

	6. Assign teamwork to reveal leadership skills.

537. Course structure

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	2 theoretical 3 practical	The student should be able to define groundwater and explain its importance and cycle in nature.	Theory: Introduction to groundwater – importance, sources, water cycle. Practical: Laboratory visit to learn about groundwater measurement tools.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the second	2 theoretical 3 practical	The student should be able to describe the characteristics of groundwater and aquifer layers.	Theory: Natural and artificial groundwater sources. Practical: Locating existing wells and analyzing their characteristics.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the third	2 theoretical 3 practical	Students should be able to distinguish between different sources of groundwater.	Theory: Drilling and well construction: types and operating mechanisms. Practical:	theoretical :Auditory methods: writing on the board method, direct	Short exams, homework

			Practical exercise on drawing a well plan.	dialogue method practical: Assignment and report	assignments, discussions
Fourth	2 theoretical 3 practical	Students should be able to design a well and understand the different types of drilling.	Theory: Drilling and well construction: types and operating mechanisms. Practical: Practical exercise on drawing a well plan.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Fifth	2 theoretical 3 practical	Students should be able to choose the appropriate irrigation method using groundwater.	Theory: Irrigation methods using groundwater (sprinkler and drip irrigation). Practical: Practical experiment on a drip irrigation system connected to a well.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Sixth	2 theoretical 3 practical	Students should be able to accurately calculate groundwater reserves.	Theory: Assessing groundwater quantities: calculations and measurements. Practical:	theoretical :Auditory methods: writing on the board method, direct	Short exams, homework

			Measuring the water level in a well using measuring instruments.	dialogue method practical: Assignment and report	assignments, discussions
Seventh	2 theoretical 3 practical	Students should be able to assess groundwater quality and its suitability for agricultural use.	Theory: Groundwater quality: salinity, minerals, chemical indicators. Practical: Analysis of laboratory water samples to determine quality.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
The eighth	2 theoretical 3 practical	Students should be able to identify depletion problems and propose solutions to reduce them.	Theory: Students should be able to assess groundwater quality and its suitability for agricultural use. Practical: Case study of areas affected by excessive depletion.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Ninth	2 theoretical 3 practical	Students should be able to propose groundwater protection strategies.	Theoretical: Methods of groundwater protection and sustainability. Practical:	theoretical :Auditory methods: writing on the board method, direct	Short exams, homework

			Application of models for protecting the water basin from pollution.	dialogue method practical: Assignment and report	assignments, discussions
tenth	2 theoretical 3 practical	Students should be able to link groundwater consumption to agriculture and demand management.	Theoretical: The relationship between groundwater and agriculture in arid regions. Practical: Analysis of water use data on a model farm.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
eleventh	2 theoretical 3 practical	Students will be able to diagnose pollution and appropriate treatment methods.	Theoretical: Pollution and methods of groundwater treatment. Practical: Study of contaminated samples and their treatment in the laboratory.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
twelfth	2 theoretical 3 practical	Students will be able to apply sustainable irrigation methods using groundwater.	Theoretical: Sustainable irrigation strategies and water reuse. Practical: Simulation experiment of a	theoretical :Auditory methods: writing on the board method, direct	Short exams, homework

			sustainable irrigation system.	dialogue method practical: Assignment and report	assignments, discussions
thirteenth	2 theoretical 3 practical	Students will be able to integrate groundwater knowledge into environmental and engineering planning.	Theory: Groundwater management in environmental and engineering planning. Practical: Developing a simple water resource management plan for a specific farm or area.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
fourteenth	2 theoretical 3 practical	Students will be able to use modern techniques to monitor and manage groundwater.	Theoretical: Modern techniques in groundwater management (GIS – Remote Sensing). Practical: Using GIS software to analyze watershed data. General review	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
fifteenth	2 theoretical 3 practical	Students should be able to integrate their theoretical and practical knowledge to manage	General review	theoretical :Auditory methods: writing on the board method, direct	Short exams, homework

		groundwater sustainably.		dialogue method practical: Assignment and report	assignments, discussions

538. Course Evaluation	
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))	
539. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	
Main References (Sources)	Fundamentals of Database Systems 6th edition Ramez Elmasri
Recommended books and references (scientific journals, reports...)	Data Modeling Fundamentals: A Practical Guide for IT Data Modeling Essentials
Electronic references and websites	https://www.pdfdrive.com/

Course Description Form

540. Course name:	
Sustainable development in desert areas	
541. Course code:	
DES307	
542. the chapterAcademic/ year	
543. Description preparation date	
1\7\2025	
544. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
545. Number of credit hours (total) / Number of units (total)	
546. Course Supervisor Name (List all names, if there is more than one)	
the name: Dr. Ahmed Faris Salem e-mail: ahmedalsawaf@ntu.edu.iq	
547. Course objectives	
Goals	1. The student should be able to explain the concept of sustainable development and its objectives in the context of desert environments.. 2. The student should be able to analyze the natural, economic and social characteristics of desert areas.. 3. The student will be able to assess environmental challenges such as water scarcity, desertification, and soil degradation in desert areas.. 4. The student will be able to apply modern strategies and methods for managing natural resources in desert environments..
548. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report.

	6. Assign teamwork to reveal leadership skills.

549. Course structure

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	2 theoretical	The student should be able to define sustainable development and explain its environmental, economic, and social dimensions.	theoretical: Introduction to Sustainable Development	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
the second	2 theoretical	The student should be able to describe the natural characteristics of desert regions and identify their impact on development.	theoretical: Environmental characteristics of desert areas	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
the third	2 theoretical	The student should be able to analyze the most prominent environmental and social challenges in desert regions.	theoretical: Environmental and social challenges	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
Fourth	2 theoretical	Students will be able to discuss the most important strategies applied to	theoretical: Sustainable development strategies	theoretical :Auditory methods: writing on the board method,	Short exams, homework

		achieve sustainable development in arid environments.		direct dialogue method	assignments, discussions
Fifth	2 theoretical	Students will be able to explain the role of renewable energy in supporting sustainable development in desert regions.	theoretical: Renewable energy: use of solar and wind energy	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
Sixth	2 theoretical	Students will be able to demonstrate the importance of education and training in raising awareness and promoting community participation.	theoretical: The role of education and training in sustainable development	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
Seventh	2 theoretical	Students will be able to analyze the relationship between economic and social development and sustainability.	theoretical: Economic and social development	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
The eighth	2 theoretical	Students will be able to evaluate the role of policies and good governance in	theoretical: Policies and Administration	theoretical :Auditory methods: writing on the board method,	Short exams, homework

		natural resource management in deserts.		direct dialogue method	assignments, discussions
Ninth	2 theoretical	Students will be able to review examples of case studies in sustainable desert development.	theoretical: Case studies	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
tenth	2 theoretical	Students will be able to explain the importance of scientific research and development in supporting sustainable development projects.	Research and Development	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
eleventh	2 theoretical	Students will be able to analyze real-life examples of sustainable development applications in desert areas.	theoretical: Analysis of successful case studies of sustainable development applications in different desert areas.	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
twelfth	2 theoretical	Students will be able to use research and evaluation tools to understand development issues in desert areas.	theoretical: Research and evaluation tools used in the study of environmental and social problems.	theoretical :Auditory methods: writing on the board method, direct	Short exams, homework assignments, discussions

				dialogue method	
thirteenth	2 theoretical	Students will be able to prepare a sustainable development project proposal that is appropriate for the characteristics of a desert region.	theoretical: Design a sustainable development project that suits the needs of a specific desert area..	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
fourteenth	2 theoretical	Students will be able to discuss the role of innovation and technology in addressing desert challenges.	theoretical: Innovations and modern technology and their role in improving conditions in desert areas.	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
fifteenth	2 theoretical	Students will be able to assess the place of sustainable development in global and local policies and relate it to the local reality.	theoretical: The importance of sustainable development in global and local contexts	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions

550. Course Evaluation	
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))	
551. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	
Main References (Sources)	Fundamentals of Database Systems 6th edition Ramez Elmasri

Recommended books and references (scientific journals, reports...)	Data Modeling Fundamentals: A Practical Guide for IT Data Modeling Essentials
Electronic references and websites	https://www.pdfdrive.com/

Course Description Form

552. Course name:	
Recycling agricultural waste	
553. Course code:	
TAMO351	
554. the chapterAcademic/ year	
555. Description preparation date	
1\7\2025	
556. Available attendance forms	
1. Weekly lesson schedule (theoretical+ practical) And my work . 2. Discussions, scientific seminars, and other extracurricular activities	
557. Number of credit hours (total) / Number of units (total)	
558. Course Supervisor Name (List all names, if there is more than one)	
the name:M.M. Omar Younis Hassan e-mail: Mti.lec224.omar@ntu.edu.iq	
559. Course objectives	
Goals	• Introduce students to the sources and types of agricultural waste. • Explain the environmental problems caused by waste accumulation. • Provide students with basic skills in recycling waste to produce fertilizer, animal feed, and energy. • Develop the ability to use modern technologies in the treatment of agricultural waste. • Raise awareness of the role of recycling in achieving sustainable development and protecting the environment.
560. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report. 6. Assign teamwork to reveal leadership skills.

561. Course structure					
week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	2 theoretical 3 practical	The student should be able to understand the introduction to agricultural waste: its concept, importance, and production volume in agricultural environments.	Theory: General introduction to agricultural waste. Practical: Collecting and sorting waste samples.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the second	2 theoretical 3 practical	The student should be able to understand the classification of agricultural waste: plant, animal, and industrial waste related to the agricultural sector.	Theory: Classification of plant and animal waste Practical: Drying and grinding plant waste.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the third	2 theoretical 3 practical	Students will be able to understand the environmental impact of waste accumulation: environmental	Theory: Environmental and health impact of waste accumulation. Practical:	theoretical :Auditory methods: writing on the board method, direct	Short exams, homework

		pollution and health problems.	Preparing compost (first stage: mixing and stacking).	dialogue method practical: Assignment and report	assignments, discussions
Fourth	2 theoretical 3 practical	Students will be able to understand the initial treatment of waste: collection, sorting, drying, and grinding.	Theory: Primary treatment methods (collection, sorting, grinding). Practical: Monitoring the composting process (second stage: turning and aerating).	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Fifth	2 theoretical 3 practical	Students will be able to understand the recycling of plant waste: composting and organic fertilizer production.	Theory: Recycling to produce organic fertilizer (compost). Practical:	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Sixth	2 theoretical	Students will be able to understand the recycling of animal waste:	Theory: Biological recycling to produce biogas.	theoretical :Auditory methods: writing on the board	Short exams, homew

	3 practical	biogas production and organic fertilizer.	Practical: Measuring compost maturity indicators (temperature, humidity, pH).	method, direct dialogue method practical: Assignment and report	ork assignments, discussions
Seventh	2 theoretical 3 practical	Students will be able to understand the production of animal feed from agricultural waste: treatment techniques to improve nutritional value.	Theory: Using waste as animal feed. Practical: Miniature biogas digester for biogas production.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
The eighth	2 theoretical 3 practical	Students will be able to understand the use of waste in energy production: biofuel, biogas, and direct combustion.	Theoretical: Recycling for energy production. Practical: Setting up a miniature biogas digester for biogas production.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

Ninth	2 theoretical 3 practical	Students will be able to understand modern recycling techniques: biotechnology, microbial and enzymatic treatments.	Theoretical: Biotechnology in recycling. Practical: Measuring biogas yield and analyzing its components.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
tenth	2 theoretical 3 practical	Students will be able to identify the production of industrial materials from waste: paper, industrial wood, building materials.	Theory: Waste as a source of industrial materials (wood, paper, building materials). Practical: Experimenting with the production of animal feed from husks or plant waste (chemical/biological processes).	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
eleventh	2 theoretical 3 practical	Students will be able to identify environmental laws and regulations: regulation of agricultural waste management.	Theory: Environmental legislation governing waste management. Practical: Production of liquid fertilizer (biofertilizer) from waste.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme	Short exams, homework assignments,

				nt and report	discussi ons
twelfth	2 theoretical 3 practical	Students will be able to identify recycling and its role in sustainable development: economic and social dimensions.	Theoretical: Local and global case studies. Practical: Recycling paper waste to produce recycled paper.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
thirteenth	2 theoretical 3 practical	The student should be able to know how to prepare small industrial models (pressed boards made of palm fronds or straw).	Theoretical: Recycling and sustainable development. Practical: Preparation of small industrial models (pressed palm frond or straw boards)	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
fourteenth	2 theoretical 3 practical	Students should be able to understand	Theory: Student presentations. Practical: Discussion of practical reports	theoretical :Auditory methods: writing on the board method, direct	Short exams, homework assignm

			from student groups.	dialogue method practical: Assignment and report	ents, discussions
fifteenth	2 theoretical 3 practical	Comprehensive review and preparation for the final exam.	Theory: Comprehensive review. Practical: Final practical test + evaluation of student projects.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

562. Course Evaluation	
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))	
563. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	
Main References (Sources)	• FAO. (2017). *Agricultural Waste Management: Towards Circular Economy*. Rome: FAO. • Diaz, L. F., & Savage, G. M. (2019). *Composting and Recycling Municipal Solid Waste*. CRC Press.
Recommended books and references (scientific journals, reports...)	
Electronic references and websites	

Course Description Form

564. Course name:	
Organic Agriculture	
565. Course code:	
TAMO352	
566. the chapterAcademic/ year	
567. Description preparation date	
1\7\2025	
568. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
569. Number of credit hours (total) / Number of units (total)	
570. Course Supervisor Name (List all names, if there is more than one)	
the name: Mr. Omar Younis Hassan e-mail: Mti.lec224.omar@ntu.edu.iq	
571. Course objectives	
Goals	• Introducing students to the concept of agriculture and its importance in food security and the economy. • Learning about the scientific basis of agricultural processes (soil, water, plants). • Develop students' skills in handling agricultural tools and field operations. • Gain practical experience in land preparation, planting, irrigation, fertilization, and harvesting. • Promote awareness of sustainable agricultural practices and the protection of natural resources.
572. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report. 6. Assign teamwork to reveal leadership skills.

