Academic Program Description Form

University name: Northern Technology University
College/Institute:Agricultural Technical College
Scientific Department:Plant production Techniques
Name of academic or professional program:Bachelor'sIn plant production techniques
Final certificate name:Bachelor'sIn the Department of plant prroduction Techniques
Academic system:curriculum system
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 : 1/7/2025

the signature :
nameHead of Department:Dr. Waad saeed Faizy
the date : 1/7/2025

Check the file before
Quality Assurance and University Performance Division
Name of the Director of the Quality Assurance and University Performance Division: Haneen mowfak ahmed
the date : 1/7/2025
the signature

Dean's approval
Prof.Dr.shihab ahmed yousif

Approval of the Dean

1. Program Vision

Leadership in preparing specialized and qualified technical personnel in the field of plant production, effectively contributing to the development of sustainable agriculture and the achievement of food security locally and regionally.

2. Program Mission

Providing high-quality technical education in the field of plant production that combines scientific knowledge with practical skills through modern curricula and hands-on training, in order to graduate professionals capable of working in both the public and private sectors and contributing to the development of sustainable agricultural technologies.

3. Program Objectives

1. Qualify graduates with high scientific and technical competence in various fields of plant production.
2. Develop students' practical skills in modern agricultural techniques such as protected cultivation, organic farming, and smart systems.
3. Promote applied scientific research in plant production to serve society and the environment.
4. Link education with the labor market through field training programs and cooperation with agricultural production institutions.
5. Support the principles of sustainable development by adopting environmentally friendly and economically efficient agricultural practices.

6. Encourage innovation and entrepreneurship in smart agriculture and modern agricultural technologies.

4. Program Accreditation

Does the program have program accreditation? And from which agency?

No

5. Other external influences

There is a strong connection with the labor market that welcomes our graduates, as we continuously monitor its needs and compare them with the academic curricula to keep pace with developments and achieve sustainable development. This is done through communication with official institutions, with a focus on the agricultural practices implemented in those entities. Accordingly, the academic curricula are updated based

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	10	20	14.37	Basic and optional
College Requirements	14	28	18.31	Basic and optional
Department Requirements	44	96	67.32	Basic and optional
Summer Training				
Other				

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

7. Program Description				
Year/Level	Course Code	Course Name	Credit Hours	
			Theoretical	Practical
First	NTU 100	Human Rights and Democracy	2	0
First	NTU 101	English Language (1)	2	0
First	NTU 102	Computer (1)	1	1
First	NTU 103	Arabic Language (1)	2	0
First	TAMO101	Mathematics	1	0
First	TAMO102	Engineering Drawing	0	3
First	TAMO103	Plane surveying	1	3
First	TAMO104	General Chemistry	1	3
First	TAMO 151	Resource Economics	2	0
First	PLP 101	General Botany	1	3
First	PLP 102	Principles of Soil Sciences	2	3
First	PLP 103	Principles of Horticulture	2	3
First	PLP 104	Plant anatomy	1	3
First	PLP 105	General Entomology	1	3
First	PLP 153	Microbiology	1	3
First	PLP 157	Sustainable Agriculture	1	3
Second	NTU 200	English language (2)	2	0

Second	**NTU 201**	**Computer (2)**	**1**	**1**
Second	**NTU 202**	**Arabic language (2)**	**2**	**0**
Second	**NTU 203**	**The crimes of Baath regime in Iraq**	**2**	**0**
Second	**NTU 204**	**Professional ethics**	**2**	**0**
Second	**TAMO 201**	**Organic Chemistry**	**2**	**3**
Second	**TAMO 202**	**Agriculture Statistics**	**1**	**2**
Second	**TAMO 252**	**Food industries**	1	3
Second	**PLP 201**	Cereal and Legume Winter Crops	**1**	**3**
Second	**PLP 202**	Deciduous Fruit Trees	**2**	**2**
Second	**PLP 203**	Production of Winter Vegetables	**1**	**3**
Second	**PLP 204**	Plant Physiology	**1**	**3**
Second	**PLP 205**	Fertility and Fertilization	**2**	**3**
Second	**PLP 206**	Nurseries and Plant Propagation	**1**	**3**
Second	**PLP 207**	Evergreen Fruit Trees	**1**	**3**
Second	**PLP 208**	Production of Summer Vegetables	**1**	**3**
Second	**PLP 209**	Cereal and Legume Summer Crops	**1**	**3**
Second	**PLP 210**	Tractors and Agricultural Equipment	**1**	**3**
Second	**PLP 251**	**Plant Taxonomy**	1	2

Second	PLP 256	Analytical Chemistry	1	3
Third	TAMO 301	Computer Applications (3)	1	2
Third	TAMO 302	Biochemistry	2	3
Third	TAMO 352	organic agriculture	1	2
Third	PLP 301	Principles of Genetics	2	3
Third	PLP 302	Plant Nutrition	1	3
Third	PLP 303	Protected Agriculture Techniques	2	3
Third	PLP 304	Decoration Plants	2	2
Third	PLP 305	Plant Growth Regulators	2	3
Third	PLP 306	Molecular Genetics	1	2
Third	PLP 307	Industrial Crops	1	2
Third	PLP 308	Post-Harvest physiology	1	2
Third	PLP 309	Useful Insects	2	3
Third	PLP 310	Summer Training (2)	0	0
Third	PLP 351	Plant Diseases	1	3
Third	PLP 357	Harvesting Equipment	1	2
Third	PLP 352	Forage Crops and Pastures	1	2
Fourth	NTU 410	Scientific research methodology	2	0

Fourth	TAMO 401	Experimental Design	1	3
Fourth	TAMO 402	Computer Applications (4)	1	3
Fourth	TAMO452	agricultural marketing	2	0
Fourth	PLP 401	Plant Breeding (1)	2	2
Fourth	PLP 402	Medical Plants	1	2
Fourth	PLP 403	Crop Quality	2	2
Fourth	PLP 404	Weeds Control	1	2
Fourth	PLP 405	Plant Breeding (2)	2	2
Fourth	PLP 406	Plant Tissue Culture	2	2
Fourth	PLP 407	landscape Design	2	3
Fourth	PLP 408	Seminar and Project (1)	1	3
Fourth	PLP 409	Seminar and Project (2)	1	3
Fourth	PLP 458	conservation agriculture	1	2
Fourth	PLP 453	Biological resistance	1	2
Fourth	PLP 452	Seed Technology	1	2

8. Expected learning outcomes of the program

Knowledge	
A-Knowledge and Cognitive Objectives	**A1**. Describes the fundamental concepts in soil science, plant science, agricultural climatology, and agricultural economics.

	A2. Explains the principles and techniques of producing field crops, vegetables, fruits, and medicinal and aromatic plants. **A3**. Differentiates between traditional and modern farming systems (such as organic and smart agriculture) in terms of environmental and economic feasibility. **A4**. Explains the principles of quality control in plant production and the requirements for food safety and plant health.
Skills	
B – Skill Objectives	**B1**. Applies the steps of cultivation—from soil preparation, planting, irrigation, and fertilization to harvesting—using appropriate agricultural tools and equipment. **B2**. Distinguishes between physiological symptoms and plant diseases or pest infestations, and proposes suitable solutions. **B3**. Collects data from experimental fields or greenhouses and analyzes them using basic statistical tools or agricultural software. **B4**. Plans and conducts small-scale experiments to improve production or test

	fertilizers and pesticides, and interprets the results.
Value	
C – Emotional and Value Objectives	**C1**. Demonstrates responsible professional behavior with integrity, accuracy, and adherence to agricultural laws and regulations in the workplace. **C2**. Shows empathy toward farmers' needs and a commitment to serving and supporting the agricultural community. **C3**. Values the importance of producing safe and healthy crops for consumers and follows practices that minimize contamination risks. **C4**. Demonstrates a willingness for continuous learning and readiness to adopt modern agricultural technologies and develop personal skills.

9. Teaching and Learning Strategies
The program relies on a set of modern methods aimed at achieving a deep understanding of scientific concepts and developing practical skills among students. These strategies include: 1. Traditional theoretical teaching. 2. Practical and applied training. 3. Collaborative learning. 4. Technology-based learning.

10. Evaluation methods

- Written exams.
- Oral exams.
- Daily quizzes/assessments.
- Practical exams in fields and nurseries.
- Practical projects.
- Summer field training/internship.

11.Faculty

Faculty members

Academic rank	specialization		Special requirements/ skills (if any)		preparation of the teaching staff	
	general	Specialized			Staff	lecturer
Prof	Chemistry	biochemistry	PhD	YES	*	
Asst . Prof	Biology	Botany	PhD	YES	*	
Asst . Prof	Biology	Botany/ Mycology	PhD	YES	*	
Asst . Prof	Biology	Mycology	PhD	YES	*	
Asst . Prof	crops	Plant Genetics and Breeding	PhD	YES	*	
Lecturer 3	Horticulture and landscaping	Horticulture and landscaping	PhD	YES	*	
lecturer	Chemistry	Physical	PhD	YES	*	
Lecturer 4	crops	crops	PhD	YES	*	
Asst .lecturer 4	crops	crops	PhD	YES	*	
Lecturer	Plant protection	Plant protection	PhD	YES	*	
Asst. lecturer	Plant Production Technologies	Plant Production Technologies	MSC	YES	*	

Asst. lecturer	Agricultural economy	Agricultural economy	MSC	YES	*	

Professional Development
Mentoring new faculty members
- A comprehensive orientation program covering the program's vision, mission, academic regulations, and learning outcomes. - Assignment of an academic mentor to support the new faculty member during the first semester. - Introductory field visits to nurseries, laboratories, and experimental fields. - A simplified procedural guide including forms, plans, and assessment mechanisms. - Foundational workshops on course design, classroom management, and blended learning.
Professional development of faculty members
Professional Development aims to update teaching and research skills and enhance academic performance through: - Regular workshops and training courses in active learning, assessment, and scientific research. - Promoting the use of educational technology such as e-learning and multimedia. - Encouraging scientific research and publication in local and international journals and conferences. - Fellowship programs and academic exchanges locally and internationally to share expertise.

- Field training and scientific visits to keep up with the latest agricultural technologies.
- Periodic academic performance evaluation with feedback and personal development plans.

12. Acceptance Criterion

The minimum GPA for graduates of secondary education/science and agricultural branches.

13. The most important sources of information about the program

- Accredited study courses and curricula approved by the Ministry of Higher Education or the supervising authority.
- Study plans and academic programs, including course description documents, learning outcomes, and university program plans.
- Quality assurance committees, curriculum committees, and academic development teams within the university.
- Recent specialized scientific books and references in plant production, sustainable agriculture, and production technologies.
- Scientific research papers, agricultural studies, conferences, and research databases.
- Educational and agricultural legislation and policies, including university regulations, agricultural laws, quality assurance, and professional development policies.
- Practical and field experience data (internship records, evaluations of nurseries and educational farms, field experiments).

Digital educational platforms (university websites, e-learning platforms, and academic forums).

14. Program development plan

Improving the quality of education and academic research, while ensuring alignment with market needs and technological advancements.

Key steps for program development include:

1. Analyzing and evaluating the current curriculum by international experts.
2. Updating the curriculum to reflect modern developments.
3. Enhancing scientific research and innovation.
4. Developing faculty members' capabilities through training and continuous learning.
5. Integrating technology into teaching and learning processes.
6. Strengthening collaboration with the agricultural industry and related sectors.
7. Continuous evaluation and quality assurance.
8. Promoting a sustainability-oriented approach in education and practice.
9. Marketing the program and attracting prospective students.
10. Securing funding and financial support for program development.

Year / Level	Course Name	Course Code	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
First	Human Rights and Democracy	NTU 100	B			√		√				√			
	English Language (1)	NTU 101	E		√					√		√			
	Computer (1)	NTU 102	B			√				√		√			
	Arabic Language (1)	NTU 103	E	√					√			√			
	Mathematics	TAMO101	B	√					√	√					

	Engineering Drawing	**TAMO102**	B			√		√			√				
	Plane surveying	**TAMO103**	**B**	√				√				√			
	General Chemistry	**TAMO104**	**B**		√				√			√			
	Resource Economics	**TAMO 105**	**B**	√				√						√	
	General Botany	**PLP 101**	**C**		√					√			√		
	Principles of Soil Sciences	**PLP 102**	**C**	√				√				√			
	Principles of Horticulture	**PLP 103**	**C**	√									√		
	Plant anatomy	**PLP 104**	**C**			√			√			√			

	General Entomology	PLP 105	C	√				√						√	
	Microbiology	PLP 106	B	√					√				√		
	Sustainable Agriculture	PLP 107	B			√			√			√			
	English language (2)	NTU 200	B	√				√					√		
	Computer (2)	NTU 201	E	√						√			√		
Second	Arabic language (2)	NTU 202	E	√				√				√			
	The crimes of Baath regime in Iraq	NTU 203	B	√					√				√		

	Professional ethics	**NTU 204**	**B**	√					√				√		
	Organic Chemistry	**TAMO 201**	**B**	√				√					√		
	Agriculture Statistics	**TAMO 202**	**B**	√				√				√			
	Food industries	**TAMO 203**	**B**	√				√					√		
	Cereal and Legume Winter Crops	**PLP 201**	**C**		√			√				√			
	Deciduous Fruit Trees	**PLP 202**	**C**	√						√			√		
	Production of Winter	**PLP 203**	**C**		√					√		√			

	Vegetables														
	Plant Physiology	**PLP 204**	C		√			√				√			
	Fertility and Fertilization	**PLP 205**	C	√				√					√		
	Nurseries and Plant Propagation	**PLP 206**	C		√			√						√	
	Evergreen Fruit Trees	**PLP 207**	C		√					√			√		
	Production of Summer Vegetables	**PLP 208**	C	√					√				√		
	Cereal and	**PLP 209**	C		√				√			√			

	Legume Summer Crops													
	Tractors and Agricultural Equipment	**PLP 210**	**B**			√				√			√		
	Plant Taxonomy	**PLP 211**	**B**	√					√				√		
	Analytical Chemistry	**PLP 212**	**B**		√				√			√			
	Computer Applications (3)	**TAMO 301**	**B**			√				√			√		
	Biochemistry	**TAMO 302**	**B**		√					√				√	

	organic agriculture	TAMO 303	E	√				√				√			
	Principles of Genetics	PLP 301	C		√					√				√	
	Plant Nutrition	PLP 302	C	√					√			√			
	Protected Agriculture Techniques	PLP 303	C		√					√			√		
	Decoration Plants	PLP 304	C	√				√				√			
	Plant Growth Regulators	PLP 305	C	√				√				√			

	Molecular Genetics	PLP 306	B			√			√				√		
	Industrial Crops	PLP 307	C	√				√				√			
	Post-Harvest physiology	PLP 308	C			√			√				√		
	Useful Insects	PLP 309	C	√				√				√			
	Summer Training (2)	PLP 310	B			√			√				√		
	Plant Diseases	PLP 311	B		√			√				√			
	Harvesting	PLP 312	B												

	Equipment													
	Forage Crops and Pastures	**PLP 313**	**B**	√						√			√		
	Scientific research methodology	**NTU 410**	**B**	√				√					√		
	Experimental Design	**TAMO 401**	**B**		√			√						√	
	Computer Applications (4)	**TAMO 402**	**E**	√					√				√		
	agricultural	**TAMO**	**B**		√			√							

	marketing													
	Plant Breeding (1)	PLP 401	C		√			√						√	
	Medical Plants	PLP 402	C	√					√				√		
	Crop Quality	PLP 403	C		√			√				√			
	Weeds Control	PLP 404	C	√						√				√	
	Plant Breeding (2)	PLP 405	C			√			√			√			
	Plant Tissue Culture	PLP 406	C	√				√					√		
	landscape Design	PLP 407	C		√			√							
	Seminar and	PLP 408	B		√				√					√	

	Project (1)													
	Seminar and Project (2)	**PLP 409**	**B**			√				√			√		
	conservation agriculture	**PLP 410**	**B**		√			√				√			
	Biological resistance	**PLP 411**	**B**	√					√				√		
	Seed Technology	**PLP 412**	**B**		√			√					√		

- **Please tick the boxes corresponding to the individual program learning outcomes under evaluatio**

Course Description Form

1. Course Name:	
Democracy and human rights	
2. Course Code:	
NTU 103	
3. Semester / Year:	
First / one	
4. Description Preparation Date:	
2025/7 /16	
5. Available Attendance Forms:	
Paper form including name, date of attendance and signature	
6. Number of Credit Hours (Total) / Number of Units (Total)	
30 / 2	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Abdul Majeed Mahmoud Hamoudi Email: Abdulmagid2020@ntu.edu.iq	
8. Course Objectives	
Course Objectives	1. Introduce the student to the most important laws related to human rights. 2. Introduce the student to the most important Iraqi constitutions and their relationship to human rights. 3. Teach the student to respect the freedom of others in their interactions, taking into account the cultural differences in the Iraqi environment.

9. Teaching and Learning Strategies	
Strategy	1. Dialogue- and discussion-based learning. 2. Brainstorming. 3. Collaborative learning. 4. Practical training. 5. Self-directed learning.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	The student must understand: First: Knowledge and understanding Second: Technology Third: Business Fourth: Values and attitudes	Human rights, definition, and objectives.	Questions and answers, interactive discussion, and self-paced learning	Oral, written and daily practical tests and scientific reports
2	2	The student should be able to: 1. Identify the roots of human rights 2. Review the most important historical milestones that contributed to the development of the concept of human rights throughout the ages	The roots of human rights and their development throughout human history. Human rights in ancient times.	Questions and answers, interactive discussion, and self-paced learning	Oral, written and daily practical tests and scientific reports

		3. Explain how the concepts of justice, freedom, and equality were expressed in ancient civilizations 4. Identify ancient documents and principles			
3	2	• The student will understand the concept of human rights as it appeared in pre-Christian civilizations. Identify the most important ancient laws that addressed rights. Explain how justice and rights were practiced in Mesopotamian civilization. Explain how divine laws addressed the concept of rights and justice. Identify human rights in Islam.	Human rights in ancient civilizations, especially Mesopotamia. Human rights in divine laws, with a focus on human rights in Islam.	Questions and answers, interactive discussion, and self-paced learning	Oral, written and daily practical tests and scientific reports
4	2	The student will be able to: 1. The nature of society in the Middle Ages (in Europe, the Islamic world, and elsewhere) and its impact on the concept of rights. 2. Explain how human rights were influenced by	Human Rights in the Middle Ages	Questions and answers, interactive discussion, and self-paced learning	Oral, written and daily practical tests and scientific reports

		feudal systems. 3. Identify important documents that emerged at that time. 4. Identify the individual's status and social class and their relationship to their rights.			
5	2	The student will learn how the concept of human rights has evolved within political and intellectual theories and distinguish between the positions of political doctrines on individual and collective rights. The student will also learn about the role of philosophers and thinkers in shaping the modern concept of human rights. The student will also compare the various political doctrines in their views of human rights.	Human rights in doctrines, schools, and political theories. Human rights in corporations, their declarations, revolutions, and constitutions.	Questions and answers, interactive discussion, and self-paced learning	Oral, written and daily practical tests and scientific reports
6	2	• Identify the most important historical milestones in international recognition of human rights after World War II. • Explain the role of international organizations (the United Nations, the Council of Europe, the African Union, and the	Human Rights in Contemporary and Modern History: International Recognition of Human Rights	Questions and answers, interactive discussion, and self-paced learning	Oral, written and daily practical tests and scientific reports

		League of Arab States) in formulating and protecting rights. • Clarify the principles of major international conventions and treaties. • Review international and regional oversight mechanisms for the implementation of human rights.			
7	2	The student will be able to understand: The concept of international and regional recognition of human rights and the motivations behind its emergence following global wars and conflicts. Become familiar with the most prominent international agreements and conventions.	International and regional recognition of human rights	Questions and answers, interactive discussion, and self-paced learning	Oral, written and daily practical tests and scientific reports
8	2	• The student will define the concept of non-governmental organizations (NGOs) and their role in civil society. • Distinguish between the types of NGOs (local, national, international) working in the field of human rights.	NGOs and human rights	Questions and answers, interactive discussion, and self-paced learning	

		• Identify the most prominent international organizations that defend human rights.			
9	2	The student will be able to understand what these organizations are and their role in society. They will also be able to distinguish between national organizations and international organizations working in the same field. They will also understand that these institutions monitor rights, investigate violations, and report on the human rights situation.	National human rights organizations	Questions and answers, interactive discussion, and self-paced learning	Oral, written and daily practical tests and scientific reports
10	2	The student will learn about the fundamental rights guaranteed by the Iraqi Constitution. Understand the difference between the rights theoretically stipulated in the Constitution and their application in daily life. Understand the challenges facing the protection of human rights in Iraq from a practical perspective.	Human Rights in Iraqi Constitutions : Between Reality and Theory	Questions and answers, interactive discussion, and self-paced learning	Oral, written and daily practical tests and scientific reports
11	2	The student will become familiar with the concept of human rights and public	The relationship between	Questions and answers, interactive	Oral, written and daily practical tests

		freedoms as stated in the Universal Declaration of Human Rights. They will understand how rights and freedoms complement each other to form a system for protecting human dignity. They will learn about the most important public freedoms, such as freedom of expression, freedom of religion, and freedom of movement.	human rights and public freedoms in the Universal Declaration of Human Rights	discussion, and self-paced learning	and scientific reports
12	2	The student will become familiar with the concept of human rights and public freedoms as stated in regional instruments 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 them among fundamental human rights. They will identify the similarities and differences between regional instruments and national constitutions in protecting	The relationship between human rights and public freedoms in regional charters and national constitutions	Questions and answers, interactive discussion, and self-paced learning	Oral, written and daily practical tests and scientific reports

		rights and freedoms.			
13	2	The student will 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 protect identity, culture, and diversity.	Essential human rights and collective human rights	Questions and answers, interactive discussion, and self-paced learning	
14	2	The student will be introduced to the concept of economic, social, and cultural human rights, such as the right to work, education, health, and adequate housing. Understand the concept of civil and political human rights, such as the right to freedom, expression, political participation, and justice. Understand the basic differences between economic, social, and cultural rights and civil and political rights.	Economic, social and cultural human rights, and civil and political human rights	Questions and answers, interactive discussion, and self-paced learning	Oral, written and daily practical tests and scientific reports
15	2	To enable the student to	Contemporar	Questions and	Oral, written

		understand contemporary human rights and the importance of integrating them with the Sustainable Development Goals.	y Human Rights: The Reality of Development and the Right to a Clean Environment	answers, interactive discussion, and self-paced learning	and daily practical tests and scientific reports

11. Course Evaluation	
Tests + Exercises + Discussions + Questions	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Studies in Democracy and Human Rights Author: Hadi Rabie Publisher: Dar Al-Janan for Publishing and Distribution 2016
Main references (sources)	"Democracy and Human Rights: Concepts, Measures and Relationships" by Dr. Todd Landman, published in 2018, discusses the concepts of democracy and human rights, how to measure them, and analyze the relationships between them.
Recommended books and references (scientific journals, reports...)	The International Journal of Human Rights Publishes research on human rights issues around the world and international politics.
Electronic References, Websites	https://www.ohchr.org https://www.amnesty.org https://www.hrw.org

Course Description Form

No.	Item	Details
1	Course Title	English Language (1)
2	Course Code	NTU101
3	Semester / Year	First Semester
4	Date of Description Preparation	—
5	Available Attendance Forms	1. Weekly lecture schedule (theoretical) 2. Discussions, scientific seminars, and other extracurricular activities
6	Total Credit Hours / Total Units	30 hours
7	Course Coordinator (mention all names if more than one)	Name: Asst. Lecturer Omar Ahmed Fathi Email: omar.ah.f@ntu.edu.iq
8	Course Objectives	1. Enable the student to acquire English terminology knowledge for all agricultural specializations. 2. Enable the student to recognize the origins of words and sentences, their components, and types. 3. Enable the student to learn the correct pronunciation of English vocabulary.
9	Teaching and Learning Strategies	1. Interactive lectures 2. Brainstorming 3. Dialogue and discussion 4. Assignments and reports 5. Group work to develop leadership skills
10	Course Structure	See detailed weekly plan below
11	Course Assessment	(Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams)
12	Learning and Teaching Resources	**Required textbooks (if any):** Lecturer-prepared notes **Main references (sources):** — **Recommended books and references (journals, reports, etc.):** English books in all specializations

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Weekly Course Plan

Week	Hours	Intended Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
1	2 theoretical	Student can identify agricultural scientific terms in English across all specializations.	Scientific terms in agriculture	Auditory methods: board writing, direct dialogue	Quizzes, assignments, discussions
2	2 theoretical	Student can identify scientific terms in plant	Scientific terms in plant production	Auditory methods:	Quizzes, assignments,

Week	Hours	Intended Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
		production.		board writing, direct dialogue	discussions
3	2 theoretical	Student can identify scientific terms in animal production.	Scientific terms in animal production	Auditory methods: board writing, direct dialogue	Quizzes, assignments, discussions
4	2 theoretical	Student can identify scientific terms in plant protection.	Scientific terms in plant protection	Auditory methods: board writing, direct dialogue	Quizzes, assignments, discussions
5	2 theoretical	Monthly exam	Monthly exam	Auditory methods: board writing, direct dialogue	Quizzes, assignments, discussions
6	2 theoretical	Student can identify scientific terms in food sciences.	Scientific terms in food sciences	Auditory methods: board writing, direct dialogue	Quizzes, assignments, discussions
7	2 theoretical	Monthly exam	Monthly exam	Auditory methods: board writing, direct dialogue	Quizzes, assignments, discussions
8	2 theoretical	Student can identify scientific terms in agricultural economic and social sciences.	Scientific terms in agricultural economic and social sciences	Auditory methods: board writing, direct dialogue	Quizzes, assignments, discussions
9	2 theoretical	Student can identify scientific terms in agricultural biotechnology.	Scientific terms in agricultural biotechnology	Auditory methods: board writing, direct dialogue	Quizzes, assignments, discussions
10	2 theoretical	Student can identify scientific terms in soil sciences.	Scientific terms in soil and water sciences	Auditory methods: board writing, direct dialogue	Quizzes, assignments, discussions
11	2 theoretical	Monthly exam	Monthly exam	Auditory methods: board writing, direct dialogue	Quizzes, assignments, discussions
12–13	2 theoretical	Student can identify scientific terms in agricultural engineering.	Scientific terms in agricultural engineering	Auditory methods: board writing,	Quizzes, assignments, discussions

Week	Hours	Intended Learning Outcomes	Unit / Topic	Teaching Method	Assessment Method
				direct dialogue	
14–15	2 theoretical	Review of all English lectures delivered during the academic year.	Review article	Auditory methods: board writing, direct dialogue	Quizzes, assignments, discussions

11. Course Assessment

(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 any):** Lecturer-prepared lectures
- **Main references (sources):** —
- **Recommended books and references (scientific journals, reports, etc.):** English books in all specializations

Course Description Form

1. Course Name:
Computer 1
2. Course Code:
NTU 101
3. Semester / Year:
2024 – 2025/1
4. Description Preparation Date:
11 / 6 / 2025
5. Available Attendance Forms:
Paper form including name, date of attendance and signature
6. Number of Credit Hours (Total) / Number of Units (Total)
45 / 3
7. Course administrator's name (mention all, if more than one name)
Name: Mustafa Natheer Mustafa Email: mustafa.n.m1989@ntu.edu.iq
8. Course Objectives

Course Objectives	• **Understand basic concepts in computer science such as data, software, hardware, and networks.** • **Ability to analyze problems and understand basic algorithms used in programming and software development.** • **Learn basic programming languages such as C, Python, or Java and understand the basics of writing and executing code.** • **Ability to use software development tools such as text editors and integrated development environments (IDEs).** • **Understand the concepts of information security and privacy in the context of technology use.** • **The ability to understand and analyze computer systems, networks, and communication concepts between devices.** • **Learn about artificial intelligence concepts and their basic applications.** • **Learn about the basics of operating systems and how to manage computer resources and processes.**

9. Teaching and Learning Strategies	
Strategy	1. Dialogue- and discussion-based learning. 2. Brainstorming. 3. Collaborative learning. 4. Practical training. 5. Self-directed learning.

10.Course Structure

Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**

1	2	The student learns the components of the computer, its material and software.	Introduction to Computers	Lecture, presentation, illustrations	Questions and answers
2	2	The student learns to apply and execute internal and external commands of the operating system.	MS-DOS operating system	Lecture, presentation, illustrations	Questions and answers
3	2	The student learns the MS-DOS operating system and distinguishes its commands from other systems.	MS-DOS Operating System Commands	Lecture, presentation, illustrations	Questions and answers
4	2	The student will be able to identify the Windows operating system, its components, requirements, and desktop features.	Windows Operating System	Lecture, presentation, illustrations	Questions and answers
5	2	The student must be proficient in symbols, handling the mouse, the taskbar, the Start menu, and how to shut down the system.	Windows Desktop Environment	Lecture, presentation, illustrations	Questions and answers
6	2	The student should know how to format	File and Disk Management	Lecture, presentation, illustrations	Questions and answers

		disks, copy files and folders, use cut and paste operations, deal with the Recycle Bin, and recover files.			
7	2	The student will learn to change the desktop background, control the screen saver, and add/remove programs from the Start menu.	System Interface Customization	Lecture, presentation, illustrations	Questions and answers
8	2	The student should be able to use the Control Panel programs.	System Settings	Lecture, presentation, illustrations	Questions and answers
9	2	The student learns to execute programs using Run.	Executing Programs using Run	Lecture, presentation, illustrations	Questions and answers
10	2	The student must be proficient in using the calculator, entertainment programs, and other additional programs.	Entertainment and Media Programs	Lecture, presentation, illustrations	Questions and answers
11	2	Paint, Office, and Help applications	Diverse System Applications	Lecture, presentation, illustrations	Questions and answers
12	2	The student will learn about computer viruses, infection methods, types, treatment methods, and anti-virus programs.	Security and virus protection concepts	Lecture, presentation, illustrations	Questions and answers

13	2	The student will understand how to work with desktop icons and the components of the My Computer icon, including disks, folders, and files.	Content Management	Lecture, presentation, illustrations	Questions and answers
14	2	Windows 7 and Microsoft allows students to learn multiple operating systems.	Windows 7 and Microsoft Corporation	Lecture, presentation, illustrations	Questions and answers
15	2	Summarize and evaluate knowledge and skills gained during the semester.	Final Review and Assessment	Lecture, presentation, illustrations	Questions and answers
11.Course Evaluation					
12.Learning and Teaching Resources					
Required textbooks (curricular books, if any)			The vocabulary prescribed by the Ministry of Higher Education and Scientific Research		
Main references (sources)			نظام التشغيل ويندوز 7, شركة مايكروسوفت الامريكية, موقع الشركة الرسمي Microsoft www.microsoft.com		
Recommended books and references (scientific journals, reports...)			Google scholar		
Electronic References, Websites			All sites that provide reliable sources and also artificial intelligence tools		

نموذج وصف المقرر الدراسي

1. المؤسسة التعليمية		
وزارة التعليم العالي والبحث العلمي/الجامعة التقنية الشمالية/ الكلية التقنية الزراعية		
2. القسم العلمي		
قسم تقنيات الإنتاج النباتي		
3. اسم المقرر		
اللغة العربية		
4. رمز المقرر		
NTU104		
5. أشكال الحضور المتاحة		
1. جدول الدروس الأسبوعي النظري. 2. الندوات التعليمية والورش والمناقشات والنشاطات اللاصفية الأخرى.		
6. الفصل / السنة		
مقررات		
7. عدد الساعات الدراسية (الكلي)		
30 ساعة (نظري)		
8. اسم مسؤول المقرر الدراسي		
م.م. امنة ماهر عزيز		
9. اهداف المقرر (الاهداف العامة للمقرر)		
1- إعداد طلاب لديهم القدرة على النطق الصحيح والكتابة من دون أخطاء قدر الإمكان. 2- ترغيب الطالب بقواعد الإملاء الصحيحة. 3- الاهتمام بعلامات الترقيم وكيفية استعمالها في الكتابة.		
10. مخرجات المقرر وطرائق التعليم والتعلم والتقييم		
المخرجات	طرق التعليم والتعلم	طرق التقييم
أ- المعرفة	المحاضرات النظرية، الحلقات النقاشية، المناظرات بين	الاختبارات الشفهية، الاختبارات التحريرية، التقارير

أ1 - أن يعرف الطالب قواعد الإملاء الضرورية. أ2 - أن يعرف الطالب علامات الترقيم وكيفية استعمالها. أ3 - أن يعرف الطالب بعضا من الأخطاء الشائعة في اللغة العربية وكيفية تصحيحها.	الطلاب، العصف الذهني.	الأسبوعية، الحضور اليومي، المشاركة والتفاعل في المحاضرات، الامتحانات الفصلية والنهائية.
ب – المهارات ب1 - **إعداد طلاب لديهم القدرة على النطق الصحيح في القراءة، والكتابة بالشكل الصحيح دون أخطاء.** **ب2 _ الاهتمام بعلامات الترقيم وكيفية استعمالها في الكتابة وتوظيفها في القراءة الصحيحة.** **ب3 _ جعل الطالب يهتم باللغة العربية الفصحى ويبتعد عن اللغة العامية الدارجة عند كتابة النصوص الرسمية والأدبية.** **ب4 _ جعل الطالب منظمًا في أفكاره التي يحاول إيصالها للمُتلقي بأسلوبٍ سلسٍ غير معقد.**	المحاضرات النظرية، حلقا ت نقاشية، العصف الذهني.	1 - استخدام الاختبارات القصيرة والامتحانات النهائية لتقييم فهم الطلاب لمفاهيم الأخطاء اللغوية. 2. الواجبات المنزلية . 3. التغذية الراجعة المستمرة : - تقديم تغذية راجعة مستمرة للطلاب حول أدائهم في الأنشطة المختلفة وتوجيههم لتحسين مهاراتهم.
ج- القيم ج1- **جعل الطالب يراعي الأسس الفنية للفنون التعبيرية.** ج2- **جعل الطالب يطور مهاراته ومعارفه اللازمة لأن يكون قارئا فعّالا.** ج3- **جعل الطالب يكتسب القدرة على التعبير الصحيح في التحدث والتخاطب والكتابة.**	التطبيق العملي لما تم دراسته في المحاضرات النظرية، مشاهدة نماذج لنصوص تعبيرية وإعادة صياغتها بالشكل الصحيح.	**تقييم دفاتر الملاحظات التي يحتفظ بها الطلاب لتسجيل مراحل تطور كتابة النصوص والملاحظات اليومية، مما يعكس تطبيقهم للأسس الفنية في اللغة العربية.**

11. بنية المقرر					
الأسبوع	الساعات	مخرجات التعلم المطلوبة	اسم الوحدة / أو الموضوع	طريقة التعليم	طريقة التقييم
1	2 ساعة	أن يتعلم الطالب القواعد الأساسية لكتابة التاء المربوطة والتاء المفتوحة وكيفية التفريق بينهما	قواعد كتابة التاء المفتوحة والتاء المربوطة	**المحاضرة والأمثلة التطبيقية**	المناقشة التفاعلية والأسئلة
2	2 ساعة	أن يعرف الطالب كيف يفرق الألف الممدودة والألف المقصورة في الكتابة	الألف الممدودة والألف المقصورة	**المحاضرة والتطبيق بالأمثلة**	حل التمارين
3	2 ساعة	أن يعرف الطالب كيف يفرق في النطق بين الحروف الشمسية والحروف القمرية	الحروف الشمسية والحروف القمرية	المحاضرة والنصوص التعليمية	استخراج الكلمات ذات الحروف الشمسية والكلمات ذات الحروف القمرية من النص والتفريق بينهما.
4	2 ساعة	أن يعرف الطالب كيف يفرق بين الضاد والظاء كتابة ونطقا	الضاد والظاء	المحاضرة والأمثلة التعليمية	اختبارات قصيرة
5	2 ساعة	أن يعرف الطالب القواعد الأساسية لكتابة همزة الوصل وهمزة القطع	همزة الوصل والقطع	المحاضرة والأمثلة التعليمية	الامتحان المفاجئ
6	2 ساعة	أن يعرف الطالب القواعد الأساسية لكتابة الهمزة المتوسطة والهمزة المتطرفة	الهمزة المتوسطة والهمزة المتطرفة	المحاضرة والأمثلة التطبيقية	امتحان إملاء كلمات تحتوي على

					الهمزة المتوسطة أو المتطرفة.
7	2 ساعة	أن يفرق الطالب بين علامات الترقيم المختلفة وأن يستطيع توضيفها في النصوص بشكل صحيح	علامات الترقيم	المحاضرة والنصوص التطبيقية	إعطاء الطالب نصًا يحتاج إلى وضع علامات الترقيم في مكانها الصحيح.
8	2 ساعة	أن يعرف الطالب ماهو الاسم وماهي علاماته التي تدل عليه، وماهو الفعل وأنواعه وعلاماته تدل عليه	الاسم والفعل والتفريق بينهما	المحاضرة والعصف الذهني	العصف الذهني
9	2 ساعة	أن يعرف الطالب التفريق هذه المفاعيل	المفاعيل: المفعول به المفعول فيه	المحاضرة والأسئلة والأجوبة	الامتحان المفاجئ
10	2 ساعة	أن يعرف الطالب التفريق هذه المفاعيل	المفاعيل: المفعول المطلق المفعول معه المفعول لأجله	المحاضرة والأمثلة التعليمية	تكليف الطلاب بعمل تقرير عن نوع من أنواع المفاعيل حسب اختيارهم

11	2 ساعة	أن يعرف الطالب الأعداد ومكوناتها، وأنواع الأعداد وتمييزها، والعلاقة بين العدد والمعدود	العدد	**المحاضرة والشرح والأمثلة التوضيحي**	اختبار يشمل توظيف الأعداد في جمل مفيدة
12	2 ساعة	أن يعرف الطالب الأعداد ومكوناتها، وأنواع الأعداد وتمييزها، والعلاقة بين الع والمعدود	إكمال موضوع العدد	**المحاضرة والشرح والأمثلة التوضيحي**	اختبار يشمل توظيف الأعداد في جمل مفيدة
13	2 ساعة	أن يعرف الطالب أشهر الأخطاء اللغوية الشائعة في الاستعمال	الأخطاء اللغوية الشائعة	الأمثلة التوضيحية والمناقشة	أن يقوم كل طالب بجمع خمس كلمات خاطئة مستعملة وشائعة في اللغة العربية ثم تصحيحها
14	2 ساعة	أن يعرف الطالب أشهر الأخطاء اللغوية الشائعة في الاستعمال	إكمال موضوع: الأخطاء اللغوية الشائعة	الأمثلة التوضيحية والمناقشة	امتحان الطلاب بنص يحتوي أخطاءً لغوية

					يقوموا بتصحيحها
15	2 ساعة		مراجعة شاملة لكل ما تم دراستة في الأسابيع الماضية		امتحان شامل

12. خطة تطوير المقرر الدراسي

1. استحداث مناهج دراسية تركز بشكل أساس على الجانب التركيبي للجملة العربية الفصيحة نطقا وكتابة.