573. Course structure					
week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	2 theoretical 3 practical	The student should be able to Explains the importance of agriculture and its economic role, and identifies agricultural tools.	Theory: Introduction to agriculture and its importance in food security and the economy Practical: Identifying agricultural tools and equipment	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the second	2 theoretical 3 practical	The student should be able to Explains the development of agricultural practices throughout history and applies soil sampling skills.	Theory: Collecting soil samples and identifying their characteristics Practical: History and development of agriculture	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the third	2 theoretical 3 practical	The student should be able to Analyzes the impact of climate, soil, and water on production, and	Theory: Environmental factors affecting agricultural production (climate, soil, water)	theoretical :Auditory methods: writing on the board method, direct	Short exams, homework

		applies soil testing.	Practical: Simple analysis of soil samples (texture, color, pH)	dialogue method practical: Assignment and report	assignments, discussions
Fourth	2 theoretical 3 practical	The student should be able to Explains soil characteristics and applies steps for preparing land for cultivation.	Theory: Characteristics of agricultural soil and methods of improving it Practical: Preparing experimental land for cultivation	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Fifth	2 theoretical 3 practical	The student should be able to Distinguishes between different irrigation methods and experiments with their application in the field.	Theory: Practical application of irrigation (surface – sprinkler – drip) Practical: Irrigation water sources and methods (traditional and modern)	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Sixth	2 theoretical	The student should be able to Identifies seed types and propagation	Theory: Experiment with sowing and planting seedlings in beds or pots	theoretical :Auditory methods: writing on the board	Short exams, homew

	3 practical	methods and applies practical cultivation.	Practical: Seeds, seedlings, and propagation methods	method, direct dialogue method practical: Assignment and report	ork assignments, discussions
Seventh	2 theoretical 3 practical	The student should be able to Explains basic agricultural processes and observes seedling growth in practice.	Theory: Monitoring seed germination and seedling growth Practical: Agricultural operations (plowing, sowing, cultivation, fertilization)	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
The eighth	2 theoretical 3 practical	The student should be able to Explains pest control strategies and applies them in practice.	Theory: Experimenting with pest control on laboratory plants Practical: Agricultural pest control (biological, chemical)	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

Ninth	2 theoretical 3 practical	The student should be able to Distinguishes between field crops and prepares a report on the visit.	Theory: Field crops (cereals, legumes, fodder) Practical: Visit to a field crop/experimental field	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
tenth	2 theoretical 3 practical	The student should be able to Describes vegetable crops and evaluates their cultivation techniques in the field.	Theory: Basic vegetable crops Practical: Visit to a vegetable farm (greenhouse/field)	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
eleventh	2 theoretical 3 practical	The student should be able to Identifies types of fruit crops and observes methods of managing them in the field.	Theory: Fruit crops Practical: Visit to a local fruit orchard	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme	Short exams, homework assignments,

				nt and report	discussi ons
twelft h	2 theoreti cal 3 practical	The student should be able to Explains the importance of industrial crops and writes a scientific report.	Theory: Industrial crops (cotton, sugarcane, sunflowers) Practical: Preparation of a field report on an agricultural visit	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme nt and report	Short exams, homew ork assignm ents, discussi ons
thirtee nth	2 theoreti cal 3 practical	The student should be able to Links agriculture and the environment and applies the principle of sustainability in a practical project.	Theory: Sustainable agriculture and environmentally friendly practices Practical: Mini-project: Growing plants in pots or a small greenhouse	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme nt and report	Short exams, homew ork assignm ents, discussi ons
fourte enth	2 theoreti cal 3 practical	The student should be able to Analyzes case studies and presents his project with teamwork skills.	Theory: Local case studies and student presentations Practical: Presentation and discussion of	theoretical :Auditory methods: writing on the board method, direct	Short exams, homew ork assignm

			practical project results	dialogue method practical: Assignment and report	ents, discussions
fifteenth	2 theoretical 3 practical	The student should be able to Integrates his knowledge and skills in a final test and evaluates his project.	Theory: General review and preparation for final exam Practical: Final practical exam and project assessment	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

574. Course Evaluation	
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))	
575. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	
Main References (Sources)	• Acquaah, G. (2012). *Principles of Crop Production: Theory, Techniques, and Technology*. Pearson. FAO. (2019). *Sustainable Crop Production Intensification*. Rome: FAO
Recommended books and references (scientific journals, reports...)	
Electronic references and websites	

Course Description Form

576. Course name:	
Horticulture	
577. Course code:	
DES351	
578. the chapter Academic/ year	
579. Description preparation date	
1\7\2025	
580. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
581. Number of credit hours (total) / Number of units (total)	
582. Course Supervisor Name (List all names, if there is more than one)	
the name: Mr. Omar Younis Hassan e-mail: Mti.lec224.omar@ntu.edu.iq	
583. Course objectives	
Goals	1. Introduce students to the concept of horticulture and types of horticultural crops (vegetables, fruits, ornamental plants). 2. Learn about the scientific principles of horticultural plant cultivation and management. 3. Develop practical skills in horticultural plant cultivation and propagation. 4. Enable students to care for horticultural crops and control diseases and pests. 5. Raise awareness of the principles of sustainable gardening and sound environmental practices.
584. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming.

	3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report. 6. Assign teamwork to reveal leadership skills.

585. Course structure

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	2 theoretical 3 practical	The student should be able to Explains the importance of gardening and identifies tools and equipment.	Theory: Introduction to gardening and its economic and nutritional importance. Practical: Familiarization with gardening tools and equipment	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the second	2 theoretical 3 practical	The student should be able to Explains the effect of environmental factors on growth and analyzes soil in practice.	Theory: Familiarization with types of horticultural crops (vegetables, fruits, ornamental plants). Practical: Practical analysis of soil characteristics	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

the third	2 theoretical 3 practical	The student should be able to Applies soil preparation in practice	Theory: Environmental factors affecting the growth of horticultural plants. Practical: Preparing the ground or pots for planting.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Fourth	2 theoretical 3 practical	The student should be able to Applies seed planting and monitors growth.	Theory: Soil and methods of preparing it for gardening. Practical: Experimenting with planting seeds and monitoring germination.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Fifth	2 theoretical 3 practical	The student should be able to Applies seed planting and monitors growth.	Theory: Seeds, seedlings, and methods of propagation. Practical: Applying fertilizer and monitoring its effect.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme	Short exams, homework assignments,

				nt and report	discussi ons
Sixth	2 theoreti cal 3 practical	The student should be able to Applies plant cuttings and grafting in practice.	Theory: Planting and vegetative propagation (cuttings, grafting). Practical: Applying practical propagation methods.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme nt and report	Short exams, homew ork assignm ents, discussi ons
Sevent h	2 theoreti cal 3 practical	The student should be able to Applies different types of irrigation in practice.	Theory: Irrigation and different irrigation methods for horticultural crops. Practical: Experimenting with different types of irrigation.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme nt and report	Short exams, homew ork assignm ents, discussi ons
The eighth	2 theoreti cal 3 practical	The student should be able to Applies fertilization and monitors its effect.	Theory: Fertilization and fertility in horticulture. Practical: Experiment with plant fertilization.	theoretical :Auditory methods: writing on the board method, direct	Short exams, homew ork assignm

				dialogue method practical: Assignment and report	ents, discussions
Ninth	2 theoretical 3 practical	The student should be able to Applies pruning and trimming in practice.	Theory: Pruning and trimming plants. Practical: Prune and trim plants in practice.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
tenth	2 theoretical 3 practical	The student should be able to Applies pest control methods in practice.	Theory: Pest and disease control in horticultural crops. Practical: Control of simple pests or diseases.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
eleventh	2 theoretical	The student should be able to Grows vegetable crops	Theory: Basic vegetable crops. Practical:	theoretical :Auditory methods: writing on the board	Short exams, homew

	3 practical	and evaluates their growth.	Growing vegetable crops in the field or greenhouse.	method, direct dialogue method practical: Assignment and report	ork assignments, discussions
twelfth	2 theoretical 3 practical	The student should be able to Grows fruit crops and observes their growth.	Theory: Important fruit crops. Practical: Growing small fruit crops.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
thirteenth	2 theoretical 3 practical	The student should be able to Grows ornamental plants and applies coordination skills.	Theory: Ornamental plants and landscaping. Practical: Growing and arranging ornamental plants.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

fourteenth	2 theoretical 3 practical	The student should be able to Applies sustainable farming practices in practice.	Theory: Sustainable agriculture in horticulture and environmental practices. Practical: Presentation and discussion of student projects.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
fifteenth	2 theoretical 3 practical	The student should be able to Presents his project and conducts the final practical test.	Theory: General review and student presentations. Practical: Final practical exam and project evaluation.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

586. Course Evaluation

((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))

587. Learning and Teaching Resources

Required textbooks (curriculum books, if available)	
Main References (Sources)	
Recommended books and references (scientific journals, reports...)	• Acquaah, G. (2012). *Horticulture: Principles and Practices*. Pearson.

	• FAO. (2019). *Sustainable Horticulture Production*. Rome: FAO
Electronic references and websites	

Course Description Form

588. Course name:	
Adapted agriculture	
589. Course code:	
DES352	
590. the chapterAcademic/ year	
Third semester	
591. Description preparation date	
1/7/2025	
592. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
593. Number of credit hours (total) / Number of units (total)	
594. Course Supervisor Name (List all names, if there is more than one)	
the name:D. Muhammad Salem Ahmed e-mail: mohameedsa66@ntu.edu.iq	
595. Course objectives	
Goals	1. The student should be able to explain the concept of adaptive agriculture and its importance in confronting climate change.. 2. The student should be able to analyze the environmental factors affecting adapted agricultural systems.. 3. The student should be able to apply modern agricultural techniques suitable for harsh climatic conditions..

	4. The student will be able to design agricultural production systems that adapt to limited water and land resources..
596. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report. 6. Assign teamwork to reveal leadership skills.

597. Course structure

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	2 theoretical 2 practical	The student should be able to define controlled agriculture, explain its objectives, and describe its geographical distribution.	Historical overview - Definition of adapted agriculture - Objectives and purposes. Geographical distribution in the world and Iraq.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the second	2 theoretical 2 practical	The student should be able to identify the criteria for selecting sites for controlled agriculture facilities.	Principles of establishing air-conditioned agricultural facilities - location - orientation - area - shape.	theoretical :Auditory methods: writing on the board method, direct	Short exams, homework assignm

				dialogue method practical: Assignment and report	ents, discussions
the third	2 theoretical 2 practical	The student should be able to analyze the impact of climatic factors on controlled crop production.	Climatic factors affecting plant growth in climate-controlled agriculture: temperature, light, and humidity.CO2	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Fourth	2 theoretical 2 practical	Students should be able to distinguish between agricultural environments and select the most suitable for controlled environment agriculture.	Soil factors affecting plant growth in adapted agriculture - types of agricultural media.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Fifth	2 theoretical 2	Students should be able to describe methods for constructing	Construction of plastic tunnels and plastic houses: shapes, types, and	theoretical :Auditory methods: writing on the board	Short exams, homew

	practical	plastic tunnels and apply a miniature practical model.	plastic specifications.	method, direct dialogue method practical: Assignment and report	ork assignments, discussions
Sixth	2 theoretical 2 practical	Students should be able to compare glasshouses with plastic greenhouses and determine their uses.	Building greenhouses: shapes, types, and types of glass.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Seventh	2 theoretical 2 practical	Students should be able to explain temperature and ventilation control systems and apply some calculations.	Methods of heating, cooling and ventilation of air-conditioned homes.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

The eighth	2 theoretical 2 practical	Students should be able to set up a nursery inside a plastic greenhouse and produce seedlings.	Production of vegetable seedlings in tunnels and air-conditioned houses.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Ninth	2 theoretical 2 practical	Students should be able to carry out a cultivation experiment in an alternative soil system.	Indoor greenhouse farming systems: planting in basins, rings, machines, straw, bags, rock wool, hydroponics.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
tenth	2 theoretical 2 practical	Students should be able to explain the stages of tomato production and apply them in practice.	Production of some vegetable crops: tomato production.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme	Short exams, homework assignments,

				nt and report	discussi ons
eleven th	2 theoreti cal 2 practical	Students should be able to identify the requirements of peppers and eggplants and manage them inside greenhouses.	Production of some vegetable crops: production of peppers and eggplants.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme nt and report	Short exams, homew ork assignm ents, discussi ons
twelft h	2 theoreti cal 2 practical	Students should be able to compare the requirements of cucumbers and squash and produce them in practice.	Production of some vegetable crops: cucumber and squash production	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme nt and report	Short exams, homew ork assignm ents, discussi ons
thirtee nth	2 theoreti cal 2 practical	Students should be able to identify the mushroom production environment and gain practical	Production of some vegetable crops: mushroom production	theoretical :Auditory methods: writing on the board method, direct	Short exams, homew ork assignm

		experience in mushroom cultivation.		dialogue method practical: Assignment and report	ents, discussions
fourteenth	2 theoretical 2 practical	Students should be able to apply the principles of chili and banana production in controlled environment agriculture.	Production of some fruit crops: production of squill - banana.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
fifteenth	2 theoretical 2 practical	Students should be able to link theoretical concepts to practical applications in controlled environment agriculture.	Historical overview - Definition of adapted agriculture - Objectives and purposes. Geographical distribution in the world and Iraq.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
598. Course Evaluation					
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))					
599. Learning and Teaching Resources					

Required textbooks (curriculum books, if available)	
Main References (Sources)	
Recommended books and references (scientific journals, reports...)	
Electronic references and websites	

Course Description Form

600. Course name:	
wild animals	
601. Course code:	
DES353	
602. the chapterAcademic/ year	
First semester	
603. Description preparation date	
604. Available attendance forms	
1. Weekly lesson schedule (theoretical). 2. Discussions, scientific seminars, and other extracurricular activities	
605. Number of credit hours (total) / Number of units (total)	
606. Course Supervisor Name (List all names, if there is more than one)	
the name:M.M. Ziad Amer Mustafa e-mail: mti.Iec96.Zeyad@ntu.edu.iq	
607. Course objectives	
Goals	• Introduce students to wild animal species and their environmental and economic importance. • Learn about the anatomical and functional characteristics of different wild animals. • Understand the role of wild animals in ecosystems and ecological balance.

	• Acquire skills in recognizing animal behaviors and methods of observing them. • Promote awareness of conservation, sustainable hunting, and wildlife management.
608. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report. 6. Assign teamwork to reveal leadership skills.

609. Course structure

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the firs	2 theoretical	The student should be able to Explains the importance of wild animals and identifies tools.	Theory: Introduction to wild animals and their environmental and economic importance Practical: Familiarization with tools and equipment for environmental monitoring	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
the second	2 theoretical 3 practic	The student should be able to Describes animal diversity and applies practical classification.	Theory: Classification of wild animals (mammals, birds, reptiles, amphibians) Practical: Study of preserved animal specimens or photographs	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions

the thir	2 theoretical	The student should be able to Explains vital functions and applies them in practice.	Theory: Anatomy and physiology of wild animals Practical: Simple anatomical examination of model animals	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
Fourth	2 theoretical	The student should be able to Analyzes animal behaviors and deduces adaptations.	Theoretical: Natural behaviors and environmental adaptations Practical: Observation of animal behaviors in the laboratory or reserve	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
Fifth	2 theoretical	The student should be able to Links food and environmental adaptations in practice.	Theoretical: Nutrition and diet of wild animals Practical: Field experiment on food sources	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
Sixth	2 theoretical	The student should be able to Describes reproduction and analyzes the life cycle in practice.	Theory: Diseases, parasites, and their effects Practical: Field test or case study of disease	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions

Seventi	2 theoretical	The student should be able to Explains distribution and applies geographic identification in practice.	Theory: Reproduction and life cycle of wild animals Practical: Monitoring pregnancy or eggs in the laboratory	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
The eighth	2 theoretical	The student should be able to Identifies migration patterns in practice.	Theory: Geographical distribution and habitats Practical: Mapping animal presence in the field	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
Ninth	2 theoretical	The student should be able to Assesses the impact of human activity on animals in practice.	Theory: Migration and movement of wild animals Practical: Tracking animals using tags or cameras	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
tenth	2 theoretical	The student should be able to Identifies diseases and their effects and applies knowledge in practice.	Theory: Interaction with humans and the impact of human activity Practical: Study of a local case of affected habitats	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions

eleventh	2 theoretical	The student should be able to Explains laws and evaluates their effectiveness in practice.	Theoretical: Wildlife protection and national laws Practical: Analysis of environmental protection policies	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
twelfth	2 theoretical	The student should be able to Links management and ecological balance in practice.	Theoretical: Management of nature reserves Practical: Field visit to a reserve	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
thirteenth	2 theoretical	The student should be able to Applies scientific observation and writes a report.	Theoretical: Group field projects Practical: Preparation of a group field report	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
fourteenth	2 theoretical	The student should be able to Analyzes studies and gives a group presentation.	Theoretical: Local and global case studies Practical: Presentation of practical project results	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions

				practical: Assignment and report	
fifteent	2 theoretical	The student should be able to Integrates knowledge and skills in a practical test.	Theoretical: General review and preparation for the final exam Practical: Practical test and evaluation of the field project	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions

610. Course Evaluation	
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))	
611. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	
Main References (Sources)	• Geist, V. (2011). *Wildlife Ecology and Conservation*. Cambridge University Press. • FAO. (2018). *Sustainable Wildlife Management*. Rome: FAO.
Recommended books and references (scientific journals, reports...)	
Electronic references and websites	

Course Description Form

612. Course name:
Dryland communities
613. Course code:
DES354
614. the chapterAcademic/ year
615. Description preparation date
616. Available attendance forms
1. Weekly lesson schedule (theoretical). 2. Discussions, scientific seminars, and other extracurricular activities
617. Number of credit hours (total) / Number of units (total)
618. Course Supervisor Name (List all names, if there is more than one)
the name:M.M. Ziad Amer Mustafa e-mail: mti.Iec96.Zeyad@ntu.edu.iq
619. Course objectives

Goals	1. The student should be able to identify the natural and environmental characteristics that characterize dry areas.. 2. The student will be able to analyze human settlement patterns and the adaptation of local communities to arid conditions.. 3. The student will be able to explain the economic, social and environmental challenges facing dryland communities.. The student will be able to evaluate sustainable development strategies in these communities..
620. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report. 6. Assign teamwork to reveal leadership skills.

621. Course structure

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	2 theoretical	The student should be able to define ecology and explain its development and importance.	Definition of ecology, its development, importance, and relationship to other sciences, and levels of ecology study.	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
the second	2 theoretical	The student should be able to classify plant species and explain their relationship to	Plant species as an ecological unit, classification, biological division of species, environmental	theoretical :Auditory methods: writing on the board method,	Short exams, homework

		the environment.	degradation, and species overlap.	direct dialogue method	assignments, discussions
the third	2 theoretical	The student should be able to describe the role of plants in the ecosystem and its components.	Plants in the Earth's ecosystem and their environmental components. Solar energy, its conversions, and biogeochemical cycles in the ecosystem.	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
Fourth	2 theoretical	The student should be able to analyze the role of solar energy and biogeochemical cycles.	Plants in the biosphere, their role, position, level in the energy pyramid, and relationship with consuming and decomposing organisms	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
Fifth	2 theoretical	Students should be able to explain the role of plants in food chains.	Biosphere, climate factors, factors affecting it, methods of heat acquisition and transfer, heat exchange, temporal and spatial differences in temperature, effect of heat	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
Sixth	2 theoretical	Students should be able to analyze the effect of heat on vegetation cover.	Light, forms of radiation, local variations in light intensity, temporal variations of radiation, its effect on plants.	theoretical :Auditory methods: writing on the board method, direct	Short exams, homework

				dialogue method	assignments, discussions
Seventh	2 theoretical	Students should be able to explain the effect of light on plant growth and distribution.	Wind, its effects, types, the effect of vegetation on it, windbreaks, fires and their effects.	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
The eighth	2 theoretical	Students should be able to assess the impact of wind and fire on the plant environment.	Water factor, division of land areas on planet Earth, rainfall, soil water forms, plant adaptation to water factor.	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
Ninth	2 theoretical	Students should be able to explain how plants adapt to varying water availability.	The atmosphere, climatic zones, plant formations and their distribution on the Earth's surface	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
tenth	2 theoretical	Students should be able to explain the relationship between climate and plant distribution.	Vegetation, its types, stages of development, plant succession, and aquatic organism succession.	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions

eleven nth	2 theoretical	Students should be able to explain the stages of plant community development.	Environment and plant communities in Iraq, topography, geographical areas, climatic conditions and plant formations.	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
twelfth	2 theoretical	Students should be able to analyze plant formations in Iraq and their relationship to the environment.	Study the relationship between plants and environmental factors and identify some phenomena during a field trip.	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
thirteenth	2 theoretical	Students should be able to observe and document environmental phenomena in the field.	Measuring soil moisture and its relationship to plant growth and density	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
fourteenth	2 theoretical	Students should be able to use tools to measure soil moisture and salinity and relate them to plant growth.	Measuring salinity and its effect on the nature and distribution of plants	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions

fiftee nth	2 theoreti cal	The student should be able to estimate biomass and analyze its role in the environment.	Measurement of the mass of plants, green matter, and plant residues	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions

622. Course Evaluation
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))

623. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	
Main References (Sources)	Required prescribed books Electronic references, Internet sites..
Recommended books and references (scientific journals, reports...)	Recommended books and references (scientific journals, reports,....)
Electronic references and websites	Electronic references, Internet sites...

Course Description Form

624. Course name:
The relationship between soil, water, and plants
625. Course code:
DES356
626. the chapterAcademic/ year
Third semester
627. Description preparation date
1/7/2025
628. Available attendance forms
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities
629. Number of credit hours (total) / Number of units (total)
630. Course Supervisor Name (List all names, if there is more than one)
the name:M.M. Omar Ahmed Fathy EmailY:omar.ah.f@ntu.edu.iq
631. Course objectives

Goals	1.
632. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report. 6. Assign teamwork to reveal leadership skills.

633. Course structure

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	2 theoretical	The student should be able to define the	Theory: Introduction to the components of the	theoretical :Auditory methods:	Short exams,

	3 practical	relationship between soil, water, and plants and explain its importance.	system (soil–water–plants) and its agricultural importance Practical: Tour to familiarize students with samples (soil, plants)	writing on the board method, direct dialogue method practical: Assignment and report	homework assignments, discussions
the second	2 theoretical 3 practical	The student should be able to explain the effect of texture and structure on water movement.	Theory: Physical properties of soil (texture, structure, porosity) Practical: Analysis of soil texture in the laboratory	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the third	2 theoretical 3 practical	The student should be able to distinguish between different forms of water and determine their importance to plants.	Theory: Water in soil: forms of water (capillary, gravitational, hygroscopic) Practical: Experiment to determine the forms of water in soil samples	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions

Fourth	2 theoretical 3 practical	The student should be able to measure field capacity and analyze its relationship to plant water.	Theory: Water retention: field capacity – wilting point Practical: Experiment to estimate the field capacity of soil	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
Fifth	2 theoretical 3 practical	Students should be able to explain the mechanisms of water movement in soil.	Theory: Water movement in soil: seepage, filtration, hydraulic conductivity Practical: Experiment to measure filtration rate using soil columns	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
Sixth	2 theoretical 3 practical	Students should be able to distinguish between evaporation and transpiration and their impact on water balance.	Theory: Evaporation and transpiration Practical: Experiment to measure evaporation and transpiration rates	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
Seventh	2 theoretical 3 practical	Students should be able to perform a simplified water balance.	Theory: Water balance in soil and plants Practical: Calculating the water balance for a typical field	theoretical :Auditory methods: writing on the board method, direct	Short exams, homework

				dialogue method	assignments, discussions
The eighth	2 theoretical 3 practical	Exam			
Ninth	2 theoretical 3 practical	Students should be able to explain the mechanism of water absorption by roots.	Theoretical: Water absorption by roots Practical: Experiment to measure the rate of water absorption by roots	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
tenth	2 theoretical 3 practical	Students should be able to describe the pathways of water movement within plants.	Theoretical: Water conduction within plants (wood and bark) Practical: Demonstration experiment on water movement using dyes	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
eleventh	2 theoretical 3 practical	Students should be able to analyze the effect of water stress on physiological processes.	Theoretical: The effect of water stress on plants Practical: Experiment exposing plants to different levels of drought	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions

twelfth	2 theoretical 3 practical	Students should be able to discuss the role of water in the movement of nutrients.	Theoretical: The relationship between nutrients and water in soil Practical: Experiment dissolving and transferring salts in soil	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
thirteenth	2 theoretical 3 practical	Students should be able to relate moisture to photosynthesis and respiration.	Theoretical: Moisture and biological processes (photosynthesis and respiration) Practical: Experiment measuring the rate of photosynthesis under different moisture levels	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
fourteenth	2 theoretical 3 practical	The student should be able to apply methods for measuring soil moisture.	:Theoretical Methods for estimating soil moisture :Practical Using a TDR device or the gravimetric method to measure moisture	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
fifteenth	2 theoretical	The student should be able to propose water and soil management	Theoretical: Water and soil management strategies	theoretical :Auditory methods: writing on the board	Short exams, homework

	3 practical	strategies to improve production.	Practical: Experiment comparing plant productivity under different irrigation systems	method, direct dialogue method	assignments, discussions

634. Course Evaluation	
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))	
635. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	
Main References (Sources)	
Recommended books and references (scientific journals, reports...)	
Electronic references and websites	

Course Description Form

636. Course name:	
Water reuse	
637. Course code:	
DES357	
638. the chapterAcademic/ year	
Third semester	
639. Description preparation date	
1/7/2025	
640. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
641. Number of credit hours (total) / Number of units (total)	
642. Course Supervisor Name (List all names, if there is more than one)	
the name:M.M. Omar Ahmed Fathy EmailY: omar.ah.f@ntu.edu.iq	
643. Course objectives	
Goals	1. Explains the basic concepts of water reuse and its importance in water resource management. 2. Describes the different sources of wastewater and their physical, chemical, and biological characteristics. 3. Distinguishes between different water treatment technologies and their suitability for reuse. 4. Evaluates the health and environmental aspects associated with water reuse. 5. Identifies possible agricultural, industrial, and urban applications for water reuse.
644. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report.