13. البنية التحتية

القاعات الدراسية و المختبرات و الورش	**متوفرة**
1- الكتب المقررة المطلوبة	**متوفرة**
2- المراجع الرئيسية (المصادر)	الإملاء الواضح، عبدالمجيد النعيمي، دحام الكيال، مكتبة دار المتنبي، بغ ط6، 1987م.
أ) الكتب والمراجع التي يوصى بها (المجلات العلمية ،التقارير ،.....)	دروس في اللغة والنحو والإملاء لموظفي الدولة، إســماعيل حمود عط وآخرون، مطبعة وزارة التربية رقم (3) بغداد، ط2، 1984م.
ب) المراجع الالكترونية ،مواقع الانترنيت ،.....	من وحي الأدب العربي، هفال محمد امين، مطبعة السعدون، بغداد.

Course Description Form

1. Course Name:	
mathematics	
2. Course Code:	
TAMO101	
3. Semester / Year:	
2024 – 2025	
4. Description Preparation Date:	
7 / 6 / 2025	
5. Available Attendance Forms:	
Paper form including name, date of attendance and signature	
6. Number of Credit Hours (Total) / Number of Units (Total)	
60 / 1	
7. Course administrator's name (mention all, if more than one name)	
Name: Qahtan diab salman Email: Qahtan.Th.Salman@ntu.edu.iq	
8. Course Objectives	
Course Objectives	• The undergraduate student will be able to: • Understand the concept of a function and define it. • Distinguish between a relationship and a function. • Identify types of functions (e.g., linear, quadratic, exponential, etc.). • Represent functions graphically on a coordinate system. • Find the value of a function for a given number (the value of the function at a given x). • Determine the domain and range of a function. • Solve simple problems using function laws. • Explain changes in a function (e.g., increase, decrease, or stability). **General Objectives of Mathematics** 1. Develop the student's understanding of basic mathematical concepts. 2. Develop logical thinking and mathematical reasoning skills. 3. Enable the student to use basic arithmetic operations (addition, subtraction, multiplication, and division) accurately. 4. Develop the ability to solve mathematical problems in an organized manner. 5. Train the student to use mathematical symbols and expressions correctly. 6. Enhance graphic representation and data reading skills. 7. Empower the student to use mathematics in everyday life situations. 8. Develop skills in analysis, comparison, and classification of mathematical concepts. 9. Enhance accuracy and attention in mathematical work. 10. Develop self-confidence when dealing with mathematical problems and ideas. 11. Use educational and technical means to facilitate the learning of mathematical concepts.

	12. Link mathematics to other sciences and clarify its role in various areas of life.

9. Teaching and Learning Strategies

Strategy	1. Dialogue- and discussion-based learning. 2. Brainstorming. 3. Collaborative learning. 4. Practical training. 5. Self-directed learning.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	1	• The student understands the concept of a function as a relationship that links two or more variables in an organized manner. The student recognizes the basic components of a function, such as domain, range, and function rule. The student distinguishes between different types of functions (linear, quadratic, fractional, exponential, and logarithmic). The student learns how to represent functions graphically using coordinates. The student analyzes the properties of functions in terms of increasing, decreasing, symmetry, and terminal behavior. The student distinguishes between different functions based on their properties and graphical representation.	functions	Presentation, Discussions, quizzes, report preparation, and seminars.	Oral, written and daily practical tests and scientific reports

		The student applies the concept of functions to solve mathematical and real-life problems.			
2	1	The student will understand the concept of differentiation as a mathematical tool for measuring the instantaneous rate of change of a function at a given point. The student will recognize the properties of algebraic functions that can be differentiated. The student will distinguish between the different types of algebraic functions and their limits when applying differentiation. The student will apply basic differentiation rules, such as: • The derivative of a constant • The derivative of a power • The product rule • The quotient rule The student will solve mathematical problems that require the use of differentiation rules to find first derivatives. The student will use the derivative to interpret instantaneous changes in real-life and scientific contexts (such as velocity, growth, or decline).	Derivative of algebraic functions	Lecture, presentation, illustrations	Questions and answers + exercise solutions
3	1	The student will understand the concept	Integration of algebraic functions	Presentation, Discussions,	Oral, written and daily

		of integration as a mathematical tool for finding the original function or calculating areas under curves. The student will recognize the relationship between integration and differentiation as inverse operations. The student will distinguish between the types of algebraic functions that can be integrated (polynomial, rational, radical). The student will apply basic integration rules to various types of algebraic functions. The student will solve mathematical problems involving calculating indefinite and definite integrals. The student will use integration to solve applied problems in fields such as engineering, physics, and economics. The student will connect integration to understanding quantitative changes through spatial representation and mathematical modeling.		quizzes, report preparation, and seminars.	practical tests and scientific reports
4	1	The student will understand the concept of the logarithmic function as a non-algebraic function used to model phenomena with relative change.	Non-algebraic functions: logarithmic function - derivative of logarithmic function	Presentation, Discussions, quizzes, report preparation, and seminars.	Oral, written and daily practical tests and scientific reports

		The student will recognize the properties of the general and normal logarithmic function and its graphical representation. The student will distinguish between the different forms of the logarithmic function and determine its domain, range, and terminal behavior. The student will apply the rules of differentiation to calculate derivatives of logarithmic functions. The student will use the chain rule to derive complex expressions containing logarithmic functions. The student will solve mathematical problems involving logarithmic functions in applied contexts. The student will analyze logarithmic models related to scientific and economic phenomena such as population growth and radioactive decay.			
5	1	The student will understand the concept of integration of a logarithmic function and its importance in mathematical and scientific applications. The student will be introduced to the indefinite integral of the	Integration of a logarithmic function	Presentation, Discussions, quizzes, report preparation, and seminars.	Oral, written and daily practical tests and scientific reports

		function ln(x)\ln(x)ln(x). The student will apply appropriate integration techniques to solve integrals involving logarithmic functions, such as: The substitution method The integration by parts method The student will solve problems involving complex logarithmic expressions that require combining more than one integration technique. The student will link logarithmic integration skills to applications in fields such as physics, engineering, and economics. The student will interpret integration results in real-life and scientific contexts, such as exponential growth and logarithmic decline.			
6	1	The student will understand the concept of the exponential function as a non-algebraic function used to describe phenomena with accelerated growth or change. The student will recognize the natural exponential function exe^xex and the exponential functions with a general basis axa^xax, and their properties.	Exponential function: Derivative of the exponential function	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		The student will distinguish between the graphical representations and terminal behavior of different exponential functions. The student will apply the rules for differentiating simple and complex exponential functions. The student will use the chain rule to derive expressions containing complex exponential functions. The student will solve applied problems involving exponential changes in fields such as physics, biology, economics, and engineering. The student will interpret the results of differentiation in real-life and scientific contexts to understand accelerated changes and dynamic models.			
7	1	The student will understand the concept of integration of exponential functions and its importance in mathematical modeling and practical applications. The student will be introduced to the indefinite integral rule for the natural exponential function exe^xex and functions of the form axa^xax.	Integration of an exponential function	Presentation, Discussions, quizzes, report preparation, and seminars.	Oral, written and daily practical tests and scientific reports

		The student will apply the basic rules for integrating exponential functions in their simple and complex forms. The student will use appropriate integration techniques, such as substitution, to integrate expressions containing exponential functions. The student will solve definite and indefinite integrals involving exponential functions in mathematical and practical contexts. The student will interpret the results of integration in practical applications from fields such as population growth, compound interest, and radioactive decay. The student will relate the integration of exponential functions to models used in physics, biology, economics, and engineering.			
8	1	Assess student understanding	First semester exam	Written exam	
9	1	The student will understand the importance of integrating trigonometric functions in the mathematical modeling of periodic phenomena in the natural and engineering sciences. The student will be familiar with the basic rules for integrating	Integration of trigonometric functions	Presentation, Discussions, quizzes, report preparation, and seminars.	Oral, written and daily practical tests and scientific reports

		trigonometric functions, such as: • sin(x)\sin(x)sin(x), cos(x)\cos(x)cos(x), tan(x)\tan(x)tan(x), and others. The student will apply appropriate integration methods, such as: • Direct integration • Substitution method The student will use trigonometric transformations (such as trigonometric identities) to simplify integral expressions involving powers or complex angles. The student will solve applied problems involving trigonometric functions related to waves, vibrations, and periodic motion. The student will connect the mathematical skills in trigonometric integration to their practical applications in fields such as engineering, physics, and acoustics. The student will interpret integration results in the context of periodic phenomena, such as alternating electric currents or simple harmonic motion.			
10	1	The student will understand the concept of implicit functions and the reasons for	Integration of implicit functions	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		using them when relationships between variables are not explicit. The student will learn the steps of implicit differentiation and extract implicit derivatives from implicit mathematical relationships. The student will apply implicit differentiation techniques to introduce integration to relationships that cannot be solved explicitly. The student will use substitution methods to simplify and integrate expressions containing implicit functions. The student will solve integration problems involving implicit relationships between variables in engineering or physical contexts. The student will connect implicit integration to realistic modeling that requires dealing with indirectly related variables. The student will interpret the results of implicit integration in applications such as the motion of objects along nonlinear paths or complex physical systems.			
11	1	The student will understand the concept of implicit	Differentiation of implicit functions	Presentation, Discussions, quizzes,	Oral, written and daily practical

		differentiation as a tool for deriving derivatives when the relationship between variables is not expressed in an explicit form. The student will be familiar with the basic steps for deriving implicit equations using the chain rule. The student will apply implicit differentiation to extract dydx\frac{dy}{dx}dxdy in equations containing implicitly related xxx and yyy. The student will use the chain rule accurately when dealing with derivatives in implicit equations, especially when complex expressions are involved. The student will solve mathematical problems involving implicit relationships between variables in theoretical and applied contexts. The student will relate implicit differentiation to its practical applications in engineering, physics, and the natural sciences. The student will interpret the results of implicit differentiation in contexts that require dealing with nonlinear equations or complex related relationships.		report preparation, and seminars.	tests and scientific reports

12	1	The student will apply the method of integration by parts to problems involving the product of functions (such as polynomials, logarithmics, trigonometrics, and exponentials). The student will solve complex integrals requiring more than one step using iterated integration by parts. The student will interpret integration results in applied contexts in mathematics, physics, and engineering. The student will develop analytical and strategic skills in selecting parts of an integration to simplify complex expressions. Methods of Integration: Integration by Parts	Integration methods: integration by parts	Presentation, Discussions, quizzes, report preparation, and seminars.	Oral, written and daily practical tests and scientific reports
13	1	Assess student understanding	Second semester exam	Written exam	
14	1	The student will understand the concept of differential equations and their importance in describing changing phenomena in the natural sciences and engineering. The student will be familiar with the classification of differential equations based on their order and linearity. The student will apply basic methods for	Solving differential equations	Presentation, Discussions, quizzes, report preparation, and seminars.	Oral, written and daily practical tests and scientific reports

		solving differential equations according to their order and linearity. The student will analyze the behavior of dynamic systems using differential equations. The student will explain the role of differential equations in analyzing mathematical models and predicting outcomes in fields such as physics, economics, and biology. The student will develop skills in using differential equations to solve real-world problems and provide practical solutions.			
15	1	The student will understand the importance of differential equations as a mathematical tool for describing changing phenomena in the fields of physics, engineering, and economics. The student will be introduced to the classification of differential equations according to the order of the derivative and the type of linearity. The student will apply the main solution methods for first-order differential equations, such as separable equations and linear equations. The student will apply the method for solving	Solving differential equations	Presentation, Discussions, quizzes, report preparation, and seminars.	Oral, written and daily practical tests and scientific reports

		second-order differential equations with constant coefficients using the characteristic equation. The student will explain how to use general and special solutions to describe the behavior of dynamical systems. The student will develop analytical skills that enable him to understand advanced mathematical models and apply them to various scientific and real-life situations.			

11. Course Evaluation	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	The vocabulary prescribed by the Ministry of Higher Education and Scientific Research
Main references (sources)	**Written by Dr. Salman bin Abdul Rahman Al-Salman** **Dr.. Ibrahim Deeb Sarmini** **INTRODUCTION TO MATHEMATICAL ECONOMICS Third Edition** **EDWARD T. DOWLING, Ph.D.**
Recommended books and references (scientific journals, reports...)	Google scholar, researcher gate
Electronic References, Websites	All sites that provide reliable sources and also artificial intelligence tools

Course Description Form

1. Course Name:	
"Land surveying and technical drawing"	
2. Course Code:	
PLP 210	
3. Semester / Year:	
One / Two	
4. Description Preparation Date:	
17 \ 7 \ 2025	
5. Available Attendance Forms:	
Paper form including name, date of attendance and signature	
6. Number of Credit Hours (Total) / Number of Units (Total)	
90 \ 2	
7. Course administrator's name (mention all, if more than one name)	
Name: Mahmood Shaker Mahmood Email: msh41551@ntu.edu.iq	
8. Course Objectives	
Course Objectives	1. To introduce the student to the most important basic information about modern technologies used in the field of plane surveying of the Earth's surface, how to use them, and how to select the best ones. 2. To teach and train students on the use of specialised machinery in the field of surveying the Earth's surface, which is used in fields, abattoirs, livestock pens and many other areas. 3. To teach and train the student to select the type of machinery or tools appropriate for working on each project.
9. Teaching and Learning Strategies	

Strategy	1. The learner will acquire skills in using new and modern technologies in surveying and computer-aided drawing. 2. The student will learn to manage a work site using the best equipment and tools to obtain the best accurate results in the least amount of time. 3. That the student will, in the future, develop their ideas with equipment and machinery that is appropriate to the nature of the areas in which the survey is conducted in the field.

1. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	The student will be able to know the concepts and basics of surveying	General concepts of surveying	Lecture, presentation, illustrations	Questions and answers + exercise solutions
2	4	The student will learn how to use tape measure, chain, marker, peg, thread and poles, as well as the use and maintenance of tools.	Devices and instruments used in measurement	Lecture, presentation, illustrations	Questions and answers + exercise solutions
3	4	The student will learn the standard units used in the science of surveying and the types of measurement systems and their transformations	Types of units of measure and their transformations	Lecture, presentation, illustrations	Questions and answers + exercise solutions

4	4	The student will learn to use the scale of drawing and its types and how to extract real dimensions from maps using the scale	Scale	Lecture, presentation, illustrations	Questions and answers + exercise solutions
5	4	- Student will learn -correction for length bar difference -correction for height difference between two points - correction of error by orientation	Necessary corrections in measuring distances	Lecture, presentation, illustrations	Questions and answers + exercise solutions
6	4	The student will learn to extract all dimensions, areas and field works	Scanning with chain and tape	Lecture, presentation, illustrations	Questions and answers + exercise solutions
7	4	The student will learn how to interpret and read maps	Topographic maps and their uses	Lecture, presentation, illustrations	Questions and answers + exercise solutions
8	4	The student will have knowledge of the types and parts of the compass and methods of observation with the compass, as well as correcting	Scanning with a compass	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		compass observations and drawing a polygon			
9	4	The student will learn the component parts of the theodolite device, its uses and how to use it in practice	Theodolite device	Lecture, presentation, illustrations	Questions and answers + exercise solutions
10	4	**First exam**			
11	4	The student will learn what AutoCAD is and its uses	AutoCAD Program	Lecture, presentation, illustrations	Questions and answers + exercise solutions
12	4	The student will learn to use drawing commands (lines, circles, rectangles, arcs, polygons, segmentation, etc.). He also used edit commands to copy, move, rotate, expand, and many other uses	Using the user interface of the program and how to adjust all settings	Lecture, presentation, illustrations	Questions and answers + exercise solutions
13	4	The student will learn the methods of drawing squares and rectangles and methods of drawing triangles of all kinds with rhombuses	Identify the different ways to draw geometric shapes	Lecture, presentation, illustrations	Questions and answers + exercise solutions

14	4	The student will have the ability to draw up sketches for farms, fields and poultry halls	How to use the LINE command to draw different geometric shapes, such as English letters such as H-E-F -L	Lecture, presentation, illustrations	Questions and answers + exercise solutions
15	4	Practical applications			

2. Course Evaluation
Tests + Exercises + Discussions + Questions

3. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	**City Survey Book 102/General Institution for Technical Education and Vocational Training/Kingdom of Saudi Arabia** **AutoCAD 2014**
Main references (sources)	
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Course Description Form

1. Course Name:
general chemistry
2. Course Code:
TAMO104
3. Semester / Year:
2024-2025
4. Description Preparation Date:
5/6/2025
5. Available Attendance Forms:
Paper form including name, date of attendance and signature
6. Number of Credit Hours (Total) / Number of Units (Total)
4/2
7. Course administrator's name (mention all, if more than one name)
Name: dr-hala awf Abdulrahman Email: dr_hala.awf.chilmeran@ntu.edu.iq
8. Course Objectives

Course Objectives	1. At the end of the course, the student should have the following: 1. Understand the basic concepts of chemistry and the preparation of solutions 2. Explain the thermal evolution associated with chemical reactions

	3. Distinguish between the elements of chemical reactions and how to represent them with equations 4. Analyze and interpret laboratory results using scientific methods 5. Understand the molar and normal ratios and their proportions 6. Identify commercial bonds and their types 7Building a scientific foundation that qualifies the student to study organic and analytical chemistry.

9. Teaching and Learning Strategies

Strategy	There are several effective strategies for teaching the Principles of Genetics course, which aim to foster a deep understanding of genetic concepts and develop critical thinking skills: 1. Dialogue- and discussion-based learning. 2. Brainstorming. 3. Collaborative learning. 4. Simulation-based learning. 5. Practical training. 6. Self-directed learning.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method

1	4	1- The student should know the basic concepts in chemistry and methods of preparing solutions. 2- The student should understand the chemical properties of elements	Chemistry Enhancement and Solution Preparation	Lecture, presentation, illustrations	Questions and answers + exercise solutions
2	4	1- The student will understand the properties of chemical elements and their classification in the periodic table. 2- The student will know the properties of transition elements and their reactions.	Periodic table of chemical elements	Lecture, presentation, illustrations	Questions and answers + exercise solutions
3	4	1- The student should understand the properties and composition of the atom. 2- The student should know Dalton's atomic model.	Atomic structure	Lecture, presentation, illustrations	Questions and answers + exercise solutions
4	4	1- The student should know the electronic theory of valence.	Electronic theory of valence	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		2- The student should understand the advantages and disadvantages of the electronic theory of valence.			
5	4	1- The student should know the types of chemical bonds. 2- The student should understand the characteristics of ionic and covalent compounds.	Types of chemical bonds	Lecture, presentation, illustrations	Questions and answers + exercise solutions
6	4	1- The student should know the Arrhenius and Brønsted concepts of acids and bases. 2- The student should understand the Lewis concepts of acids and bases.	Acids, bases and salts	Lecture, presentation, illustrations	Questions and answers + exercise solutions
7	4	1- The student will be able to understand chemical balance. 2- The student will understand mathematical examples of oxidation-reduction reactions.	Oxidation-reduction reactions	Lecture, presentation, illustrations	Questions and answers + exercise solutions

8	4	1- The student will understand the general properties of halogens. 2- The student will learn how to prepare halogens.	Halogens	Lecture, presentation, illustrations	Questions and answers + exercise solutions
9	4	1- The student will understand electrochemical and electrolytic cells. 2- The student will understand the working principle of electrochemical and electrolytic cells.	Electrochemistry	Lecture, presentation, illustrations	Questions and answers + exercise solutions
10	4	1- The student will learn about oxidation potential and electron affinity. 2- The student will understand ionization energy.	Metallic and non-metallic elements	Lecture, presentation, illustrations	Questions and answers + exercise solutions
11	4	1- The student will learn about the general properties of the elements in Group 4. 2- The student will learn about examples of the elements in Group 4	General properties of elements in Group 4	Lecture, presentation, illustrations	Questions and answers + exercise solutions
12	4	1- The student will learn about the general properties	General properties of the elements in Group 5	Lecture, presentation, illustrations	Questions and answers

		of the elements in Group 5. 2- The student will learn about examples of the elements in Group 5.			+ exercise solutions
13		1- The student will gain an understanding of the properties of ideal gases. 2- The student will understand the laws and mathematical examples of ideal and real gases.	Ideal and real gases	Lecture, presentation, illustrations	Questions and answers + exercise solutions
14	4	1- The student will learn about the standard hydrogen potential. 2- The student will learn about the standard calomel electrode potential.	Standard Phosphorus Potential	Lecture, presentation, illustrations	Questions and answers + exercise solutions
15	4	1- The student will learn about the concept of nuclear chemistry and its application areas. 2- The student will learn about the types of nuclear	Nuclear Chemistry	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		radiation and their uses.			
11. Course Evaluation: Tests + Exercises + Discussions + Questions					
12. Learning and Teaching Resources					
Required textbooks (curricular books, if any)			The vocabulary prescribed by the Ministry of Higher Education and Scientific Research		
Main references (sources)			Principles of General Chemistry, Dr. Mohi El-Din Al-Bakoush 2024		
Recommended books and references (scientific journals, reports...)			Google scholar, researcher gate		
Electronic References, Websites			All sites that provide reliable sources and also artificial intelligence tools		

Course Description Form

1. Course Name:	
Agricultural statistics	
2. Course Code:	
TAMO 151	
3. Semester / Year:	
First Level / 2024-2025	
4. Description Preparation Date:	
8 \ 6 \ 2025	
5. Available Attendance Forms:	
Paper form including name, date of attendance and signature	
6. Number of Credit Hours (Total) / Number of Units (Total)	
30 \ 2	
7. Course administrator's name (mention all, if more than one name)	
Name: bashar Mohsin mohammed Email: bashar_mohsin.m@ntu.edu.iq	
8. Course Objectives	
Course Objectives	By the end of the course, the student is expected to be able to: 1. Study the concept of economics, agricultural economics, branches of agricultural economics, and the relationship of agricultural economics to other sciences. 2. Focus on economic and agricultural problems in terms of their causes and solutions.

	3. Study the economics of agricultural production, production functions, and their economic derivatives. 4. Study production costs, cost functions, and their economic derivatives. 5. Study markets, revenues, and profits. 6. Study agricultural marketing, pricing policy, and farm management.

9. Teaching and Learning Strategies

Strategy	1. Dialogue- and discussion-based learning. 2. Brainstorming. 3. Collaborative learning. 4. Practical training. 5. Self-directed learning.

6. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Analyzing the relationship between agricultural resources and the economy. Studying pricing and equilibrium mechanisms in agricultural markets. Developing economic strategies to support sustainable agricultural production.	Principles of agricultural economics	Lecture, presentation, illustrations	Questions and answers + exercise solutions
2	2	Analyzing their causes and impact	Economic problems	Lecture, presentation,	Questions and answers +

		on societies Evaluating how to allocate limited resources to meet growing needs Studying possible solutions to address economic problems		illustrations	exercise solutions
3	2	Understanding the impact of prices, income, and climate change on crop consumption Studying how demand responds to changes in prices and economic factors Developing effective marketing plans to ensure stable crop demand	Demand for agricultural crops	Lecture, presentation, illustrations	Questions and answers + exercise solutions
4	2	Analyzing its role in supporting agricultural production and sustainability Studying loans, subsidies, and investments in the agricultural sector Understanding the impact of government policies	Agricultural financing	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		on agricultural project financing			
5	2	Understanding how to achieve optimal use of agricultural resources Studying the impact of costs on agricultural profitability Studying the factors affecting farmers' financial returns	Agricultural production economics	Lecture, presentation, illustrations	Questions and answers + exercise solutions
6	2	Analyze factors affecting agricultural production, such as technology and climatic conditions. Understand basic processes such as planting, irrigation, and harvesting to ensure production efficiency. Implement sustainable agricultural practices to preserve the environment and ensure food security.	Agricultural production functions.	Lecture, presentation, illustrations	Questions and answers + exercise solutions
7	2	Analyzing how trade policies affect	Analysis of agricultural trade	Lecture, presentation,	Questions and answers +

		agricultural production and distribution Studying the impact of international agreements on local and global agricultural markets Understanding the role of subsidies and pricing policies in enhancing agricultural production	policies	illustrations	exercise solutions
8	2	Analyze fixed and variable costs and their impact on profitability. Study the impact of land, labor, capital, and management on production costs. Understand how to calculate total costs and profit margins to ensure the sustainability of agricultural projects.	Agricultural Production Costs	Lecture, presentation, illustrations	Questions and answers + exercise solutions
9	2	Analyzing the impacts of climate change on the environment, economy, and communities	The impact of climate change	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		Implementing policies to conserve natural resources and reduce negative impacts Understanding how to raise awareness and take effective action to combat climate change			
10	2	Analyzing the difference between gross revenue and net profit Studying different ways to generate income for projects Using financial indicators to evaluate project success	Revenue and profit for projects	Lecture, presentation, illustrations	Questions and answers + exercise solutions
11	2	Analyzing agricultural processes and their impact on the economy and sustainability Studying agricultural innovations and their impact on improving productivity Developing strategies for	Agricultural Production	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		efficient resource use and reducing waste.			
12	2	Analyze how pricing is set to achieve market objectives and profitability. Study different methods such as cost-based pricing, value-based pricing, and competition-based pricing. Study how pricing policies are used to achieve a competitive advantage in the market	Pricing Policy	Lecture, presentation, illustrations	Questions and answers + exercise solutions
13	2	Analyze the relationship between quantity supplied and quantity demanded and its impact on prices. Study the impact of income, prices, competition, and economic changes on supply and demand. Understand how equilibrium price is determined in the	Supply and Demand	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		market based on the interaction of supply and demand.			
14	2	Analyze the role of management in improving agricultural productivity and sustainability. Study how to organize land, labor, and capital to achieve optimal results. Develop operational plans to ensure efficient agricultural operations.	Farm Management	Lecture, presentation, illustrations	Questions and answers + exercise solutions
15	2	Analyze the role of evaluation in improving performance and making strategic decisions. Examine how to establish clear criteria to measure project success. Understand how to collect and analyze data to evaluate project impact.	Project Evaluation	Lecture, presentation, illustrations	Questions and answers + exercise solutions
7. Course Evaluation					

Tests + Exercises + Discussions + Questions	
8. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	The vocabulary prescribed by the Ministry of Higher Education and Scientific Research
Main references (sources)	Al-Dahri, Abdul-Wahab Matar. 1987 Agricultural Economics. Ministry of Higher Education and Scientific Research. University of Baghdad. Second Edition. Baghdad Al-Najfi, Salem Tawfiq. 1992 Agricultural Economics. Dar Al-Hikma for Printing and Publishing. Mosul
Recommended books and references (scientific journals, reports...)	Google scholar, researcher gate
Electronic References, Websites	All sites that provide reliable sources and also artificial intelligence tools

Course Description Form

1. Course Name:	
General Botany	
2. Course Code	
PLP 101	
3. Semester / Year :	
First/2024-2025	
4. Description Preparation Date:	
2025/5/1	
5. Available Attendance Forms:	
Daily attendance record	
6. Number of Credit Hours (Total) / Number of Units (Total):	
50/3	
7. Course administrator's name (mention all, if more than one name)	
Name: Alaa Khaled Ibrahim Abdullah **Email: alaa.khaleed088@ntu.edu.iq**	
8. Course Objectives	
Course Objectives	**By the end of the course, the student is expected to be able to:** **Introducing students to the basics of botany, including the structural and functional composition of plant parts.** **Understanding plant classification and its different types, such as flowering and non-flowering plants.** **Acquiring skills to identify local plants and understand their environments and adaptations.** **Explaining the importance of plants in ecological balance and their role in producing oxygen and food.**

	Developing scientific research skills through laboratory experiments related to growth, reproduction, and photosynthesis. **Enhancing students' awareness of plant diversity and the importance of preserving it in the face of environmental changes.**

9. Teaching and Learning Strategies

Strategy	• **Interactive theoretical lectures** • **Practical laboratory instruction** • **Problem-based learning** • **Student presentations and group discussions** • **E-learning/blended learning** • **Educational visits/field observations**

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	1 theoretical + 3 practical	1-The student will understand the classification of plant species, to determine the evolutionary relationships between them and document biological diversity	plant kingdom-General -1 Classification of the Plant Kingdom 2--General Characteristics of Plants	Interactive theoretical lecture - Discussion - Practical lab activity - Educational video	

		2- The student will define plants as multicellular autotrophic organisms.			
2	**1 theoretical + 3 practical**	**1-The student will be able to define cell science and its components.** **2-The student will be able to distinguish between plant cells and animal cells in terms of structure and function.** **3-The student will explain the importance of chloroplasts in the building process.**	**plant cellCellComponents**	**Theoretical lecture.** **- Practical lab activity.** **- Group teaching.** **- Short interactive video.**	**Quizzes** **- Classroom Participation** **- Homework**
3	**1 theoretical + 3 practical**	**1- The student classifies fungi according to their characteristics using tables or diagrams.** **2- Compare fungal species in terms of shape,**	**The Fungi,** **Its types**	**Theoretical lecture with illustrations** **- Practical lab activity** **- Short video presentation on the mechanism of stomata**	**-Quiz** **-Class participation** **-Homework**

		reproduction method, and the environment in which they live. 3- The student analyzes fungal images or samples.		- Field visit	
4	1 theoretical + 3 practical	1- The student should define the root system and its importance in plants. 2- Distinguish between primary roots (taper) and secondary roots (lateral and adventitious).	root system 1-Root and branching modifications 2-Secondary root modifications	Theoretical lecture. - Practical lab activity. - Video presentation. - Class discussion.	Quizzes - Classroom Participation - Homework
5	1 theoretical + 3 practical	1. The student will explain the functions of the stem in transport, support, storage, and reproduction. 2. The student will demonstrate the importance of branching in	Vegetative group Stem structure 1--Stem str ucture 2--Stem branches 3--Stem types	- Theoretical lecture supported by illustrations - Practical activity - Class discussion - Educational video presentation	Quizzes - Classroom Participation - Homework

		increasing leaf area and improving photosynthesis.			
6	**1 theoretical + 3 practical**	**1-The student should explain the difference between flower and vegetative buds in terms of structure and function.** **2- The student should explain the importance of buds in reproduction, branching, and growth.**	**Buds** **Types of buds**	**Theoretical lecture** **- Practical activity** **- Class discussion** **- Educational video presentation.**	**Quizzes** **- Classroom Participation** **- Homework**
7	**1 theoretical + 3 practical**	**1- The student distinguishes between the types of leaves: simple and compound, and their shapes (ovate, lanceolate, arrow-shaped, ribbon-shaped, etc.).** **2- The student evaluates the importance of**	**Leaf** **Leaf Parts** **Leaf Arrangement on the Stem** **Leaf Types** **Send feedback** **Side panels** **History** **Saved** **See dictionary**	**Theoretical lecture** **- Practical activity** **- Class discussion**	**Quizzes** **- Classroom Participation** **- Homework**

		leaves in respiration, transpiration, storage, and defense.			
8	**1 theoretical + 3 practical**	**1-The student should explain the function of each part of the flower.** **2- Distinguish between flower types in terms of sex (unisexual and bisexual).**	**The flower.**	**Interactive lecture.** **- Practical microscope activity.** **- Class discussion video.**	**Quizzes** **- Classroom Participation** **- Homework**
9	**1 theoretical + 3 practical**	**1- The student distinguishes between simple, aggregate, and compound fruits in terms of origin and composition.** **2- The student explains the difference between fleshy and dry fruits in terms of water content and function.**	**Fruits** **Types of fruits**	**nteractive lecture.** **- Practical microscope activity.** **- Class discussion video.**	**Quizzes** **- Classroom Participation** **- Homework**
10	**1 theoretical**	**1- The student will define the**	**-**	**Theoretical lecture.**	**Quizzes**

	+ 3 practical	**seed and explain its function in forming a new plant.** **2- The student will list the parts of a seed: the pericarp, the embryo, and the cotyledons.**	**Seeds and their germination.** Seed structure Seed vitality	**- Practical activity.** **- Video clip**	**- Classroom Participation** **- Homework**
11	**1 theoretical + 3 practical**	**1- The student will explain the function of vascular tissues (xylem and phloem) in transporting water and nutrients.** **2- The student will explain the importance of vascular plants in the environment**	**Vascular plants** **xylem tissue**	**Theoretical lecture.** **- Practical activity**	**Quizzes** **- Classroom Participation** **- Homework**
12	**1 theoretical + 3 practical**	**1- The student should list the components of phloem tissue: sieve tubes, companion cells,**	**Vascular plants** **phloem tissue**	**Theoretical lecture.** **- Practical activity**	**Quizzes** **- Classroom Participation** **- Homework**

		parenchyma cells, and fibers. **2- The student should explain the difference between primary and secondary phloem in terms of origin and structure.**			
13	**1 theoretical + 3 practical**	**1-To draw a flower and accurately identify its parts.** **2- To analyze plant samples and identify their species.**	**Flowering plants:** **how to use them** **Examples**	**Theoretical lecture.** **- Practical activity**	**Quizzes** **- Classroom Participation** **- Homework**
14	**1 theoretical + 3 practical**	**1-The student should explain the role of green leaves in absorbing light through the pigment chlorophyll.** **2- The student should list the steps of photosynthesis: light absorption, water**	**Energy transfer in green leaves and stomata..** **Steps of photosynthesis and types of stomata**	**Theoretical lecture.** **- Practical activity**	**Quizzes** **- Classroom Participation** **- Homework**

		dissociation, production of ATP and NADPH, and conversion of CO_2 to glucose.			
15	**1 theoretical + 3 practical**	**1- The student acquires new information and concepts.** **2- The student interprets and analyzes phenomena or processes related to the topic.**	**Field observations:** **Differentiating between leaf an** **d root shapes and plant species**	**Theoretical lecture.** **- Practical activity**	**Quizzes** **- Classroom Participation** **- Homework**

11. Course Evaluation:

--1ntinuous Assessment

2- Written Exams

3- Projects and Reports

4- Self-Assessment and Feedbac

12. Learning and Teaching Resources :

Required textbooks (curricular books, if any)	**General Botany2020**
Main references (sources)	**General Botany / Ain Shams University / Faculty of Agriculture 2018**

Recommended books and references (scientific journals, reports...)	**General Botany, 2014, Dr. Abdel Aziz Al-Sabbagh, Dr. Imad Al-Qadi**
Electronic References, Websites	**https://www.everand.com/book/282617930/General-Botany**

Course Description Form

1. Course Name:	
Principles of Soil Sciences	
2. Course Code:	
PLP 102	
3. Semester / Year:	
Level Two / 2024-2025	
4. Description Preparation Date:	
9/6/2025	
5. Available Attendance Forms:	
Paper form including name, date of attendance and signature	
6. Number of Credit Hours (Total) / Number of Units (Total)	
75 / 3	
7. Course administrator's name (mention all, if more than one name)	
Name: samara saad younus Email: samarah90saad@ntu.edu.iq	
8. Course Objectives	
Course Objectives	By the end of the course, the student is expected to be able to: 1. Identify the factors affecting soil formation and development. 2. Identify the physical, chemical, and biological properties of soil, such as texture, structure, porosity, moisture, and pH. 3. Analyze the relationship between soil and plants. 4. Understand how soil properties affect crop growth and agricultural production. 5. Know the role of soil in the agricultural environment. 6. Understand nutrient cycling, aeration, and

	soil water retention. 7. Acquire soil classification skills. 8. Identify soil problems and their treatment methods, such as salinization, degradation, poor drainage, and compaction. 9. Enable the student to conduct basic soil laboratory tests, such as determining texture, electrical conductivity, organic content, etc. 10. Link theoretical knowledge to practical application. 11. Through case studies, field visits, and laboratory experiments..