	6. Assign teamwork to reveal leadership skills.

645. Course structure

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the firs	2 theoretical	The student should be able to define the concept of water reuse and identify its sources.	The concept of recycled water. The water sources used are surface runoff water, drainage water, and high ground water	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
the second	2 theoretical	The student should be able to explain the principles of wastewater treatment and reuse standards.	Methods used to reuse all types of irrigation water	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
the thir	2 theoretical	Students should be able to analyze the characteristics of poor-quality water and select appropriate irrigation methods.	Wastewater treatment processes, standards and principles of reuse methods	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
Fourth	2 theoretical	Students should be able to explain methods of using saline	Poor quality irrigation water (pollution standards and standards and	theoretical :Auditory methods: writing on the board	Short exams, homework

		water for irrigation.	methods of reuse. Types of appropriate irrigation methods)	method, direct dialogue method	assignments, discussions
Fifth	2 theoretical	Students should be able to evaluate simple and effective reuse technologies.	Groundwater with salt content and methods for adapting its use in irrigation systems that rely on groundwater as a primary source	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
Sixth	2 theoretical	Students will be able to identify the components of wastewater and its sources of pollution.	Low cost technology for water reuse	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
Seventl	2 theoretical	Students will be able to explain the stages of wastewater treatment and the application of oxidation ponds.	Sewage, waste water. Characteristics of wastewater: Components and sources of pollutants in wastewater	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
The eighth	2 theoretical	Students will be able to compare the pros and cons of oxidation ponds.	Wastewater treatment operations. Methods of water disposal and usage. Choosing treatment methods. Processing stages.	theoretical :Auditory methods: writing on the board method, direct	Short exams, homework

			Oxidation and stabilization lakes.	dialogue method	assignments, discussions
Ninth	2 theoretical	Students will be able to distinguish between methods of water reuse in different irrigation systems.	Advantages and importance Disadvantages of oxidation lakes	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
tenth	2 theoretical	Students should be able to discuss the environmental and technical factors affecting oxidation ponds.	Sanitation considerations Factors affecting the operation of oxidation lakes	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
eleventh	2 theoretical	Students should be able to define sludge and classify its types.	Sludge Reuse of sludge (solid sediments) What is sludge and its types	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
twelfth	2 theoretical	Students should be able to analyze the chemical composition of sludge and its agricultural applications.	Its chemical composition. Using sludge as a fertilizer.	theoretical :Auditory methods: writing on the board method, direct	Short exams, homework assignments, discussions

				dialogue method	
thirteenth	2 theoretical	Students should be able to assess the health and environmental risks of using treated water.	Risks of using treated wastewater and sludge in irrigation and agriculture, biological risks, toxins and risks of toxic substances.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
fourteenth	2 theoretical	Students will be able to explain the possibilities of reuse in different areas.	Reuse of wastewater in groundwater recharge and recharge, and agricultural and industrial use of water.	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
fifteent	2 theoretical	Students will be able to describe advanced treatment methods and the benefits of recycling.	Use of tertiary treatment (filtration, absorption, reverse osmosis) Article: Use of wastewater, its recycling, and its benefits.	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
646. Course Evaluation					
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))					

647. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	
Main References (Sources)	
Recommended books and references (scientific journals, reports...)	
Electronic references and websites	

Course Description Form

648. Course name:	
Desert Arai Management	
649. Course code:	
DES358	
650. the chapterAcademic/ year	
Third semester	
651. Description preparation date	
1/7/2025	
652. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
653. Number of credit hours (total) / Number of units (total)	
654. Course Supervisor Name (List all names, if there is more than one)	
the name:M.M. Omar Ahmed Fathy EmailY: omar.ah.f@ntu.edu.iq	
655. Course objectives	
Goals	The student should be able to: 1. Explain the natural and environmental characteristics of desert lands and the challenges associated with them. 2. Distinguish between types of desert lands in terms of soil, vegetation cover, and water resources. 3. Explain the impact of climatic and geomorphological factors on the fertility and productivity of desert lands. 4. Identify the main problems associated with desert lands, such as salinity, erosion, and desertification. 5. Applies scientific practices to improve and manage soil fertility in desert environments. 6. Employs water harvesting and supplemental irrigation techniques to increase the efficient use of limited water resources.
656. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training.

	4. Dialogue and discussion. 5. Assign tasks and report. 6. Assign teamwork to reveal leadership skills.

657. Course structure

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the firs	2 theoretical	The student should be able to define the desert and its general characteristics.	Introduction to the desert (natural characteristics, climate, geographical distribution)	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
the second	2 theoretical	The student should be able to explain strategies for managing drylands.	Dryland management (concepts, strategies, challenges) Water supply in dry areas (traditional and non-traditional sources)	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
the third	2 theoretical	The student should be able to analyze methods of securing water in the desert.	The importance of plants in drylands (ecological balance, soil stabilization, grazing)	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions

Fourth	2 theoretical	The student should be able to explain the role of desert plants in protecting the environment.	Desert plant species (annuals, perennials, succulents, thorns)	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
Fifth	2 theoretical	Students should be able to classify desert plants according to their characteristics.	Stopping sand dune encroachment (mechanical, biological, chemical methods)	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
Sixth	2 theoretical	Students should be able to compare different methods of reducing sand dunes.	Reducing sandstorms (preventive methods and damage reduction)	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
Seventh	2 theoretical	Students should be able to propose solutions to reduce the impact of sandstorms.	Reducing sandstorms (preventive methods and damage reduction)	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions

The eighth	2 theoretical	Reducing desertification (combating desertification – sustainable resource management)	Reducing desertification (combating desertification – sustainable resource management)	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
Ninth	2 theoretical	Students should be able to identify the potential for desert tourism.	Tourism in deserts (types, components, challenges)	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
tenth	2 theoretical	Students should be able to evaluate desert tourism experiences.	Tourism in deserts (practical examples – Arab and international experiences)	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
eleventh	2 theoretical 3 practic	Students should be able to analyze the economic value of deserts.	The economic importance of deserts (minerals, agriculture, pastures)	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions

twelfth	2 theoretical	Students will be able to explain ways to exploit deserts economically.	The economic importance of deserts (energy, industries, services)	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
thirteenth	2 theoretical	Students will be able to explain the potential for renewable energy production in deserts.	The potential of deserts for clean energy production (solar energy, wind energy)	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
fourteenth	2 theoretical	Students will be able to evaluate energy projects in deserts.	The potential of deserts for clean energy production (case studies, existing projects)	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
fifteent	2 theoretical	Exam			
658. Course Evaluation					

((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))	
659. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	
Main References (Sources)	Required prescribed books Electronic references, Internet sites...
Recommended books and references (scientific journals, reports...)	Recommended books and references (scientific journals, reports,....)
Electronic references and websites	Electronic references, Internet sites...

Course Description Form

660. Course name:	
Scientific research methodology	
661. Course code:	
TAMO400	
662. the chapterAcademic/ year	
First semester	
663. Description preparation date	
1\7\2025	
664. Available attendance forms	
1. Weekly lesson schedule (theoretical). 2. Discussions, scientific seminars, and other extracurricular activities	
665. Number of credit hours (total) / Number of units (total)	
666. Course Supervisor Name (List all names, if there is more than one)	
the name:Mr. Omar Ahmed Fathy e-mail: omar.ah.f@ntu.edu.iq	
667. Course objectives	
Goals	
668. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report. 6. Assign teamwork to reveal leadership skills.

669. Course structure

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	2 theoretical	theoretical: The student should be able to know the modern	theoretical: scientific method	theoretical :Auditory methods: writing on the board	Short exams, homework

		scientific method and its steps.		method, direct dialogue method	assignments, discussions
the second	2 theoretical	theoretical: The student should be able to identify the assumptions on which scientific research into natural phenomena is based.	theoretical: General concepts of the scientific method	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
the third	2 theoretical	theoretical: The student should be able to identify the basic characteristics of scientific research.	theoretical: Deep research methodology	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
Fourth	2 theoretical	theoretical: The student should be able to know Types of scientific research and how to apply each one	theoretical: Types of research and its applications	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
Fifth	2 theoretical	theoretical: The student should be able to formulate research hypotheses.	theoretical: Steps for preparing scientific research	theoretical :Auditory methods: writing on the board method, direct	Short exams, homework

				dialogue method	assignments, discussions
Sixth	2 theoretical	theoretical: The student should be able to know the basic characteristics of preparing a successful scientific research.	theoretical:Characteristics of successful research	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
Seventh	2 theoretical	theoretical: The student should be able to know the tools for collecting information and data in scientific research.	theoretical: Samples and data collection tools	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
The eighth	2 theoretical	theoretical: The student should be able to know Information display devices and tools	theoretical: Information display methods	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
Ninth	2 theoretical	theoretical: The student should be able to know the physical and	theoretical: Final form of the research	theoretical :Auditory methods: writing on the board method,	Short exams, homework

		technical form of the research.		direct dialogue method	assignments, discussions
tenth	2 theoretical	theoretical: The student should be able to know how to organize and classify information sources in the library.	theoretical: Using the library in scientific research	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
eleventh	2 theoretical	theoretical: The student should be able to identify computer and electronic information sources.	theoretical: Information sources and their use in scientific research	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
twelfth	2 theoretical	theoretical: The student should be able to identify paper or traditional sources and how to obtain them.	theoretical:Paper sources	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
thirteenth	2 theoretical	theoretical: The student should be able to know and use the Internet.	theoretical: Internet and search	theoretical :Auditory methods: writing on the board method, direct	Short exams, homework

				dialogue method	assignments, discussions
fourteenth	2 theoretical	theoretical: The student should be able to understand how to store files over the Internet.	theoretical: Cloud programming	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
fifteenth	2 theoretical	Monthly exam			

670. Course Evaluation
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))

671. Learning and Teaching Resources

Required textbooks (curriculum books, if available)	
Main References (Sources)	Khader, Ahmed Ibrahim (2013). Preparing scientific research and theses from idea to conclusion. Mohammed, Fouad Qasim (2012). Scientific Research from Preparation to Publication, Mosul University Book House.
Recommended books and references (scientific journals, reports...)	Alley, M (2013).The craft of Scientific Presentations Pages. Cargi, M. and O'Connor P. (2009). Writing Scientific Research Artiches.Wiley-Blackwell.UK Pages.
Electronic references and websites	

Course Description Form

672. Course name:
Design and analysis of experiments

673. Course code:	
TAMO401	
674. the chapterAcademic/ year	
First semester	
675. Description preparation date	
676. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
677. Number of credit hours (total) / Number of units (total)	
678. Course Supervisor Name (List all names, if there is more than one)	
the name:Dr. Mohamed Salem Ahmed e-mail: mohameedsa66@ntu.edu.iq	
679. Course objectives	
Goals	1. Explains the basic concepts of experimental design and the importance of statistical application in scientific research.. 2. Distinguish between different types of experimental designs (complete, incomplete, and chance experiments) and the characteristics of each.. 3. Determines the steps for designing a correct scientific experiment according to the research objectives.. 4. Uses appropriate statistical methods to analyze experimental data.. 5. Interprets the results of statistical analysis and draws accurate scientific conclusions.. 6. Employs specialized statistical software in designing and analyzing experiments.
680. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report.

	6. Assign teamwork to reveal leadership skills.

681. Course structure

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	2 theoretical 3 practical	The student should be able to explain general definitions, experimentation, design, experimental unit, experimental error, and conditions for controlling experimental error.	theoretical: General definitions, experiment, design, experimental unit of work, experimental error, conditions for controlling experimental error, practical: Types of experiments, how to plan an experiment, and researcher specifications.	theoretical:Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the second	2 theoretical 3 practical	The student should be able to identify the basic rules for designing experiments, the requirements for a good experiment, and the steps followed in scientific experiments.	theoretical: Basic rules for experimental design, requirements for a good experiment, steps followed in scientific experiments. practical: Solve exercises to analyze data for a completely random design, using a spreadsheet.Excela nd compare the	theoretical:Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

			results obtained by analyzing them using the program.SAS.		
the third	2 theoretical 3 practical	The student should be able to understand and comprehend completely random design, its advantages and disadvantages, and the use of the design in the case of recording one observation per experimental unit, a) in the case of an equal number of repetitions, and b) in the case of unequal repetitions.	theoretical: Completely random design, advantages and disadvantages, use of the design in case of recording one observation per experimental unit, a - in case of equal number of replications b - in case of unequal replications. practical: Complete and assign students to analyze various data exercises and prepare weekly reports on them.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Fourth	2 theoretical 3 practical	The student should be able to explain the design of a completely randomized block, the conditions for using the design, the advantages and disadvantages of the design,	theoretical: Complete randomized block design, conditions for using the design, advantages and disadvantages of the design, sources of variance, and the basis of block work. practical:	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme	Short exams, homework assignments, discussions

		sources of variation, and the basis of the block's operation.	Solve exercises on diagnosing the significance of differences between means.	nt and report	
Fifth	2 theoretical 3 practical	The student should be able to define the concept of analysis of variance, determine the number of replicates, and estimate the missing value (or values) in the sections.	theoretical: Analyze variance, determine the number of duplicates, and estimate the missing value (or more) in the sections. practical: Solve exercises to analyze data from a completely randomized block design.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Sixth	2 theoretical 3 practical	Students should be able to explain the concept of complete randomized block design efficiency, Latin square design, conditions of use, and advantages and disadvantages of the design.	theoretical: Efficiency of complete randomized block design, Latin square design, conditions of use, advantages and disadvantages of design. practical: Exercises to find the missing value in complete random blocks.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Seventh	2 theoretical	The student should be able to identify sources of variance in the	theoretical: Sources of variance in the Latin square, analysis of variance,	theoretical :Auditory methods: writing on the board	Short exams, homew

	3 practical	Latin square, analyze variance, and estimate missing values or more.	estimation of one or more missing values. practical: Latin square, design, analysis of sources of variance.	method, direct dialogue method practical: Assignment and report	ork assignments, discussions
The eighth	2 theoretical 3 practical	Students should be able to understand and comprehend factorial experiments, their conditions, advantages, and disadvantages.	theoretical: Factor experiments, their conditions, advantages and disadvantages. practical: Use a spreadsheetExcelAnd compare the results obtained by analyzing it usingSAS	theoretical:Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Ninth	2 theoretical 3 practical	Students should be able to identify sources of variation in factorial experiments, analyze variation, interaction, and its types.	theoretical: Sources of variance in factorial experiments, analysis of variance, interaction and its types. practical: Solve exercises to analyze sources of variance in a Latin square design.	theoretical:Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
tenth	2 theoretical 3 practical	Students should be able to explain the concept of factorial experiments	theoretical: Factorial experiments using a completely randomized design practical:	theoretical:Auditory methods: writing on the board method,	Short exams, homew

		using a completely randomized design.	Solve exercises for designing factorial experiments.	direct dialogue method practical: Assignment and report	ork assignments, discussions
eleventh	2 theoretical 3 practical	Students should be able to identify factorial experiments using a completely randomized block design.	theoretical: Factorial experiments using a completely randomized block design practical: Use a spreadsheetExcelAnd compare the results obtained by analyzing it usingSAS	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
twelfth	2 theoretical 3 practical	Students should be able to understand and comprehend split-plot design, its conditions, advantages, and disadvantages.	theoretical: Split Panel Design, Terms, Advantages, Disadvantages practical: Use a spreadsheetExcelAnd compare the results obtained by analyzing it usingSAS	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
thirteenth	2 theoretical 3 practical	Students should be able to identify sources of variation in split-plot experiments	theoretical: Sources of variance in split-plate experiments, analysis of variance practical:	theoretical :Auditory methods: writing on the board method,	Short exams, homew

		and analyze variation.	Solve exercises to analyze the variance of sources of variance in split-panel designs. Use a spreadsheet.ExcelAnd compare the results obtained by analyzing it usingSAS	direct dialogue method practical: Assignment and report	ork assignments, discussions
fourteenth	2 theoretical 3 practical	Students should be able to use general definitions, experiments, designs, experimental units, experimental error, experimental error control conditions, basic rules for experimental design, requirements for good experiments, and steps followed in scientific experiments.	theoretical: General definitions, experiment, design, experimental unit of work, experimental error, conditions for controlling experimental error, basic rules for experimental design, requirements for a good experiment, steps followed in scientific experiments. practical: Solve exercises to analyze the variance of sources of variance in split-panel designs. Use a spreadsheet.ExcelAnd compare the results obtained by	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

			analyzing it usingSAS		
fiftee nth	2 theoreti cal 3 practical	Students will be able to use Excel spreadsheets to design and analyze experiments, including functions and methods for calculating variances and statistical parameters for analyzing experiments.	theoretical: Use a spreadsheetExcel for designing and analyzing experiments, including functions and methods for calculating variances and statistical parameters for analyzing experiments. practical: Discussing student reports	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme nt and report	Short exams, homew ork assignm ents, discussi ons

682. Course Evaluation
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))

683. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	
Main References (Sources)	Required prescribed books Electronic references, Internet sites...
Recommended books and references (scientific journals, reports...)	Recommended books and references (scientific journals, reports,....)
Electronic references and websites	Electronic references, Internet sites...

Course Description Form

684. Course name:
Field irrigation methods

685. Course code:	
DES402	
686. the chapterAcademic/ year	
First semester	
687. Description preparation date	
1\7\2025	
688. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
689. Number of credit hours (total) / Number of units (total)	
690. Course Supervisor Name (List all names, if there is more than one)	
the name:Dr. Mohamed Salem Ahmed e-mail: mohameedsa66@ntu.edu.iq	
691. Course objectives	
Goals	1. Explains the basic concepts of field irrigation and the importance of water management in sustainable agriculture.. 2. Distinguish between different irrigation systems and methods (surface irrigation, sprinkler irrigation, drip irrigation) and the characteristics of each.. 3. Determines the factors affecting the selection of the optimal method of field irrigation according to the type of soil, crop, and climate.. 4. Calculates the required irrigation water quantities according to crop needs and evapotranspiration rate.. 5. Designs field irrigation networks using appropriate engineering and hydraulic principles.. 6. Compares irrigation methods in terms of water efficiency, costs, and economic feasibility.
692. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report.

	6. Assign teamwork to reveal leadership skills.

693. Course structure

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	2 theoretical 3 practical	The student should be able to explain the concept of field irrigation and identify surface irrigation methods.	theoretical: Meaning of field irrigation, selection of irrigation method, field irrigation methods, surface irrigation, basin irrigation practical: Providing information, training and practical experience for the design and implementation of surface irrigation methods (panels, strips and corridors)	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the second	2 theoretical 3 practical	The student should be able to compare surface irrigation and sprinkler irrigation methods.	theoretical: Surface irrigation, strip irrigation, and sprinkler irrigation. practical: Presentation of sprinkler network parts and various sprinkler systems.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

the third	2 theoretical 3 practical	The student should be able to evaluate the efficiency of sprinklers under different operating conditions.	theoretical: Sprinkler irrigation, benefits and uses of sprinkler irrigation, its disadvantages and difficulties practical: Try measuring a sprinkler with one or two nozzles and measuring the sprinkler pressure. Try measuring the difference in sprinkler discharge with different operating pressures. Surface disturbance	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Fourth	2 theoretical 3 practical	The student should be able to identify the components of the system in practice.	theoretical: Components of a sprinkler system (pumping unit, pipe network, sprinklers, valves, gauges) practical: A scientific visit to a sprinkler irrigation project	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Fifth	2 theoretical 3 practical	Students will be able to distinguish between systems and evaluate their benefits.	theoretical: Types of sprinkler irrigation systems (fixed and mobile) practical: An experiment to discover the	theoretical :Auditory methods: writing on the board method, direct	Short exams, homework assignm

			benefits of sprinkler irrigation.	dialogue method practical: Assignment and report	ents, discussions
Sixth	2 theoretical 3 practical	Students will be able to calculate the design requirements of a sprinkler irrigation system.	theoretical: Water distribution around the sprinkler, water distribution patterns practical: Solve problems related to the length and number of irrigation pipes and the number of movements.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Seventh	2 theoretical 3 practical	Students will be able to operate and maintain a sprinkler irrigation system and identify a drip system.	theoretical: Installation, operation and maintenance of sprinkler irrigation system (fixed and mobile) practical: Identify the parts of a drip irrigation system in the laboratory or in the field, identify dripper types, and calculate costs.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
The eighth	2 theoretical 3 practical	Students will be able to design a preliminary drip network.	theoretical: Introduction to drip irrigation, definition of drippers, types of drippers,	theoretical :Auditory methods: writing on the board method,	Short exams, homew

			calculating the number of drippers. practical: Calculating expenses through closed pipes, calculating expenses through multi-hole pipe.	direct dialogue method practical: Assignment and report	ork assignments, discussions
Ninth	2 theoretical 3 practical	Students should be able to describe and evaluate drip irrigation networks in the field.	theoretical: Complete drip irrigation network classification practical: A scientific visit to a drip irrigation project.	theoretical:Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
tenth	2 theoretical 3 practical	Students should be able to operate irrigation networks and adjust distribution regularity.	theoretical: Control unit operation, piping network operation, drip irrigation and filter operation practical: Field selection experiment for distillation regularity	theoretical:Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
eleventh	2 theoretical	Students should be able to apply maintenance and prevention methods.	theoretical: Drip irrigation maintenance, mineral and organic sediment	theoretical:Auditory methods: writing on the board	Short exams, homew

	3 practical		treatment, drip irrigation system cleaning practical: Connecting the pipe network that forms the drip irrigation system	method, direct dialogue method practical: Assignment and report	ork assignments, discussions
twelfth	2 theoretical 3 practical	Students should be able to operate water wells and connect auxiliary devices.	theoretical: Operation of water wells fed by irrigation and drip irrigation systems practical: Introduction to filter and injector devices, their connection to the network and their dismantling.	theoretical:Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
thirteenth	2 theoretical 3 practical	The student should be able to explain the principle of subsurface irrigation and identify smart irrigation.	theoretical: Subsurface irrigation method, how to install, operate and maintain subsurface irrigation. practical: Visit one of the smart irrigation projects and learn how to operate it and train on it	theoretical:Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
fourteenth	2 theoretical	The student should be able to analyze smart irrigation applications.	theoretical: Smart irrigation method: installation, operation and	theoretical:Auditory methods: writing on the board	Short exams, homew

	3 practical		maintenance of this method. practical: Discussing students' reports.	method, direct dialogue method practical: Assignment and report	ork assignments, discussions
fifteenth	2 theoretical 3 practical	The student should be able to integrate their knowledge of irrigation systems and their applications.	theoretical: Installation and operation of drip irrigation system, self-operation practical: Films and slides on wind erosion	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

694. Course Evaluation	
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))	
695. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	
Main References (Sources)	Required prescribed books Electronic references, Internet sites...
Recommended books and references (scientific journals, reports...)	Recommended books and references (scientific journals, reports,....)
Electronic references and websites	Electronic references, Internet sites...

Course Description Form

696. Course name:
land reclamation
697. Course code:
DES403
698. the chapterAcademic/ year
First semester
699. Description preparation date
1\7\2025

700. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
701. Number of credit hours (total) / Number of units (total)	
702. Course Supervisor Name (List all names, if there is more than one)	
the name:Dr. Ahmed Faris Salem e-mail: ahmedalsawaf@ntu.edu.iq	
703. Course objectives	
Goals	1. Providing students with basic knowledge about the characteristics of degraded lands and their various problems (salinity, alkalinity, structural degradation, etc.) 2. Introducing students to scientific methods and modern technologies used in land reclamation and improving land fertility. 3. Enabling students to develop practical plans for land reclamation in line with the principles of sustainable agricultural development.. 4. Enhancing students' ability to evaluate the efficiency of reclamation methods from a technical, economic and environmental perspective..
704. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report. 6. Assign teamwork to reveal leadership skills.
705. Course structure	

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	2 theoretical 3 practical	Knowledge and practical application	theoretical: Meaning of field irrigation, selection of irrigation method, field irrigation methods, surface irrigation, basin irrigation practical: Providing information, training and practical experience for the design and implementation of surface irrigation methods (panels, strips and corridors)	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the second	2 theoretical 3 practical	Knowledge and practical application	theoretical: Surface irrigation, strip irrigation, and sprinkler irrigation. practical: Presentation of sprinkler network parts and various sprinkler systems.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the third	2 theoretical	Knowledge and practical application	theoretical: Sprinkler irrigation, benefits and uses of sprinkler irrigation,	theoretical :Auditory methods: writing on	Short exams,