9. Teaching and Learning Strategies

Strategy	1. Dialogue- and discussion-based learning. 2. Brainstorming. 3. Collaborative learning. 4. Practical training. 5. Self-directed learning.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	5	Understand what soil is, the purpose of its study, soil science, and the basic components of soil.		Lecture, presentation, illustrations	Questions and answers + exercise solutions
2	5	Understand weathering, its types, factors, and parent material composition.	Weathering	Lecture, presentation, illustrations	Questions and answers + exercise solutions
3	5	Learn and understand the factors that form soil.	Soil formation factors	Lecture, presentation, illustrations	Questions and answers + exercise solutions

4	5	Understand soil morphology, soil composition, soil color, and soil horizons.	soil morphology	Lecture, presentation, illustrations	Questions and answers + exercise solutions
5	5	Understand what diagnostic soil horizons are, their types, characteristics, and colors.	Soil horizons	Lecture, presentation, illustrations	Questions and answers + exercise solutions
6	5	Understand and analyze the physical properties of soil: soil texture, soil composition	Physical properties of soil	Lecture, presentation, illustrations	Questions and answers + exercise solutions
7	5	Understand and analyze soil bulk density, soil true density, soil porosity, and soil texture.	Physical properties of soil	Lecture, presentation, illustrations	Questions and answers + exercise solutions
8	5	Understand what the liquid phase of soil is, soil water laws, and soil water classification.	Soil phases	Lecture, presentation, illustrations	Questions and answers + exercise solutions
9	5	Understand what soil colloids and clay minerals are.	soil colloids	Lecture, presentation, illustrations	Questions and answers + exercise solutions
10	5	Understand and analyze the chemical properties of soil,	Chemical properties of soil	Lecture, presentation, illustrations	Questions and answers + exercise

		soil salinity, soil reactivity, and cation exchange capacity			solutions
11	5	Understand what is meant by soil organic matter, its sources, and components.	soil organic matter	Lecture, presentation, illustrations	Questions and answers + exercise solutions
12	5	Understand and analyze soil fertility, nutrients, and soil composition	Soil fertility	Lecture, presentation, illustrations	Questions and answers + exercise solutions
13	5	Understanding water movement in soil, types of water in soil, and the relationship of water to plant roots	The relationship between soil, water, and plants	Lecture, presentation, illustrations	Questions and answers + exercise solutions
14	5	Understanding and interpreting Atterberg's limits (liquid, plastic, and shrinkage) Compressibility and collapse Soil classification systems	Soil classification	Lecture, presentation, illustrations	Questions and answers + exercise solutions
15	5	Understanding alluvial soils Gypsum soil Saline soil Sandy soil	Soils in Iraq	Lecture, presentation, illustrations	Questions and answers + exercise solutions

11. Course Evaluation	
Tests + Exercises + Discussions + Questions	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	The vocabulary prescribed by the Ministry of Higher Education and Scientific Research
Main references (sources)	مبادئ تربة .سالم سلطان / جامعة الموصل "Soil Science: Methods & Applications" – David L. Rowell
Recommended books and references (scientific journals, reports...)	Google scholar, researcher gate
Electronic References, Websites	All sites that provide reliable sources and also artificial intelligence tools

Course Description Form

1. Course Name:
Principles of Horticulture
2. Course Code:
PLP 103
3. Semester / Year:
First / one
4. Description Preparation Date:
2025/6 /10
5. Available Attendance Forms:
Paper form including name, date of attendance and signature
6. Number of Credit Hours (Total) / Number of Units (Total)
75 / 3
7. Course administrator's name (mention all, if more than one name)
Name: waad saeed faizy Email: waadwaad1970@ntu.edu.iq
8. Course Objectives

Course Objectives	
9. Teaching and Learning Strategies	
Strategy	1. Dialogue- and discussion-based learning. 2. Brainstorming. 3. Collaborative learning. 4. Practical training. 5. Self-directed learning.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	5	1- The student will understand the definition of horticulture. 2- The student will differentiate between the main divisions of horticulture. 3- The student will learn about pomology and classify fruit trees.	Principles of Horticulture	Presentation, Discussions, quizzes, report preparation, and seminars.	Oral, written and daily practical tests and scientific reports
2	5	1- The student will identify the main parts of a tree in detail. 2- The student will know the function of each part of the tree. 3- The student will draw a tree with detailed annotations.	Parts of Fruit Trees	Presentation, Discussions, quizzes, report preparation, and seminars.	Oral, written and daily practical tests and scientific reports
3	5	1- The student will identify deciduous trees.	Types of Deciduous Fruit	Presentation, Discussions, quizzes, report	Oral, written and daily practical tests

		2- The student will be able to classify deciduous trees. 3- List the fruits called pomes. 4- Identify stone fruits. 5- Give examples of evergreen fruit trees.		preparation, and seminars.	and scientific reports
4	5	1- The student will be able to classify vegetable plants. 2- The student will explain the agricultural systems used to grow vegetables. 3- The student will apply the steps for growing vegetables.	Vegetable Science	Presentation, Discussions, quizzes, report preparation, and seminars.	Oral, written and daily practical tests and scientific reports
5	5	1- The student will understand what ornamental plants are and what their benefits are. 2- The student will divide ornamental plants into categories and types. 3- The student will identify flowering	Ornamental Plants	Presentation, Discussions, quizzes, report preparation, and seminars.	Oral, written and daily practical tests and scientific reports

		herbaceous ornamental plants.			
6	5	1- Explain green spaces and their most important benefits. 2- The student will identify the difference between shade-loving plants and sun-loving plants. 3- The student will identify aquatic plants and desert plants.	Types of Ornamental Plants	Presentation, Discussions, quizzes, report preparation, and seminars.	Oral, written and daily practical tests and scientific reports
7	5	1- The student will be able to distinguish between different types of ornamental plants. 2- The student will be able to construct green hedges. 3- The student will be able to identify the purpose of using ornamental trees and shrubs.	Complete Types of Ornamental Plants	Presentation, Discussions, quizzes, report preparation, and seminars.	Oral, written and daily practical tests and scientific reports
8			First Semester Exam		
9	5	1. The student will understand the basic principles of	Propagation of Horticultural Plants	Presentation, Discussions, quizzes, report	Oral, written and daily practical tests

		propagation of horticultural plants. 2. The student will explain the method of sexual propagation in plants. 3. The student will identify when and why plants propagate sexually. 4. The student will analyze the benefits of using this propagation method.		preparation, and seminars.	and scientific reports
10	5	1- The student will apply vegetative propagation methods for plants. 2- The student will list the advantages of vegetative propagation. 3- The student will compare different propagation methods.	Asexual or Vegetative Propagation	Presentation, Discussions, quizzes, report preparation, and seminars.	Oral, written and daily practical tests and scientific reports
11	5	1- The student will learn the basics of tree pruning. 2- The student will list and distinguish between different	Pruning	Presentation, Discussions, quizzes, report preparation, and seminars.	Oral, written and daily practical tests and scientific reports

		types of pruning methods. 3- The student will accurately determine the best times for tree pruning. 4- The student will master pruning techniques and mechanisms.			
12	5	1. The student will explain the methods of protected cultivation. 2. The student will analyze the advantages and disadvantages of protected cultivation. 3. The student will identify the key factors for the success of protected cultivation. 4. The student will understand the main steps of production under covers.	Protected Cultivation	Presentation, Discussions, quizzes, report preparation, and seminars.	Oral, written and daily practical tests and scientific reports
13			Second Semester Exam		

14	5	1- The student will understand what organic farming is. 2- The student will analyze the reasons for organic farming. 3- The student will compare organic fertilizers with chemical fertilizers.	Organic Agriculture	Presentation, Discussions, quizzes, report preparation, and seminars.	Oral, written and daily practical tests and scientific reports
15	5	1. The student will learn about the methods of harvesting horticultural crops. 2. The student will understand the importance of storing crops. 3. The student will apply some artificial ripening methods. 4. The student will list preservation methods and explain their benefits.	Harvesting and Preserving Horticultural Crops	Presentation, Discussions, quizzes, report preparation, and seminars.	Oral, written and daily practical tests and scientific reports
11. Course Evaluation					
12. Learning and Teaching Resources					
Required textbooks (curricular books, if any)			• The prescribed book: Principles of Horticulture, Dr. Karim Saleh Abdul and Dr. Saad Zaaloul		

Main references (sources)	• Principles of Gardening, authored by Dr. Faisal Rashid Nasser, Directorate of Dar Al-Kutub for Printing and Publishing, 1988, Mosul
Recommended books and references (scientific journals, reports...)	Gardening Principles: Dr. Sami Karim Mohamed Amin and Ms. Nisreen Khalil, 2014
Electronic References, Websites	All sites that provide reliable sources and also artificial intelligence tools. https://www.agro-lib.site/2022/04/blog-post_45.html

Course Description Form

1. Course Name:plant anatomy	
2. Course Code: : PLP 104	
3. Semester / Year : First/2024-2025	
4. Description Preparation Date:2025/5/1	
5. Available Attendance Forms: Daily attendance record	
6. Number of Credit Hours (Total) / Number of Units (Total): 60/2	
7. Course administrator's name (mention all, if more than one name)	
Name: Alaa Khaled Ibrahim Abdullah **Email: alaa.khaleed088@ntu.edu.iq**	
8. Course Objectives	
Course Objectives	**By the end of the course, the student is expected to be able to:** **• Introduce the student to the basic concepts of plant anatomy and identify the tissues and organs of vascular plants.** **• Understand the internal structure of plants (root, stem, leaf, flower, seed) and its relationship to their vital functions.** **• Distinguish between plant cell and tissue types (parenchyma, collenchyma, sclerenchyma, vascular tissue).**

	• Explain the mechanisms of growth and cellular specialization through the study of meristematic and permanent tissue activities. • Develop students' practical skills in preparing microscopic slides and using the light microscope to diagnose internal structures. • Link anatomical information to agricultural applications, such as pruning, propagation, and resistance to environmental stresses. • Enhance analytical thinking and careful observation skills in the study of plant microscopic structures.

9. Teaching and Learning Strategies

Strategy	• Interactive theoretical lectures • Practical laboratory instruction • Problem-based learning • Student presentations and group discussions • E-learning/blended learning • Educational visits/field observations

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	1 theoretical + 3 practical	Define meristematic tissues and their types (apical, mesophyll, lateral). - Distinguish the characteristics of meristematic cells in	meristematic tissue	Interactive theoretical lecture - Discussion - Practical lab activity	

		terms of shape, structure, and function. - Explain the role of meristematic tissues in primary and secondary plant growth.		- Educational video	
2	1 theoretical + 3 practical	Define permanent tissues and distinguish them from meristematic tissues. - Classify permanent tissues into simple (parenchyma, collenchyma, sclerenchyma) and compound (xylem, phloem). - Describe the cellular structure and functions of each tissue type. - Identify the locations of these tissues in different plant organs.	permanent tissues	Theoretical lecture. - Practical lab activity. - Group teaching. - Short interactive video.	Quizzes - Classroom Participation - Homework
3	1 theoretical + 3 practical	-Define plant epidermis and describe its cellular structure. -Explain the functions of the epidermis in protecting plants and regulating gas exchange. -Classify epidermal cell types (regular,	Skin, Functions/Skin Types	Theoretical lecture with illustrations - Practical lab activity - Short video presentation on the	-Quiz -Class participation -Homework

		stomatal, root hair, and villi). **-Identify the components of the epidermis under the microscope using prepared slides.** **-Relate the structure and function of the epidermis in different plant parts (root, stem, leaf).**		**mechanism of stomata** **- Field visit**	
4	**1 theoretical + 3 practical**	**- Define the layers of the periderm and the components of cork and cork bark.** **- Explain the function of cork as an external protective layer for plants.** **- Identify the location of the cork bark in plant tissues.** **- Explain the role of cork in reducing water loss and protecting plants from external factors.** **- Identify the characteristics of cork cells (dead cells containing air).**	**layers of perim, cork, cork veneer**	**Theoretical lecture.** **- Practical lab activity.** **- Video presentation.** **- Class discussion.**	**Quizzes** **- Classroom Participation** **- Homework**

5	**1 theoretical + 3 practical**	**Define parenchyma tissue and explain its cell characteristics.** **- Describe the functions of parenchyma tissue in plants (storage, photosynthesis, support).** **- Define sclerenchyma tissue and distinguish its cell characteristics (dead cells, thick walls).** **- Explain the role of sclerenchyma tissue in supporting and protecting plants.**	**Bar tissue nakimi, sugar nakimi**	**- Theoretical lecture supported by illustrations** **- Practical activity** **- Class discussion** **- Educational video presentation**	**Quizzes** **- Classroom Participation** **- Homework**
6	**1 theoretical + 3 practical**	**-Define xylem tissue and list its main components (vessels, tracheids, fibers, and xylem parenchyma).** **-Explain the function of xylem in transporting water and salts from the roots to the rest of the plant.** **-Distinguish the structural characteristics of xylem cells (dead, thick walls, pitting).**	**wood texture**	**Theoretical lecture** **- Practical activity** **- Class discussion** **- Educational video presentation.**	**Quizzes** **- Classroom Participation** **- Homework**

		-Explain the difference between primary and secondary xylem. **-Examine microscopic slices of xylem and identify their components.** **-Relate the structure of xylem tissue to its function in support and conduction.**			
7		**Define phloem tissue and explain its importance in transporting photosynthetic products.** **- Identify the components of phloem: sieve cells, companion cells, phloem parenchyma, and phloem fibers.** **- Distinguish between living and nonliving cells within phloem.** **- Describe the difference between primary and secondary phloem in terms of origin and function.** **- Examine microscopic slides and accurately identify the**	**bark tissue**	**Theoretical lecture** **- Practical activity** **- Class discussion**	**Quizzes** **- Classroom Participation** **- Homework**

		components of phloem tissue.			
8	**1 theoretical + 3 practical**	**Define secretory cells and tissues and distinguish their types.** **- Explain their functions in secreting substances such as oils, resins, gum, and latex.** **- Classify secretory tissues into internal (resin ducts, oil cells) and external (glands, glandular hairs).** **- Explain the physiological and defensive importance of these cells and tissues in plants.**	**secretory cells and tissues**	**Interactive lecture.** **- Practical microscope activity.** **- Class discussion video.**	**Quizzes** **- Classroom Participation** **- Homework**
9	**1 theoretical + 3 practical**	**Describe the internal anatomical structure of the root (epiphyte, cortex, endodermis, vascular cylinder).** **- Distinguish between the primary root in monocotyledons and dicotyledons.** **- Explain the functions of each tissue layer in the root, especially the endodermis, xylem, and phloem.**	**Internal structure of the root**	**nteractive lecture.** **- Practical microscope activity.** **- Class discussion video.**	**Quizzes** **- Classroom Participation** **- Homework**

10	**1 theoretical + 3 practical**	**escribe the internal anatomical structure of the stem (epidermis, cortex, vascular bundles, and medulla).** **- Distinguish between the internal structure of the stem of monocotyledons and dicotyledons.** **- Explain the functions of the different tissues in the stem (support, conduction, and storage).** **- Trace the path of water and nutrient transport in the stem through the xylem and phloem.** **- Identify vascular bundles in microscopic sections and determine their distribution pattern.**	**Internal structure of the leg**	**Theoretical lecture.** **- Practical activity.** **- Video clip**	**Quizzes** **- Classroom Participation** **- Homework**
11	**1 theoretical + 3 practical**	**- Describe the inner layers of the leaf (epidermis, meristem, spongy tissue, hypodermis, stomata, and vascular bundles).** **- Explain the function of each layer in photosynthesis,**	**Internal structure of the leaf**	**Theoretical lecture.** **- Practical activity**	**Quizzes** **- Classroom Participation** **- Homework**

		ventilation, and transport. **- Distinguish between the structure of a monocotyledonous and dicotyledonous leaf.** **- Explain how the internal structure of the leaf helps it perform its vital functions.** **- Identify the anatomical structure of the leaf using microscopic slides.**			
12	**1 theoretical + 3 practical**	**Explain the concept of secondary thickening and its importance in plants.** **- Identify the tissues responsible for secondary thickening (vascular cambium, cork cambium).** **- Describe the mechanism of secondary xylem and secondary phloem formation.** **- Explain the difference between primary and secondary thickening.**	**secondary thickening**	**Theoretical lecture.** **- Practical activity**	**Quizzes** **- Classroom Participation** **- Homework**

13	**1 theoretical + 3 practical**	**efine secondary wood and distinguish it from primary wood.** **-Explain how secondary wood is formed by the vascular cambium.** **-Identify the components of secondary wood (vessels, tracheids, parenchyma, fibers).** **-Explain the role of secondary wood in supporting the plant and transporting water and salts.** **-Analyze annual rings and their importance in tree ageing.**	**secondary wood**	**Theoretical lecture.** **- Practical activity**	**Quizzes** **- Classroom Participation** **- Homework**
14		**Define secondary phloem and differentiate it from primary phloem.** **- Explain the mechanism of secondary phloem formation from the vascular cambium.** **- Identify the components of secondary phloem (sieve tubes,**	**secondary bark**	**Theoretical lecture.** **- Practical activity**	**Quizzes** **- Classroom Participation** **- Homework**

		companion cells, parenchyma, fibers). **- Explain the function of secondary phloem in transporting organic materials (such as sugars).** **- Compare the composition of phloem in dicotyledonous and monocotyledonous plants (when present).** **- Identify secondary phloem through microscopic sections.**			
15	**1 theoretical + 3 practical**	**-Define periderm and identify its basic components (cork cambium, cork, and cork bark).** **-Explain the role of periderm as a replacement tissue for the epidermis in mature stems and roots.** **-Explain the process of periderm formation and its importance in protecting and reducing water loss.** **-Identify periderm in cross sections using a microscope.**	**The pre-drum**	**Theoretical lecture.** **- Practical activity**	**Quizzes** **- Classroom Participation** **- Homework**

11. Course Evaluation:

--1ntinuous Assessment

2- Written Exams

3- Projects and Reports

4- Self-Assessment and Feedbac

12. Learning and Teaching Resources :

Required textbooks (curricular books, if any)	**Plant Anatomy,2006**
Main references (sources)	
Recommended books and references (scientific journals, reports...)	**Crop Plant Anatomy,2018**
Electronic References, Websites	**Plant Anatomy,2018** **https://link.springer.com/book/10.1007/978-3-319-77315-5**

Course Description Form

1. Course Name:	
General insects	
2. Course Code:	
PLP 154	
3. Semester / Year:	
First	
4. Description Preparation Date:	
11/6/2025	
5. Available Attendance Forms:	
A paper form that includes the student's name, date, and signature.	
6. Number of Credit Hours (Total) / Number of Units (Total)	
60 – 2	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr.Alaa younis zanoun *Email: alaa.alsafawy89@ntu.edu.iq*	
8. Course Objectives	
Course Objectives	1. Understand the general basics of entomology: Learn about the classification of insects and their external and internal structures. Learn the general characteristics that distinguish insects from other arthropods. 2. Study the structure of the insect body and the functions of its organs: Learn about the main body parts (head, thorax, abdomen). Learn about the internal systems (digestive, respiratory,

	circulatory, nervous, reproductive). 3. Learn about insect reproduction and development: Learn about the patterns of metamorphosis in insects (incomplete, complete). Learn about the life cycles of different insect orders. 4. Classification of Insects: Learn about the different insect orders and the characteristics of each order. Learn about important economic species (harmful and beneficial). 5-Study the importance of insects in the environment (pollinators, predators, analyzers) Identify the role of insects as agricultural pests or disease vectors 6- Acquire practical skills in collecting, embalming and classifying insects Training students on scientific methods for collecting insects from different environments Preparing and classifying insect samples using taxonomic keys 7- Estimating insect biodiversity and its importance in the ecosystem Enhance understanding of the importance of insect diversity in the ecological balance

9. Teaching and Learning Strategies

Strategy	1- Interactive lecture 2- Brainstorming 3- Dialogue and discussion 5- Assignment of tasks and reports 6- Educational videos

10. Course Structure

We	Hour	Required Learning	Unit or subject	Learning method	Evaluation

ek	s	Outcomes	name		method
1	4	1- The student should learn the basic concepts of general entomology. 2- The student should understand the harms of insects and their benefits. 3- The student should be familiar with each term related to general entomology. 4- The student should learn the steps followed in pest control	The relationship of insects to other animals. Describe insects - their characteristics - the most important insect orders of economic importance.	Lecture + Presentation	Test + Questions and Answers + discussion
2	4	1- To know the importance of economic insects. 2- The student understands how to take a control process for similar wings insects 3- That the student can do the control process	Order Orthoptera - locust, cricket, order Equiptera - termites	Lecture + Presentation	Test + Questions and Answers + discussion
3	4	1- That the student get to know the insects belonging to the crop of wheat, barley and corn 2- The student works to continue to	Wheat and barley insects - ear-breaking worm, scale insects, corn insects - from leaves - corn worm	Lecture + Presentation	Test + Questions and Answers + discussion

		collect insect samples with similar wings.			
4	4	1- That the student get to know the insects belonging to the crop of wheat, barley and corn 2- The student works to continue to collect insect samples with similar wings.	Broad bean borer, legume worm, stem borer, clover and sorghum borers	Lecture + Presentation	Test + Questions and Answers
5	4	The student should be able to identify the types of insects that infect beets and sunflowe	sugar beet bugs, sunflower bugs	Lecture + Presentation	Test + Questions and Answers discussion
6	4	1- The student gets acquainted with cotton and yellow insects 2- The student knows the sources of difference in cotton and zero insects 3- The student understands how to apply control in the field. 4- The student learns how to find alternative solutions to control.	Cotton insects, safflower insects	Lecture + Presentation	Test + Questions and Answers + discussion
7	4	1- Knowing the student, the	Onion and garlic bugs - cabbage and	Lecture + Presentation	Test + Questions and Answers +

		difference between insects that affect onions, garlic and lettuce 2- Understanding the student how to combat insects that affect onions and garlic	cauliflower bugs		discussion
8	4	1- The student should learn the economic importance of insects that infect the Solanaceae family and the cucurbitaceous family	Insects of the Solanaceae family - Insects of the Cucurbitaceae family	Lecture + Presentation	Test + Questions and Answers + discussion
9	4	1 -The student should recognize the insects that infect the family, pomegranate insects and figs 2- The student should understand when the control process is conducted. 3- The student should know when each pesticide is used in the control process	Pomegranate insects - fig insects	Lecture + Presentation	Test + Questions and Answers

10	4	That the student get to know the insects that affect grapes and citrus fruits	Grape bugs - Citrus bugs		
11	4	1- The student should be acquainted with olive insects and buckthorn. 2-Insects are olive leaf fly - scale insect - olive buckthorn flour - buckthorn fruit fly	Olive insects - buckthorn insects	Lecture + Presentation	Test + Questions and Answers
12	4	The student should know the types of excavators that infect the stems	Walnut insects	Lecture + Presentation	Test + Questions and Answers
13	4	The student should understand the difference between the types of insects that infect apples and how to combat each type of apple bug.	Almond insects	Lecture + Presentation	Test + Questions and Answers
14	4	The student should understand the difference between insects that infect palms and how to combat each type of insects that infect palms, all of us according to the	Palm insects	Lecture + Presentation	Test + Questions and Answers discussion +

		rank to which he belongs.			
15	4	The student should know the insects that infect ornamental plants	ornamental plant insects	Lecture + Presentation	Test + Questions and Answers + discussion
11. Course Evaluation test , discussion , asking questions					
12. Learning and Teaching Resources					
Required textbooks (curricular books, if any)	The Book of General Insects / Dr. Nizar Mustafa Al-Mallah				
Main references (sources)					
Recommended books and references (scientific journals, reports...)	The Sailor's Dictionary of Entomological Terms 2022				
Electronic References, Websites	https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://www.seip-eg.com/%3Fp%3D1366&ved=2ahUKEwihpNKczr6FAxXVYPEDHaNwBHgQFnoECBIQAQ&usg=AOvVaw3yHTA-lk9LVMVFIRz-k_5u				

Course Description Form

1. Course Name:
Microscopic biology
2. Course Code:
PLP 153
3. Semester / Year:
First
4. Description Preparation Date:
11/6/2025
5. Available Attendance Forms:
A paper form that includes the student's name, date, and signature.
6. Number of Credit Hours (Total) / Number of Units (Total)
60 – 2
7. Course administrator's name (mention all, if more than one name)
Name: Dr.Alaa younis zanoun *Email: alaa.alsafawy89@ntu.edu.iq*
8. Course Objectives

Course Objectives	**1-**Understanding the scientific basics of microscopic neighborhoods Definition of students to microorganism The installation of bacterial and virus cells, cell ingredient functions, classification of microorganisms and their general characteristics 2- Learn about the structure and functions of microbial cells and the difference between primitive cells and the truth of the nucleus

	3- Understanding the interactions between man, microorganisms, beneficial and harmful microorganisms, and the role of microbes in health and disease 4- Knowing the methods of transmission of microbial diseases, methods of prevention, infection concepts, methods of transmission, and the role of the immune system in combating them. Sterilization methods, prevention methods and combating infection 5- Gaining the basic skills in the microbiology laboratory security dealing with microorganisms and identifying the techniques used in the cultivation, insulation and diagnosis of microorganisms. 6- In accommodation of the role of microbiology in the environment and industry Using microbes in the food, pharmaceutical and environmental industries (such as biological treatment).

9. Teaching and Learning Strategies

Strategy	1- Interactive lecture 2- Brainstorming 3- Dialogue and discussion 5- Assignment of tasks and reports 6- Educational videos

10. Course Structure

Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	4	- The student should learn the basic concepts of microbiology 2- The student should understand the location of	**Definition of microbiology, its position in the world of living organisms, prokaryotic and eukaryotic organisms, development of microbiology**	Lecture + Presentation	Test + Questions and Answers + discussion

		microbiology in the animal kingdom 3- The student should recognize every term related to microbiology. 4- The student should learn the difference between the primitive nucleus and the real nucleus.			
2	4	1- To know the general characteristics of microorganisms. 2- The student should understand how to name microorganisms and classify microorganisms	**Characteristics of microorganisms,naming of microorganisms,classification of microorganisms**	Lecture + Presentation	Test + Questions and Answers + discussion
3	4	1- That the student get to know the apparent attributes of bacteria 2- The student learns how to dye bacteria and the types of dyes used 3- The student learns how to raise and develop bacteria	Bacteria, phenotypic traits, bacterial testing, bacteria dyeing methods, bacterial anatomy, bacterial development	Lecture + Presentation	Test + Questions and Answers + discussion
4	4	- The student should learn about the phenotypic	Fungus, mold, reproduction, types, development,	Lecture + Presentation	Test + Questions and Answers

		characteristics of fungi 2- The student should learn how to develop fungi 3- The student should understand the relationship of fungi with other living organisms	relationship to other organisms		
5	4	1- The student should know the types of yeasts 2- The student should know how they reproduce and their characteristics.	Yeasts, types of yeasts, their reproduction, agricultural characteristics	Lecture + Presentation	Test + Questions and Answers discussion
6	4	1- The student gets to know the types of algae 2- The student knows the methods of reproduction in algae 3- The student understands the economic importance of algae. 4- The student learns how to isolate and purify algae.	**Algae, Morphological characteristics of algae, Reproduction, Algae isolation and purification, Economic importance**	Lecture + Presentation	Test + Questions and Answers + discussion
7	4	1- The student's knowledge of how to classify primary schools.	**primary, taxonomy, adenoids, flagella, cilia, sporidia**	Lecture + Presentation	Test + Questions and Answers + discussion

		2- Understand the student, how to summarize the whipping, bouquets, and guidances.			
8	4	1-The student should learn the economic importance of viruses 2-The student should learn how viruses are classified	**Viruses, their characteristics, construction, classification, replication, methods of growing viruses**	Lecture + Presentation	Test + Questions and Answers + discussion
9	4	1 That the student gets to know the types of Reticia 2 The student understands the general characteristics. 3- That the student knows the importance of the rkets, how to develop it and the diseases it causes.	**Ecclesiastia, general properties, its divisions and importance, reproductive and development media, diseases caused by it**	Lecture + Presentation	Test + Questions and Answers
10	4	That the student get acquainted with the metabolism in microscopic neighborhoods	**Metabolism in microorganisms**		
11	4	To familiarize the student with physical and	**Microbiology genetics, physicochemical**	Lecture + Presentation	Test + Questions and Answers

		chemical agents and antibiotics.	**agents, antibiotics and therapeutic agents**		
12	4	The student understands the relationship of microorganism with diseases, pathogens and factors that affect the severity of the injury	**Microbiology control**	Lecture + Presentation	Test + Questions and Answers
13	4	The student should understand the relationship of microbiology with diseases, pathogens and factors that affect the severity of the injury	**The relationship of microbiology to diseases, pathogens, injury, factors affecting the severity of injury**	Lecture + Presentation	Test + Questions and Answers
14	4	The student should distinguish between applied microbiology and the difference between soil microbiology and water and food biology	**Applied Microbiology,Soil Microbiology,Water and Food Biology**	Lecture + Presentation	Test + Questions and Answers discussion +
15	4	The student should recognize immunity in microbiology.	Immunity	Lecture + Presentation	Test + Questions and Answers + discussion
11. Course Evaluation test , discussion , asking questions					
12. Learning and Teaching Resources					
Required textbooks					MicrobiologyRequired Texts

(curricular books, if any)	Diagnostic microbiology book /Dr. Abdul Nabi Jawid Al -Maamouri
Main references (sources)	
Recommended books and references (scientific journals, reports...)	Glossary of Microscopic Terminology 2020
Electronic References, Websites	https://www.google.iq/books/edition/%D8%A7%D9%84%D9%83%D8%AA%D8%A7%D8%A8_%D8%A7%D9%84%D8%B9%D9%85%D9%84%D9%8A_%D9%84%D9%84%D8%A3%D8%AD%D9%8A%D8%A7%D8%A1/j_qjDgAAQBAJ?hl=ar&gbpv=1&dq=%D9%83%D8%AA%D8%A7%D8%A8%20%D8%A7%D9%84%D8%A7%D8%AD%D9%8A%D8%A7%D8%A1%20%D8%A7%D9%84%D9%85%D8%AC%D9%87%D8%B1%D9%8A%D8%A9&pg=PA1&printsec=frontcover

نموذج وصف المقرر

1. Course name:	
Sustainable agriculture	
2. Course code:	
PLP 157	
3. Level/Academic Year:	
The first / first	
4. Date of preparation of the description:	
2025/6 /10	
5. Available attendance forms:	
Paper form including name, date of attendance and signature	
6. Number of credit hours (total) / Number of units (total):	
45 hours/2 units	
7. Name of the course supervisor (all names should be mentioned if there are multiple supervisors):	
Name: dr. wadhah thabit abed wadah8324@ntu.edu.iq :الاميل	
8. Course objectives:	
The undergraduate student will be able to: 1-Cognitive objectives (knowledge and understanding): -Introduce students to the concept of sustainable agriculture and its importance in achieving food security and preserving natural resources. -Understand the basic principles of sustainable agriculture, such as improving soil fertility, rationalizing water use, and preserving biodiversity- To study sustainable agricultural systems, such as organic farming, permaculture, and agroforestry. - To analyze the environmental and economic challenges facing conventional agriculture and how to address them through sustainable agriculture.	**:Course objectives**

2- Skill Objectives (Practical Application): - The student will learn sustainable agricultural techniques, such as: - Nutrient recycling (composting). -No-till farming. - **Natural pest management (biological control)**. **-The student will apply sustainable irrigation methods, such as drip irrigation or the use of graywater**. **-Design integrated agricultural systems based on agricultural diversity and reducing chemical inputs**. -3**Analytical objectives (scientific method)-**: **The student will analyze the environmental and economic impacts of sustainable agriculture compared to conventional agriculture**. **-The student will evaluate the success of sustainable agricultural projects locally and globally**. **-Study the role of agricultural policies and legislation in supporting sustainable agriculture**. -4**Social and awareness-raising objectives**: **-Raising awareness of the importance of agricultural sustainability in the face of climate change**. **-Encouraging responsible agricultural practices among farmers and local communities**. **-Promoting sustainable urban agriculture (such as home gardens and green roofs)**.	

9. Teaching and learning strategies:

• Learning based on dialogue and discussion. • Brainstorming. • Cooperative and group learning. • Practical training.التعلم الذاتي	strategies

10. Course structure

Evaluation method	Learning method	Name of the unit or topic	Required learning outcomes	Watches	week
Oral, written and daily practical tests	Presentation, explanation, questions and	Definition of sustainable agriculture and its importance	1- Introduction to sustainable agriculture, definition and importance of	3	1

and scientific reports	answers, interactive discussion, and self-learning		sustainable agriculture, importance of sustainable agriculture, 2- Differences between traditional and sustainable agriculture		
Oral, written and daily practical tests and scientific reports	Presentation, explanation, questions and answers, interactive discussion, and self-learning	sustainable agricultural systems,	Sustainable agricultural systems, the most important sustainable agricultural systems, the importance of conservation agriculture, applications of conservation agriculture, challenges of conservation agriculture, organic agriculture, basic principles of organic agriculture.	3	2
Oral, written and daily practical tests and scientific reports	Presentation, explanation, questions and answers, interactive discussion,	Soil health and sustainable management, definition of soil health, soil health, components of healthy soil	Soil health and sustainable management, definition of soil health, soil health, components of healthy soil, sustainable soil management,	3	3

	and self-learning		importance of monitoring and evaluation, soil properties and their role in plant production		
Oral, written and daily practical tests and scientific reports	Presentation, explanation, questions and answers, interactive discussion, and self-learning	Water management in sustainable	Water management in sustainable agriculture, the importance of water management in sustainable agriculture, challenges in water management in agriculture, water management strategies in sustainable agriculture, modern technologies in water management	3	4
Oral, written and daily practical tests and scientific reports	Presentation, explanation, questions and answers, interactive discussion, and self-learning	Crop diversification and multifunctional agriculture, vegetation cover planting and biodiversity improvement	Crop diversity and multifunctional agriculture, vegetation cover cropping and biodiversity improvement, concept of vegetation cover cropping, role of vegetation cover cropping in biodiversity improvement,	3	5

			strategies for biodiversity improvement		
Oral, written and daily practical tests and scientific reports	Presentation, explanation, questions and answers, interactive discussion, and self-learning	Integrated Pest Management (IPM),	Integrated Pest Management (IPM), key approaches to sustainable pest and disease management, basic principles of IPM, challenges in implementing sustainable management, modern techniques in pest control	3	6
Oral, written and daily practical tests and scientific reports	Presentation, explanation, questions and answers, interactive discussion, and self-learning	Organic fertilizers and integrated fertility management	Organic fertilizers and integrated fertility management, types of organic fertilizers, integrated fertility management, elements of integrated fertility management	3	7
Written exam.	Presentation, explanation, questions and answers, interactive discussion, and self-learning	Case Studies in Sustainable Agriculture	Case Studies in Sustainable Agriculture	3	8

Oral, written and daily practical tests and scientific reports	Presentation, explanation, questions and answers, interactive discussion, and self-learning	Soilless agriculture	Soilless farming, types of soilless farming, components of soilless farming systems, advantages and benefits of soilless farming	3	9
Oral, written and daily practical tests and scientific reports	Presentation, explanation, questions and answers, interactive discussion, and self-learning	Biotechnology in Sustainable Agriculture	Biotechnology in sustainable agriculture, the difference between traditional and modern biotechnology, the role of biotechnology in improving agricultural production, biotechnology techniques in sustainable agriculture	3	10
Oral, written and daily practical tests and scientific reports	Presentation, explanation, questions and answers, interactive discussion, and self-learning	Renewable energy in sustainable agriculture	Renewable energy in sustainable agriculture, the concept of renewable energy in sustainable agriculture, types of renewable energy in sustainable agriculture, advantages of	3	11

			renewable energy in sustainable agriculture		
Oral, written and daily practical tests and scientific reports	Presentation, explanation, questions and answers, interactive discussion, and self-learning	Urban agriculture and vertical farming	Urban agriculture and vertical farming, definition of urban agriculture, importance of vertical farming, vertical farming techniques	3	12
Written exam.	Presentation, explanation, questions and answers, interactive discussion, and self-learning	Economic and social sustainability	Economic and social sustainability in agriculture, social sustainability in agriculture	3	13
Oral, written and daily practical tests and scientific reports	Presentation, explanation, questions and answers, interactive discussion, and self-learning	Climate change and its impact on agriculture	Climate change and its impact on agriculture, the concept of climate change and global warming, the causes of climate change and global warming, the impact of climate change and global warming on agriculture, strategies for adapting to climate change and global warming in agriculture	3	14

Oral, written and daily practical tests and scientific reports	Presentation, explanation, questions and answers, interactive discussion, and self-learning	Practical applications and final projects,	Practical applications and final projects, practical applications in sustainable agriculture, proposed final projects for students, discussion questions, educational outcomes	3	15

11. Course Evaluation:	
Tests + Exercises + Discussions + Questions	
12. Learning and teaching resources:	
● الكتاب المقرر: الزراعة الحافظة ● د. ايمن الشحاذة العودة/ اكساد 2024 ●	Required textbooks (curriculum books, if any)
●	Main References (Sources)
	Recommended books and references (scientific journals, reports...)
All sites that provide reliable sources and also AI tools.	Electronic references, websites

Course Description Template

1. Course name:	
English (2)	
2. Course code:	
NTU200	
2. Semester/Year	
3. Date of preparation of the description	
4. Available forms of attendance	
1. Weekly lesson schedule (theoretical). 2. Discussions, scientific seminars, and other extracurricular activities.	
5. Number of credit hours (total)/number of units (total)	
6. Name of the person responsible for the course (list all names, if there is more than one)	
Name: M.M. Omar Ahmed Fathi Email: omar.ah.f@ntu.edu.iq	
7. Objectives of the course	
	1. 1. Students should be able to recognize all English language skills and knowledge. 2. 2. Students should be able to encourage and develop scientific research in the field of English language in general. 3. 3. Students should be able to cooperate with local and international organizations in the field of English language development.
8. Teaching and learning strategies	
strategies	1. Interactive lectures. 2. Brainstorming. 3. Dialogue and discussion. 4. Assignments and reports. 5. Working together to reveal leadership skills.
9. Course structure	

Week	Hours	Required learning outcomes	Unit name/topic	Teaching method	Assessment method
First + Second	2 Theoretical	Parts of speech, sentences and phrases in English, comprehension	Speech parts, sentences in English, comprehension	Discussion method, lecture method	Short exams, assignments, discussions
Third	2 Theoretical	The student should be able to recognize proper nouns, indefinite nouns, material nouns, plural nouns, abstract 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, assignments, discussions
Fourth + Fifth	2 Theoretical	The student should be able to recognize pronouns and their types: personal, accusative and genitive, possessive, reflexive, demonstrative, relative, and interrogative pronouns.	Pronouns: types, personal (subject, objective), possessive, reflexive, demonstrative, interrogative, and relative pronouns.	Discussion method, lecture method	Short exams, assignments, discussions
Sixth	2 Theoretical	The student should be able to recognize auxiliary verbs and their types.	Auxiliary verbs, types	Discussion method, lecture method	Short exams, assignments

					, discussions
Seventh	2 Theoretical	The student should be able to identify tenses in the passive voice: simple tenses: present, past, future.	Tenses in active voice case: simple tense: present, past, future	Discussion method, lecture method	Short exams, assignments , discussions
Eighth	2 Theoretical	The student should be able to recognize continuous tenses: present, past, and future.	Continuous tense: present, past, future	Discussion method, lecture method	Short exams, assignments , discussions
Ninth	2 Theoretical	The student should be able to recognize the perfect tense: present, past, and continuous.	Perfect tense: present, past, future	Discussion method, lecture method	Short exams, assignments , discussions
Tenth	2 Theoretical	The student should be able to recognize the present continuous tense: present, past, future.	Continuous perfect tense: present, past, future	Discussion method, lecture method	Short exams, assignments, discussions

Eleventh + Twelfth	2 Theoretical	The student should be able to recognize the following types of adjectives: scientific, possessive, descriptive, long, short, comparative, and .superlative	Adjectives: names, possessive, descriptive, long, and short adjective. Comparison and similarity	Discussion method, lecture method	Short exams, assignments, discussions
Thirteenth + Fourteenth	2 Theoretical	The student should be able to recognize the sounds in the English language: vowels, consonants, and consonant clusters.	English sounds: constants, vowels	Discussion method, lecture method	Short exams, assignments, discussions
Fifteenth	2 Theoretical	Comprehensive review of all vocabulary in the material	Review of the article	Discussion method, lecture method	Short exams, assignments, discussions
10. Course evaluation					
((Oral exams/written exams/weekly reports/daily attendance/participation and interaction in lectures/midterm and final exams))					
11. Learning and teaching resources					
Required textbooks (curriculum books, if applicable)	Rapid Rewiw				

Main references (sources)	English Grammar
Recommended books and references (scientific journals, reports, etc.)	Eurasea Article
Electronic references and websites	Lib.gin

Course Description Template

1. Course name:	
Computer Basics (2)	
2. Course code:	
NTU201	
3. Semester/Year	
First semester	
4. Date of description	
5. Available attendance formats	
1. Weekly lesson schedule (theoretical and practical). 2. Scientific discussions, seminars, and other extracurricular activities	
3. Number of credit hours (total) / Number of units (total)	
4. Name of the person responsible for the course (list all names, if there is more than one)	
Name: M.M. Manhal Muhammad Bashir Email: manhalbasher@ntu.edu.iq	
5. Objectives of the course	
Objectives	1. Students should be able to define a calculator – generations of calculators – hardware and software components. 2. Students should be able to identify the most important basic information about computers and generations of computers, as well as operating systems. 3. Students should be able to understand the MS-DOS operating system, system concepts, system signals, disks, directories and their levels, files, and internal and external commands. 4. Students should be able to recognize Microsoft software and how to use it.
6. Teaching and learning strategies	
strategies	1. Interactive lectures. 2. Brainstorming.

	3. Practical training. 4. Dialogue and discussion. 5. Assignments and reports. Assignments involving group work to reveal leadership skills.

7. Course Structure

Week	Hours	Required learning outcomes	Unit name/topic	Teaching method	Assessment method
First	1 Theoretical 1 Practical	The importance of computers in our daily lives and economy Knowledge of information technology and learning about computer parts and components	Introduction to Computers Basic Concepts in Information Technology Computer Systems Information Technology Types of Computers Computer Parts Input and Output Devices Memory Central Processing Unit	Theoretical: Auditory methods: writing on the board, direct dialogue Practical: Assigning tasks and reports	Short exams, assignments, discussions
Second	1 Theoretical 1 Practical	Getting to know computer equipment and types of memory	Equipment Computer and logic units Recorders Control unit Input unit Peripheral units Memory, storage, and performance Main types of memory	Theoretical: Auditory methods: writing on the board, direct dialogue Practical: Assignin	Short exams, assignments, discussions

				g tasks and reports	
Third	1 Theoretical 1 Practical	Learn how data is represented, what units of measurement are used, learn about software and compilers, and learn about types of operating systems.	Data representation in memory Memory measurement unit Secondary memory and its types Data storage in memory Computer performance Software Systems software (programming languages) Compilers, interpreters, operating systems Types of operating systems Application software	Theoretical: Auditory methods: writing on the board, direct dialogue Practical: Assigning tasks and reports	Short exams, assignments, discussions
Fourth	1 Theoretical 1 Practical	Examination on the subject	Theoretical exam (1)	Theoretical: Auditory methods: writing on the board, direct dialogue Practical: Assigning tasks and reports	Short exams, assignments, discussions

Fifth	1 Theoretical 1 Practical	Getting to know Windows	Windows Using the mouse, minimizing and maximizing windows, closing windows	Theoretical: Auditory methods: writing on the board, direct dialogue Practical: Assigning tasks and reports	Short exams, assignments, discussions
Sixth	1 Theoretical 1 Practical	Learn about window movement and how to control it	Move windows from one place to another, control window size, taskbar, date and time	Theoretical: Auditory methods: writing on the board, direct dialogue Practical: Assigning tasks and reports	Short exams, assignments, discussions
Seventh	1 Theoretical 1 Practical	Getting to know the main Windows icons	Start Menu Programs My Documents	Theoretical: Auditory methods: writing on the board, direct dialogue	Short exams, assignments, discussions

				Practical: Assigning tasks and reports	
Eighth	1 Theoretical 1 Practical	Recognizing 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, direct dialogue Practical: Assigning tasks and reports	Short exams, assignments, discussions
Ninth	1 Theoretical 1 Practical	Identify the operations performed on the file	File management Select, choose folder, create folder, rename, delete file, copy file, move file	Theoretical: Auditory methods: writing on the board, direct dialogue Practical: Assigning tasks and reports	Short exams, assignments, discussions
Tenth	1 Theoretical 1 Practical	Explanation of screen and mouse settings	Screen settings Sleep screen Change mouse pointer Control mouse speed	Theoretical: Auditory methods: writing on the	Short exams, assignments, discussions

			Control double-click speed	board, direct dialogue Practical: Assigning tasks and reports	
Eleventh	1 Theoretical 1 Practical	Knowing how to install and delete programs from your hard drive	Installing and uninstalling programs Disk information, Requesting help	Theoretical: Auditory methods: writing on the board, direct dialogue Practical: Assigning tasks and reports	Short exams, assignments, discussions
Twelfth	1 Theoretical 1 Practical	Examination on the subject	Monthly exam (2)	Theoretical: Auditory methods: writing on the board, direct dialogue Practical: Assigning tasks and reports	Short exams, assignments, discussions

Thirteenth	1 Theoretical 1 Practical	Learn how to use Microsoft software and master the basics of writing.	Microsoft program and how to use it	Theoretical: Auditory methods: writing on the board, direct dialogue Practical: Assigning tasks and reports	Short exams, assignments, discussions
Fourteenth	1 Theoretical 1 Practical	Knowing how to set keyboard shortcuts	Keyboard shortcuts	Theoretical: Auditory methods: writing on the board, direct dialogue Practical: Assigning tasks and reports	Short exams, assignments, discussions
Fifteenth	1 Theoretical 1 Practical	Identify the types of tool bars and the role of each one.	Toolbars in Word documents	Theoretical: Auditory methods: writing on the board, direct dialogue	Short exams, assignments, discussions

				Practical: Assigning tasks and reports	

8. Course evaluation
((Oral exams/written exams/weekly reports/daily attendance/participation and interaction in lectures/midterm and final exams))

9. Learning and teaching resources	
Required textbooks (curriculum books, if any)	Metzeelaer and Scharpf / Benjamin / Cummings Pub. 1995
Main references (sources)	Library, scientific websites, access to lectures from other universities
Recommended books and references (scientific journals, reports, etc.)	
Electronic references and websites	Internet

Course Description Form

1. Course Name:	
Baath regime crimes in Iraq	
2. Course Code:	
NTU203	
3. Semester / Year:	
Level 2 / 2024-2025	
4. Description Preparation Date:	
9/6/2025	
5. Available Attendance Forms:	
Paper form including name, date of attendance and signature	
6. Number of Credit Hours (Total) / Number of Units (Total)	
30 / 2	
7. Course administrator's name (mention all, if more than one name)	
Name: Abdul Majeed Mahmoud Hamoudi Email:	
8. Course Objectives	
Course Objectives	1- Providing students with basic concepts related to the definition, types, and categories of crimes. 2- Define the crimes and violations of the former regime and the types of international crimes. 3- Define the crimes of mass graves and violations of Iraqi laws. 4- Address environmental crimes, the destruction of cities, demographic

	change policies, and extrajudicial detention. 5- Explain the role of the Supreme Criminal Court in dealing with the crimes of the Ba'ath regime.

9. Teaching and Learning Strategies

Strategy	1. Dialogue- and discussion-based learning. 2. Brainstorming. 3. Collaborative learning. 4. Self-directed learning.

10. Course Structure

Week	Hours	Unit or subject name	Required Learning Outcomes	Learning method	Evaluation method
1	2	- Crimes of the Ba'ath regime according to the Iraqi Supreme Criminal Court Law of 2005	- The student will understand The concept of crimes and their types The student will understand definition of crime in language and terminology	Lecture, presentation, illustrations	Questions and answers
2	2	- Crime sections	-The student will understand Crimes of the Ba'ath regime as documented by the Iraqi Supreme Criminal Court Law of 2005	Lecture, presentation, illustrations	Questions and answers
3	2	Types of international crimes	The student will understand decisions issued by the Supreme Criminal Court	Lecture, presentation, illustrations	Questions and answers

4	2	Psychological and social crimes and their effects	- The student will understand psychological crimes - The student will understand mechanisms of psychological crimes - The student will understand effects of psychological crimes	Lecture, presentation, illustrations	Questions and answers
5	2	social crimes	The student will understand social Crimes - The student will understand militarization of Society - The student will understand the Ba'ath Regime's Stance on Religion Images of human rights violations and crimes of power	Lecture, presentation, illustrations	Questions and answers
6	2	- Violations of Iraqi laws	The student will understand images of human rights violations and crimes of power	Lecture, presentation, illustrations	Questions and answers
7	2	Some decisions on the political and military violations of the Baath regime	The student will understand some decisions on the political and military	Lecture, presentation, illustrations	Questions and answers

			violations of the Baath regime		
8	2	Baath regime prisons and detention centers	The student will understand baath regime prisons and detention centers	Lecture, presentation, illustrations	Questions and answers
9	2	Environmental crimes of the Baath regime in Iraq	The student will understand draining marshes	Lecture, presentation, illustrations	Questions and answers
10	2	War pollution, radioactivity, and mine explosions	The student will understand war pollution, radioactivity, and mine explosions	Lecture, presentation, illustrations	Questions and answers
11	2	- Destruction of cities and villages	The student will understand scorched earth policy	Lecture, presentation, illustrations	Questions and answers
12	2	- Draining marshes	The student will understand destruction of palm groves, trees, and crops	Lecture, presentation, illustrations	Questions and answers
13	2	Mass Grave Crimes	The student will understand definition of Mass Graves	Lecture, presentation, illustrations	Questions and answers
14	2	Mass graves and genocide committed by the Baath regime	The student will understand mass graves and genocide committed by the Baath regime	Lecture, presentation, illustrations	Questions and answers

15	2	Chronological classification of genocide graves in Iraq	The student will understand chronological classification of genocide graves in Iraq	Lecture, presentation, illustrations	Questions and answers solutions

11. Course Evaluation	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Publications on crimes, penal law and human rights available in the college library and the university's central library
Main references (sources)	Publications on crimes, penal law and human rights available in the college library and the university's central library
Recommended books and references (scientific journals, reports...)	Google scholar, researcher gate
Electronic References, Websites	All sites that provide reliable sources and also artificial intelligence tools

Course Description Form

1. Course Name:	
Professional ethics	
2. Course Code:	
NTU 204	
3. Semester / Year:	
2024 – 2025	
4. Description Preparation Date:	
17 / 7 / 2025	
5. Available Attendance Forms:	
Paper form including name, date of attendance and signature	
6. Number of Credit Hours (Total) / Number of Units (Total)	
60 / 2	
7. Course administrator's name (mention all, if more than one name)	
Name: Qahtan diab salman Email: Qahtan.Th.Salman@ntu.edu.iq	
8. Course Objectives	
Course Objectives	By the end of the course, the student is expected to be able to: 1. Introduce students to the concept of professional ethics and its importance in professional life and careers, and enhance awareness of work ethics in various sectors. 2. Provide students with knowledge of the ethical principles and values that should govern individual behavior within the workplace, such as honesty, integrity, transparency, fairness, and responsibility. 3. Encourage commitment to sound professional conduct by clarifying the ethical and behavioral standards expected in various professional practices. 4. Develop ethical decision-making skills in professional situations involving conflicts of interest or ethical problems. 5. Promote a culture of professional accountability among students and clarify the legal and professional consequences of unethical behavior. 6. Introduce students to the laws and regulations related to professional ethics, both locally and internationally, and encourage them to respect and comply with them. 7. Prepare students to deal with the ethical challenges they may encounter in the workplace in the future, and develop their ability to provide ethical and professional solutions. 8. Deepening the sense of professional belonging and community commitment by linking ethical values to the public interest and social responsibility of the profession.
9. Teaching and Learning Strategies	
Strategy	1. Dialogue- and discussion-based learning. 2. Brainstorming. 3. Collaborative learning. 4. Practical training. 5. Self-directed learning.
10. Course Structure	

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Knowledge Domain 1. Explain the basic concepts of professional ethics, including values, principles, and behavioral standards. 2. Identify ethical models and theories and their applications in the professional context. 3. Distinguish between proper and improper professional behavior in various professional situations.	Concepts of professional ethics and knowledge of its importance	Lecture, presentation, illustrations	Questions and answers + exercise solutions
2	2	1. Professional ethics is a practical extension of the concept of ethics, but within the framework of work and the professional environment. 2. The relationship between them: 3. General ethics represent the philosophical basis for professional ethics, as the principles of honesty, integrity, justice, and respect emanate from general human ethics. 4. Professional ethics regulate professional behavior and define what is acceptable or unacceptable	The concept of ethics linguistically and technically and its relationship to professional ethics	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		within a particular profession. 5. Ethics concerns the behavior of individuals as individuals within society, while professional ethics concerns the behavior of individuals within the scope of work and their professional responsibilities toward others. 6. Every profession requires a code of ethics that regulates the behavior of its members to ensure fair and responsible performance based on ethical principles.			
3	2	• Professional Ethics: The principles and values that guide an employee's performance and determine what is right or wrong in their work, such as honesty, integrity, and respect for confidentiality. • Workplace Behavior: The employee's actual behavior within the work environment, such as how they interact with colleagues, respect for work	How do we differentiate between professional ethics and job behavior?	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		hours, and follow-up on orders.			
4	2	Professional ethics are the product of an interaction between religion, society, philosophy, law, professional codes, and human conscience.	What are the sources from which professional ethics emerged?	Lecture, presentation, illustrations	Questions and answers + exercise solutions
5	2	Professional ethics in Islam are not merely rules of professional conduct. Rather, they represent a comprehensive system of faith and ethics that integrates religion and work, elevating the value of the human being as a vicegerent on earth and responsible for his professional integrity.	Professional ethics in Islam have several characteristics.	Lecture, presentation, illustrations	Questions and answers + exercise solutions
6	2	These ethics create a professional environment based on justice, respect, competence, and responsibility, and lead to human satisfaction, social solidarity, and comprehensive development in light of the principles of Islam.	What are the commendable professional ethics in Islam?	Lecture, presentation, illustrations	Questions and answers + exercise solutions
7	2	The general components of professional ethics aim to promote an honest, responsible, and professional work environment that contributes to achieving justice, efficiency, and satisfaction within the professional community.	General components of professional ethics.	Lecture, presentation, illustrations	Questions and answers + exercise solutions

8	2	Professional integrity is the cornerstone of trust and career success. It includes honesty, trustworthiness, transparency, and respect for the law. It is not only practiced in big actions, but also begins with the daily details of work and individual behavior within the workplace.	What forms of integrity are required in professional work?	Lecture, presentation, illustrations	Questions and answers + exercise solutions
9	2	Competition is essential for market development and improved performance, but it requires regulation and laws that ensure it remains within the bounds of integrity and fairness to achieve economic and social benefits. Fair competition strengthens the profession and society and is consistent with Islamic and professional ethics. Unfair competition harms the profession and society and is inconsistent with moral and religious values. Therefore, professional ethics are a fundamental reference for guiding the type of acceptable and desirable competition in any field.	Types of competition.	Lecture, presentation, illustrations	Questions and answers + exercise solutions
10	2	Unfair competition distorts the business environment, undermines market fairness, and harms	What are the forms of unfair competition?	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		consumer confidence. It violates: 1. Commercial laws, 2. Codes of professional ethics, 3. Islamic teachings, which emphasize honesty, justice, and refraining from harming others. 4. Therefore, it is essential to adhere to fair competition, which drives innovation and serves society as a whole.			
11	2	Administrative corruption is an unethical and illegal behavior that hinders justice and development. It must be combated through oversight, instilling professional ethics, and nurturing professional conscience.	Administrative corruption.	Lecture, presentation, illustrations	Questions and answers + exercise solutions
12	2	Combating administrative corruption requires an integrated system of deterrent legislation, promoting the values of integrity and transparency, and activating oversight and accountability mechanisms to ensure a fair and effective administrative environment that achieves sustainable development goals.	Types of administrative corruption.	Lecture, presentation, illustrations	Questions and answers + exercise solutions
13	2	Behavioral deviations are actions or behaviors that deviate from ethical standards or agreed-upon rules and negatively impact the individual, the	What are behavioral deviations?	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		work environment, or society. Examples include cheating, negligence, aggression, or abuse of office. They occur for reasons such as weak moral restraint or lack of oversight. Addressing them is essential to maintaining a healthy and just environment.			
14	2	Organizational deviations are behaviors or actions that violate the rules and regulations in place within an organization, negatively impacting the flow and efficiency of work. These include, for example, frequent lateness to work, failure to adhere to instructions, misuse of resources, or disregard for official procedures. These deviations can lead to decreased productivity and increased chaos within the workplace.	What are organizational deviations?	Lecture, presentation, illustrations	Questions and answers + exercise solutions
15	2	Addressing administrative corruption requires enhancing transparency, strictly enforcing laws, improving internal oversight, instilling professional ethics, simplifying procedures, and encouraging community participation in oversight. This contributes to	Treatment of administrative corruption.	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		reducing corruption and improving administrative performance.			
11. Course Evaluation					
Tests + Discussions + Questions					
12. Learning and Teaching Resources					
Required textbooks (curricular books, if any)			The vocabulary prescribed by the Ministry of Higher Education and Scientific Research		
Main references (sources)			Professional Ethics Assistant Professor Iman Qasim, Assistant Professor Yamama Kashkoul, and Associate Professor Raya Abdel Sattar 2019-2020Acquaah, G. (2012). *Principles of Plant Genetics and Breeding*.		
Recommended books and references (scientific journals, reports...)			Google scholar, researcher gate		
Electronic References, Websites			All sites that provide reliable sources and also artificial intelligence tools		

Course Description Form

1. Course Name:
Summer Cereal and Legume Crops
2. Course Code:
TAMO 201
3. Semester / Year:
2024 – 2025
4. Description Preparation Date:
16 / 7 / 2025
5. Available Attendance Forms:
Paper form including name, date of attendance and signature
6. Number of Credit Hours (Total) / Number of Units (Total)
60 / 5
7. Course administrator's name (mention all, if more than one name)
Name:Dr. Shihhab ahmed Email:
8. Course Objectives

Course Objectives	At the end of the course, the student is expected to be able to**:** - **Identify summer field crops** - **Understand the importance of summer cereal crops** - **Differentiate between cereal and legume crops** - **Understand crop management methods** - **Know the types of fertilizers and methods of their application**
9. Teaching and Learning Strategies	
Strategy	- Discussion-based learning - Brainstorming - Asking questions and trying to answer them through cooperation Self-learning.

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	5	Recognize the importance and history of organic chemistry. Differentiate between ionic and covalent bonds. Explain the concept of hybridization (sp3, sp2, sp) and draw simple molecular shapes	Introduction to Organic Chemistry and Chemical Bonding (Ionic and Covalent Bonds, sp3 Hybridization).	Lecture, presentation, illustrations	Short answer questions on specific topics
2	5	Name alkanes and cycloalkanes using IUPAC rules. Relate the molecular structure of alkanes to their physical properties (e.g., boiling point	Alkanes and Cycloalkanes: IUPAC Nomenclature and Physical Properties	Lecture, presentation, illustrations	Questions and answers
3	5	Draw Newman projections to illustrate different conformations. Analyze the stability of different cycloalkane conformations	Conformations of Alkanes and Cycloalkanes (Newman Projections, Chair and Boat Conformations).	Lecture, presentation, illustrations	Questions and answers

		(chair and boat			
4	5	Name alkenes and alkynes and determine the degree of unsaturation. Describe the double and triple bonds in terms of hybridization (sp2, sp)	Alkenes and Alkynes: Structure, Nomenclature, and Physical Properties	Lecture, presentation, illustrations	Questions and answers
5	5	Explain the mechanism of an electrophilic addition reaction. Apply Markovnikov's rule to predict the major product of a reaction	Electrophilic Addition Reactions of Alkenes and Alkynes (Markovnikov's Rule)	Lecture, presentation, illustrations	Questions and answers + exercise solutions
6	5	Identify chiral centers in a molecule. Distinguish between enantiomers and diastereomers. Assign the absolute configuration (R/S) to a chiral center	Stereochemistry: Chirality, Enantiomers, and Assigning Configuration (R/S)	Lecture, presentation, illustrations	Questions and answers
7	5	Classify alkyl halides as primary, secondary, or tertiary.	Ikyl Halides: Classification, Nomenclature, and	Lecture, presentation, illustrations	Questions and answers

		Name alkyl halides according to the IUPAC system	Physical Properties		
8	5	Compare the SN1 and SN2 mechanisms. Identify the factors that favor one mechanism over the other (nature of the alkyl halide, nucleophile, solvent	Nucleophilic Substitution Reactions (SN1 & SN2): Mechanisms and Influencing Factors	Lecture, presentation, illustrations	Questions and answers
9	5	Compare the E1 and E2 mechanisms. Apply Zaitsev's rule to predict the most stable elimination product	Elimination Reactions (E1 & E2): Mechanisms and Zaitsev's Rule	Lecture, presentation, illustrations	Questions and answers + exercise solutions
10	5	Name and classify alcohols and ethers. Explain the effect of hydrogen bonding on the physical properties of alcohols	Alcohols and Ethers: Nomenclature, Properties, and Preparation Methods	Lecture, presentation, illustrations	Questions and answers + exercise solutions
11	5	Describe the oxidation reactions of alcohols. Explain the reaction for	Reactions of Alcohols and Ethers	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		converting alcohols to alkyl halides			
12	5	Define the concept of aromaticity and apply Hückel's rule. Name monosubstituted and disubstituted benzene derivatives	Aromatic Compounds: The Concept of Aromaticity, Nomenclature of Benzene Derivatives	Lecture, presentation, illustrations	Questions and answers
13	5	Explain the general mechanism of an EAS reaction. Predict the products of nitration, halogenation, and sulfonation of benzene	Electrophilic Aromatic Substitution (EAS): Nitration, Halogenation, Sulfonation	Lecture, presentation, illustrations	Questions and answers
14	5	Name aldehydes and ketones. Explain the mechanism of nucleophilic addition to the carbonyl group	Aldehydes and Ketones: Structure, Nomenclature, and Nucleophilic Addition Reactions	Lecture, presentation, illustrations	Questions and answers
15	5	Explain the reason for the acidity of carboxylic acids. Recognize the basic reactions of	Carboxylic Acids and Their Derivatives: Acidic Properties and Reactions	Lecture, presentation, illustrations	Questions and answers

		carboxylic acids, such as ester formation			

11. Course Evaluation

- **Continuous Assessment**: Regular quizzes, field reports, and participation in practice al sessions
- **Final Examination:** Written exam assessing both theoretical understanding and the application of practices

Final Project: A comprehensive project where students design a conservation agriculture plan based on a case study

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	**Required Textbooks (Curriculum books, if any(**
Recommended books and references (scientific journals, reports...)	**Google Scholar, Scientific Researcher Portal**
Electronic References, Websites	**All sites that provide accredited sources and also artificial intelligence tools**

Course Description Form

1. Course Name:	
Agricultural statistics	
2. Course Code:	
TAMO 202	
3. Semester / Year:	
Second Level / 2024-2025	
4. Description Preparation Date:	
2025/ 6 / 8	
5. Available Attendance Forms:	
Paper form including name, date of attendance and signature	
6. Number of Credit Hours (Total) / Number of Units (Total)	
3 / 45	
7. Course administrator's name (mention all, if more than one name)	
Name: bashar Mohsin mohammed Email: bashar_mohsin.m@ntu.edu.iq	
8. Course Objectives	
Course Objectives	By the end of the course, the student is expected to be able to: 1. Understand the principles of agricultural marketing. 2. Analyze supply chains. 3. Apply marketing strategies. 4. Utilize modern technology. 5. Evaluate marketing performance.

9. Teaching and Learning Strategies	
Strategy	1.Dialogue- and discussion-based learning. 2. Brainstorming. 3. Collaborative learning. 4. Practical training. 5. Self-directed learning.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	An essential tool for collecting accurate data on agricultural production and resource use.	The concept, importance, objectives, and benefits of the agricultural census	Lecture, presentation, illustrations	Questions and answers + exercise solutions
2	3	The agricultural census is conducted through various methods, including comprehensive census and statistical sampling, and faces challenges such as high cost, difficulty of access, and inaccurate data due to rapid agricultural changes and weak technological infrastructure.	Methods of agricultural census – Types of samples – Problems and obstacles of the agricultural census	Lecture, presentation, illustrations	Questions and answers + exercise solutions

3	3	Implementing an agricultural census includes setting objectives, designing a methodology, preparing tools, training teams, collecting data, analyzing it, and disseminating results to support agricultural policies.	Steps for implementing the agricultural census	Lecture, presentation, illustrations	Questions and answers + exercise solutions
4	3	Learning objectives include understanding environmental and population changes, evaluating agricultural policies, making data-driven decisions, and enhancing awareness of global resources for sustainable development.	Land statistics	Lecture, presentation, illustrations	Questions and answers + exercise solutions
5	3	Economic land valuation determines its agricultural value based on factors such as soil, water, and infrastructure, while productivity	Economic valuation of land – Land productivity indicators	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		indicators such as crop yields, resource use efficiency, and profitability are measured to ensure sustainability and effective investment.			
6	3	Agricultural production statistics provide accurate data on crops, productivity, and agricultural changes, helping to improve agricultural planning.	Agricultural production statistics – Benefits of agricultural statistics	Lecture, presentation, illustrations	Questions and answers + exercise solutions
7	3	Evaluating the economic value of agricultural production by analyzing cash returns compared to costs, which helps in making informed investment decisions and improving production efficiency.	Monetary valuation of agricultural production	Lecture, presentation, illustrations	Questions and answers + exercise solutions
8	3	Agricultural production is	Classifications of agricultural	Lecture,	Questions and

		classified into subsistence farming, which aims for self-sufficiency of farmers, and commercial farming, which targets markets for profit.	production	presentation, illustrations	answers + exercise solutions
9	3	Review of all previous topics	Examples and exercises	Lecture, presentation, illustrations	Questions and answers + exercise solutions
10	3	Understanding agricultural production indicators, analyzing production efficiency, evaluating economic returns, and applying statistical methods to improve agricultural planning and data-driven decision-making.	Examples and exercises on agricultural production indicators	Lecture, presentation, illustrations	Questions and answers + exercise solutions
12	3	Learning outcomes include analyzing time trends,	Definition and objectives of studying time	Lecture, presentat	Questions and answers +

		identifying seasonal patterns, using time series for future forecasting, and applying statistical methods in decision making and analyzing economic and agricultural data.	series	ion, illustratio ns	exercise solutions
13	3	Analyze the impact of time factors such as trends, seasonality, and random fluctuations, apply forecasting models to understand future patterns, and use statistical methods to analyze time data and make accurate decisions.	Factors affecting time series	Lecture, presentat ion, illustratio ns	Questions and answers + exercise solutions
14	3	Assessing the student's understanding of previous topics	Quest exam	Lecture, presentat ion, illustratio ns	Questions and answers + exercise solutions
15	3	Understand the difference between fixed and variable costs, analyze the	Fixed, variable, and total costs	Lecture, presentat ion,	Questions and answers + exercise

		impact of costs on production and profitability, apply total costing techniques, and use financial statements to make informed economic decisions		illustrations	solutions
11. Course Evaluation			Analyzing the impact of time factors such as trends, seasonality, and random fluctuations, applying forecasting models to understand future patterns, and using statistical methods to analyze time-series data and make accurate decisions.	Factors affecting time series	Questions and answers + exercise solutions
Tests + Exercises + Discussions + Questions					
12. Learning and Teaching Resources					
Required textbooks (curricular books, if any)	The vocabulary prescribed by the Ministry of Higher Education and Scientific Research				
Main references (sources)	Introduction to Statistics, Dr. Khasha' Al-Rawi, College of Agriculture and Forestry, University of Mosul, 1980				

	Statistical Data Analysis, Dr. Amani Musa Muhammad, Institute of Statistical Studies and Research, Cairo University, 2007
Recommended books and references (scientific journals, reports...)	Google scholar, researcher gate
Electronic References, Websites	All sites that provide reliable sources and also artificial intelligence tools

Course Description Form

1. Course Name:	
Principles of the food industry	
2. Course Code:	
TAMO 252	
3. Semester / Year:	
Second semester / 2024 – 2025	
4. Description Preparation Date:	
5 – 6 – 2025	
5. Available Attendance Forms:	
Paper form including name, date of attendance and signature	
6. Number of Credit Hours (Total) / Number of Units (Total)	
60/2	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Janan Kassim AL-Tarjuman Email: janankhorshed@ntu.edu.iq	
8. Course Objectives	
Course Objectives	By the end of the course, the student is expected to be able to: 1. Comprehend the fundamentals of the food industry. 2. Explain the chemical composition of food and the transformations that occur in food. 3. Understand and recognize the importance of food safety, potential hazards, and the application of health standards. 4. Acquire practical and applied skills. 5. Enhance student awareness of food quality

	and safety standards.