	3 practical		its disadvantages and difficulties practical: Try measuring a sprinkler with one or two nozzles and measuring the sprinkler pressure. Try measuring the difference in sprinkler discharge with different operating pressures. Surface disturbance	the board method, direct dialogue method practical: Assignment and report	homework assignments, discussions
Fourth	2 theoretical 3 practical	Knowledge and practical application	theoretical: Components of a sprinkler system (pumping unit, pipe network, sprinklers, valves, gauges) practical: A scientific visit to a sprinkler irrigation project	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Fifth	2 theoretical 3 practical	Knowledge and practical application	theoretical: Types of sprinkler irrigation systems (fixed and mobile) practical: An experiment to discover the benefits of sprinkler irrigation.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme	Short exams, homework assignments,

				nt and report	discussi ons
Sixth	2 theoreti cal 3 practical	Knowledge and practical application	theoretical: Water distribution around the sprinkler, water distribution patte practical: Solve problems related to the length and number of irrigation pipes and the number of movements.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme nt and report	Short exams, homew ork assignm ents, discussi ons
Sevent h	2 theoreti cal 3 practical	Knowledge and practical application	theoretical: Installation, operation and maintenance of sprinkler irrigation system (fixed and mobile) practical: Identify the parts of a drip irrigation system in the laboratory or in the field, identify dripper types, and calculate costs.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme nt and report	Short exams, homew ork assignm ents, discussi ons
The eighth	2 theoreti cal 3 practical	Knowledge and practical application	theoretical: Introduction to drip irrigation, definition of drippers, types of drippers, calculating the number of drippers.	theoretical :Auditory methods: writing on the board method, direct	Short exams, homew ork assignm

			practical: Calculating expenses through closed pipes, calculating expenses through multi-hole pipe.	dialogue method practical: Assignment and report	ents, discussions
Ninth	2 theoretical 3 practical	Knowledge and practical application	theoretical: Complete drip irrigation network classification practical: A scientific visit to a drip irrigation project.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
tenth	2 theoretical 3 practical	Knowledge and practical application	theoretical: Control unit operation, piping network operation, drip irrigation and filter operation practical: Field selection experiment for distillation regularity	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
eleventh	2 theoretical 3 practical	Knowledge and practical application	theoretical: Drip irrigation maintenance, mineral and organic sediment treatment, drip	theoretical :Auditory methods: writing on the board method, direct	Short exams, homework

			irrigation system cleaning practical: Connecting the pipe network that forms the drip irrigation system	dialogue method practical: Assignment and report	assignments, discussions
twelfth	2 theoretical 3 practical	Knowledge and practical application	theoretical: Operation of water wells fed by irrigation and drip irrigation systems practical: Introduction to filter and injector devices, their connection to the network and their dismantling.	theoretical:Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
thirteenth	2 theoretical 3 practical	Knowledge and practical application	theoretical: Subsurface irrigation method, how to install, operate and maintain subsurface irrigation. practical: Visit one of the smart irrigation projects and learn how to operate it and train on it	theoretical:Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
fourteenth	2 theoretical 3 practical	Knowledge and practical application	theoretical: Smart irrigation method: installation, operation and	theoretical:Auditory methods: writing on the board method,	Short exams, homew

			maintenance of this method. practical: Discussing students' reports.	direct dialogue method practical: Assignment and report	ork assignments, discussions
fifteenth	2 theoretical 3 practical	theoretical: practical:	theoretical: Installation and operation of drip irrigation system, self-operation practical:Films and slides on wind erosion	theoretical :Auditory methods: writing on the board method, practical: Assignment and report	Short exams, homework assignments, discussions

706. Course Evaluation	
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))	
707. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	
Main References (Sources)	
Recommended books and references (scientific journals, reports...)	
Electronic references and websites	

Course Description Form

708. Course name:
Wind erosion prediction models
709. Course code:
DES404
710. the chapterAcademic/ year
Fourth semester
711. Description preparation date

1/7/2025	
712. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
713. Number of credit hours (total) / Number of units (total)	
714. Course Supervisor Name (List all names, if there is more than one)	
the name:M.M. Omar Younis Hassan e-mail: Mti.lec224.omar@ntu.edu.iq	
715. Course objectives	
Goals	1. Providing students with basic knowledge of the concepts of wind erosion and its impact on environmental and agricultural systems. 2. Enable students to understand the theoretical and mathematical foundations of wind erosion prediction models.. 3. Training students to use numerical and computer models to estimate wind erosion rates. 4. Develop skills in analyzing climate and surface data and linking them to wind erosion phenomena..
716. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report. 6. Assign teamwork to reveal leadership skills.

717. Course structure

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method

the first	2 theoretical 3 practical	Knowledge and application	Introduction: The concept of erosion / Types of erosion / Wind erosion	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the second	2 theoretical 3 practical	Knowledge and application	Factors affecting wind erosionFactor affecting wind erosion 1-ClimateClimate: Wind / Rain / Temperature 2- Land usesLand use 3- Topography Topography 4-Soil propertiesSoil characteristics	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the third	2 theoretical 3 practical	Knowledge and application	Types of wind erosionType of wind erosion 1- Winnowing 2- Abrasion 3-Avalanching	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions

				practical: Assignment and report	
Fourth	2 theoretical 3 practical	Knowledge and application	Wind erosion mechanics:erosion mechanics wind 1- Disintegration and destruction of soilSoil loss and disintegration 2- The beginning of the movementInitiation of soil movement 3- Transportation Transporting 4- SedimentationDeposition	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Fifth	2 theoretical 3 practical	Knowledge and application	Forms of soil movement by wind:Type of soil movement by wind 1- Suspended movement Suspended load 2- JumpingSaltation 3- Surface creep Creep Surface	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Sixth	2 theoretical	Knowledge and application	Wind erosion risksHazard of wind erosion / Tolerance limit of wind erosion	theoretical :Auditory methods: writing on the board	Short exams, homework

	3 practical			method, direct dialogue method practical: Assignment and report	assignments, discussions
Seventh	2 theoretical 3 practical	Knowledge and application	Major attempts to conserve soil from wind erosion / Basic principles of wind erosion control	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
The eighth	2 theoretical 3 practical	Knowledge and application	Wind erosion control methods - mechanical methods Wind erosion control - mechanical methods PlowingTillage / No-tillage system / Emergency tillage / Mechanical barriers The most important deciduous fruit trees in Iraq - importance - propagation	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

			methods - varieties - most important service operations		
Ninth	2 theoretical 3 practical	Knowledge and application	Wind erosion control methods - chemical methods Wind erosion control – chemical methods CoversMulches / Natural and artificial mulches / Oils and petroleum derivatives	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
tenth	2 theoretical 3 practical	Knowledge and application	Wind erosion control methods - chemical methods Wind erosion control – chemical methods CoversMulches / Natural and artificial mulches / Oils and petroleum derivatives The most important winter vegetables in Iraq	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
eleventh	2 theoretical 3 practical	Knowledge and application	sand dunesSand dunes / Sand dune stabilization methods – chemical and biological methods	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions

				practical: Assignment and report	
twelfth	2 theoretical 3 practical	Knowledge and application	Economic and social impacts of wind erosionEconomic and social effect of wind erosion	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
thirteenth	2 theoretical 3 practical	Knowledge and application	Gas movement in soil	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
fourteenth	2 theoretical 3 practical	Knowledge and application	Dust storms / sources and their agricultural impacts Dust storms-the sources and its agricultural effectiveness	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions

				practical: Assignment and report	
fifteenth	2 theoretical 3 practical	Knowledge and application	Introduction: The concept of erosion / Types of erosion / Wind erosion	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

718. Course Evaluation
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))

719. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	
Main References (Sources)	
Recommended books and references (scientific journals, reports...)	
Electronic references and websites	

Course Description Form

720. Course name:	
Fluid motion modeling	
721. Course code:	
DES405	
722. the chapterAcademic/ year	
First semester	
723. Description preparation date	
724. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
725. Number of credit hours (total) / Number of units (total)	
726. Course Supervisor Name (List all names, if there is more than one)	
the name:M.M. Samir Farhan Ayoub e-mail: Samir.f.ayoub@ntu.edu.iq	
727. Course objectives	
Goals	1. Providing students with theoretical and practical knowledge about the basic principles of fluid motion and its behavior under different conditions.. 2. Enabling students to use mathematical and computational modeling methods to understand and analyze fluid dynamics.. 3. Develop students' abilities to link physical concepts to mathematical laws used in modeling and simulation.. 4. Preparing students to use modern simulation programs in the field of fluids(eg: ANSYS Fluent, OpenFOAM)
728. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion.

	5. Assign tasks and report. 6. Assign teamwork to reveal leadership skills.

729. Course structure

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	2 theoretical 3 practical	theoretical: practical:	Introduction to Modeling	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the second	2 theoretical 3 practical	theoretical: practical:	Main menu forHydrus	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the third	2 theoretical	theoretical: practical:	Data entry windows	theoretical :Auditory methods:	Short exams,

	3 practical			writing on the board method, direct dialogue method practical: Assignment and report	homework assignments, discussions
Fourth	2 theoretical 3 practical	theoretical: practical:	Ocean conditions variables	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Fifth	2 theoretical 3 practical	theoretical: practical:	Engineering Information Windows	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

Sixth	2 theoretical 3 practical	theoretical: practical:	Output files	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Seventh	2 theoretical 3 practical	theoretical: practical:	Practical examples of the single-layer filtration model	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
The eighth	2 theoretical 3 practical	theoretical: practical:	Practical examples of the multi-layer infiltration model	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme	Short exams, homework assignments, discussions

				nt and report	
Ninth	2 theoretical 3 practical	theoretical: practical:	Practical examples of evaporation from soil	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
tenth	2 theoretical 3 practical	theoretical: practical:	Examples of piercing	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
eleventh	2 theoretical 3 practical	theoretical: practical:	Practical examples of the movement of charged salts	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions

				practical: Assignment and report	
twelfth	2 theoretical 3 practical	theoretical: practical:	Practical examples of permeability	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
thirteenth	2 theoretical 3 practical	theoretical: practical:	soil heat movement	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
fourteenth	2 theoretical 3 practical	theoretical: practical:	Gas movement in soil	theoretical :Auditory methods: writing on the board method, direct	Short exams, homework

				dialogue method practical: Assignment and report	assignments, discussions
fifteenth	2 theoretical 3 practical	theoretical: practical:	Reverse modeling and applied examples	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

730. Course Evaluation

((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))

731. Learning and Teaching Resources

Required textbooks (curriculum books, if available)	
Main References (Sources)	
Recommended books and references (scientific journals, reports...)	
Electronic references and websites	

Course Description Form

732. Course name:	
dryland plants	
733. Course code:	
DES406	
734. the chapterAcademic/ year	
735. Description preparation date	
1/7/2025	
736. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
737. Number of credit hours (total) / Number of units (total)	
738. Course Supervisor Name (List all names, if there is more than one)	
the name:Dr. Faris Faisal Abdulghani e-mail:	
739. Course objectives	
Goals	1. Explains the environmental and climatic characteristics that characterize arid and semi-arid regions.. 2. Explain the morphological and physiological adaptations of arid zone plants to resist environmental stresses such as drought, heat, and salinity.. 3. Distinguish between native and invasive plant species in arid environments. 4. Analyzes the ecological and economic importance of dryland plants in sustainable development.. 5. Apply scientific methods in the cultivation and propagation of plants suitable for dry conditions.. 6. Evaluates the role of dryland plants in combating desertification and maintaining ecological balance..
740. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion.

	5. Assign tasks and report. 6. Assign teamwork to reveal leadership skills.

741. Course structure

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the firs	2 theoretical	The student should be able to identify plants of arid regions and explain their environmental and agricultural importance.	Introduction to arid zone plants – definition, importance, distribution	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
the second	2 theoretical	The student should be able to describe the characteristics of the desert environment and its impact on plant growth.	Characteristics of the desert environment and its impact on plants	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
the thir	2 theoretical	The student should be able to explain the physiological adaptations of desert plants.	Physiological adaptations of plants to drought	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
Fourth	2 theoretical	The student should be able to describe the	Anatomical adaptations of desert plants	theoretical :Auditory methods:	Short exams, homework

		anatomical adaptations of plants.		writing on the board method, direct dialogue method	assignments, discussions
Fifth	2 theoretical	Students should be able to classify plants of arid regions and identify economically important species.	Classification of arid zone plants and the most important economic species	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
Sixth	2 theoretical	Students should be able to identify the life cycle of plants and its impact on agricultural strategies.	Life cycle of desert plants: perennial, annual, seasonal	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
Seventl	2 theoretical	Students should be able to relate soil characteristics to the growth of desert plants.	Soil and nutrients and their impact on the growth of plants in arid regions	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions

The eighth	2 theoretical	Students should be able to relate soil characteristics to the growth of desert plants.	Soil and nutrients and their impact on the growth of plants in arid regions	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
Ninth	2 theoretical	Students will be able to manage water resources for plants in arid regions.	Water and irrigation in arid regions	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
tenth	2 theoretical	Students will be able to apply appropriate propagation methods for desert plants.	Reproduction and propagation in plants in arid regions	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
eleventh	2 theoretical 3 practic	Students will be able to assess the salinity tolerance of plants.	Salt-tolerant plants and the effect of salinity on plant growth	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions

twelfth	2 theoretical	Students will be able to apply plants for soil conservation and combating desertification.	Use of plants in combating desertification and soil conservation	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
thirteenth	2 theoretical	Students will be able to identify medicinal and aromatic plants and their uses.	Medicinal and aromatic plants in drylands	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
fourteenth	2 theoretical	Students will be able to explain the impact of climate change on desert plants.	Environmental challenges and the impact of climate change on plants in drylands	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
fifteent	2 theoretical	Students will be able to develop strategies for the sustainable use of desert plants.	Sustainable use of plants in drylands in agriculture and the environment	theoretical :Auditory methods: writing on the board method,	Short exams, homework assignments, discussions

				direct dialogue method	

742. Course Evaluation	
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))	
743. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	
Main References (Sources)	"Occupational Safety and Health" by Dr. Nasser Al-Daghmi, Al-Yazouri Publishing and Distribution House, 2016.
Recommended books and references (scientific journals, reports...)	"General Occupational Safety" by Khaled Fathi Madi and Ahmed Ragab Al-Khatib, Kunuz Al-Ma'rifa Scientific House, 2011
Electronic references and websites	National Occupational Safety and Health File - Republic of Iraq(2022) | International Labor Organization (ilo.org)

Course Description Form

744. Course name:	
Occupational safety	
745. Course code:	
TAMO451	
746. the chapterAcademic/ year	
747. Description preparation date	
1/7/2025	
748. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
749. Number of credit hours (total) / Number of units (total)	
750. Course Supervisor Name (List all names, if there is more than one)	
the name:Dr. Ahmed Faris Salem e-mail: ahmedalsawaf@ntu.edu.iq	
751. Course objectives	
Goals	1. Introducing students to the concepts of occupational safety and health and their importance in protecting people, property, and the environment.. 2. Identify the types of hazards (electrical, mechanical, chemical, physical, biological, etc.) and ways to prevent them.. 3. Providing students with knowledge of local and international regulations and laws related to occupational safety and health..
752. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report. 6. Assign teamwork to reveal leadership skills.