9. Teaching and Learning Strategies

Strategy	There are several effective strategies for teaching the Principles of the food industry, which aim to foster a deep understanding of genetic concepts and develop critical thinking skills: 1. Dialogue- and discussion-based learning. 2. Brainstorming. 3. Collaborative learning. 4. Simulation-based learning. 5. Practical training. 6. Self-directed learning.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	1. The student will understand the basic concepts of food industry principles. 2. The factors that have contributed to the interest in food manufacturing and its development. 3. The student will understand the main objectives of food preservation and processing.	Food industry science	Lecture, presentation, illustrations	Questions and answers
2	4	1. The student will understand the most	Main food industries and	Lecture, presentation,	Questions and

		important food industries in Iraq. 2. The student will understand the reasons for the underdevelopment of the food industry in Iraq. 3. The student will understand the factors to consider when selecting an area or location to establish a food processing plant.	methods used in establishing a new industry	illustrations	answers
3	4	1. The student will be able to distinguish the components of food. 2. The student will understand the importance of water to the human body. 3. The types of water found in food.	Food ingredients	Presentation, explanation, questions and answers, discussion	Short tests, writing a report on a scientific article.
4	4	1. The student will understand lipids, their types, and their benefits. 2. The student will be able to classify fatty acids and define	Lipids	Lecture, presentation, illustrations	Questions and answers

		vitamins, minerals, and organic acids.			
5	4	1. The student will know the types of muscles in meat. 2. The student will understand the phenomenon of rigor mortis, the difference between white and red meat, and fish meat.	Meat	Lecture, presentation, illustrations	Questions and answers
6	4	1. The student will learn about the properties of enzymes in food processing. 2. The student will understand oxidants and their antioxidants.	Dyes, enzymes, and flavorings	Lecture, presentation, illustrations	Questions and answers
7	4	1. The student will understand egg proteins. 2. The student will describe the steps involved in freezing eggs. 3. The student will distinguish between fresh and stored eggs and explain the role	Eggs	Lecture, presentation, illustrations	Questions and answers

		of eggs and their products in the food industry.			
8	4	1. The student will know the types of rancidity. 2. The student will understand the spoilage of oils and fats. 3. The student will know the properties of fats.	Some types of dietary oils and fats	Lecture, presentation, illustrations	Questions and answers
9	4	1. The student will know the components of grains. 2. The student will know the main types of wheat. 3. The student will understand the milling process. 4. The student will know the tests performed on flour to determine its bakeability.	Cereals	Lecture, presentation, illustrations	Questions and answers
10	4	1. The student should know the basic requirements for cold	Food preservation methods	Lecture, presentation, illustrations	Questions and answers

		storage. 2. The student should understand the changes that occur in food during cold storage.			
11	4	1. The student will know the location of ice crystals. 2. The student will understand the types of freezing. 3. The student will understand the methods of freezing food. 4. The student will understand the effects of freezing on food.	Freezing preservation	Lecture, presentation, illustrations	Questions and answers
12	4	1. The student should know what heat preservation is. 2. The student should understand the stages of food packaging. 3. The student should know the changes that occur when raw materials are delayed. 4. The student should	Heat preservation	Lecture, presentation, illustrations	Questions and answers

		understand peeling methods.			
13	4	1. The student will understand the nature and benefits of the boiling process. 2. The student will understand the benefits of the canning medium. 3. The student will understand the methods of emptying. 4. The student will understand the purpose of heat treatments. 5. The student will be able to classify foods according to their acidity. 6. The student will be able to explain the stages of sterilization.	Light boiling	Lecture, presentation, illustrations	Questions and answers
14	4	1. The student will know the paint materials. 2. The student will know the benefits of metal cans.	Cans and their manufacture	Lecture, presentation, illustrations	Questions and answers

		3. The student will understand the types of metal cans. 4. The student will know the benefits and drawbacks of glass cans.			
15	4	1. The student will learn how to detect spoilage in canned foods. 2. The student will understand the specifications required for food additives. 3. The student will know the most important preservatives.	Tests on canned goods	Lecture, presentation, illustrations	Questions and answers
11. Course Evaluation : Tests + Exercises + Discussions + Questions					
12. Learning and Teaching Resources					
Required textbooks (curricular books, if any)			The vocabulary prescribed by the Ministry of Higher Education and Scientific Research		
Main references (sources)			Al-Aswad, M.B., Abdul-Azis, O. F. and Soulaka. (2000). Principles of Food Processing. Dar Al-Kutub for. Printing and publishing		

Recommended books and references (scientific journals, reports...)	Google scholar, researcher gate
Electronic References, Websites	All sites that provide reliable sources and also artificial intelligence tools

Summer Cereal and Legume Crops

Course Information

Course Name	**Winter Cereal and Legume Crops**
Course Code	PLP 201
Level/Academic Year	Second Level / 2024-2025
Date of Description Preparation	2025
Available Attendance Models	Paper form including name and attendance date
Accredited Hours (Total)/Number of Units	60/4
Course Coordinator Name	Muqdad Daham Jasim
Email	muqdad.da@ntu.edu.iq
Course Description	Content for course description seems to be missing in the source text

Course Objectives	**At the end of the course, the student is expected to be able to**: • **Identify the major winter crops and understand their production techniques and agronomic management.** • **Determine the optimal environmental conditions for cultivating each crop and assess their economic importance locally and globally.** • **Acquire the ability to scientifically design and program crop rotations to enhance plant growth and improve agricultural sustainability** -
Learning and Teaching Strategies	- Discussion-based learning - Brainstorming - Asking questions and trying to answer them through cooperation - Self-learning

Weekly Lecture Plan

WEEK	Hours	Lecture Title	Learning Method	Required Learning Outcomes	Assessment Method

1	Th 1 + Pr 3	**Field Crops** • The importance of field crop production in the world and in Iraq. • Classification of crops based on botanical classification. • Based on economic importance and usage. • Based on the planting season	Lecture + Presentation +Video & photos+ Video & Photos	• Identify the importance of field crops globally and in Iraq. • Classify crops based on botanical, economic, and seasonal criteria. • Understand the relationship between crop uses and planting seasons	**Test + Asking questions**
2	Th 1 + Pr 3	**Soil Tillage Operations and Their Importance**: • Plowing, harrowing, leveling, rolling, and land division	Lecture + Presentation +Video & photos+ Video & Photos	• Recognize various soil service operations. • Distinguish between types of tillage and tools used. • Explain the importance of each operation in enhancing soil productivity	**Test + Asking questions**
3	Th 1 + Pr 3	**Planting Methods Based On**: • Soil moisture content. • Seed	Lecture + Presentation +Video & photos	• Identify planting methods based on soil	**Test + Asking questions**

		placement in the soil. • Post-planting field managemen		moisture. • Explain seed placement and its impact on germinatio n. • Distinguish between different post-planting operations	
4	Th 1 + Pr 3	**crop Management**: • Fertilization, irrigation, replanting, thinning, weeding, pest control, harvesting, marketing, and storage	Lecture + Presentation +Video & photos	• List post-planting service operations (fertilizing, irrigation, etc.). • Explain the role of each operation in crop developme nt. • Relate timing of operations to yield and productivit y	**Test + Asking questions**
5	Th 1 + Pr 3	**Wheat Production**: • Origin, economic importance, suitable environmental conditions, planting time, planting method, seed rate, wheat crop growth stages, and	Lecture + Presentation +Video & photos	• Identify the origin and economic importance of wheat. • Explain optimal environme ntal conditions for wheat	**Test + Asking questions**

		grain ripening stages		cultivation. • Describe the growth stages and grain maturity of whea	
6	Th 1 + Pr 3	**Barley Production**: • Origin, economic importance, suitable environmental conditions, planting time, planting method, seed rate, crop growth stages, and grain ripening stages	Lecture + Presentation +Video & photos	• Explain the origin and economic value of barley. • Identify suitable environmental conditions and planting time. • Describe growth and maturity stages of barley.	**Test + Asking questions**
7	Th 1 + Pr 3	**Triticale Production**: • Origin, economic importance, suitable environmental conditions, planting time, planting method, and seed rate	Lecture + Presentation +Video & photos	• Identify triticale and its origin. • Compare its cultivation needs to other crops. • Determine suitable seeding rate and planting method.	**Test + Asking questions**
8	Th 1 + Pr 3	**Faba Bean Production**: • Economic importance,	Lecture + Presentation +Video & photos	• Explain economic and nutritional	**Test + Asking questions**

		suitable environmental conditions, planting time, planting method, seed rate, and human sensitivity to faba beans		importance of faba beans • Understand human sensitivity to faba beans (favism). • Identify ideal environmental conditions and sowing time	
9	Th 1 + Pr 3	**chickpea and Lentil Production**: • Economic importance, suitable environmental conditions, production challenges, planting time, planting method, and seed rate	Lecture + Presentation +Video & photos	• Explain the economic and nutritional importance of chickpeas and lentils. • Identify common production challenges for both crops. • Determine optimal sowing dates, methods, and seed rates	**Test + Asking questions**
10	Th 1 + Pr 3	**Flax and Safflower Production**: • Origin, economic importance, suitable environmental conditions, planting time,	Lecture + Presentation +Video & photos Video & Photos	• Identify the origin and economic value of flax and safflower • Describe the ideal	**Test + Asking questions**

		planting method, and seed rate		environmental conditions for their cultivation. • Compare sowing methods and required seed rates	
11	Th 1 + Pr 3	**Sugar Beet Production**: • Economic importance, suitable environmental conditions, planting time, planting method, seed rate, and sugar extraction stages	Lecture + Presentation +Video & photos	• Explain the importance of sugar beet in sugar production. • Describe suitable environmental conditions and planting time. • Identify the stages of sugar extraction from beet	**Test + Asking questions**
12	Th 1 + Pr 3	**Sugarcane Production**: • Origin, economic importance, suitable environmental conditions, planting time, and planting method	Lecture + Presentation +Video & photos	• Identify the origin and industrial importance of sugarcane • Describe ideal growing conditions and sowing time • Explain planting	**Test + Asking questions**

				methods and crop care practices.	
13	Th 1 + Pr 3	**Quality Traits of Sugar Beet and Sugarcane** • And the stages of sugar production	Lecture + Presentation +Video & photos	• Distinguish between the qualitative traits of beet and cane • Understand the stages of sugar production from both crops. • Evaluate how quality traits affect sugar yield and purity	**Test + Asking questions**
14	Th 1 + Pr 3	-Agricultural Operations Fertilization, Irrigation, Replanting/Patching, Thinning, Weeding, Pest Control, Harvesting, Marketing, Storage.	Lecture + Presentation +Video & photos	• Define what crop rotation is. • Explain the importance of rotations in maintaining soil fertility. • Describe the impact of crop rotations on crop yields	**Test + Asking questions**
15	Th 1 + Pr 3	Types of Crop Rotations and Their Classification with Examples	Lecture + Presentation +Video &	• List different types of	**Test + Asking questions**

			photos	crop rotations. • Classify rotations based on crop type or season. • Provide practical examples of common rotations used in Iraq	

Assessment Methods	Tests + Discussions + Asking questions

References	• • **Field Crop Production – by Dr. Majid Mohsen Al-Ansari, 1982** • **Cereal Crop Production – by Dr. Abdel-Hamid Mohamed Hassanein** **file:///C:/Users/noon/Downloads/antaj_mhasyl_alhbwb.pdf**

Course Description Template

1. Course name:	
False falling fruit	
2. Course code:	
PLP202	
3.Semester/Year	
level 2 2024/2025	
4. Date of preparation of the description	
17 / 7/ 2025	
5. Available forms of attendance	
A paper form that includes the name, date of attendance and signature	
6. Number of credit hours (total)/number of units (total)	
2 / 60	
7. Name of the person responsible for the course (list all names, if there is more than one)	
Name: M.M.wasan waled mustafa Email: wsnalobaidy@ntu.edu.iq	
8. Objectives of the course	
The course goals	Understanding the basics of fruit production of papers: Students will learn the scientific and practical principles of fruit production, with a focus on environmentally friendly practices that .maintain natural resources Choosing appropriate environmental varieties and conditions: Students will acquire the ability to determine the appropriate fruit varieties for local climatic conditions and soil types, in addition to understanding the effect of environmental factors on the growth and .production of fruits Apply sound agricultural practices: This includes learning agricultural, irrigation, fertilization, trim, pest control and

	diseases using sustainable methods that reduce dependence on chemical .pesticides Effective management of fruit farms: Students will learn how to plan and manage fruit farms from an economic and technical perspective, including .estimating cost, profit and marketing Using modern technologies: Students will learn about the latest technologies used in fruit production, such as hydroponics, organic agriculture, harvesting and storage techniques.

9. Teaching and learning strategies	
strategies	1. Interactive lectures. 2. Brainstorming. 3. Dialogue and discussion. 4. Assignments and reports. 5. Working together to reveal leadership skills.

10. Course structure

Week	Hours	Required learning outcomes	Unit name/topic	Teaching method	Assessment method
First	2 Theoretical	The student will learn about the economic and nutritional importance and the benefits of falling fruit cultivation It will be familiar with the appropriate climatic conditions for its cultivation He has knowledge of the division of fruit trees.	Economic and nutritional importance, benefits of falling fruit and climatic conditions appropriate to their cultivation, dividing fruit .trees	Discussion method, lecture method	Short exams, assignments, discussions

Second	2	The student will understand the meaning of the thief of stillness and comfort for buds	Develop . dormancy and rest of shoots		
Third	2 Theoretical	The student . will understand the importance of pollination, fertilization and fruit .contract He will be familiar with the causes of flowers and fruits will have knowledge and knowledge of the stages of the growth of fruits He will acquire knowledge of the ways to reap the fruits.	Flutization, fertilization, fruit contract, flowering and fruits, stages of fruit growth, harvesting .fruits	Discussion method, lecture method	Short exams, assignments, discussions
Fourth	2 Theoretical	The student . will be able to know the types of assets used in the production of fruit trees and how to choose the origins of fallen fruit trees, he will be aware of the relationship between taste .and origin The student will learn about the methods of multiplication	. Choose the origins of fallen fruit trees, the relationship between the taste and the origin, the methods of multiplication .of assets	Discussion method, lecture method	Short exams, assignments, discussions

		of assets.			
Fifth	2 Theoretical	The student will be aware of the importance of growth organizations in the production of fallen fruits and the mechanism of use and times of use	Using growth organizations in the field of .falling fruit	Discussion method, lecture method	Short exams, assignments, discussions
Sixth	2 Theoretical	The student will be able to plan and create orchids The student will be able to study the environmental conditions of the site to be created The student will be able to determine the success of the garden of fruit in the specified sites	Planning and constructing orchids	Discussion method, lecture method	Short exams, assignments, discussions
Seventh	2 Theoretical	The student will learn about the most important types of apple and economic feasibility from the establishment of optics farms The student will be familiar with the appropriate environment for the production of apples and	Apples (apples) in terms of the original homeland, nutritional value, economic importance, the appropriate environment for the multiplication .of items	Discussion method, lecture method	Short exams, assignments, discussions

		environmental factors that limit production			
Eighth	2 Theoretical	The student will learn about the local and international pear varieties and be able to identify the suitable items for production according to the available environment He will be familiar with the most important types of quince and the economic value of it and the methods of establishing and producing quince farms.	Pears and saffron - the homeland, the nutritional and economic value, the methods of propagation, conditions, items	Discussion method, lecture method	Short exams, assignments , discussions
Ninth	2 Theoretical	The student will learn about the types of fruits with a stone nucleus (peaches, apricots, pears) in terms of the original homeland - nutritional and economic value The student will be able to know the methods of multiplication and the most important varieties circulating for the fruits with a stone .nucleus	Fruits with a stone nucleus (peaches, apricots, pears) in terms of the original homeland - nutritional and economic value, multiplication, varieties	Discussion method, lecture method	Short exams, assignments , discussions

		The student will learn about the most important problems facing the orchards of a stone nucleus			
Tenth	2 Theoretical	The student will learn about the appropriate environmental conditions for the fruit with a stone nucleus. The student will learn about the nature and nature of the pregnancy for fruits with a stone ,nucleus The student will be able to know the methods of education and trim the fruits of the stone core fruit	Suitable environmental conditions, flowers, nature of pregnancy, education and fruit trim for fruits with a stone nucleus	Discussion method, lecture method	Short exams, assignments, discussions
Eleventh	2 Theoretical	The student will learn about the appropriate environmental conditions for cherries and almonds. The student will learn about the nature and	Cherry and almonds - home, importance, appropriate conditions, propaganda methods, varieties, nature of .flowering	Discussion method, lecture method	Short exams, assignments, discussions

		nature of the pregnancy of cherry and ,almonds The student will be able to know the methods of education and trim the fruiting of cherries and .almonds			
Twelfth	2 Theoretical	The student will learn about the economic importance of grapes. The student will get to know the vegetarian division, grape varieties, and the nature of pregnancy The student will be able to know the methods of education and pruning of grapes	Grapes - the original habitat, economic importance and nutritional value, plant division, the appropriate environment, reproduction, the nature of pregnancy, methods of education and trimming .fruits	Discussion method, lecture method	Short exams, assignments, discussions
Thirteenth	2 Theoretical	The student will learn about the appropriate environmental conditions for grape breeding, the student will learn about the type of pruning for	The appropriate environment, reproduction, the nature of pregnancy, methods of education and trimming .fruits	Discussion method, lecture method	Short exams, assignments, discussions

		grape ,varieties The student will be able to know the methods of education and pruning of grapes			
Fourteenth	2 Theoretical	The student will learn about figs and pomegranate - the original habitat, nutritional value, economic importance, appropriate environment, reproduction, service operations, nature of pregnancy, varieties.	Fig and pomegranate - the original home, nutritional value, economic importance, appropriate environment, reproduction, service operations, nature of pregnancy, .varieties	Discussion method, lecture method	Short exams, assignments , discussions
Fifteenth	2 Theoretical	The student will learn about the nuts (nuts, pistachios, chestna and bacon) in terms of the original homeland, economic and food importance, the appropriate environment, proliferation, varieties, and pollination methods	Gemini (nuts, pistachios, chestna and bickens) in terms of the original homeland, economic and nutritional importance, the appropriate environment, propagation, varieties, pollination methods	Discussion method, lecture method	Short exams, 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 applicable)	Rapid Rewiw
Main references (sources)	
Recommended books and references (scientific journals, reports, etc.)	Eurasea Article
Electronic references and websites	Lib.gin

Course Description Form

1. Course Name:	
Production of Winter Vegetables	
2. Course Code:	
PLP 203	
3. Semester / Year:	
SECOND 2024-2025	
4. Description Preparation Date:	
7/6/2025	
5. Available Attendance Forms:	
A paper form that includes the student's name, date of attendance, and signature.	
6. Number of Credit Hours (Total) / Number of Units (Total)	
45/2	
7. Course administrator's name (mention all, if more than one name)	
Name: **Amer Moqbel Abdul Hameed** Email: **amer.m@ntu.edu.iq**	
8. Course Objectives	
Course Objectives	1. Introduce students to the most important winter vegetables and their production and presentation methods. 2. Identify methods for classifying winter crops and the plant species for each crop. 3. Identify propagation methods and be able to describe the appropriate environment for each crop.
9. Teaching and Learning Strategies	
Strategy	1. Explanation and clarification. 2. Lecture delivery. 3. Video and image playback. 4. Daily and monthly exams. 5. Dialogue-based learning and discussion.

	6. Practical aspects.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	1	1 . Know the types of agricultural facilities required for cultivation. 2. Identify the necessary processes required for winter vegetable crops. 3. How to classify vegetable crops into groups.	Facilities needed for vegetable cultivation	Presentation, explanation, questions and answers, discussion	Test and Questions and Answers
2	1	1. Necessary processes for winter vegetable crops. 2. Mulching and its benefits.	Agricultural operations in vegetable crops	Demonstrative lecture, interactive lessons	Test and Questions and Answers
3	1	1. Knowing plant families. 2. How to classify vegetable crops into groups.	Vegetable Crop Classification	Demonstrative lecture, interactive lessons	Test and Questions and Answers
4	1	1. Identify the two types of reproduction in vegetable crops. 2. Vegetative propagation methods for winter vegetable crops. 3. Acclimatization methods.	Vegetable Crop Propagation	Group discussion on methods of reproduction	Test and Questions and Answers
5	1	1. Understand the factors affecting seed germination. 2. Learn about seed planting methods.	Seed Germination	Demonstrative lecture, interactive lessons	Test and Questions and Answers
6	1	1. Defining a seed botanically and agriculturally. 2. Identifying the flowers produced by vegetable plants.	Seed production in vegetable crops	Group discussion on how to obtain seeds	Test and Questions and Answers

7	1	1. Identify the types of pollination (self and cross). 2. What is the fruit?	Pollination in vegetable plants	Demonstrative lecture, interactive lessons	Test and Questions and Answers
8	1	1 . Define the term dormancy. 2. Identify the types of dormancy (internal and external). 3. Identify the most important problems related to external dormancy in vegetable seeds.	Seed dormancy	Presentation, explanation, questions and answers, discussion	Test and Questions and Answers
9	1	1. Identifying the internal dormancy states of vegetable plant seeds: Flesh fruits/celery/lettuce/beans/beets Sweet potatoes/potatoes	Dormancy of vegetable seeds	Demonstrative lecture, interactive lessons	Test and Questions and Answers
10	3	1. Identify suitable soil. 2. Suitable conditions. 3. Propagation methods. 4. Planting date. 5. Seed quantity. 6. Fertilization.	Spinach /scientific name/family	Field farming in practice	Test and questions and answers, practical practice in the field
12	3	1. Identify suitable soil. 2. Suitable conditions. 3. Propagation methods. 4. Planting date. 5. Seed quantity. 6. Fertilization.	Chard scientific name/family	Show the lecture on the data show device	Test and questions and answers, practical practice in the field
13	3	1. Identify suitable soil. 2. Suitable conditions. 3. Propagation methods. 4. Planting date.	Beetroot scientific name/family	Show the lecture on the data show device	Test and questions and answers, practical practice in the field

		5. Seed quantity. 6. Fertilization.			
14	3	1 . Identify suitable soil. 2. Suitable conditions. 3. Propagation methods. 4. Planting date. 5. Seed quantity. 6. Fertilization.	Fabaceae Peas Scientific name/ Family Broadbean Scientific name/ Family Umbilicaceae	Presentation, explanation, questions and answers, discussion	Test and questions and answers, practical practice in the field
15	3	1. Identify suitable soil. 2. Suitable conditions. 3. Propagation methods. 4. Planting date. 5. Seed quantity. 6. Fertilization.	Umbilicaceae Carrot Scientific name/ Family	Demonstrative lecture, interactive lessons	Test and questions and answers, practical practice in the field

11. Course Evaluation
Tests and field practices with cooperative learning and problem solving.

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	According to the terms specified by the Ministry of Higher Education and Scientific Research.
Main references (sources)	*Adnan Nasser Matloub / Vegetable Production / Part One / Mosul / 1989
Recommended books and references (scientific journals, reports...)	*Vegetable Crop Production Book - Ahmed Abdel Moneim Hassan Arab House for Publishing and Distribution / Cairo. First Edition. 1991.
Electronic References, Websites	http://nile.enal.sci.eg/bib/34815

Course Description Form

1. Course Name:	
Plant physiology	
2. Course Code:	
PLP 204	
3. Semester / Year:	
Second / 2024-2025	
4. Description Preparation Date:	
2025/6 /10	
5. Available Attendance Forms:	
Paper form including name, date of attendance and signature	
6. Number of Credit Hours (Total) / Number of Units (Total)	
60 / 2	
7. Course administrator's name (mention all, if more than one name)	
Name: waad saeed faizy Email: waadwaad1970@ntu.edu.iq	
8. Course Objectives	
Course Objectives	The undergraduate student will be able to: • 1. Understand biological processes: Study the basic functions of plants, such as photosynthesis, respiration, and water and nutrient absorption. • 2. Analyze the influence of environmental factors: Understand how environmental factors (such as light, temperature, and humidity) affect plant growth and function.

	• 3. Explore internal interactions: Understand how different systems within plants, such as enzymes and vitamins, interact. • 4. Apply knowledge in agriculture: Use the principles of plant physiology to improve cultivation methods and crop production. • 5. Develop research skills: Enhance scientific research skills through laboratory experiments and field studies. • 6. Appreciate the importance of plants: Recognize the vital role of plants in the ecosystem and their impact on human life.

9. Teaching and Learning Strategies

Strategy	1. Dialogue- and discussion-based learning. 2. Brainstorming. 3. Collaborative learning. 4. Practical training. 5. Self-directed learning.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	1- The student will understand physiology in general and plant physiology in particular. 2- The student will draw a plant cell,	Introduction to Physiology and the Cell	Presentation, Discussions, quizzes, report preparation, and seminars.	Oral, written and daily practical tests and scientific reports

		label it, and explain its types. 3- Define growth and its nature.			
2	4	1- The student will know the function of each cell component. 2- Draw a cell and label its parts. 3- Understand the role of the cell as the basic building block of the plant body.	Plant Cell Organelles	Presentation, Discussions, quizzes, report preparation, and seminars.	Oral, written and daily practical tests and scientific reports
3	4	1- The student will know the types of solutions. 2- Distinguish between acidic and basic solutions, salts, and buffer solutions. 3- The student will be able to calculate the concentrations of solutions.	Solutions	Presentation, Discussions, quizzes, report preparation, and seminars.	Oral, written and daily practical tests and scientific reports
4	4	1- The student will learn the properties of colloidal systems. 2- The student will understand the mechanisms of	Colloidal Systems	Presentation, Discussions, quizzes, report preparation, and seminars.	Oral, written and daily practical tests and scientific reports

		colloidal system stability. 3- The student will understand the importance of the colloidal state for plant cells.			
5	4	1- The student will be able to understand diffusion and its laws. 2- Explain osmosis and its importance to plant development and growth. 3- Explain the difference between transpiration and transpiration.	Plant Water Relationships	Presentation, Discussions, quizzes, report preparation, and seminars.	Oral, written and daily practical tests and scientific reports
6	4	1- The student will be able to explain and draw the root system with its parts. 2- The student will be familiar with the types and methods of absorption. 3- The student will be able to define ascending bile and explain the theories behind the	Water Absorption	Presentation, Discussions, quizzes, report preparation, and seminars.	Oral, written and daily practical tests and scientific reports

		mechanisms of bile ascent.			
7	4	1- The student will explain the stomatal system in plants and draw and label it. 2- The student will explain the factors affecting water loss in plants. 3- The student will be able to list and explain the mechanisms of phloem sap transport.	Water Loss	Presentation, Discussions, quizzes, report preparation, and seminars.	Oral, written and daily practical tests and scientific reports
8			First Semester Exam		
9	4	1- The student will be able to draw and dissect chloroplasts. 2- Understand the role of plant pigments in photosynthesis. 3- Explain the stages of photosynthesis.	Photosynthesis	Presentation, Discussions, quizzes, report preparation, and seminars.	Oral, written and daily practical tests and scientific reports
10	4	1- The student will explain photochemical reactions. 2- The student will explain	Types of Photosynthetic Reactions	Presentation, Discussions, quizzes, report preparation, and seminars.	Oral, written and daily practical tests and scientific reports

		thermochemical reactions. 3- The student will distinguish between C3 and C4 plants.			
11	4	1- The student will understand the process of breathing and its importance. 2- The student will explain the mechanics of breathing	Respiration	Presentation, Discussions, quizzes, report preparation, and seminars.	Oral, written and daily practical tests and scientific reports
12	4	1. The student will understand the importance of the Krebs cycle. 2. The student will explain the function of each stage of the cycle. 3. The student will connect the Krebs cycle to other processes, such as glycolysis and the electron transport chain. 4. The student will explain the factors affecting respiration.	Krebs Cycle	Presentation, Discussions, quizzes, report preparation, and seminars.	Oral, written and daily practical tests and scientific reports
13			Second Semester Exam		

14	4	1- The student will understand the concept of enzymes and their importance in chemical reactions. 2- The student will explain the general properties and structures of enzymes.	Enzymes	Presentation, Discussions, quizzes, report preparation, and seminars.	Oral, written and daily practical tests and scientific reports
15	4	1- The student will clarify and explain the factors affecting enzyme activity. 2- The student will identify vitamins and their functions. 3- The student will enhance their awareness of the importance of vitamins.	Enzyme Supplement + Vitamins	Presentation, Discussions, quizzes, report preparation, and seminars.	Oral, written and daily practical tests and scientific reports

11. Course Evaluation	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	• The prescribed book: Theoretical and Practical Plant Physiology. 2- Plant Physiology Dr. Abdul-Azim Kazim Muhammad
Main references (sources)	• Plant physiology, 2009. Hopkins, W.G. and. Hiiner, N.P. Wiley

Recommended books and references (scientific journals, reports...)	Plant physiology and molecular biology during water stress. Dr. Jaber Mukhtar Abu Jad Allah.
Electronic References, Websites	All sites that provide reliable sources and also artificial intelligence tools. • Journal of Plant Physiology Plant Physiology Indian Journal of Plant Physiology

Course Description Form

1. Course Name:	
Plant nutrition	
2. Course Code:	
PLP 302	
3. Semester / Year:	
Third Level / 2024-2025	
4. Description Preparation Date:	
08/06/2025	
5. Available Attendance Forms:	
Paper form including name, date of attendance and signature	
6. Number of Credit Hours (Total) / Number of Units (Total)	
75/5	
7. Course administrator's name (mention all, if more than one name)	
Name: **Alaa Raja Ali** Email: **alaa.raja@ntu.edu.iq**	
8. Course Objectives	
Course Objectives	1. Understanding the basics of plant nutrition 2. Understanding and studying how plants absorb nutrients 3. Diagnosing nutrient deficiencies in plants 4. Improving soil fertility and fertilizer management 5. Practical applications in agriculture 6. Keeping up with scientific developments

9. Teaching and Learning Strategies	
Strategy	1. Dialogue- and discussion-based learning. 2. Brainstorming. 3. Collaborative learning. 4. Practical training. 5. Self-directed learning.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	5	**1.** Identify the essential plant nutrients (macronutrients and micronutrients) and understand their physiological roles. **2.** Explain the mechanisms of nutrient uptake from the soil and within plant tissues. **3.** Analyze the factors affecting nutrient availability (such as soil pH, organic matter, and nutrient interactions). **4.** Diagnose symptoms of nutrient deficiency or toxicity in plants based on visual signs and laboratory analyses.	Introduction to Plant Nutrition	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		5. Compare different types of fertilizers (organic, chemical, and biofertilizers) and their effects on plants and the environment. **6.** Understand modern nutrition techniques such as soilless cultivation (hydroponics) and precision fertilization.			
2	5	1. The student should be able to identify the essential nutrients required for proper plant growth. 2. The student should state the importance of each nutrient in the vital processes within the plant. 3. The student should explain the role of macronutrients such as nitrogen, phosphorus, and potassium in plant growth. 4. The student should recognize	Main Components of Plant Nutrition	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		micronutrients such as iron, zinc, and manganese, and their effects on plant health. 5. The student should distinguish between the deficiency symptoms of different nutrients on various plant parts such as leaves or roots			
3	5	1. Analyze soil or plant test results to identify deficiencies or excesses of nutrients. 2. Suggest solutions or recommendations to correct nutrient deficiency problems in plants (such as appropriate fertilization). 3. Use tools and techniques for assessing plant nutrition (such as pH testing or leaf analysis)	Nutrient Sources	Lecture, presentation, illustrations	Questions and answers + exercise solutions
4	5	**Scientific Visit**			
5	5	1. The student should explain how plants	Absorption and Translocation of	Lecture, presentation,	Questions and answers + exercise

		absorb nutrients from the soil through the roots. 2. The student should describe the role of root hairs in the absorption process. 3. The student should distinguish between active and passive nutrient uptake mechanisms. 4. The student should identify the factors that influence nutrient absorption from the soil (such as pH, moisture, and aeration). 5. The student should describe the pathway of nutrient translocation from the roots to other parts of the plant. 6. The student should trace the movement of nutrients through the xylem and phloem	Nutrients	illustrations	solutions
6	5	**First Term Exam**			
7	5	1. The student should explain the concept of a growing medium and	The Relationship Between Plants and Different Growing Media	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		its role in supporting plant life. 2. The student should list the different types of growing media (natural soil, hydroponics, soilless culture, peat moss, vermiculite, perlite). 3. The student should describe the characteristics of each growing medium in terms of aeration, water retention, and nutrient availability. 4. The student should compare plant growth efficiency across different growing media. 5. The student should explain how the type of growing medium affects nutrient absorption and root			

		development.			
8	5	**Conducting Laboratory Scientific Experiments**			
9	5	1. The student should define the concept of passive (or simple) absorption in plants. 2. The student should explain that passive absorption occurs without energy consumption by the plant (unlike active absorption). 3. The student should describe the mechanisms involved in passive absorption, such as: 4. Simple diffusion 5. Osmosis 6. The student should explain the role of concentration gradients in the movement of nutrients from the soil solution into the root.	Passive absorption	Lecture, presentation, illustrations	Questions and answers + exercise solutions

10	5	1. The student should explain how different environmental factors affect the plant's ability to absorb nutrients. 2. The student should describe the role of temperature in accelerating or slowing down nutrient uptake. 3. The student should illustrate how soil salinity negatively impacts water and nutrient absorption. 4. The student should relate soil pH to the availability of nutrients for plant uptake. 5. The student should explain the relationship between soil moisture and the root's ability to absorb water and ions.	Effect of Environmental Factors on Plant Nutrition	Lecture, presentation, illustrations	Questions and answers + exercise solutions

11	5	**Scientific Field Trip Proposal To The University Agricultural Fields**			
12	5	1. To identify the essential nutrients required by plants for growth and development. 2. To understand the difference between macronutrients (such as nitrogen, phosphorus, potassium) and micronutrients (such as iron, zinc, manganese). 3. To explain the functions of each nutrient in the plant and its importance in various physiological processes. 4. To distinguish the deficiency symptoms of different nutrients as they appear on the plant (such as yellowing, stunting, leaf edge burn). 5. To correlate the visible deficiency symptoms on the plant with the specific missing nutrient.	Nutrients and Their Deficiency Symptoms in Plants	Lecture, presentation, illustrations	Questions and answers + exercise solutions
13	5	**Second Term Exam**			

14	5	**Comprehensive Review and Assessment Model for Deferred Students**
15	5	**Final Curriculum Review Plan**

11. Course Evaluation	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	The vocabulary prescribed by the Ministry of Higher Education and Scientific Research
Main references (sources)	Al-Mawsili, M. A. D., et al. (2019). *Plant nutrition (theoretical and practical)*. Dar Al-Kutub Al-Ilmiyah. Beirut, Lebanon.
Recommended books and references (scientific journals, reports...)	Google Scholar, Research Gate
Electronic References, Websites	All Sites That Provide Reliable Sources And Also Artificial Intelligence Tools

Course Description Form

Nurseries and plant propagation

1. Course Name:					
Nurseries and plant propagation					
2. Course Code:					
PLP 206					
3. Semester / Year:					
2024 – 2025/					
4. Description Preparation Date:					
11 / 6 / 2025					
5. Available Attendance Forms:					
Paper form including name, date of attendance and signature					
6. Number of Credit Hours (Total) / Number of Units (Total)					
60 / 2					
7. Course administrator's name (mention all, if more than one name)					
Name: Wsn Walid Ahmed Email: wsnalobaidy@ntu.edu.iq					
8. Course Objectives					
Course Objectives	• **Course objectives: To familiarize the student with the most important nurseries, their types, and their importance in propagating plants before transferring them to the permanent field. The student will be able to propagate plants using plant tissue culture techniques and the use of culture media formulated for propagation.**				
9. Teaching and Learning Strategies					
Strategy	1. Dialogue- and discussion-based learning. 2. Brainstorming. 3. Collaborative learning. 4. Practical training. 5. Self-directed learning.				
10.Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**

1	4	The student will be able to identify nurseries, types of nurseries, and the economic benefits of nurseries. The student will be able to study the nursery site. The student will be familiar with how to establish a nursery. The student will have sufficient knowledge of how to build the basic nursery accessories.	1. Nurseries - Types of nurseries, economic importance, selection of nurseries, location of nurseries, nursery planning, nursery construction.	Lecture, presentation, tutorials, educational films	Questions and answers + brainstorming + free discussion
2	4	The student will have a thorough understanding of the types of culture media used in propagation processes in the nursery. The student will be familiar with methods for sterilizing culture media. The student will be able to	Propagation media - Sterilization of the medium	Lecture, presentation, tutorials, educational films	Questions and answers + brainstorming + free discussion

		employ different types of culture media in the production process.			
3	4	The student will be familiar with propagation methods. The student will be able to identify the most appropriate propagation methods for each plant species. The student will distinguish between seed types for different plant species.	Reproduction - Methods of reproduction - Sexual reproduction - Characteristics of good seeds.	Lecture, presentation, tutorials, educational films	Questions and answers + brainstorming + free discussion
4	4	The student will be familiar with the stages of seed formation. The student will also be familiar with methods for addressing problems facing seed germination.	Seed formation - types of seeds.	Lecture, presentation, tutorials, educational films	Questions and answers + brainstorming + free discussion
5	4	Introducing the student to seed dormancy and the types of physical and	Seed dormancy, types of dormancy	Lecture, presentation, tutorials, educational films	Questions and answers + brainstorming + free discussion

		chemical dormancy			
6	4	The student will be able to distinguish between the types of stillness. The student will be able to process the types of stillness using various physical and chemical methods. The student will also be able to identify the materials used to terminate stillness.	Reasons for stillness - End of stillness	Lecture, presentation, tutorials, educational films	Questions and answers + brainstorming + free discussion
7	4	The student will be familiar with the causes of variation in seed germination. The student will be able to calculate the germination percentage. The student will be able to determine seed viability. The student will have knowledge of the conditions suitable for seed germination.	Seed germination variation - Seed purity - Seed germination	Lecture, presentation, tutorials, educational films	Questions and answers + brainstorming + free discussion

8	4	The student will learn about the types of vegetative propagation. He will be familiar with the advantages of vegetative propagation.	Vegetative (asexual) reproduction	Lecture, presentation, tutorials, educational films	Questions and answers + brainstorming + free discussion
9	4	The student will learn about the types of cuttings, the characteristics of each type, and which plant species are suitable for propagation using each type of cutting. The student will be familiar with the environmental conditions required for propagation using cuttings and how to provide them. The student will be aware of the timing of harvesting cuttings and the plant parts suitable for	Reproduction by brains - Types of brains - Physiological and anatomical basis.	Lecture, presentation, tutorials, educational films	Questions and answers + brainstorming + free discussion

		harvesting cuttings.			
10	4	The student will be familiar with root types and have a comprehensive understanding of the obstacles to root formation on cuttings. The student will also learn about the role of auxins in stimulating root formation. The student will also learn about methods for treating cuttings with auxins.	Factors affecting root formation - auxins and rooting.	Lecture, presentation, tutorials, educational films	Questions and answers + brainstorming + free discussion
11	4	The student will learn about the types of grafting, the advantages of each type, and which plant varieties are suitable for propagation by grafting. The student will be familiar with grafting timing, the compatibility between plant varieties, and	Vaccination, types of vaccination, and factors affecting the success of vaccination.	Lecture, presentation, tutorials, educational films	Questions and answers + brainstorming + free discussion

		the requirements for propagation by grafting. The student will be familiar with how to perform the grafting process and the plant parts suitable for grafting.			
12	4	The student will be familiar with the types of stocks used in propagation operations and the reason for using each type.	Use of assets in propagation, types of assets.	Lecture, presentation, tutorials, educational films	Questions and answers + brainstorming + free discussion
13	4	The student will learn about the interaction between the graft and the rootstock and how to avoid failure in the grafting process. The student will be introduced to layering, its types, and the benefits and harms of layering.	Effect of origin on taste, layering, types of layering	Lecture, presentation, tutorials, educational films	Questions and answers + brainstorming + free discussion
14	4	Introducing students to root propagation, how to take root cuttings, and	Reproduction by specialized stems and roots, and reproduction by various	Lecture, presentation, tutorials, educational films	Questions and answers + brainstorming

		how to plant them. Introducing students to propagation by suckers and offshoots, the most important plant species that propagate using these methods, and the reasons for using them.	vegetative methods.		+ free discussion
15	4	Introducing the student to tissue culture, its benefits, areas of use, and working mechanism.	Propagation by plant tissue culture	Lecture, presentation, tutorials, educational films	Questions and answers + brainstorming + free discussion
11.Course Evaluation					
12.Learning and Teaching Resources					
Required textbooks (curricular books, if any)			The vocabulary prescribed by the Ministry of Higher Education and Scientific Research		
Main references (sources)					
Recommended books and references (scientific journals, reports...)			Google scholar		
Electronic References, Websites			All sites that provide reliable sources and also artificial intelligence tools		

Course Description Form

1. Course Name:	
Evergreen Fruit Trees	
2. Course Code:	
PLP 202	
3. Semester / Year:	
2024 – 2025/	
4. Description Preparation Date:	
11 / 6 / 2025	
5. Available Attendance Forms:	
Paper form including name, date of attendance and signature	
6. Number of Credit Hours (Total) / Number of Units (Total)	
45 / 2	
7. Course administrator's name (mention all, if more than one name)	
Name: Mustafa Natheer Mustafa Email: mustafa.n.m1989@ntu.edu.iq	
8. Course Objectives	
Course Objectives	• **Understanding the Fundamentals of Evergreen Fruit Production:** Students will learn the scientific and practical principles of fruit production, focusing on environmentally friendly practices that conserve natural resources. • **Selecting Appropriate Varieties and Environmental Conditions:** Students will gain the ability to identify fruit varieties suited to local climatic conditions and soil types, as well as understanding the impact of environmental factors on fruit growth and production. • **Applying Sound Agricultural Practices:** This includes learning techniques for cultivation, irrigation, fertilization, pruning, and pest and disease control using sustainable methods that reduce the reliance on chemical pesticides. • **Efficient Management of Fruit Farms:** Students will learn how to plan and manage fruit farms from economic and technical perspectives, including cost and profit estimation, and marketing.

	• **Utilizing Modern Technologies:** Students will be introduced to the latest technologies used in fruit production, such as hydroponics, organic farming, and techniques for harvesting and storage.

9. Teaching and Learning Strategies

Strategy	1. Dialogue- and discussion-based learning. 2. Brainstorming. 3. Collaborative learning. 4. Practical training. 5. Self-directed learning.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Introduction to evergreen fruit	Recognizing the importance of evergreen fruit trees and their cultivation areas in Iraq.	Lecture, presentation, illustrations	Questions and answers
2	4	Botanical classification of perennial fruit	Classification of sustainable fruits by families, genera, species, with emphasis on palm, olive, citrus, bananas and pineapples	Lecture, presentation, illustrations	Questions and answers
3	4	Palm (Phoenix dactylifera)	Know the habitat and botanical description of the palm and its parts (root, vegetative, flower, fruiting)	Lecture, presentation, illustrations	Questions and answers
4	4	Palm Tree Service Technologies	Learn the steps of pruning, pruning and Arabization in palm trees	Lecture, presentation, illustrations	Questions and answers

5	4	Olive tree (Olea europaea)	Identify the original habitat of the olive tree and describe its different parts,	Lecture, presentation, illustrations	Questions and answers
6	4	Olive tree care	Familiarity with the techniques of care, pruning and treatment of diseases and pests	Lecture, presentation, illustrations	Questions and answers
7	4	Introduction to Citrus	Familiarity with the techniques of care, pruning and treatment of diseases and pests	Lecture, presentation, illustrations	Questions and answers
8	4	Citrus parts and service	Identify citrus fruits, their types and economic groups	Lecture, presentation, illustrations	Questions and answers
9	4	Citrus groups	Understanding the vegetative structures of citrus and the necessary horticultural service operations	Lecture, presentation, illustrations	Questions and answers
10	4	Banana	Recognizing the botanical composition of bananas and their various components	Lecture, presentation, illustrations	Questions and answers
11	4	Management of Banana Cultivation	Knowledge of irrigation, fertilization, and disease protection techniques for bananas	Lecture, presentation, illustrations	Questions and answers

12	4	Pineapple Cultivation	Pineapple cultivation study, its origin and economic importance	Lecture, presentation, illustrations	Questions and answers
13	4	Parts of the pineapple plant	Understanding the botanical structures and components of pineapple	Lecture, presentation, illustrations	Questions and answers
14	4	Pineapple Care and Harvesting	Learn methods of pest control and harvesting techniques in pineapple.	Lecture, presentation, illustrations	Questions and answers
15	4	Summarize and evaluate knowledge and skills gained during the semester.	Final Review and Assessment	Lecture, presentation, illustrations	Questions and answers
11.Course Evaluation					
12.Learning and Teaching Resources					
Required textbooks (curricular books, if any)			The vocabulary prescribed by the Ministry of Higher Education and Scientific Research		
Main references (sources)					
Recommended books and references (scientific journals, reports...)			Google scholar		
Electronic References, Websites			All sites that provide reliable sources and also artificial intelligence tools		

Course Description Form

1. Course Name:	
Production of Summer Vegetables	
2. Course Code:	
PLP 208	
3. Semester / Year:	
Level 2 / 2024-2025	
4. Description Preparation Date:	
9/6/2025	
5. Available Attendance Forms:	
A paper form that includes the student's name, date of attendance, and signature.	
6. Number of Credit Hours (Total) / Number of Units (Total)	
45/2	
7. Course administrator's name (mention all, if more than one name)	
Name: Name: **Amer Moqbel Abdul Hameed** Email: **amer.m@ntu.edu.iq**	
8. Course Objectives	
Course Objectives	1. Students will learn to identify all types of summer vegetables and their agricultural practices. 2. Students will be able to understand the propagation methods of each crop. 3. Students will be able to identify the types of summer crops, their family, and their scientific names.
9. Teaching and Learning Strategies	
Strategy	1. Explanation and clarification. 2. Lecture delivery.

	3. Video and image playback. 4. Daily and monthly exams. 5. Dialogue-based learning and discussion. 6. Practical aspects.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	1	1. Know the types of agricultural facilities required for cultivation. 2. Identify the necessary operations required for summer vegetable crops.	Factors to Consider When Establishing a Vegetable Field	Group discussion on how to obtain seeds	Test and Questions and Answers
2	1	1. Identify the advantages and disadvantages of vegetative (asexual) reproduction. 2. Also identify the advantages and disadvantages of sexual (seed) reproduction.	Vegetable Crop Propagation	Demonstrative lecture, interactive lessons	Test and Questions and Answers
3	1	1. Knowing the methods of examining seeds suitable for planting. 2. Knowing how to measure germination percentage.	Vegetable Seed Testing	Demonstrative lecture, interactive lessons	Test and Questions and Answers

4	1	1. The student will be familiar with the essential qualities found in vegetable seeds. 2. Know their original source.	Specifications required for vegetable seeds	Illustrative group discussion	Test and Questions and Answers
5	1	1. Knowledge of vegetative propagation methods. 2. Advantages and disadvantages. 3. Conditions to be applied when performing vegetative propagation.	Vegetative Propagation	Demonstrative lecture, interactive lessons	Test and Questions and Answers
6	1	1. Know how to prepare cuttings for propagation. 2. Know how to prepare corms for propagation. 3. Know how to divide plants for propagation.	Vegetative Propagation Methods	Group discussion to learn about preparing plant parts for reproduction	Test and Questions and Answers
7	1	1. Students will learn how to plant vegetable seeds. 2. Learn how to plant them directly in the field.	Methods of planting vegetable seeds	Demonstrative lecture, interactive lessons	Test and Questions and Answers

		3. Learn how to plant seeds using a seed drill. 4. Learn how to plant seeds at the proper planting depth, along with proper seedbed care and watering.			
8	1	1. Understand the advantages of planting seedlings. 2. Also understand the disadvantages of transplanting. 3. Understand the classification of vegetable crops according to their ability to tolerate transplanting. 4. Understand the factors on which the transplanting process depends.	Vegetable Nursery	Group discussion on how to obtain seeds	Test and Questions and Answers
9	1	1. Understand the importance of plant age in transplanting. 2. Observe plant roots and their importance in transplanting.	Factors Affecting the Success of the Transplanting Process	Demonstrative lecture, interactive lessons	Test and Questions and Answers
10	1	1. Learn about vegetable seedling production in nurseries.	Vegetable Crop Seedling Production	Field farming in practice	Test and questions and answers,

		2. Learn about traditional and modern seedling production methods. 3. Learn about seed planting methods.			practical practice in the field.
11	3 Practical part	1. Know the scientific name and family of the crop. 2. Know the appropriate soil. 3. Explain the topic of apical dominance.	Solanaceae family Scientific name Family	Show the lecture on the data show device	Test and questions and answers, practical practice in the field.
12	3	1. Identify suitable soil. 2. Suitable conditions. 3. Propagation methods. 4. Planting date. 5. Seed quantity. 6. Fertilization.	Cucurbitaceae family Scientific name Family Fabaceae family Scientific name Family	Show the lecture on the data show device	Test and questions and answers, practical practice in the field.
13	3	1. Identify suitable soil. 2. Suitable conditions. 3. Propagation methods. 4. Planting date. 5. Seed quantity. 6. Fertilization.	Fabaceae family Scientific name Family	Group discussion on how to obtain seeds	Test and questions and answers, practical practice in the field.

14	3	1. Identify suitable soil. 2. Suitable conditions. 3. Propagation methods. 4. Planting date. 5. Seed quantity. 6. Fertilization.	Malvaceae family Scientific name Family	Demonstrative lecture, interactive lessons	Test and questions and answers, practical practice in the field.
15	3	1. Identify suitable soil. 2. Suitable conditions. 3. Propagation methods. 4. Planting date. 5. Seed quantity.	Russellaceae family Scientific name Family Liliaceae family Scientific name Family	Demonstrative lecture, interactive lessons	Test and questions and answers, practical practice in the field.

11. Course Evaluation	
Tests and field practices with cooperative learning and problem solving.	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	According to the terms specified by the Ministry of Higher Education and Scientific Research.
Main references (sources)	*Adnan Nasser Matloub / Vegetable Production / Part One / Mosul / 1989 *Vegetable Production 2. Fruit Vegetable Crops. Production of Tuber and Bulb Vegetable Crops. Production of Secondary Vegetable Crops
Recommended books and references (scientific journals, reports...)	* Vegetable Crop Production Book - Ahmed Abdel Moneim Hassan

	Arab House for Publishing and Distribution / Cairo. First Edition. 1991. *Hassan, Ahmed Abdel Moneim (2001) Cucurbits: Arab House for Publishing and Distribution - First Edition - Cairo - Arab Republic of Egypt. *Hassan, Ahmed Abdel Moneim (2003) Potatoes: Arab House for Publishing and Distribution - First Edition - Cairo - Arab Republic of Egypt. *Hassan, Ahmed Abdel Moneim (2017) Basics of Vegetable Production: Arab House for Publishing and Distribution - First Edition - Cairo - Arab Republic of Egypt.
Electronic References, Websites	https://www.agro-lib.site/2024/02/blog-post_84.html

Course Description Form

1. Course Name:
Summer Cereal and Legume Crops
2. Course Code:
PLP 201
3. Semester / Year:
2024 – 2025
4. Description Preparation Date:
6 / 6 / 2025
5. Available Attendance Forms:
Paper form including name, date of attendance and signature
6. Number of Credit Hours (Total) / Number of Units (Total)
60 / 4
7. Course administrator's name (mention all, if more than one name)
Name: muqdad daham jasim Email: muqdad.da@ntu.edu.iq
8. Course Objectives

Course Objectives	At the end of the course, the student is expected to be able to**:** - **Identify summer field crops** - **Understand the importance of summer cereal crops** - **Differentiate between cereal and legume crops** - **Understand crop management methods** - **Know the types of fertilizers and methods of their application**
9. Teaching and Learning Strategies	
Strategy	- Discussion-based learning - Brainstorming - Asking questions and trying to answer them through cooperation Self-learning.

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	4	Explains the importance of field crops	Introduction to the importance of field crop production in Iraq and the	Lecture, presentation, illustrations	Short answer questions on specific topics
2	4	Knows crop service operations, their	Classification of field crops according to use and planting date. Soil service operations before planting and their importance	Lecture, presentation, illustrations	Questions and answers
3	4	Identifies planting methods and	Planting methods: Soil moisture content – Placing seeds in the soil – Crop service operations after planting	Lecture, presentation, illustrations	Questions and answers
4	4	Clarifies types of fertilizers, the function of each type, and method of application	Fertilization, its types, and methods of application	Lecture, presentation, illustrations	Questions and answers
5	4	conditions - Crop service operations - Growth stages - Planting date	Sunflower crop: Economic importance - Suitable environmental	Lecture, presentation, illustrations	Questions and answers + exercise solutions
6	4	Service operations - Growth stages - Maturity signs - Crop harvesting - Ginning and baling	Cotton crop: Economic importance - Suitable environmental conditions	Lecture, presentation, illustrations	Questions and answers
7	4	environmental conditions –	Maize (Yellow Corn) and Rice crop: Economic	Lecture, presentation,	Questions and answers

		Service operations - Growth stages - Maturity signs - Crop harvesting - Processing operations	importance - Suitable	illustrations	
8	4	environmental conditions – Service operations - Growth stages - Maturity signs - Crop harvesting - Manufacturing operations	Sesame, Peanut, and Mung bean crops: Economic importance - Suitable	Lecture, presentation, illustrations	Questions and answers
9	4	Suitable environmental conditions - Service operations - Growth stages - Maturity signs - Harvesting	Soybean, Tobacco, Jute, and Safflower (Jiljl): Economic importance	Lecture, presentation, illustrations	Questions and answers + exercise solutions
10	4	Conditions - Service operations - Growth stages - Maturity signs - Harvesting	White Sorghum crop: Economic importance - Suitable environmental	Lecture, presentation, illustrations	Questions and answers + exercise solutions
11	4	Conditions - Service operations - Growth stages - Maturity signs – Harvesting	Barley crop: Origin - Economic importance - Suitable environmental	Lecture, presentation, illustrations	Questions and answers + exercise solutions
12	4	Conditions - Planting date - Service operations	Triticale crop: Origin - Economic importance - Suitable environmental	Lecture, presentation, illustrations	Questions and answers
13	4	Conditions - Service operations - Human sensitivity to faba beans	Faba Bean crop: Economic importance - Suitable environmental	Lecture, presentation, illustrations	Questions and answers
14	4	Understanding the	Chickpea and Lentil	Lecture,	Questions

		Economic Impacts of Conservation Agriculture	crops: Economic importance - Suitable	presentation, illustrations	and answers
15	4	Community Impact and Environmental Benefits Understanding Community Acceptance of Conservation Agriculture Technology	Flax and Safflower crops: Economic importance - Suitable environmental	Lecture, presentation, illustrations	Questions and answers
16			Sugar Beet crop: Economic importance - Suitable environmental		

11. Course Evaluation

- **Continuous Assessment**: Regular quizzes, field reports, and participation in practice al sessions
- **Final Examination:** Written exam assessing both theoretical understanding and the application of practices

Final Project: A comprehensive project where students design a conservation agriculture plan based on a case study

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	**Required Textbooks (Curriculum books, if any(**
Recommended books and references (scientific journals, reports...)	**Google Scholar, Scientific Researcher Portal**
Electronic References, Websites	**All sites that provide accredited sources and also artificial intelligence tools**

Course Description Form

1. Course Name:
Tractors and Agricultural Equipment
2. Course Code:
PLP 210
3. Semester / Year:
Two / one
4. Description Preparation Date:
17 \ 7 \ 2025
5. Available Attendance Forms:
Paper form including name, date of attendance and signature
6. Number of Credit Hours (Total) / Number of Units (Total)
60 \ 2
7. Course administrator's name (mention all, if more than one name)
Name: Mahmood Shaker Mahmood Email: msh41551@ntu.edu.iq
8. Course Objectives

Course Objectives	**Introducing the student to the types of agricultural tractors, their parts, how they work, and their economic importance in serving the agricultural operation. He will be able to perform periodic maintenance operations for them and determine the type of tractor needed for each agricultural operation and its relationship to the type of soil.**
9. Teaching and Learning Strategies	
Strategy	1. **Working to increase knowledge to gain practical experience from others through educational videos and training courses to obtain new scientific information in the field of knowledge. Practical field training and how to take field measurements. Access to modern scientific literature. Scientific laboratories with other universities.**

2. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	4	**The importance of agricultural mechanization in the field of agricultural production. Types of agricultural mechanization**	General concepts of agricultural tractors	Lecture, presentation, illustrations	Questions and answers + exercise solutions
2	4	**Agricultural tug, its definition, types.**	Types of agricultural tractors	Lecture, presentation, illustrations	Questions and answers + exercise solutions
3	4	**The main parts of the tug (the engine and its fixed and moving parts).**	Agricultural tractor parts	Lecture, presentation, illustrations	Questions and answers + exercise solutions
4	4	**Means of transmission and mechanical power.**	Power transmission	Lecture, presentation, illustrations	Questions and answers + exercise solutions
5	4	**Fuel system for diesel and gasoline engines, parts of the system.**	Agricultural tractor engine	Lecture, presentation, illustrations	Questions and answers + exercise solutions
6	4	**Air and exhaust purification system, parts of the system and the function of each part**	Agricultural tractor engine	Lecture, presentation, illustrations	Questions and answers + exercise solutions
7	4	**The cooling and lubrication system in the tug, parts of the system**	Agricultural tractor engine	Lecture, presentation, illustrations	Questions and answers + exercise solutions
8	4	**A general idea about equipmentes with agricultural land,**	General concepts of	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		and how to connect it to the tug.	agricultural machiner		
9	4	**Soil preparation plow, subtractive plow, disc plow, their parts and the function of each part.**	Soil preparation equipmen	Lecture, presentation, illustrations	Questions and answers + exercise solutions
10	4	**Chisel plow, rotary plow, subsoil plow, its parts and the function of each part.**	Soil preparation equipmen	Lecture, presentation, illustrations	Questions and answers + exercise solutions
11	4	**Smoothing equipment (disc combs, toothed combs), types, importance of each part and Leveling and adjustment machines and equipment, their types and the function of each part.**	Soil preparation equipmen	Lecture, presentation, illustrations	Questions and answers + exercise solutions
12	4	**Seeding equipment, grain seed, its parts, the function of each part. Fertilized seed, its parts, and the function of each part.**	Seeding and planting equipment	Lecture, presentation, illustrations	Questions and answers + exercise solutions
13	4	**How to organize and calibrate seeds, mathematical problems. And Seed methods.**	Seeding and planting equipment	Lecture, presentation, illustrations	Questions and answers + exercise solutions
14	4	**Irrigation equipment (stream openers), its parts and the function of each part.**	Crop service equipment	Lecture, presentation, illustrations	Questions and answers + exercise solutions

15	4	**Maintenance and maintenance of tillage, smoothing and seeding equipment.**	Crop service equipment	Lecture, presentation, illustrations	Questions and answers + exercise solutions

3. Course Evaluation
Tests + Exercises + Discussions + Questions

4. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	**Agricultural tractors** **Agricultural machines and machinery**
Main references (sources)	**Yassin Al-Tahan , Lutfi Hussin** **Yassin Al-Tahan , Muhammad Al-Naama**
Recommended books and references (scientific journals, reports...)	Google scholar, researcher gate
Electronic References, Websites	

Course Description Form

1. Course Name:
Plant Taxonomy
2. Course Code:
PLP 251
3. Semester / Year:
2024-2025
4. Description Preparation Date:
2025/6/9
5. Available Attendance Forms:
"Attendance is recorded in two ways: using a paper sheet during the lecture that includes the student's name, academic level, and signature, and electronically through a Google Forms link."
6. Number of Credit Hours (Total) / Number of Units (Total)
60-3
7. Course administrator's name (mention all, if more than one name)
Name: **M.S.C. Alaa Raja Ali** Email: **alaa.raja@ntu.edu.iq**
8. Course Objectives

Course Objectives	1. **The objective is to identify any plant and determine the group to which it belongs.** 2. **To classify and name living organisms by establishing their evolutionary relationships with one another.**

9. Teaching and Learning Strategies	
Strategy	1. **Active Learning** 2. **Project-Based Learning** 3. **Visual and Multimedia-Based Learning** 4. **Field Trips** 5. **Simulation and Concept Mapping** 6. **Formative and Summative Assessment** 7. **Technology Integration** 8. **Linking Theory to Practice** 9. **Self-Directed Learning** 10. **Immediate Feedback**

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	1. To enable the student to learn the basic principles and foundations of plant taxonomy. 2. To familiarize the student with the names of key scientists and their contributions to the development of plant taxonomy. 3. The student should be able to master	Introduction to Plant Taxonomy	Giving a lecture	1. Exam 2. Question and Answer (Q&A) 3. Brainstorming

		techniques for growing and caring for plants, as well as study their anatomical structures.			
2	4	1. To enable the student to learn the definition of seed plants. 2. To help the student understand the characteristics of plants. 3. To enable the student to master techniques for planting and caring for plants, and to study their anatomical structures.	Seed Plants	Lecture، Discussion with students	Tests, Discussions, and Classroom Activities
3	4	1. To enable the student to learn the anatomical parts of the plant. 2. To help the student understand the classification of flowering	plant organs	Lecture Group Discussions Workshops	• Summarizing Scientific Articles • Brief Literature Review

		plants. 3. To familiarize the student with the general external morphology of plants.			
4	4	Scientific Visit			
5	4	1. The student should learn the classifications and structures of buds. 2. The student should understand the parts of the leaf and their modifications. 3. The student should identify the main parts of the plant.	Buds	Lecture Workshop Applied Examples Field Trip	Detailed Study Plan Quizzes
6	4	First Term Exam			
7	4	1. The student will learn the parts of a flower. 2. The student will understand the meaning of complete vs. incomplete flowers. 3. The student will identify	Flower Anatomy and Plant Structures	Lecture	Field experiment evaluation

		other parts of plants.			
8	4	Conducting Laboratory Scientific Experiments			
9	4	• Students will learn and identify the female reproductive parts of a flower.	Female Reproductive Structures in Flowers	PowerPoint Lecture	Quiz
10		Understanding Ovaries, Fruits, and General Plant Parts	Ovaries, Fruits	PowerPoint Lecture	Quiz
11	4	Scientific Field Trip Proposal To The University Agricultural Fields			
12	4	1. Students will learn the meaning of pollination and identify different pollination types. 2. Students will understand the optimal developmental stages for pollination. 3. Students will recognize wind-pollinated versus insect-pollinated flowers.	Pollination	Lecture, Discussions, and Explanation on Pollination	Oral Examination Structure Final Report Requirements

13	4	Second Term Exam
14	4	Comprehensive Review and Assessment Model for Deferred Students
15	4	Final Curriculum Review Plan

11. Course Evaluation

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	The vocabulary prescribed by the Ministry of Higher Education and Scientific Research
Main references (sources)	Ali Hussein Issa Al-Mousawi, 1987, Plant Taxonomy.
Recommended books and references (scientific journals, reports...)	Google Scholar, Research Gate
Electronic References, Websites	All Sites That Provide Reliable Sources And Also Artificial Intelligence Tools

Course Description Form

1. Course Name:
Analytical chemistry
2. Course Code:
PLP 256
3. Semester / Year:
SECOND/ 2024-2025
4. Description Preparation Date:
5/6/2025
5. Available Attendance Forms:
Paper form including name, date of attendance and signature
6. Number of Credit Hours (Total) / Number of Units (Total)
4/2
7. Course administrator's name (mention all, if more than one name)
Name: dr-hala awf Abdulrahman Email: dr_hala.awf.chilmeran@ntu.edu.iq
8. Course Objectives

Course Objectives	1. At the end of the course, the student should have the following: 1. Understand the basic principles of analytical chemistry 2. Identify the types of chemical analysis (qualitative and quantitative).

	3. Identify and distinguish between traditional and modern analytical methods. 4. Learn methods of titration, gravimetric analysis, spectroscopy, and electrochemical analysis. 5. Analyze and interpret laboratory results scientifically. 6. Apply analytical chemistry to real-world applications. 7. Analyze complex chemical problems and provide practical solutions.

9. Teaching and Learning Strategies

Strategy	There are several effective strategies for teaching the analytical chemistry course, which aim to foster a deep understanding of genetic concepts and develop critical thinking skills: 1. Dialogue- and discussion-based learning. 2. Brainstorming. 3. Collaborative learning. 4. Simulation-based learning. 5. Practical training. 6. Self-directed learning.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method

1	4	1- The student should understand the importance of analytical chemistry and its applications. 2- The student should understand qualitative (descriptive) and quantitative analysis.	Introduction to Analytical Chemistry	Lecture, presentation, illustrations	Questions and answers + exercise solutions
2	4	1- The student should know the types of primary and secondary standard solutions. 2- The student should understand the titration process.	Volumetric Analysis	Lecture, presentation, illustrations	Questions and answers + exercise solutions
3	4	1- The student should know the rules used to calculate molar concentration. 2- The student should know the rules used to calculate normal concentration. 3- The student should understand the mathematical relationship	Molar and Normal Concentrations	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		between molar and normal concentration.			
4	4	1- The student should understand the method of preparing primary and secondary standard solutions.	Preparing Standard Solutions	Lecture, presentation, illustrations	Questions and answers + exercise solutions
5	4	1- The student should know the general concepts in chemical balancing. 2- The student should understand the equilibrium constant and the activity coefficient.	Chemical Balance	Lecture, presentation, illustrations	Questions and answers + exercise solutions
6	4	. 1- The student should know how to accurately perform gravimetric analysis. 2- The student should understand the advantages and disadvantages of gravimetric analysis	Gravimetric Analysis	Lecture, presentation, illustrations	Questions and answers + exercise solutions
7	4	1- The student should know the types of equilibrium and complex formation equilibria. 2- The student should understand	Types of Volumetric Analysis Methods	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		oxidation-reduction equilibria and precipitation equilibria.			
8	4	1- The student will understand the concept of buffer solutions and examples of buffer solutions. 2- The student will understand the types of buffer solutions and the importance of their use.	Buffered Solutions	Lecture, presentation, illustrations	Questions and answers + exercise solutions
9	4	1- The student will know the types of neutralization corrections. 2- The student will know the uses of neutralization corrections.	Equivalence Titrations	Lecture, presentation, illustrations	Questions and answers + exercise solutions
10	4	1- The student will know the Vias principle and the Kjeldahl method. 2- The student will know the advantages and disadvantages of the Kjeldahl method.	Kjeldahl Analysis	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		3- The student will be familiar with the Kjeldahl apparatus.			
11	4	1- The student will understand the redox correction. 2- The student will understand the electrochemical and electrolytic cell, and the Nerst equation.	Electrochemistry	Lecture, presentation, illustrations	Questions and answers + exercise solutions
12	4	1- The student will understand the standard hydrogen potential. 2- The student will understand the standard calomel electrode potential.	Standard Potential	Lecture, presentation, illustrations	Questions and answers + exercise solutions
13	4	1- The student will understand photolysis, its basics, and calculations. 2- The student will understand the Beer-Lambert law.	Spectral Analysis	Lecture, presentation, illustrations	Questions and answers + exercise solutions
14	4	1- The student should understand the principle of chromatographic analysis. 2- The student should know the types of	Chromatography	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		chromatographic analysis.			
15	4	1- The student should understand the principle of gas chromatography. 2- The student should know the advantages of gas chromatography.	Gas Chromatography	Lecture, presentation, illustrations	Questions and answers + exercise solutions
11. Course Evaluation: Tests + Exercises + Discussions + Questions					
12. Learning and Teaching Resources					
Required textbooks (curricular books, if any)			The vocabulary prescribed by the Ministry of Higher Education and Scientific Research		
Main references (sources)			-Fundamentals of Analytical Chemistry 9th Edition by Douglas Skoog (Author), Donald West (Author), F. Holler (Author), Stanley Crouch (Author)		
Recommended books and references (scientific journals, reports...)			Google scholar, researcher gate		
Electronic References, Websites			All sites that provide reliable sources and also artificial intelligence tools		

Course Description Form

1. Course Name:
Biochemistry
2. Course Code:
TAMO 302
3. Semester / Year:
THIRID/2024-2025
4. Description Preparation Date:
5/6/2025
5. Available Attendance Forms:
Paper form including name, date of attendance and signature
6. Number of Credit Hours (Total) / Number of Units (Total)
5/3
7. Course administrator's name (mention all, if more than one name)
Name: dr-hala awf Abdulrahman Email: dr_hala.awf.chilmeran@ntu.edu.iq
8. Course Objectives

Course Objectives	Ultimately, the student should be able to: 1. Understand the basics of biochemistry 2. Identify the types of catabolism and anabolism in cells 3. Identify respiratory processes and the role of oxygen in large quantities

	4. Understand how enzymes function as catalysts in biological reactions 5. Understand the role of oxygen and bioregulation 6. Identify the structure and functions of biomolecules and vitamins 7. Understand how energy is produced in cells

9. Teaching and Learning Strategies

Strategy	There are several effective strategies for teaching the biochemistry course, which aim to foster a deep understanding of genetic concepts and develop critical thinking skills: 1. Dialogue- and discussion-based learning. 2. Brainstorming. 3. Collaborative learning. 4. Simulation-based learning. 5. Practical training. 6. Self-directed learning.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	5	1- The student will understand the basic concepts of biochemistry. 2- The student understands the	Introduction to Biochemistry	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		non-molecular physical structure.			
2	5	1- The student is not aware of diabetes, which is an important component of metabolic processes. 2- The student understands that sugars are the primary source of energy needed for bodily functions.	Carbohydrates	Lecture, presentation, illustrations	Questions and answers + exercise solutions
3	5	1- The student will know the types of monosaccharides, disaccharides, and polysaccharides. 2- The student will understand the chemical structure of monosaccharides, disaccharides, and polysaccharides.	Carbohydrates	Lecture, presentation, illustrations	Questions and answers + exercise solutions
4	5	1- The student will know the importance and functions of lipids. 2- The student will know the difference between oils and fats.	Lipids	Lecture, presentation, illustrations	Questions and answers + exercise solutions

5	5	1- The student will know the chemical structure of neutral lipids. 2- The student will know the importance of lipids for energy production.	Lipids	Lecture, presentation, illustrations	Questions and answers + exercise solutions
6	5	1- The student should know the difference between saturated and unsaturated fats. 2- The student should know fat metabolism.	Lipids	Lecture, presentation, illustrations	Questions and answers + exercise solutions
7	5	1- The student should know the types of amino acids. 2- The student should understand the importance of amino acids for plants.	Amino acides and peptide	Lecture, presentation, illustrations	Questions and answers + exercise solutions
8	5	1- The student should know the types of amino acids and how they are linked to form peptides. 2- The student should understand	Amino acides and peptide	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		examples of peptides found in plants.			
9	5	1- The student should know the concept of proteins and their importance. 2- The student should understand the functions of proteins.	Proteins	Lecture, presentation, illustrations	Questions and answers + exercise solutions
10	5	1- The student will understand the types of globular and fibrous proteins. 2- The student will understand the shapes and structures of proteins.	Proteins	Lecture, presentation, illustrations	Questions and answers + exercise solutions
11	5	1- The student will understand the role of enzymes as catalysts in biological reactions. 2- The student will understand the mechanism of enzyme action.	Enzymes	Lecture, presentation, illustrations	Questions and answers + exercise solutions
12	5	1- The student will understand the types of enzymes.	Enzymes	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		2- The student will understand enzyme activity, the active site of the enzyme, and the specific activity of the enzyme.			
13	5	1- The student will understand the theories of enzyme function.	Enzymes	Lecture, presentation, illustrations	Questions and answers + exercise solutions
14	5	1- The student will understand the importance of nucleic acids. 2- The student will understand the chemical composition of nucleic acids (DNA and RNA).	Nucleic acids	Lecture, presentation, illustrations	Questions and answers + exercise solutions
15	5	1- The student will know the types of nucleic acids (RNA). 2- The student will understand the difference between nucleic acids (DNA and RNA).	Nucleic acids	Lecture, presentation, illustrations	Questions and answers + exercise solutions
11. Course Evaluation: Tests + Exercises + Discussions + Questions					
12. Learning and Teaching Resources					
Required textbooks (curricular books, if any)			The vocabulary prescribed by the Ministry of Higher Education and Scientific Research		

Main references (sources)	Lehninger Principles of Biochemistry David L. Nelson, Michael M. Cox, Aaron A. Hoskins th edition-2021
Recommended books and references (scientific journals, reports...)	Google scholar, researcher gate
Electronic References, Websites	All sites that provide reliable sources and also artificial intelligence tools

Course Description Form

1. Course Name:	
Organic agriculture	
2. Course Code:	
TAMO352	
3. Semester / Year:	
2024-2025	
4. Description Preparation Date:	
9-5-2025	
5. Available Attendance Forms:	
Paper form including name, date of attendance and signature	
6. Number of Credit Hours (Total) / Number of Units (Total)	
45/2	
7. Course administrator's name (mention all, if more than one name)	
Name: Azhar Idrees Thanon Email: azharadrees16@ntu.edu.iq	
8. Course Objectives	
Course Objectives	1- The student will learn about the ancient organic farming system and its characteristics compared to traditional farming. 2- The student will learn about the components of moisture and its importance in organic farming. 3- The student will learn about the use of specialized organic materials in agriculture.