753. Course structure					
week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the firs	2 theoretical	The student should be able to define occupational safety and explain its importance in the agricultural sector.	Occupational safety concept	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
the second	2 theoretical	The student should be able to identify the laws and regulations governing occupational safety in agriculture.	Regulations, laws and legislation	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
the thir	2 theoretical	Students will be able to identify and classify the various hazards in the agricultural environment.	Identifying agricultural risks	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
Fourth	2 theoretical	Students will be able to protect themselves and others from physical hazards.	Safety from physical hazards	theoretical :Auditory methods: writing on the board method, direct	Short exams, homework assignments, discussions

				dialogue method	
Fifth	2 theoretical	Students will be able to prevent biological hazards on farms.	Safety from biological hazards	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
Sixth	2 theoretical	Students should be able to safely handle pesticides, fertilizers, and chemicals.	Safety from chemical hazards	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
Seventl	2 theoretical	Students should be able to prevent mechanical hazards associated with agricultural machinery.	Safety from mechanical hazards	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
The eighth	2 theoretical	Students should be able to prevent common diseases in the agricultural sector.	Safety from common diseases	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions

Ninth	2 theoretical	Students should be able to safely use agricultural machinery and equipment.	Handling agricultural machinery	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
tenth	2 theoretical	Students should be able to link occupational safety to the economic improvement of agricultural establishments.	Foundations of economic development	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
eleventh	2 theoretical 3 practic	Students should be able to manage agricultural waste in a safe and environmentally friendly manner.	Dealing with agricultural waste	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
twelfth	2 theoretical	Students should be able to assess the causes of agricultural accidents and take preventive measures.	Accidents and injuries in the agricultural sector	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
thirteenth	2 theoretical	Students should be able to follow the correct	Accident reporting procedures	theoretical :Auditory methods: writing on	Short exams, homework assignments, discussions

		procedures for reporting accidents.		the board method, direct dialogue method	
fourteenth	2 theoretical	Students should be able to provide first aid in emergencies.	first aid	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions
fifteent	2 theoretical	Students should be able to apply safety rules when using pesticides and fertilizers in a practical and safe manner.	Safe use of pesticides and fertilizers	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions

754. Course Evaluation
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))

755. Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	
Main References (Sources)	"Occupational Safety and Health" by Dr. Nasser Al-Daghmi, Al-Yazouri Publishing and Distribution House, 2016.
Recommended books and references (scientific	"General Occupational Safety" by Khaled Fathi Madi and Ahmed Ragab Al-Khatib, Kunuz Al-Ma'rifa Scientific House, 2011

journals, reports...)	
Electronic references and websites	National Occupational Safety and Health File - Republic of Iraq(2022) | International Labor Organization (ilo.org)

Course Description Form

756. Course name:	
Dry area facilities	
757. Course code:	
DES451	
758. the chapterAcademic/ year	
Fourth semester	
759. Description preparation date	
1/7/2025	
760. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
761. Number of credit hours (total) / Number of units (total)	
762. Course Supervisor Name (List all names, if there is more than one)	
the name:Dr. Faris Faisal Abdul Ghani e-mail: faris.faisal.701@ntu.edu.iq	
763. Course objectives	
Goals	1. Introducing students to the characteristics of arid and semi-arid regions in terms of climate, soil, water resources, and agricultural challenges.. 2. Providing students with knowledge of the basics of designing agricultural and hydraulic structures suitable for harsh environmental conditions.. 3. Developing students' abilities to plan and manage water resources (dams, reservoirs, irrigation networks) to ensure sustainability. 4. Qualifying students to deal with the problems of erosion, soil drift, and desertification and proposing appropriate engineering solutions.
764. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report.

	6. Assign teamwork to reveal leadership skills.

765. Course structure

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	2 theoretical 3 practical	The student should be able to define dryland structures and explain their importance.	Theory: Introduction to dryland structures – definition and importance Practical: Visit to a laboratory/station to see examples of structures	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the second	2 theoretical 3 practical	The student should be able to distinguish between different types of structures and describe their functions.	Theory: Types of structures: reservoirs, small dams, water collection basins Practical: Drawing simplified diagrams of different structures	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the third	2 theoretical 3 practical	The student should be able to apply the basics of engineering design for small	Theory: Basics of designing small dams and water basins Practical:	theoretical :Auditory methods: writing on the board method,	Short exams, homework assignments, discussions

		water structures.	Exercise in designing a small basin or experimental dam	direct dialogue method practical: Assignment and report	
Fourth	2 theoretical 3 practical	The student should be able to describe surface water collection systems and evaluate their effectiveness.	Theory: Students should be able to describe surface water collection systems and evaluate their effectiveness Practical: Field visit to a rainwater collection site	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Fifth	2 theoretical 3 practical	Students should be able to implement soil erosion prevention techniques and evaluate their impact.	Theory: Soil improvement and erosion prevention in dry areas Practical: Experiment with soil barriers or earthen terraces	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Sixth	2 theoretical	Students should be able to apply techniques for combating	Theory: Techniques for combating	theoretical :Auditory methods: writing on	Short exams, homework assignments, discussions

	3 practical	desertification and land reclamation.	desertification and reclaiming dry land Practical: Planting soil-stabilizing plants in an experimental field	the board method, direct dialogue method practical: Assignment and report	
Seventh	2 theoretical 3 practical	Students should be able to design and implement irrigation networks suitable for desert conditions.	Theory: Designing drip irrigation networks and ditches in dry areas Practical: Installing and testing a small irrigation network model	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
The eighth	2 theoretical 3 practical	Exam			
Ninth	2 theoretical 3 practical	Students will be able to evaluate and manage groundwater and surface water resources.	Theory: Groundwater and surface water management Practical: Measuring water levels and monitoring quality	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments, discussions

				practical: Assignment and report	
tenth	2 theoretical 3 practical	Students will be able to apply techniques for protecting land from floods and flash floods.	Theory: Flood and flash flood control structures in dry areas Practical: Designing a simple model of a drainage channel or	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
eleventh	2 theoretical 3 practical	Students will be able to apply techniques for protecting land from floods and flash floods.	Rainfed and dry farming flood barrier	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
twelfth	2 theoretical 3 practical	Students will be able to conduct economic evaluations of facilities.	Theory: Maintenance and monitoring of water structures Practical: Prepare a periodic maintenance plan for a pilot site	theoretical :Auditory methods: writing on the board method, direct	Short exams, homework assignments, discussions

				dialogue method practical: Assignment and report	
thirteenth	2 theoretical 3 practical	Students will be able to develop and implement maintenance plans for facilities.	Theoretical: Use of modern technology (GIS – Remote Sensing) in the design and monitoring of structures Practical: Practice using GIS software to monitor and follow up on a facility site	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
fourteenth	2 theoretical 3 practical	Students should be able to use modern technology to monitor and manage facilities.	Theory: The environmental impact of facilities and risk management Practical: Case study to assess the environmental impact of an existing facility	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
fifteenth	2 theoretical	Exam			

	3 practical	
766. Course Evaluation		
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))		
767. Learning and Teaching Resources		
Required textbooks (curriculum books, if available)		
Main References (Sources)		
Recommended books and references (scientific journals, reports...)		
Electronic references and websites		

Course Description Form

768. Course name:	
Conservation agriculture	
769. Course code:	
DES452	
770. the chapterAcademic/ year	
771. Description preparation date	
1\7\2025	
772. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
773. Number of credit hours (total) / Number of units (total)	
774. Course Supervisor Name (List all names, if there is more than one)	
the name:Dr. Mohamed Salem Ahmed e-mail: mohameedsa66@ntu.edu.iq	
775. Course objectives	
Goals	
776. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report. 6. Assign teamwork to reveal leadership skills.

777. Course structure

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	2 theoretical	The student should be able to define conservation agriculture and	Theory: Introduction to conservation agriculture – definition,	theoretical :Auditory methods: writing on the board	Short exams, homew

	3 practical	explain its importance.	importance, basic principles. Practical: Discussion of local examples of farms using conservation agriculture.	method, direct dialogue method practical: Assignment and report	ork assignments, discussions
the second	2 theoretical 3 practical	The student should be able to explain the causes of soil degradation resulting from traditional practices.	Theory: Problems with conventional soil and causes of its degradation. Practical: Analysis of field soil characteristics and the impact of conventional tillage.	theoretical:Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the third	2 theoretical 3 practical	The student should be able to explain the basic principles of conservation agriculture and apply them theoretically.	Theory: The three principles of conservation agriculture: no-till, cover crops, and diversity. Practical: Demonstration of cover crops on a small field.	theoretical:Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

Fourth	2 theoretical 3 practical	Students should be able to manage agricultural residues effectively in conservation agriculture systems.	Theory: Agricultural waste management in conservation agriculture. Practical: Collection and analysis of plant residues for reuse as mulch or organic fertilizer.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Fifth	2 theoretical 3 practical	**Exam**			
Sixth	2 theoretical 3 practical	Students should be able to select and apply appropriate plant cover.	Theoretical: Plant cover: types, benefits, techniques. Practical: Planting cover crops in a demonstration field.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Seventh	2 theoretical 3 practical	Students will be able to implement limited tillage techniques and analyze their	Theoretical: Reducing tillage and its impact on soil and water. Practical:	theoretical :Auditory methods: writing on the board method,	Short exams, homework

		effects on the soil.	Use of limited tillage tools to compare their impact on soil.	direct dialogue method practical: Assignment and report	assignments, discussions
The eighth	2 theoretical 3 practical	Students will be able to develop a plan for soil and nutrient management in conservation agriculture systems.	Theoretical: Soil and nutrient management in conservation agriculture. Practical: Use of limited tillage tools to compare their impact on soil.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Ninth	2 theoretical 3 practical	Students will be able to apply effective water management in conservation fields.	Theoretical: Water management in conservation agriculture. Practical: Experimentation with irrigation systems suitable for conservation agriculture	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
tenth	2 theoretical	Students will be able to implement weed and pest	Theory: Weed and pest control in conservation	theoretical :Auditory methods: writing on	Short exams,

	3 practical	control strategies within conservation agriculture systems.	agriculture systems. Practical: Application of weed control techniques in a field trial.	the board method, direct dialogue method practical: Assignment and report	homework assignments, discussions
eleventh	2 theoretical 3 practical	Students will be able to plan and implement sustainable crop rotations.	Theory: Crop diversity and the importance of rotations in conservation agriculture. Practical: Designing a crop rotation schedule for an experimental field.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
twelfth	2 theoretical 3 practical	Students will be able to assess the economic viability of conservation agriculture.	Theoretical: Evaluating the economic performance of conservation agriculture. Practical: Calculating the costs and returns of an experimental field using conservation agriculture.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

thirteenth	2 theoretical 3 practical	Students will be able to link conservation agriculture practices to climate change.	Theoretical: Adapting to climate change through conservation agriculture. Practical: Analyzing climate data and linking it to conservation agriculture applications.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
fourteenth	2 theoretical 3 practical	Students will be able to apply conservation agriculture in dry environments.	Theoretical: Conservation agriculture in desert and dry environments. Practical: Case study of a desert farm using conservation agriculture.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
fifteenth	2 theoretical 3 practical	Exam			
778. Course Evaluation					
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))					
779. Learning and Teaching Resources					

Required textbooks (curriculum books, if available)	
Main References (Sources)	Dry farming, its foundations, elements and investment / Dr. Abdullah Qasim
Recommended books and references (scientific journals, reports...)	
Electronic references and websites	

Course Description Form

1. Course name:	
Dryland pastures	
2. Course code:	
DES453	
3. the chapterAcademic/ year	
4. Description preparation date	
1/7/2025	
5. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
6. Number of credit hours (total) / Number of units (total)	
7. Course Supervisor Name (List all names, if there is more than one)	
the name:M.M. Omar Ahmed Fathy e-mail: omar.ah.f@ntu.edu.iq	
8. Course objectives	
Goals	Defining the importance of natural pastures, methods for evaluating pasture plants, methods for caring for and improving

	natural and artificial pastures, the most important pastoral plants and means of preserving them, and focusing on the most important promising pastoral plants in arid regions.
9. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report. 6. Assign teamwork to reveal leadership skills.