	4- Understanding the importance of organic farming in various aspects of life 5- Comparison between organic and conventional farming 6- Identifying the factors affecting organic farming

9. Teaching and Learning Strategies

Strategy	There are several effective strategies for teaching the organic agriculture course, which aim to foster a deep understanding of organic agriculture concepts and develop critical thinking skills: 1. Dialogue- and discussion-based learning. 2. Brainstorming. 3. Collaborative learning. 4. Simulation-based learning. 5. Practical training. 6. Self-directed learning.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	1. The student will understand the basic concepts of organic agriculture. 2-The student will understand the terminology of 3. The storganic agriculture 3-udent will understand organic	Terms related to organic farming. - Learn about the most important agricultural systems. - What is an organic product	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		agriculture phenomena and implications.			
2	3	The student should understand Definition of organic agriculture	- Principles of organic farming. - Some organizations interested in organic medium-sized farming.	Lecture, presentation, illustrations	Questions and answers + exercise solutions
3	3	The student should understand Soil pollution - Types of agricultural soil pollutants. - Pollution from chemical fertilizers. - Environmental damage from pesticide pollution. - The most important consequences of excessive pesticide use.	Pollution	Lecture, presentation, illustrations	Questions and answers + exercise solutions
4	3	The student should understand Site Selection Requirements - Agricultural Product Selection Requirements	Conditions required for organic farm elements	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		- Certification and Accreditation			
5	3	The student should understand Benefits and advantages of agricultural rotations. Agricultural rotation design. Steps for designing agricultural rotations.	What are the organic fertilizers, soil conditioners, agricultural processes and techniques that are followed?	Lecture, presentation, illustrations	Questions and answers + exercise solutions
6	3	The student should understand Natural Fertilization (Organic and Biofertilizers) -The Role of Organic Fertilizers in Soil Properties	Classification of organic fertilizer types	Lecture, presentation, illustrations	Questions and answers + exercise solutions
7	3	The student should understand Uses of Compost - Types of Compost - Stages of Compost Preparation - Factors Affecting Compost	Industrial organic fertilizers (compost).	Lecture, presentation, illustrations	Questions and answers + exercise solutions
8	3	The student should understand Classification of biofertilization (biofertilization)	Biological fertilizer	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		- Types of biofertilizers - Economic benefits of biofertilizers			
9	3	The student should understand Humic acids. - Fulvic acids. - Humic acids. - Benefits of humic acids for plants and soil.	Humic acids (humic composition)	Lecture, presentation, illustrations	Questions and answers + exercise solutions
10	3	The student should understand Biological fixation - Atmospheric fixation - Artificial fixation	The role of nitrogen in nature	Lecture, presentation, illustrations	Questions and answers + exercise solutions
11	3	- The student should understand Nitrogen fixation by symbiotic bacteria - Nitrogen fixation by free-living bacteria	Types of nitrogen fixation	Lecture, presentation, illustrations	Questions and answers + exercise solutions
12	3	The student should understand Natural Resistance - Solar Moisture Pasteurization	Disease resistance in organic farming	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		- Soil Steam Sterilization - Agricultural Processes - Use of Fungi and Green Manures to Control Plant Diseases			
14	3	The student should understand Natural Resistance - Solar Moisture Pasteurization - Soil Steam Sterilization	Insect resistance in organic farming	Lecture, presentation, illustrations	Questions and answers + exercise solutions
15	3	- The student should understand Agricultural Processes - Use of Fungi and Green Manures to Control Plant Diseases	insect resistance in organic farming	Lecture, presentation, illustrations	Questions and answers + exercise solutions

11. Course Evaluation	
: Tests + Exercises + Discussions + Questions	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	The vocabulary prescribed by the Ministry of Higher Education and Scientific Research
Main references (sources)	Organic Agriculture Book by:

	Professor Dr. Jassim Mohammed Alwan / Department of Horticulture and Landscape Architecture Sama'at Ismail Abdullah / Department of Natural Sciences and Water Sovereignty
Recommended books and references (scientific journals, reports...)	Google scholar, researcher gate
Electronic References, Websites	All sites that provide reliable sources and also artificial intelligence tools

Course Description Form

1. Course Name:	
genes	
2. Course Code:	
PLP301	
3. Semester / Year:	
2024 - 2025	
4. Description Preparation Date:	
5 – 6 - 2025	
5. Available Attendance Forms:	
Paper form including name, date of attendance and signature	
6. Number of Credit Hours (Total) / Number of Units (Total)	
3/5	
7. Course administrator's name (mention all, if more than one name)	
Name: Noura Huseen Saleh Email: Noura_aljarjary@ntu.edu.iq	
8. Course Objectives	
Course Objectives	By the end of the course, the student is expected to be able to: 1. Understand the basic concepts of heredity 2. Explain the mechanisms of hereditary trait transmission 3. Identify the genetic makeup of living organisms 4. Analyze genetic patterns

	5. Understand the relationship between genes and phenotypic traits 6. Identify genetic mutations and their effects 7. Understand the importance of heredity in various areas of life.

9. Teaching and Learning Strategies

Strategy	There are several effective strategies for teaching the Principles of Genetics course, which aim to foster a deep understanding of genetic concepts and develop critical thinking skills: 1. Dialogue- and discussion-based learning. 2. Brainstorming. 3. Collaborative learning. 4. Simulation-based learning. 5. Practical training. 6. Self-directed learning.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	5	1. The student will understand the basic concepts of genetics. 2. The student will understand the terminology of genetics. 3. The student will understand	Genetic history, and development, relationshipnbetween genetic and other scince	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		genetic phenomena and implications.			
2	5	1. The student will understand the interpretation of chromosomal theories. 2. The student will know Mendelian inheritance and its laws. 3. The student will apply Mendelian inheritance problem-solving.	Chromosome theory, Mendelar genetic	Lecture, presentation, illustrations	Questions and answers + exercise solutions
3	5	1. The student should understand the interpretation of genetic variation. 2. The student should understand experimental vaccination.	Test cross, modified mendelian	Lecture, presentation, illustrations	Questions and answers + exercise solutions

4	5	1. The student should know the types of genes. 2. The student should understand genetic interaction.	Gene intraction	Lecture, presentation, illustrations	Questions and answers + exercise solutions
5	5	1. The student should understand the interpretation of genetic variation. 2. The student should understand test pollination.	Probability and use in genetic problems	Lecture, presentation, illustrations	Questions and answers + exercise solutions
6	5	1. The student will recognize the nature of genetic crossing-over. 2. The student will understand the mechanism of genetic crossing-over. 3. The student will apply the theories of	Linkageand crossing over and chromosome mapping	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		genetic crossing-over.			
7	5	1. The student will understand the structure and function of chromosomes. 2. The student will understand the normal number of chromosomes. 3. The student will understand the abnormalities of chromosomes.	Variation in chromosome number	Lecture, presentation, illustrations	Questions and answers + exercise solutions
8	5	1. The student will know the basics of blood groups. 2. The student will understand the mechanism of blood group inheritance. 3. The student will know dominant and recessive blood types.	Sex determination, chromosomes, sex genetic balance	Lecture, presentation, illustrations	Questions and answers + exercise solutions

9	5	1. The student will know the types of genetic mutations. 2. The student will understand the mechanism of mutations. 3. The student will know the causes of genetic mutations.	Blood group	Lecture, presentation, illustrations	Questions and answers + exercise solutions
10	5	1. The student will know what phenotypic variation is. 2. The student will understand how to estimate heritability. 3. The student will be familiar with genetic maps.	Genetic mutation	Lecture, presentation, illustrations	Questions and answers + exercise solutions
12	5	1. The student will learn about the cell cytoplasm. 2. The student will understand	Quantitive genetic. Effect of leathal gene	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		the role of cytoplasm in the process of inheritance. 3. The student will learn about genetic material and genes.			
13	5	1. The student will understand the history and development of genetic engineering. 2. The student will understand the applications used in genetic engineering. 3. The student will understand the techniques used in genetic engineering.	Cytoplasmic genetic	Lecture, presentation, illustrations	Questions and answers + exercise solutions
14	5	1. The student will understand the principles of genetic engineering. 2. The student will understand common	Genetic engineering	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		genetic modification techniques. 3. The student will understand the benefits of genetic modification.			
15	5	1. The student will learn about the biological diversity of living organisms. 2. The student will understand genetic variation. 3. The student will apply research and innovation.	Engineering practice in the plants technology reproductive	Lecture, presentation, illustrations	Questions and answers + exercise solutions
11. Course Evaluation : Tests + Exercises + Discussions + Questions					
12. Learning and Teaching Resources					
Required textbooks (curricular books, if any)			The vocabulary prescribed by the Ministry of Higher Education and Scientific Research		
Main references (sources)			Genetics Book (Prof. Dr. Fouad Razzaq Al-Baraki) + Principles of Genetics (Don Gardner)		

Recommended books and references (scientific journals, reports...)	Google scholar, researcher gate
Electronic References, Websites	All sites that provide reliable sources and also artificial intelligence tools

Course Description Form

1. Course Name:	
Plant nutrition	
2. Course Code:	
PLP 302	
3. Semester / Year:	
Third Level / 2024-2025	
4. Description Preparation Date:	
08/06/2025	
5. Available Attendance Forms:	
Paper form including name, date of attendance and signature	
6. Number of Credit Hours (Total) / Number of Units (Total)	
75/5	
7. Course administrator's name (mention all, if more than one name)	
Name: **Alaa Raja Ali** Email: **alaa.raja@ntu.edu.iq**	
8. Course Objectives	
Course Objectives	1. Understanding the basics of plant nutrition 2. Understanding and studying how plants absorb nutrients 3. Diagnosing nutrient deficiencies in plants 4. Improving soil fertility and fertilizer management 5. Practical applications in agriculture 6. Keeping up with scientific developments

9. Teaching and Learning Strategies	
Strategy	1. Dialogue- and discussion-based learning. 2. Brainstorming. 3. Collaborative learning. 4. Practical training. 5. Self-directed learning.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	5	**1.** Identify the essential plant nutrients (macronutrients and micronutrients) and understand their physiological roles. **2.** Explain the mechanisms of nutrient uptake from the soil and within plant tissues. **3.** Analyze the factors affecting nutrient availability (such as soil pH, organic matter, and nutrient interactions). **4.** Diagnose symptoms of nutrient deficiency or toxicity in plants based on visual signs and laboratory analyses. **5.** Compare	Introduction to Plant Nutrition	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		different types of fertilizers (organic, chemical, and biofertilizers) and their effects on plants and the environment. **6.** Understand modern nutrition techniques such as soilless cultivation (hydroponics) and precision fertilization.			
2	5	1. The student should be able to identify the essential nutrients required for proper plant growth. 2. The student should state the importance of each nutrient in the vital processes within the plant. 3. The student should explain the role of macronutrients such as nitrogen, phosphorus, and potassium in plant growth. 4. The student should recognize micronutrients such as iron, zinc, and manganese, and	Main Components of Plant Nutrition	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		their effects on plant health. 5. The student should distinguish between the deficiency symptoms of different nutrients on various plant parts such as leaves or roots			
3	5	1. Analyze soil or plant test results to identify deficiencies or excesses of nutrients. 2. Suggest solutions or recommendations to correct nutrient deficiency problems in plants (such as appropriate fertilization). 3. Use tools and techniques for assessing plant nutrition (such as pH testing or leaf analysis)	Nutrient Sources	Lecture, presentation, illustrations	Questions and answers + exercise solutions
4	5	**Scientific Visit**			
5	5	1. The student should explain how plants absorb nutrients from the soil through the roots.	Absorption and Translocation of Nutrients	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		2. The student should describe the role of root hairs in the absorption process. 3. The student should distinguish between active and passive nutrient uptake mechanisms. 4. The student should identify the factors that influence nutrient absorption from the soil (such as pH, moisture, and aeration). 5. The student should describe the pathway of nutrient translocation from the roots to other parts of the plant. 6. The student should trace the movement of nutrients through the xylem and phloem			
6	5	**First Term Exam**			
7	5	1. The student should explain the concept of a growing medium and its role in supporting plant life.	The Relationship Between Plants and Different Growing Media	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		2. The student should list the different types of growing media (natural soil, hydroponics, soilless culture, peat moss, vermiculite, perlite). 3. The student should describe the characteristics of each growing medium in terms of aeration, water retention, and nutrient availability. 4. The student should compare plant growth efficiency across different growing media. 5. The student should explain how the type of growing medium affects nutrient absorption and root development.			

8	5	**Conducting Laboratory Scientific Experiments**			
9	5	1. The student should define the concept of passive (or simple) absorption in plants. 2. The student should explain that passive absorption occurs without energy consumption by the plant (unlike active absorption). 3. The student should describe the mechanisms involved in passive absorption, such as: 4. Simple diffusion 5. Osmosis 6. The student should explain the role of concentration gradients in the movement of nutrients from the soil solution into the root.	Passive absorption	Lecture, presentation, illustrations	Questions and answers + exercise solutions
10	5	1. The student should explain how different	Effect of Environmental Factors on Plant	Lecture, presentation,	Questions and answers + exercise

		environmental factors affect the plant's ability to absorb nutrients. 2. The student should describe the role of temperature in accelerating or slowing down nutrient uptake. 3. The student should illustrate how soil salinity negatively impacts water and nutrient absorption. 4. The student should relate soil pH to the availability of nutrients for plant uptake. 5. The student should explain the relationship between soil moisture and the root's ability to absorb water and ions.	Nutrition	illustrations	solutions
11	5	**Scientific Field Trip Proposal To The University Agricultural Fields**			
12	5	1. To identify the	Nutrients and	Lecture,	Questions and

		essential nutrients required by plants for growth and development. 2. To understand the difference between macronutrients (such as nitrogen, phosphorus, potassium) and micronutrients (such as iron, zinc, manganese). 3. To explain the functions of each nutrient in the plant and its importance in various physiological processes. 4. To distinguish the deficiency symptoms of different nutrients as they appear on the plant (such as yellowing, stunting, leaf edge burn). 5. To correlate the visible deficiency symptoms on the plant with the specific missing nutrient.	Their Deficiency Symptoms in Plants	presentation, illustrations	answers + exercise solutions
13	5	**Second Term Exam**			
14	5	**Comprehensive Review and Assessment Model for Deferred Students**			
15	5	**Final Curriculum Review Plan**			
11. Course Evaluation					

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	The vocabulary prescribed by the Ministry of Higher Education and Scientific Research
Main references (sources)	Al-Mawsili, M. A. D., et al. (2019). *Plant nutrition (theoretical and practical)*. Dar Al-Kutub Al-Ilmiyah. Beirut, Lebanon.
Recommended books and references (scientific journals, reports...)	Google Scholar, Research Gate
Electronic References, Websites	All Sites That Provide Reliable Sources And Also Artificial Intelligence Tools

Course Description Form

1. Course Name:	
Protected Agriculture Techniques	
2. Course Code:	
PLP 303	
3. Semester / Year:	
Level 3 2024-2025	
4. Description Preparation Date:	
9/ 6/2025	
5. Available Attendance Forms:	
A paper form that includes the student's name, date of attendance, and signature.	
6. Number of Credit Hours (Total) / Number of Units (Total)	
75 /3	
7. Course administrator's name (mention all, if more than one name)	
Name: : **Amer Moqbel Abdul Hameed** Email: **amer.m@ntu.edu.iq**	
8. Course Objectives	
Course Objectives	1. Students will learn the problems and obstacles facing farmers in protected agriculture. 2. Students will learn the points to consider when building greenhouses and plastic houses. 3. Students will gain the knowledge and ability to produce crops from different plant families within a protected environment.
9. Teaching and Learning Strategies	
Strategy	1. Explanation and clarification.

	2. Lecture delivery. 3. Video and image playback. 4. Daily and monthly exams. 5. Dialogue-based learning and discussion. 6. Practical aspects.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	1. Introduce the student to the first people who used greenhouses. 2. Define greenhouses and their benefits.	A historical overview of protected agriculture	Presentation, explanation, questions and answers, discussion	Test and Questions and Answers
2	2	1. Identify the most important problems facing Iraqi farmers when farming in a protected environment. 2. Identify the economic evaluation of greenhouse farming.	Problems and obstacles facing farmers in protected agriculture	Demonstrative lecture, interactive lessons	Test and Questions and Answers
3	2	1. Identify the necessary points for establishing a greenhouse. 2. The economics of production in protected agriculture compared to open-air agriculture	Points to consider when building greenhouses and plastic houses	Demonstrative lecture, interactive lessons	Test and Questions and Answers
4	2	1. Identify the types of covers. 2. Their specifications.	Types of covers	Demonstrative group discussion	Test and Questions and Answers
5	2	1. Student knowledge of polyethylene plastic sheeting	Types of plastic covers	Demonstrative lecture,	Test and Questions and Answers

		2. Polyvinyl chlorides 3. Ethylene vinyl acetate 4. Mylar		interactive lessons	
6	2	1. How does temperature affect the protected environment? 2. How does light affect the protected environment? 3. How does temperature affect the protected environment?	The Effect of Climatic Factors on Plant Growth in Protected Agriculture Facilities	Presentation, explanation, questions and answers, discussion	Test and Questions and Answers
7	2	Know the importance of light for plants.	Light	Demonstrative lecture, interactive lessons	Test and Questions and Answers
8	2	1. Student knowledge of the effect of light on plants through: Intensity, type, and length of the photoperiod 1. Student knowledge of the factors affecting CO2 absorption, which are plant type and variety - Light intensity - Carbon dioxide concentration in the atmosphere - Thirst	The Effect of Light	Presentation, explanation, questions and answers, discussion	Test and Questions and Answers
9	2	1. Identify ways to extend the period of darkness.	Factors Affecting Carbon	Demonstrative lecture, interactive lessons	Test and Questions and Answers

		2. Shorten the period of darkness. 3. Increase light intensity. 4. Reduce light intensity.	Dioxide Absorption		
10	2	Introduce the student to the characteristics that agricultural environments should possess.	Controlling the length of the photoperiod	Demonstrative lecture, interactive lessons	Test and Questions and Answers
11	3 Practical part	Students will learn about the characteristics of agricultural media.	Media used in protected cultivation	Group discussion on media used in agriculture	Test and Questions and Answers
12	3	Learn about agricultural media and their specifications, including: Perlite / Vermiculite Peat / Peat moss Sphagnum moss	Types of media used in protected cultivation	View the lecture on the Data Show	Test and questions and answers, practical exercise at the protected facility site
13	3	1. Learn about cultivation in: Beds / Ring cultivation Straw bale cultivation Bag cultivation Rockwool cultivation Hydroponic cultivation	Modern cultivation methods for tomato plants	View the lecture on the Data Show	Test and questions and answers, practical exercise at the protected facility site
14	3	Knowing the nutritional value Suitable weather conditions Suitable soil/propagation Planting method/irrigation/fertilization	Methods for Growing and Producing Shalik	View the lecture on the Data Show	Test and questions and answers, practical exercise at the protected facility site

15	3	1. Knowing cooling methods 2. Heating methods 3. Thermostat	Humidity Problems in Greenhouses	Group discussion and questions and answers on the main causes of humidity	Test and questions and answers, practical exercise at the protected facility site

11. Course Evaluation
Tests and field practices with cooperative learning and problem solving.

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	According to the terms specified by the Ministry of Higher Education and Scientific Research.
Main references (sources)	Dr. Bashir, Essam Abdullah "Protected Agriculture"
Recommended books and references (scientific journals, reports...)	Protected Agriculture Dr. Essam Abdullah Bashir
Electronic References, Websites	• https://agrsaba.alexu.edu.eg/index.php/2016-02-25-09-33-33/2021-04-28-11-18-19/2021-04-28-11-20-45

Course Description Form

1. Course Name:
Ornamental plants
2. Course Code:
PLP304
3. Semester / Year:
Level Three / 2024-2025
4. Description Preparation Date:
9/6/2025
5. Available Attendance Forms:
Paper form including name, date of attendance and signature
6. Number of Credit Hours (Total) / Number of Units (Total)
60 / 3
7. Course administrator's name (mention all, if more than one name)
Name: Khawla Mahmoud Yahya Email: kawllamhmood@ntu.edu.iq Name: yarub samer ahmed mustafa Email: yarub.sa@ntu.edu.iq
8. Course Objectives

Course Objectives	By the end of the course, the student is expected to be able to: 1. • The student will be well acquainted with a detailed definition of ornamental plants and how to utilize them in the job market, in addition to methods of employing

	them in the service of different types of gardens. 2. The student will be able to recognize the most important types of Ornamental trees, their structural forms, methods of service, and the most suitable places for planting and distributing them in public and private gardens, in addition to the mechanism of distributing trees in the center islands. Public and private gardens in addition to the mechanism of distributing trees in the center islands For streets and the specifications of trees planted in the center islands 3. The student will be able to identify the coordinating value of hedge plants, their types, care methods, suitable environmental conditions for their growth, and recognize the most important hedge plants found in Iraq. 4. The student will be able to identify types of flowering herbs, their ornamental value, planting times, and suitable care methods for each type. 5. The student is able to take care of indoor ornamental plants and adapt the environmental conditions to make them suitable for their growth and longevity, as well as to address the main problems that hinder their cultivation in the closed environments of offices and halls. 6. The student will be able to cultivate and produce globally important cut flowers and

	will be aware of the most important cut flowers produced worldwide and their market value, along with knowledge of their production seasons in the open environment. 7. • The student will be able to identify green potted plants and flowering plants, understand the aesthetic value of each, as well as the methods of producing and commercially marketing them.

9. Teaching and Learning Strategies

Strategy	1. Dialogue- and discussion-based learning. 2. Brainstorming. 3. Collaborative learning. 4. Practical training. 5. Self-directed learning.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	1- The student will learn about ornamental plants, the economic importance of their production and marketing, and be able to distinguish between their main groups. He will also know the benefits of each group.	Introduction to Ornamental Plants The economic importance of ornamental plants, the main groups of ornamental plants.	Lecture, presentation, illustrations	Questions and answers + exercise solutions

2	4	1- The student will understand the meaning of the term herbaceous plants and be able to differentiate between their types. 2- The student will identify winter annuals, understand their coordinating importance, planting dates, and how to maintain them, and have knowledge of the most important types of winter annuals. - The student will identify summer annuals, understand their coordinating importance, planting dates, and how to maintain them, and have knowledge of the most important types of summer annuals.	Flowering herbs Winter annuals, the importance of coordination, planting time, major types of winter annuals Summer annuals: their coordinative importance, planting time, and major types of summer annuals.	Lecture, presentation, illustrations	Questions and answers + exercise solutions
3	4	The student will learn about biennial herbaceous ornamental plants, their coordinating importance, and will be familiar with	Flowering herbs Herbaceous biennial ornamental plants, their coordination significance, planting	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		planting dates and maintenance methods. He will also learn about their most important types. The student will be able to identify perennial herbaceous plants, their coordinating importance, determine planting dates, and learn about their most important types.	time, and main types. Perennial herbs, coordinating importance, planting time, main types.		
4	4	He The student will distinguish between the types of hedges. They will understand the decorative value of hedge plants. They will be familiar with the botanical classification of ornamental hedge plants. They will be familiar with the maintenance and	The coordinating value of hedge plantsThe plant classification of ornamental hedge plantsThe most important ornamental hedge plants	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		care of hedge plants.dge plants			
5	4	The student will distinguish between the types of hedges. They will understand the decorative value of hedge plants. They will be familiar with the botanical classification of ornamental hedge plants. They will be familiar with the maintenance and care of hedge plants.	Ornamental climber The coordinating value of climbing ornamental plantsThe botanical classification of climbing ornamental plantsThe most important climbing ornamental plants	Lecture, presentation, illustrations	Questions and answers + exercise solutions
6	4	The student will learn about the decorative value of ornamental shrubs. They will be familiar with the botanical classification of ornamental shrubs. They will gain knowledge of the most important ornamental shrubs in Iraq and the	Ornamental shrubs The coordinating value of ornamental shrubsThe botanical classification of ornamental shrubsThe most important ornamental shrubs in Iraq	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		decorative value of each.			
7	4	The student will learn about the landscaping value of ornamental trees and how to distribute them in public and private gardens. The student will learn about the economic and environmental importance of ornamental trees. The student will be familiar with the botanical classification of ornamental trees.	Ornamental trees The coordinating value of ornamental treesThe botanical classification of ornamental trees	Lecture, presentation, illustrations	Questions and answers + exercise solutions
8	4	Introducing students to the most important characteristics of median and sidewalk trees, and how to distribute and maintain them. Students will be familiar with the most important problems facing trees in industrial	Ornamental trees The main characteristics of median and street treesTrees of industrial areasThe most important ornamental trees in Iraq	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		areas and how to address them. Students will be familiar with the most important ornamental trees in Iraq.			
9	4	1- The student will understand the meaning of the term ornamental bulbs and distinguish between their types. 2- The student will be familiar with the coordination importance, planting times, and how to serve ornamental bulbs, and will have knowledge of their most important types.	Ornamental bulbous plants Types of ornamental bulbsThe coordinating value of ornamental bulbs and care methods for them	Lecture, presentation, illustrations	Questions and answers + exercise solutions
10	4	The student will learn about the economic importance of cut flowers. They will be familiar with the most important types of cut flowers and the economic value of each.	Cut flowers	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		They will be familiar with how some cut flowers are produced.			
11	4	The student will be familiar with the most important field factors affecting cut flower production. The student will be familiar with methods for addressing field problems that may face flower production in greenhouses. The student will gain knowledge of how to produce flowers on a commercial scale.	Cut flowers Economic importance of the main types of cut flowers	Lecture, presentation, illustrations	Questions and answers + exercise solutions
12	4	The student will be familiar with the most important post-harvest processes that affect the production and flower life of cut flowers. The student will be familiar with flower treatment methods before and during storage.	Factors affecting cut flowers during harvest and post-harvest cut flower treatments	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		The student will gain knowledge of the types of preservation solutions for cut flowers.			
13	4	The student will learn about ornamental palm species. The student will be able to use palm species in gardens.	ornamental palm	Lecture, presentation, illustrations	Questions and answers + exercise solutions
14	4	The student will be able to classify indoor landscaping plants according to their environment and growing conditions. The student will be able to propagate indoor landscaping plants. The student will be able to address the problems faced by indoor landscaping plants in closed environments.	Interior landscaping plants	Lecture, presentation, illustrations	Questions and answers + exercise solutions
15	4	The student will be able to identify the types of green spaces and their intended uses. They	Green areas Types of green surfaces	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		will be familiar with the mechanism for maintaining green spaces. The student will learn about the types of green spaces in sports fields.	Ways to care for green areas		

11. Course Evaluation	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	The vocabulary prescribed by the Ministry of Higher Education and Scientific Research
Main references (sources)	نباتات الزينة .سالم سلطان / جامعة الموصل انتاج نباتات الزينة , أبو الذهب محمد أبو الذهب ,المملكة العربية السعودية / دار المريخ للنشر
Recommended books and references (scientific journals, reports...)	Google scholar, researcher gate
Electronic References, Websites	All sites that provide reliable sources and also artificial intelligence tools

Course Description Form

1. Course Name:
Plant Growth Regulators
2. Course Code:
PLP 305
3. Semester / Year:
One / Three
4. Description Preparation Date:
2025/6 /10
5. Available Attendance Forms:
Paper form including name, date of attendance and signature
6. Number of Credit Hours (Total) / Number of Units (Total)
60 / 2
7. Course administrator's name (mention all, if more than one name)
Name: waad saeed faizy Email: waadwaad1970@ntu.edu.iq
8. Course Objectives

Course Objectives

9. Teaching and Learning Strategies

Strategy

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name
1	4	1. The student will explain growth regulators and plant hormones. 2. List the main groups of growth regulators. 3. The student will understand the general	Introduction to Plant Growth Regulators

		physiological effects of growth regulators.	
2	4	1- The student will learn about auxins. 2- The student will draw a Fent experiment diagram to explain phototropism. 3- The student will understand the biological structure and mechanisms of auxin transport within the plant.	Auxins
3	4	1. The student will explain the mechanism by which plants control auxin concentration. 2. The student will identify the natural sources of auxin and its distribution in plants. 3. The student will analyze the phenomena affected by auxin.	Continued Auxins
4	4	1- The student will learn about gibberellins and	Gibberellins

		how they are discovered. 2- The student will list their general and chemical properties. 3- The student will identify the main sites of their production within plants.	
5	4	1. The student will identify the sites of gibberellins synthesis in plants. 2. The student will explain the methods of gibberellins' degradation and the compounds that antagonize them. 3. The student will understand the mechanism of action, movement, and transport of gibberellins in plants. 4. The student will distinguish the physiological effects of gibberellins.	Continued Gibberellins

6	4	1- The student will identify cytokinins. 2- The student will compare the types of cytokinins. 3- The student will understand how cytokinins are formed and the direction of movement in plants.	Cytokinins
7	4	1. The student will conduct a biochemical investigation of cytokines. 2. The student will understand how cytokines work. 3. The student will identify the locations where cytokines are found and synthesized. 4. The student will analyze the physiological phenomena of cytokines.	Continued Cytokinins
8			First Semester Exam
9	4	1. The student will conduct a biochemical	Ethylene

		investigation of cytokines. 2. The student will understand how cytokines work. 3. The student will identify the locations where cytokines are found and synthesized. 4. The student will analyze the physiological phenomena of cytokines.	
10	4	1. To enhance the student's understanding of the role of ethylene in plant growth and behavior. 2. To encourage the student to conduct a biological assay of ethylene. 3. To stimulate the student's curiosity to explore the physiological effects of ethylene.	Continued Ethylene
11	4	1- The student understands that growth regulation	Abscisic Acid

		can be achieved by inhibiting it. 2- The student understands the natural presence and distribution of abscesses. 3- The student traces the pathways of ethylene movement in plants.	
12	4	1- The student will explain the mechanism of biosynthesis of acetylated hexapeptide. 2- The student will conduct an acid metabolism and bioassay. 3- The student will identify the physiological effects of acetylated hexapeptide.	Continued Abscisic Acid
13			Second Semester Exam
14	4	1- The student will be able to identify growth inhibitors and growth-inhibiting substances.	Growth Retardants and Inhibitors

		2- The student will increase his or her knowledge of growth inhibitors and growth-inhibiting substances. 3- The student will be able to distinguish between natural and synthetic inhibitors and growth-inhibiting substances.	
15	4	1- The student will analyze phenomena that can be treated using plant growth regulators. tudent will be able to identify the appropriate growth regulator and concentration to treat a specific condition. 3- The student will implement the treatment process through a practical application.	Introduction to Plant Growth Regulators
11. Course Evaluation			

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	• Prescribed textbook: Abdul, Karim Sa Scientific Research. Salahuddin Univer
Main references (sources)	• Printed lectures and notes
Recommended books and references (scientific journals, reports...)	Growth and flowering regulators Agriculture, Mansoura University
Electronic References, Websites	All sites that provide reliable sources a http://hasancelik.web.tr/derssunur

Course Description Form

1. Course Name:					
Molecular Genetics					
2. Course Code:					
PLP306					
3. Semester / Year:					
Level Three / 2024 - 2025					
4. Description Preparation Date:					
1/7/2025					
5. Available Attendance Forms:					
Paper form including name, date of attendance and signature					
6. Number of Credit Hours (Total) / Number of Units (Total)					
45/2					
7. Course administrator's name (mention all, if more than one name)					
Name: Asst. Prof. Dr. Fahad K. Y. Al-Dulaimi Email: fahadbiologymycology@ntu.edu.iq					
8. Course Objectives					
Course Objectives	By the end of the course, the student is expected to be able to: 1. Apply the basic concepts of molecular genetics. 2. Conduct practical experiments to examine the structure of genetic material (DNA and RNA). 3. Apply mechanisms of replication, transcription, and translation to explain gene expression processes in plants. 4. Analyze gene structure and regulation of gene expression using genetic analysis software. 5. Use genetic material repair techniques in applied case studies to understand genome stability in crops. 6. Perform practical experiments using molecular techniques such as PCR, electrophoresis, and extraction and analysis of genetic material in the laboratory.				
9. Teaching and Learning Strategies					
Strategy	1. Interactive lectures 2. Project-based learning 3. Teamwork 4. Problem-based learning 5. Practical workshops 6. Presentations and classroom discussions 7. Blended e-learning				
10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	3	Explain the basic concepts of	Introduction to Molecular	Interactive lecture +	Classroom participation

		molecular genetics and its importance in improving plant traits.	Genetics: Basic concepts and the importance of molecular genetics in plant improvement.	classroom discussion	assessment
2	3	Identify the structure of genetic material (DNA and RNA) and explain their chemical and physical properties.	Structure of Genetic Material: DNA and RNA – chemical and physical properties.	Interactive lecture + applied activity	Applied activity + simple individual evaluation
3	3	Interpret the mechanisms of genetic material replication and associated enzymatic processes.	DNA Replication: Enzymes and replication mechanisms.	Lecture + practical laboratory workshop	Oral test
4	3	Clarify gene structure in prokaryotes and eukaryotes, comparing structural differences.	Gene Structure in Prokaryotes and Eukaryotes.	Interactive lecture + group analytical activities	Group assessment
5	3	Explain the process of transcription.	Transcription: RNA synthesis from DNA.	Individual/group practical application (drawing and presenting transcription mechanism) + classroom discussion	Individual assignment
6	3	Explain the process of translation, highlighting the role of the genetic code in protein	Translation: Protein synthesis and the role of the genetic code.	Short lecture + applied activity	Applied activity assessment

		synthesis.			
7	3	Interpret gene expression regulation mechanisms at transcriptional and translational levels in plant cells.	Gene Expression Regulation**:** Control mechanisms of transcription and translation.	Practical training on analyzing gene expression regulation systems in plants + classroom discussion	Short written quiz
8	3	Classify genetic mutations and analyze their negative and positive effects on plants.	Genetic Mutations: Types, causes, and effects on plants.	Case studies on mutations + applied activity	Case analysis assessment
9	3	Explain genetic material repair mechanisms and their role in maintaining genetic trait stability.	DNA Repair: Mechanisms for repairing genetic material damage.	Lecture for laboratory experiment on DNA repair mechanisms using live demonstrations and models + classroom discussion	Practical assessment
10	3	Apply basic molecular techniques such as PCR and electrophoresis in plant genetics studies.	Molecular Techniques: PCR, electrophoresis, and genetic engineering.	Practical laboratory workshop: performing PCR + electrophoresis and analyzing results	Practical report
11	3	Interpret the use of molecular markers in breeding programs and plant improvement.	Molecular Markers: Applications in plant breeding.	Interactive lecture on the use of molecular markers with applied data analysis	Applied activity report
12	3	Analyze molecular genetics	Applications of Molecular	Group applied project on	Group project evaluation

		applications in developing plant varieties and increasing productivity.	Genetics: Role in plant genetic improvement programs.	molecular genetics applications for improving a selected crop	
13	3	Review modern techniques in molecular genetics and their role in accelerating genetic improvement programs.	Modern Techniques in Molecular Genetics.	Interactive lecture	Case analysis report
14	3	Explain how CRISPR technology is used in gene editing to create modified plant varieties.	CRISPR and Genome Editing in Plants.	Practical training on CRISPR technique (video presentations, simulations, case study analysis)	Group discussion activity + oral evaluation
15	3	Discuss ethical and legal issues related to the use of genetic engineering techniques.	Ethical and Legal Issues in Genetic Engineering.	Interactive classroom discussion on ethical and legal issues with real-world examples	Classroom participation assessment

11. Course Evaluation

(Total Score: 100 Marks)

1. Class Participation and Weekly Activities **10%**
2. Individual and Group Assignments/Tasks **10%**
3. Periodic Short Quizzes **10%**
4. Research Presentation and Discussion **10%**
5. Practical Work **10%**
6. Final Written Exam **50%**

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	
Recommended books and references	https://www.springer.com/journal/11103

(scientific journals, reports...)	
Electronic References, Websites	

Course Description Form

1. Course Name:	
Industrial crops	
2. Course Code:	
PLP 307	
3. Semester / Year:	
Third	
4. Description Preparation Date:	
8/6/2025	
5. Available Attendance Forms:	
A paper form that includes the student's name, date, and signature.	
6. Number of Credit Hours (Total) / Number of Units (Total)	
45 – 2	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr.Zahraa Abdulrahman Sabri *Email: 85zahraa@ntu.edu.iq*	
8. Course Objectives	
Course Objectives	1- Providing students with the knowledge and skills necessary to understand industrial projects and their importance. 2. Enable students to broadly utilize this knowledge and skills to solve problems related to industry and production. 3. Teaching students how to effectively manage industrial crops, such as crop cultivation, irrigation, fertilizer, and protection. 4. Qualifying new students or specialized

	academic cadres in industrial specializations.