10.Course structure

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	2 theoretical 3 practical	The student should be able to define pastures and their types and explain their economic importance.	Pastures, definition, types, economic importance of natural pastures,spacesPastoral,yieldBotanical and pastoral rangelands	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
the second	2 theoretical 3 practical	The student should be able to estimate plant and pastoral productivity in	Features Home For pastures natural in Homeland Arabic environments Vegetarianism The Great in Homeland ArabicThe method	theoretical :Auditory methods: writing on the board method, direct	Short exams, homework

		practice and theory.	used to exploit natural pastures in the desert.	dialogue method practical: Assignment and report	assignments, discussions
the third	2 theoretical 3 practical	The student should be able to describe the environmental characteristics of natural pastures and classify plant environments.	Problems and difficulties facing natural pastures in Iraq,factorsrelated to humanitarian activities,factorsrelated to agricultural activities,factorsassociated with pastoral practices,factorsRelated to land ownership, policies and laws,factorsInstitutional	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Fourth	2 theoretical 3 practical	Students should be able to analyze different methods of pasture exploitation.	Qualitative aspects of natural pasture plants (natural vegetation and its distribution in pasture types, natural vegetation in deserts such as annual plants, perennial trees and perennial shrubs).	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

Fifth	2 theoretical 3 practical	Students should be able to analyze problems associated with natural pastures and their factors.	Patterns Pastoral and its impact on plants pastures deterioration lands pastures natural in Homeland Arabic,deterioration lands pastures natural	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Sixth	2 theoretical 3 practical	Students should be able to assess the impact of human and agricultural activities on pastoral lands.	factors Influential in deterioration lands Pastoral ,Indicators deterioration lands pastures natural	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
Seventh	2 theoretical 3 practical	Students will be able to identify and classify pasture plants according to species and vegetation type.	The basis of quantitative evaluation of pasture plants, important and basic indicators in determining pasture productivity, Quantitative attributes or	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme	Short exams, homework assignments,

			measures, sampling methods	nt and report	discussi ons
The eighth	2 theoreti cal 3 practical	Students will be able to analyze the impact of different grazing patterns on plant diversity and productivity.	plants Pastoral and evaluation Its importance Relativity in Homeland Arabic,Standards Importance Relativity For plants Pastoral,StandardE nvironmental,Stand ardFood,standardM ullaandWhatyield	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme nt and report	Short exams, homew ork assignm ents, discussi ons
Ninth	2 theoreti cal 3 practical	Students will be able to identify and quantify indicators of pasture degradation.	look around Activities Rehabilitation pastures deteriorating The material The plants used ,Most important plants Pastoral Promising,treesPast oral,shrubsPastoral, aFor lingualism,herbsPa storal	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignme nt and report	Short exams, homew ork assignm ents, discussi ons
tenth	2 theoreti cal 3 practical	Students should be able to apply quantitative assessment principles and sampling methods to	perceptions Futuristic For development And development Resources Pastoral to update And activate Policies and legislation The	theoretical :Auditory methods: writing on the board method, direct	Short exams, homew ork assignm

		estimate pasture productivity.	archer For development Sustainable pastures	dialogue method practical: Assignment and report	ents, discussions
eleventh	2 theoretical 3 practical	Students should be able to assess the relative importance of pasture plants according to scientific criteria.	situation And implementation Strategies And plans a job suitable For development Pastoral resources,strengthening Frames Institutional same relationship With qualification And management Pastoral resources,Accreditation approach ShareyourY in development And management Resources Pastoral	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
twelfth	2 theoretical 3 practical	Students should be able to prepare and implement plans for rehabilitating degraded pastures and selecting appropriate plants.	building Capabilities Technical To qualify And management Resources Pastoral,to encourage Research and studies in area Resources Pastoral,to implement Packages Technical	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions

			Promising on range wide		
thirteenth	2 theoretical 3 practical	Students should be able to analyze policies and make proposals for the development and improvement of pastoral resources.	Units Pastoral Home and integration Among them,Pasturesworm wood,PasturesAllies,PasturesThe hatred,Pasturessaline lands,Pasturessandy lands	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
fourteenth	2 theoretical 3 practical	Students should be able to develop strategies and action plans for the development of pastoral resources and manage research projects.	Methods of caring for and improving natural pastures, reviving degraded grazing areas, and exploiting available water resources.	theoretical :Auditory methods: writing on the board method, direct dialogue method practical: Assignment and report	Short exams, homework assignments, discussions
fifteenth	2 theoretical 3 practical	Students should be able to apply methods for improving natural pastures and managing water resources in a practical manner.	Pastures, definition, types, economic importance of natural pastures,spacesPastoral,yieldBotanical and pastoral rangelands	theoretical :Auditory methods: writing on the board method, direct dialogue method	Short exams, homework assignments,

				practical: Assignment and report	discussions
11. Course Evaluation					
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))					
12.Learning and Teaching Resources					
Required textbooks (curriculum books, if available)					
Main References (Sources)					
Recommended books and references (scientific journals, reports...)					
Electronic references and websites					

Course Description Form

1. Course name:	
Geographic Information Systems (GIS)	
2. Course code:	
DES455	
3. the chapterAcademic/ year	
4. Description preparation date	
1/7/2025	
5. Available attendance forms	
1. Weekly lesson schedule (theoretical) And my work). 2. Discussions, scientific seminars, and other extracurricular activities	
6. Number of credit hours (total) / Number of units (total)	
7. Course Supervisor Name (List all names, if there is more than one)	
the name:Mr. Samir Farhan Ayoub e-mail: Samir.f.ayoub@ntu.edu.iq	
8. Course objectives	
Goals	1. Introducing students to the concept of geographic information systems and their basic components (software, hardware, data, human resources).

	2. Providing students with basic skills in dealing with spatial and descriptive data in terms of collection, entry, storage, processing and analysis.. 3. Developing students' ability to use spatial analysis tools in studying environmental, agricultural, urban, and natural resource problems.. 4. Introducing students to GIS technologies and their various applications in urban planning, resource management, environmental studies, and precision agriculture..
9. Teaching and learning strategies	
Strategy	1. Interactive lectures. 2. Brainstorming. 3. Practical laboratory and field training. 4. Dialogue and discussion. 5. Assign tasks and report. 6. Assign teamwork to reveal leadership skills.

10.Course structure

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the firs	2 theoretical 3 practical	Students should be able to link different technologies to GIS software and apply technical tools in the software.	theoretical: Definition of Geographic Information Systems (GIS), a historical overview of the emergence of GIS, the concept of categories in GIS, components of GIS (computer systems, GIS software, spatial and descriptive data and information, users, data management and spatial analysis). practical: - Define the geographic	theoretical: Auditory methods: writing on the board method, direct dialogue method practical:Assignment and report	Short exams, homework assignments, discussions

			information system, install the program, - Get to know the program interfaceARC GIS 9.3“ "ArcCatalog"And" Arc Map"And"Arc Toolbox“. - The types of data that the program deals with.		
the second	2 theoretical 3 practical	Students should be able to describe the benefits of using geographic information systems and use the basic tools in the software.	theoretical: - The relationship of the GIS to other sciences (remote sensing, cartography, statistics, geography, computer science). practical: Select the appropriate location for the map, determine the coordinates, and correct and modify the map image using four reference points with known coordinates on the map.	theoretical: Auditory methods: writing on the board method, direct dialogue method practical:Assignment and report	Short exams, homework assignments, discussions
the thir	2 theoretical 3 practical	Students should be able to use geographic information	theoretical: GIS functions (data collection, storage, querying, analysis, and output).	theoretical: Auditory methods: writing on the board	Short exams, homewo

		systems to create shapefiles and apply cartographic representation rules.	practical: Create a shapefile for the features that represent aspects of the map, taking into account the rules and principles of cartographic representation. Define map elements (point, line, polygon).	method, direct dialogue method practical:Assignment and report	rk assignments, discussions
Fourth	2 theoretical 3 practical	The student should be able to link geographic information systems to other sciences and apply coordinate correction to maps.	theoretical: Benefits of using GIS. practical: - Dealing with the toolbarTools. - Working with the standard toolbar	theoretical: Auditory methods: writing on the board method, direct dialogue method practical:Assignment and report	Short exams, homework assignments, discussions
Fifth	2 theoretical 3 practical	The student should be able to define geographic information systems, explain their components, and use ArcGIS software.	theoretical: GIS-related techniques (remote sensing, geodesy, photogrammetry, construction science, and cartography). Advantages of GIS software. practical: - Dealing with the toolbarTools. - Working with the standard toolbar	theoretical: Auditory methods: writing on the board method, direct dialogue method practical:Assignment and report	Short exams, homework assignments, discussions

Sixth + Seventl	2 theoretical 3 practical	• Students will be able to represent and synthesize spatial data using advanced tools in ArcGIS. • Students will be able to classify data sources and their characteristics and apply them in the program.	theoretical: Data synthesis and representation methods in GIS (components of spatial data, data synthesis in GIS, linear vector structure, including point, line, and polygon), spatial grid, and triangulation network model construction. Irregular tablesTIN, Metadata Tables. practical: - Dealing with the editor toolbar. - Drawing tools in the Drawing Tool menu and Edit menu commands in the View area.	theoretical: Auditory methods: writing on the board method, direct dialogue method practical:Assignment and report	Short exams, homework assignments, discussions
The eighth Ninth	2 theoretical 3 practical	• Students should be able to enter spatial data and create different feature layers. • Students should be able to manage, process, and analyze metadata.	theoretical: Data types in GIS (spatial, non-spatial, temporal, dynamic spatial data). Linear data sources "Vector data sources". - Spatial data sources "raster data sources" - Primary sources - Secondary sources (maps of all types, aerial photographs, satellite data and visualizations, GPS, digital elevation model). - Non-spatial data sources practical:	theoretical: Auditory methods: writing on the board method, direct dialogue method practical:Assignment and report	Short exams, homework assignments, discussions

			- Working with the Effect toolbar. Types of lines and colors of features. - Advanced Editing toolbar		
tenth + eleventh	2 theoretical 3 practical	- أن يكون الطالب قادراً على إجراء التحليل المكاني للبيانات الخطية وتطبيق المطابقة الطوبولوجية. أن يكون الطالب قادراً على استخدام DEM لإنتاج خرائط تحليلية متعددة وتحليل التضاريس.	theoretical: Entering spatial data into the computer (the concept of the process of entering spatial and descriptive data, criteria for evaluating spatial data, and methods of entering spatial data into the computer (using a device)DigitizerManual and automatic and their advantages. - Coordinate system. - Classification of map projections. - Determine coordinates, correct	theoretical: Auditory methods: writing on the board method, direct dialogue method practical:Assignment and report	Short exams, homework assignments, discussions

			the map, and select the map location. - Steps to represent the features of the corrected map using the program "ARC GIS". - Create layers for the features that make up the map. - Representation of point, line and area features of map features. practical: Preparing the map for printing and working with the Layout toolbar - Insert toolbar to insert map elements.		
twelfth + thirteenth	2 theoretical 3 practical	- Students should be able to produce infrastructure network maps and analyze them spatially. - Students should be able to integrate spatial data and analyze spatial	theoretical: Spreadsheets, entering metadata associated with point, line, and cadastral spatial data. Data processing (selecting features using spreadsheets, selecting features based on their location among other features, selecting features using a shape, the Statistics dialog	theoretical: Auditory methods: writing on the board method, direct dialogue method practical:Assignment and report	Short exams, homework assignments, discussions

		results for GIS projects.	box, and the Summary dialog box) practical: Spreadsheets, entering metadata associated with point, line, and cadastral spatial data. Data processing (selecting features using spreadsheets, selecting features based on their location among other features, selecting features using a shape, the Statistics dialog box, and the Summary dialog box)		
fourteenth + fifteent	2 theoretical 3 practical	- Students should be able to prepare maps for final output and include the necessary elements. - Students should be able to integrate all the skills acquired	theoretical: Spatial analysis of data in GIS, spatial analysis of linear data (topological matching and its types, spatial analysis in the surveying system (cellular), digital elevation model"DEM"Regular and irregular grid structure, extrapolation of data from digital	theoretical: Auditory methods: writing on the board method, direct dialogue method practical:Assignment and report	Short exams, homework assignments, discussions

		into a comprehensive applied GIS project.	elevation model”DEMDerivation of maps: contour maps, aspect maps, hillshading maps, slope maps, field of view, elevation sections, production of sewer network maps. practical: Spatial analysis of data in GIS, spatial analysis of linear data (topological matching and its types, spatial analysis in the surveying system (cellular), digital elevation model”DEM, regular and irregular network structure, extrapolation of data from digital elevation model (DEM), map derivation: contour maps, aspect maps, hillshading maps, slope maps, field of view, elevation sections, production of		

			sewer network maps.		

11. Course Evaluation	
((Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams))	
12.Learning and Teaching Resources	
Required textbooks (curriculum books, if available)	Lectures according to the prescribed curriculum
Main References (Sources)	Microsoft Access 2010
Recommended books and references (scientific journals, reports...)	
Electronic references and websites	