9. Teaching and Learning Strategies

Strategy	1- Interactive lecture 2- Brainstorming 3- Dialogue and discussion 5- Assignment of tasks and reports 6- Educational videos

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	To introduce the student to industrial crops.	Industrial crops are defined by their economic importance	Lecture + Presentation	Test + Questions and Answers + discussion
2	3	To introduce the student to the types of industrial crops.	General characteristics of oils, partitioning, dietary fats, development of sugar production, fibres Grinding grain crops and accumulated foods	Lecture + Presentation	Test + Questions and Answers + discussion
3	3	1- The student will learn about the economic, nutritional, and industrial importance of sesame. 2- Identify the conditions suitable for sesame growth. 3- Identify the basic agricultural	Sesame crop	Lecture + Presentation	Test + Questions and Answers + discussion

		processes. 4- Understand the production and harvest cycle.			
4	3	1- Identify the economic and nutritional benefits. 2- Understand simple questions. 3- Identify the correct farming methods. 4- Identify the diseases and pests that affect farms and how to control them. 5- Identify the growth stages, the appropriate time for all products, and the quality of the crop.	Field pistachio crop,	Lecture + Presentation	Test + Questions and Answers
5	3	Identify the crop, its economic importance, and the environmental conditions suitable for growth and crop service.	Sunflower crop	Lecture + Presentation	Test + Questions and Answers discussion
6	3	Identify the crop, its economic importance, and the environmental conditions suitable for growth and crop service.	Safflower Crop	Lecture + Presentation	Test + Questions and Answers + discussion
7	3	Identify the crop, its	Soybean crop,	Lecture +	Test +

		economic importance, and the environmental conditions suitable for growth and crop service.		Presentation	Questions and Answers + discussion
8	3	Identify the crop, its economic importance, and the environmental conditions suitable for growth and crop service.	Mustard (turnip)	Lecture + Presentation	Test + Questions and Answers + discussion
9	3	Identify the crop, its economic importance, and the environmental conditions suitable for growth and crop service.	Castor bean crop,	Lecture + Presentation	Test + Questions and Answers
10 + 11	3	The student will be able to distinguish the properties of cotton fibers and their manufacturing methods.	Cotton crop:	Lecture + Presentation	Test + Questions and Answers
12	3	The student will be able to identify the crop, its economic importance, and the environmental conditions suitable for its growth and production.	Flax crop	Lecture + Presentation	Test + Questions and Answers
13	3	Identify the crop, its	Jute crop.	Lecture +	Test +

		economic importance, and the environmental conditions suitable for growth and crop service.		Presentation	Questions and Answers
14	3	Identify the crop, its economic importance, the environmental conditions suitable for growth, and the industrial processes for sugar production	Sugarcane crop:	Lecture + Presentation	Test + Questions and Answers discussion +
15	3	Identify the crop, its economic importance, the environmental conditions suitable for growth, and the industrial processes for sugar production	Sugar beet crop:	Lecture + Presentation	Test + Questions and Answers + discussion

11. Course Evaluation test , discussion , asking questions

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Industrial Crops in Iraq, authored by Abdul Hamid Al-Younis, 1977, Al-Kotob Foundation for Printing and Publishing Fiber Crops Book by Dr. Ayad Talat
Main references (sources)	
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	Sites specialized in industrial crops

Course Description Form

1. Course Name:	
Post-Harvest physiology	
2. Course Code:	
PLP 308	
3. Semester / Year:	
2024 – 2025/1	
4. Description Preparation Date:	
11 / 6 / 2025	
5. Available Attendance Forms:	
Paper form including name, date of attendance and signature	
6. Number of Credit Hours (Total) / Number of Units (Total)	
45 /2	
7. Course administrator's name (mention all, if more than one name)	
Name: wasan waleed ahmed Email: wsnalobaidy@ntu.edu.iq	
8. Course Objectives	
Course Objectives	• **Understanding physiological processes:** A comprehensive understanding of the vital processes that occur in plants after harvest, including respiration, metabolism, microbial infections, and changes in chemical composition. • **Analyzing modern technologies:** Understanding and evaluating modern and innovative technologies in the field of horticultural crop care and storage, such as biotechnology, advanced packaging, and environmental control technologies. • **Ability to design storage plans:** Developing the skills necessary to design and implement effective storage plans for various horticultural crops, based on their physiological and environmental requirements. • **Scientific research and analysis:** The ability of students to conduct scientific research and analysis of specialized problems related to the care and storage of horticultural crops, using appropriate tools and techniques. • **Developing communication skills:** The ability to communicate effectively with colleagues and professionals in the field, including exchanging knowledge and advice on best practices for the care and storage of horticultural crops.
9. Teaching and Learning Strategies	
Strategy	1. Dialogue- and discussion-based learning. 2. Brainstorming.

	3. Collaborative learning. 4. Practical training. 5. Self-directed learning.

10.Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Understanding the importance of storage, and the stages of growth and maturity of fruits.	Postharvest Physiology and Technology	Lecture, presentation, illustrations	Questions and answers
2	3	Identifying the composition and structure of fruits and vegetables and understanding their nutritional value.	Postharvest Physiology and Technology	Lecture, presentation, illustrations	Questions and answers
3	3	Learning how to measure fruit maturity.	Postharvest Physiology and Technology	Lecture, presentation, illustrations	Questions and answers
4	3	Describing the physiological and chemical changes that occur to fruits during storage.	Postharvest Physiology and Technology	Lecture, presentation, illustrations	Questions and answers
5	3	Explaining the respiration process and its relationship to ripening and storage, and identifying the role of ethylene in the fruit ripening process.	Postharvest Physiology and Technology	Lecture, presentation, illustrations	Questions and answers
6	3	Understanding and applying methods for measuring the respiratory rate of produce.	Postharvest Physiology and Technology	Lecture, presentation, illustrations	Questions and answers
7	3	Understanding the industrial ripening process of fruits.	Industrial Ripening	Lecture, presentation, illustrations	Questions and answers
8	3	Learning the methods of picking, sorting, grading, and packing fruits.	Harvest and Postharvest Handling of Fruits	Lecture, presentation, illustrations	Questions and answers

9	3	Learning the methods of picking, sorting, grading, and packing vegetable crops.	Harvest and Postharvest Handling of Vegetables	Lecture, presentation, illustrations	Questions and answers
10	3	Understanding the function and management of packing houses.	Packing House Operations	Lecture, presentation, illustrations	Questions and answers
11	3	Learning about the methods of pre-cooling fruits before shipping and storing.	Cooling and Storage Techniques	Lecture, presentation, illustrations	Questions and answers
12	3	Identifying various storage methods for fruits and vegetables.	Storage Methods	Lecture, presentation, illustrations	Questions and answers
13	3	Understanding the deterioration processes of crops after harvest and during storage.	Postharvest Losses and Preservation	Lecture, presentation, illustrations	Questions and answers
14	3	Recognizing physiological and bacterial damages that affect crops during storage.	Storage Disorders and Damage Control	Lecture, presentation, illustrations	Questions and answers
15	3	Learning the methods of picking, preparing, and storing flowers.	Postharvest Handling of Floriculture Crops	Lecture, presentation, illustrations	Questions and answers

11.Course Evaluation	
12.Learning and Teaching Resources	
Required textbooks (curricular books, if any)	The vocabulary prescribed by the Ministry of Higher Education and Scientific Research
Main references (sources)	https://www.agro-lib.site/2020/07/blog-post_39.html https://faculty.uobasrah.edu.iq/faculty/572/teaching https://www.kutub.best/2021/05/124.html
Recommended books and references (scientific journals, reports...)	Google scholar
Electronic References, Websites	All sites that provide reliable sources and also artificial intelligence tools

Course Description Form

1. Course Name:	
Useful Insects	
2. Course Code:	
PLP309	
3. Semester / Year:	
Third , 2024/2025	
4. Description Preparation Date:	
2025/6/5	
5. Available Attendance Forms:	
Daily attendance record	
6. Number of Credit Hours (Total) / Number of Units (Total)	
3/75	
7. Course administrator's name (mention all, if more than one name)	
Name: yarub samer ahmed mustafa Email: yarub.sa@ntu.edu.iq	
8. Course Objectives	
Course Objectives	Introducing students to the concept of beneficial insects and their environmental and agricultural importance, with a focus on the role of bees. Understand the importance of bees in pollinating plants and agricultural crops and their role in increasing productivity.

	Identify types of beneficial insects, with a detailed study of honeybee colonies and their functions (queen, worker bees, drones). Study the life cycle of bees, their behavior patterns, and their impact on the agricultural ecosystem. Learn beekeeping and conservation methods to improve honey production and other products.

9. Teaching and Learning Strategies

Strategy	1. Dialogue-based learning and discussion. 2. Brainstorming. 3. Cooperative learning. 4. Simulation-based learning. 5. Practical training. 6. Self-directed learning.

10. Course Structure

Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	5	1. Explain the economic importance of beekeeping and its role in supporting the agricultural economy and increasing farmers' income. 2. Analyze the contribution of bees to pollinating	The economic importance of beekeeping and its development in Iraq	1. Theoretical lectures: 2. Demonstrations and educational videos: 3. Practical training in the laboratory or field:	1-Quiz 2-Classroom participation 3-Homework

		agricultural crops and its impact on increasing productivity and crop quality. 3. Identify the stages of beekeeping development and the most important modern technologies used in this field.			
2	5	1. Identify the components of a honeybee colony and the functions of its members. 2. Distinguish the characteristics and appearance of the queen compared to other members of the colony. 3. Understand the biological and reproductive role of the queen within the hive. 4. Identify the queen's behavior and how she communicates with the workers.	Honey bee colony - queen	1. Theoretical lectures: 2. Demonstrations and educational videos: 3. Practical training in the laboratory or field:	1-Quiz 2-Classroom participation 3-Homework

3	5	1. Define worker bees and their vital role within the bee colony. 2. Distinguish the anatomical and functional characteristics of worker bees compared to queen bees and drones. 3. Explain the various tasks performed by worker bees depending on their age (cleaning, brood care, wax secretion, guarding, nectar and pollen collection). 4. Explain the importance of worker bees in honey production and flower pollination.	Honey bee colony - worker bees	1. Theoretical lectures: 2. Demonstrations and educational videos: 3. Practical training in the laboratory or field:	1-Quiz 2-Classroom participation 3-Homework
4	5	1. Identify the different roles of honeybee colonies (workers, queen, drones) in the hive. 2. Distinguish between the daily activities of worker	Activities and functions of honey bee colony members (workers, queen, drones).	1. Theoretical lectures: 2. Demonstrations and educational videos:	1-Quiz 2-Classroom participation 3-Homework

		bees according to their age stages, such as cleaning the hive, feeding larvae, building wax, guarding, and foraging. 3. Explain the role of the queen (mother) in laying eggs and regulating the hive's life through pheromones. 4. Understand the role of drones.		3. Practical training in the laboratory or field:	
5	5	1. Identify the scientific classification of different honeybee species. 2. Distinguish between local and international honeybee breeds in terms of morphological and behavioral characteristics. 3. Understand the productive and adaptive characteristics of each breed in	Types and breeds of honey bees.	1. Theoretical lectures: 2. Demonstrations and educational videos: 3. Practical training in the laboratory or field:	1-Quiz 2-Classroom participation 3-Homework

		different environments. 4. Evaluate the advantages and disadvantages of the most important breeds used in beekeeping in Iraq and around the world.			
6	5	Understand the concept of swarming in honeybees and its importance in colony management. Distinguish between the behavioral and phenotypic signs that precede swarming. Classify the types of swarming (natural swarming, artificial swarming, etc.).	Scavenging, its signs, types, scavenging seasons.	1. Theoretical lectures: 2. Demonstrations and educational videos: 3. Practical training in the laboratory or field:	1-Quiz 2-Classroom participation 3-Homework
7	5	1. Understand the importance of hibernation in maintaining the health of bee colonies during the winter. 2. Identify the environmental	Honey bee colony wintering and methods of implementation.	1. Theoretical lectures: 2. Demonstrations and educational videos:	1-Quiz 2-Classroom participation 3-Homework

		conditions that require hibernation. 3. Distinguish between the different methods of hibernating bees (internal and external hibernation). 4. Explain the nutritional and care requirements of the colony during the winter. 5. Implement appropriate apiary management practices to ensure efficient hive survival.		3. Practical training in the laboratory or field:	
8	5	1. Explain the importance of feeding honeybee colonies in improving their health and increasing their production of honey and beeswax. 2. Identify periods when colonies need additional nutrition, such as periods of	Honeybee colony nutrition: importance, alternatives, and supplements.	1. Theoretical lectures: 2. Demonstrations and educational videos: 3. Practical training in the laboratory or field:	1-Quiz 2-Classroom participation 3-Homework

		nectar and pollen scarcity. 3. Identify the types of nutritional substitutes used in bee nutrition as alternatives to natural nectar and pollen. 4. Explain the role of nutritional supplements.			
9	5	1. Define the concept of queen rearing in honeybees and its importance in supporting the continuity and health of the colony. 2. Explain the steps and stages of queen rearing, starting from selecting the appropriate brood to hatching the queen. 3. Identify the key factors affecting the success of queen rearing, such as nutrition,	Breeding honey bee queens, factors for successful breeding, and its causes.	1. Theoretical lectures: 2. Demonstrations and educational videos: 3. Practical training in the laboratory or field:	1-Quiz 2-Classroom participation 3-Homework

		temperature, and humidity. 4. Explain the importance of selecting the queen strain and its impact on colony production and quality. 5. Identify the common causes of queen rearing failure.			
10	5	Define apiaries and their importance in honeybee breeding and agricultural production. 2. Identify the different types of apiaries (fixed, mobile, urban, rural) and the advantages of each type. 3. Explain the conditions for the spread of suitable apiaries in terms of environment, climate, and availability of food sources. 4. Identify the factors influencing	Apiaries, their types, and conditions for their spread.	1. Theoretical lectures: 2. Demonstrations and educational videos: 3. Practical training in the laboratory or field:	1-Quiz 2-Classroom participation 3-Homework

		the selection of an apiary site, such as the availability of flowers, the distance from sources of pollution, and the protection of colonies.			
11	5	1. Identify the most common bee diseases, such as Varroa mite, Nosema mite, Aspergillus mite, and Anthrax. 2. Understand the causes of each disease and its symptoms in colonies. 3. Explain the ways diseases are transmitted between beehives and how to prevent them. 4. Identify natural enemies of bees, such as wasps, ants, spiders, and some harmful birds and insects. 5. Study the impact of these diseases	Diseases and enemies of bees.	1. Theoretical lectures: 2. Demonstrations and educational videos: 3. Practical training in the laboratory or field:	1-Quiz 2-Classroom participation 3-Homework

		and enemies on colony health and honey production. 6. Learn about modern methods of disease and pest control using chemical, biological, and natural methods.			
12	5	1. Identify the types of honeybee products, such as honey, beeswax, propolis, pollen, royal jelly, and bee venom. 2. Understand the chemical and physical properties of each product and its various uses in the food, medical, and cosmetic industries. 3. Explain methods for collecting and storing these products while maintaining their quality and safety. 4. Study the health and therapeutic benefits of honeybee products	Honey bee products.	1. Theoretical lectures: 2. Demonstrations and educational videos: 3. Practical training in the laboratory or field:	1-Quiz 2-Classroom participation 3-Homework

		and their role in alternative medicine.			
13	5	Identify different types of pollinating insects, such as bees, butterflies, flies, beetles, and ants. 2. Understand the importance of pollinating insects in the pollination and fertilization process of plants and their role in increasing agricultural production. 3. Study the behavior of pollinating insects and the factors that attract them to plants, such as scent, color, and flower shape.	Pollinating insects.	1. Theoretical lectures: 2. Demonstrations and educational videos: 3. Practical training in the laboratory or field:	1-Quiz 2-Classroom participation 3-Homework
14	5	1. Understand the importance of bee pollination in improving crop productivity and its role in increasing the quality and	Pollination of bee colonies for the purpose of pollinating crops.	1. Theoretical lectures: 2. Demonstrations and educational videos:	1-Quiz 2-Classroom participation 3-Homework

		quantity of produce. 2. Identify the types of crops that directly benefit from bee pollination and how pollination affects their characteristics. 3. Understand how to prepare and manage bee colonies for transfer to crop fields and the best timing for pollination.		3. Practical training in the laboratory or field:	
15	5	1. Understand the concept of insectivores and their role in the agricultural ecosystem. 2. Understand the importance of predatory insects as biological pest control agents. 3. Identify the main types of insectivores, such as ladybirds, parasitic flies, and spiders.	Insects that feed on insects.	1. Theoretical lectures: 2. Demonstrations and educational videos: 3. Practical training in the laboratory or field:	1-Quiz 2-Classroom participation 3-Homework

		4. Study the life cycle of predatory insects and their relationship with their prey (pests).			

11. Course Evaluation	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	
Main references (sources)	تربية سلالات النحل 2012
Recommended books and references (scientific journals, reports...)	معجم الملاح في مصطلحات علم الحشرات 2022
Electronic References, Websites	

Course Description Form

1. Course Name:	
Plant Diseases	
2. Course Code:	
3. Semester / Year:	
2024 – 2025	
4. Description Preparation Date:	
5 – 6 – 2025	
5. Available Attendance Forms:	
Paper form including name, date of attendance and signature	
6. Number of Credit Hours (Total) / Number of Units (Total)	
60/2	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Janan Kassim AL-Tarjuman Email: janankhorshed@ntu.edu.iq	
8. Course Objectives	
Course Objectives	By the end of the course, the student is expected to be able to: 1. Identify plant diseases and their importance. 2. Understand the relationship between the host and the pathogen. 3. Define toxins, enzymes, and plant hormones. 4. Explain the effect of pathogens on plant physiological processes.

	5. Define mycotoxins, their types, and their various effects. 6. Understand epidemics, endemic diseases, and pests. 7. Understand the importance and concept of agricultural quarantine. 8. Define fungi, distinguish their different types, the diseases they cause, and their symptoms.

9. Teaching and Learning Strategies

Strategy	There are several effective strategies for teaching the Principles of Genetics course, which aim to foster a deep understanding of genetic concepts and develop critical thinking skills: 1. Dialogue- and discussion-based learning. 2. Brainstorming. 3. Collaborative learning. 4. Simulation-based learning. 5. Practical training. 6. Self-directed learning.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	1. The student will understand the basic concepts of plant pathology and its importance. 2. The student will understand	Definition of disease. Importance of diseases. Symptoms of disease.	Lecture, presentation, illustrations	Questions and answers

		the different types of disease symptoms. 3. The student will understand the losses caused by plant diseases.			
2	4	1. The student will understand the basic factors that cause disease (the disease triangle). 2. The student will know how to classify living and nonliving pathogens. 3. The student will be able to distinguish between commensal and parasitic relationships.	Host-pathogen relationship, disease incidence, levels of parasitism	Lecture, presentation, illustrations	Questions and answers
3	4	1. The student will understand the ways in which pathogens cause plant disease.	The effect of pathogens on their hosts, toxins, enzymes and plant hormones	Lecture, presentation, illustrations	Questions and answers

		2. The impact of pathogens on the host's biological processes. 3. Define mycotoxins, their types, and their effects. 4. Define enzymes and enzymes secreted by pathogens, and define plant hormones, their types, and their functions.			
4	4	1. The student will understand epidemiology and its common terminology. 2. The student will understand epidemic diseases and their types. 3. Define agricultural quarantine and its importance.	Epidemiology of plant diseases	Lecture, presentation, illustrations	Questions and answers

5	4	1. The student will describe the stages of plant disease development. 2. Describe the types of inoculum in various pathogens and their sources. 3. Understand the methods by which pathogens penetrate the host. 4. Identify invasion, reproduction, dispersal, and dispersal or latency. 5. Classify pathogens according to the number of cycles they undergo during the host's growing season.	Stages of disease development problems	Lecture, presentation, illustrations	Questions and answers
6	4	1. The student will understand mycology, fungi,	Fungi	Lecture, presentation, illustrations	Questions and answers

		and their reproduction. 2. Distinguish between the different methods of reproduction in fungi. 3. Understand the main divisions and classes of fungi and the characteristics of each division. 4. Describe hyphal and true fungi. 5. Describe oomycetes and distinguish them from zygomycetes, sac fungi, and basidiomycetes. 5. Explain the economic importance of fungi.			
7	4	The student should know the late blight	Diseases caused by oomycetes.	Lecture, presentation,	Questions and

		disease on potatoes and its symptoms.		illustrations	answers
8	4	The student should know the late blight disease of tomato and its symptoms.	Diseases caused by oomycetes.	Lecture, presentation, illustrations	Questions and answers
9	4	The student knows the disease of seedling death, its most important symptoms, and methods of controlling it.	Diseases caused by oomycetes.	Lecture, presentation, illustrations	Questions and answers
10	4	Understand the symptoms and control of downy mildew on onions and lettuce.	Diseases caused by oomycetes	Lecture, presentation, illustrations	Questions and answers
11	4	Understand downy mildew disease on grapes and cucurbits, its symptoms and control	Diseases caused by oomycetes	Lecture, presentation, illustrations	Questions and answers
12	4	1. The student will be familiar	zygotic fungi, their most important	Lecture, presentation,	Questions and

		with zygotic or zygotic fungi, their main characteristics, and methods of reproduction. 2. The student will understand the diseases caused by zygotic fungi.	characteristics and the diseases they cause	illustrations	answers
13	4	1. The student will be familiar with the symptoms and signs of disease caused by zygotic fungi and methods for controlling them. 2. 4. Identify rot and distinguish between its types, soft and dry.	Diseases caused by zygotic fungi	Lecture, presentation, illustrations	Questions and answers
14	4	1. The student will be familiar with sac fungi, their characteristics, and methods of reproduction.	Ascomycetes, their most important characteristics are the diseases they cause, powdery mildew diseases on cucurbits,	Lecture, presentation, illustrations	Questions and answers

		2. The student will understand powdery mildew diseases, their symptoms on cucurbits and grasses, and methods for controlling them.	grasses and grapes.		
15	4	. The student will understand powdery mildew diseases, their symptoms on grapes, and methods of controlling them. 3. The student will know apple scab disease and methods of controlling it.	Powdery mildew diseases and their symptoms on grapes		

11. Course Evaluation : Tests + Exercises + Discussions + Questions	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	The vocabulary prescribed by the Ministry of Higher Education and Scientific Research
Main references (sources)	Fungal Plant Diseases Book by Dr. Sharif Fayyad Muhammad, 2012, Plant Diseases Series.
Recommended books and references (scientific journals, reports...)	Google scholar, researcher gate
Electronic References, Websites	All sites that provide reliable sources and also artificial intelligence tools

Course Description Form

1. Course Name:
Harvesting Equipment's
2. Course Code:
PLP 357
3. Semester / Year:
Three / Two
4. Description Preparation Date:
17 \ 7 \ 2025
5. Available Attendance Forms:
Paper form including name, date of attendance and signature
6. Number of Credit Hours (Total) / Number of Units (Total)
60 \ 3
7. Course administrator's name (mention all, if more than one name)
Name: Mahmood Shaker Mahmood Email: msh41551@ntu.edu.iq
8. Course Objectives

Course Objectives	**Introducing the student to the most important machines and machines used in harvesting and reaping crops, what their components are, performing calculations on how to calibrate them, and becoming able to perform maintenance operations on them and how to choose the appropriate type of them.**
9. Teaching and Learning Strategies	
Strategy	**Working to increase knowledge to gain practical experience from others through educational videos and training courses to obtain new scientific information in the field of knowledge. Practical field training and how to take field measurements. Access to modern scientific literature. Scientific laboratories with other universities.**
1. Course Structure	

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	The student will learn about automated harvesting and its benefits, as well as automated harvesting methods	General Concepts of Harvesting and Harvesting Equipment	Lecture, presentation, illustrations	Questions and answers + exercise solutions
2	4	The student will get to know the cutting group (cutting knife, joining club, fans) and its parts are turned on and changed	The Harvester of the Grain (Combine)	Lecture, presentation, illustrations	Questions and answers + exercise solutions
3	4	The student will get acquainted with the transport group in the harvester whose parts are operated	The Harvester of the Grain (Combine)	Lecture, presentation, illustrations	Questions and answers + exercise solutions
4	4	The student will learn about the diasis group in the harvester of its parts, as well as the factors affecting the process of diasis, both fixed and variable.	The Harvester of the Grain (Combine)	Lecture, presentation, illustrations	Questions and answers + exercise solutions
5	4	The student will get acquainted with the separation and cleaning group in the harvester crop route and change	The Harvester of the Grain (Combine)	Lecture, presentation, illustrations	Questions and answers + exercise solutions

6	4	The student will learn about the packing group its parts and the function of each part	The Harvester of the Grain (Combine)	Lecture, presentation, illustrations	Questions and answers + exercise solutions
7	4	The student will learn how to detect a harvester malfunction, treat and fix each malfunction	The Harvester of the Grain (Combine)	Lecture, presentation, illustrations	Questions and answers + exercise solutions
8		Mathematical problems		Lecture, presentation, illustrations	Questions and answers + exercise solutions
9	4	**First exam**			
10	4	The student will get acquainted with his cotton collection, its types, parts and the function of each part,	Economic Crop Harvesting Equipment	Lecture, presentation, illustrations	Questions and answers + exercise solutions
11	4	The student will learn about the falling cotton harvesting machine, mechanical method, spindles and factors affecting cotton harvesting	Economic Crop Harvesting Equipment	Lecture, presentation, illustrations	Questions and answers + exercise solutions
12	4	The student will learn about the diabetic beet harvesting machine, its parts and the function of each part	Ground and root crop harvesting equipment	Lecture, presentation, illustrations	Questions and answers + exercise solutions

13	4	The student will learn about the potato harvesting machine, its types, parts and the function of each part	Tuber crop harvesting equipment	Lecture, presentation, illustrations	Questions and answers + exercise solutions
14	4	The student will get acquainted with the feed shredder machine and its functions are its parts	Feed Crop Harvesting Equipment	Lecture, presentation, illustrations	Questions and answers + exercise solutions
15	4	Second exam			

2. Course Evaluation	
Tests + Exercises + Discussions + Questions	
3. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	**Book of Reaping and Harvesting Equipment** **Lectures on Reaping and Harvesting Equipment**
Main references (sources)	Prof. PhD. Aziz Ramo Al-Banna Mr. Faris Abdullah Hamed
Recommended books and references (scientific journals, reports...)	Google scholar, researcher gate
Electronic References, Websites	

Course Description Form

1. Course Name:	
Forage crops	
2. Course Code:	
PLP352	
3. Semester / Year:	
2024 - 2025	
4. Description Preparation Date:	
17 – 7 - 2025	
5. Available Attendance Forms:	
Paper form including name, date of attendance and signature	
6. Number of Credit Hours (Total) / Number of Units (Total)	
3/2	
7. Course administrator's name (mention all, if more than one name)	
Name: Muhammad Amin Walid Taha Amin Email: mohmadameenm@ntu.edu.iq	
8. Course Objectives	
Course Objectives	By the end of the course, the student is expected to be able to: 1. Understand the basic concepts of forage crops and pastures 2. Explain the mechanisms by which various environmental and climatic factors and crop service processes affect forage production 3. Identify the types of forage crops

	4. Analyze the effects of various service processes on production, both quantitatively and qualitatively 5. Understand the relationship between the composition of animal feeds and animal production, both quantitatively and qualitatively 6. Identify each forage crop separately 7. Understand the importance of these forages, their effects, and how to benefit from them

9. Teaching and Learning Strategies

Strategy	There are several effective strategies for teaching forage crops and pastures, which aim to foster a deep understanding of the effects of various plant physiological processes and develop students' critical thinking skills. These include: 1. Dialogue- and discussion-based learning. 2. Brainstorming. 3. Cooperative learning. 4. Simulation-based learning. 5. Practical training. 6. Self-directed learning.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	1. The student should understand the basic concepts of the importance of livestock.	The importance of livestock, the importance of fodder crops and their role in meeting the fodder	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		2. The student should understand the importance of fodder crops and their role in meeting the fodder needs of livestock. 3. The student should understand the phenomena and implications of the influence of all climatic and service factors on the production of various fodder crops..	needs of livestock, the reality of fodder crop cultivation in Iraq		
2	3	1. The student will understand the factors affecting fodder production and quality. 2. The student will know how to utilize saline	Factors affecting fodder production and quality, exploitation of saline and rain-fed lands in fodder crop production	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		and rain-fed lands for fodder crop production.			
3	3	1. The student will understand the environmental conditions suitable for Alfalfa production. 2. The student will understand the effects of these conditions on Alfalfa seed production..	(Alfalfa) economic importance, suitable environmental conditions, for the production of alfalfa seeds	Lecture, presentation, illustrations	Questions and answers + exercise solutions
4	3	1. The student will understand the economic importance of alfalfa. 2. The student will understand the various influences on alfalfa seed production.	Alfalfa: economic importance, suitable environmental conditions, seed production	Lecture, presentation, illustrations	Questions and answers + exercise solutions
5	3	1. The student will be able to identify the crops of hartaman,	Hartaman, Kart, Kakouz economic importance, suitable	Lecture, presentation, illustrations	Questions and answers + exercise

		karta, and cocos. 2. The student will understand the different effects on seed production of each of these crops.	environmental conditions, seed production		solutions
6	3	1. The student will be familiar with forage crops. 2. The student will understand the economic importance, suitable environmental conditions, production principles, and uses of these crops.	Production of forage crops (1) Yellow corn (2) White corn) and their economic importance includes suitable environmental conditions, production principles, and their fodder uses.	Lecture, presentation, illustrations	Questions and answers + exercise solutions
7	3	1. The student will be familiar with the economic importance of Sudanese grass, its suitable environmental conditions, production	Sudanese grass: economic importance, suitable environmental conditions, production principles, fodder uses, species of the genus Sorghum,	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		principles, and fodder uses. 2. The student will be familiar with the species of the genus Sorghum. 3. The student will understand the dangers of green feed to animals due to hydrocyanic acid (HCN) poisoning.	and the danger of green feed to animals as a result of hydrocyanic acid (HCN) poisoning.		
8	3	1. The student will understand the economic importance of barley, oats, and millet, as well as the basics of production. 2. The student will understand the species used for fodder and their uses for fodder.	Barley, oats, millet: economic importance, production principles, species used for fodder, and their exploitation for fodder.	Lecture, presentation, illustrations	Questions and answers + exercise solutions
9	3	1. The student should know the ingredients of	Concentrated feed materials, their importance in	Lecture, presentation, illustrations	Questions and answers +

		concentrated feed. 2. The student should understand their importance in animal nutrition. 3. The student should know their sources and nutritional content (chemical composition).	animal nutrition, their sources, their content of nutritional elements (their chemical composition).		exercise solutions
10	3	1. The student will know the definition of feed mixtures. 2. The student will understand their importance and types. 3. The student will be familiar with the basic elements of feed mixtures.	Feed mixtures, definition, importance, types, basic elements included in the feed mixture.	Lecture, presentation, illustrations	Questions and answers + exercise solutions
11	3	1. The student will understand what threshing is, its definition, and its	Threshing, definition, its importance in animal nutrition, why do we resort	Lecture, presentation, illustrations	Questions and answers + exercise

		importance in animal nutrition. 2. The student will understand determining the appropriate time for cutting based on growth stages, drying methods, and the types of forage loss that occur during threshing.	to threshing, determining the appropriate time for cutting according to the growth stages, drying methods, types of loss of feed material that occurs during threshing.		solutions
12	3	1. The student will know: silage, its definition, the importance of its production, and the manufacturing steps. 2. The student will know how to identify the cutting stages, the chemical changes in fodder during preservation, and methods for preserving silage.	Silage, its definition, the importance of its manufacture, manufacturing steps, determining the cutting stages, chemical changes in the feed during preservation, methods of preserving silage, preservatives, types of loss in nutritional value resulting from preservation.	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		3. The student will know the techniques used in preservatives and the types of loss in nutritional value resulting from preservation.			
13	3	1. The student should know: What are pastures? 2. The student should know the definition and importance of pastures. 3. The student should know the types of pastures.	Pastures, definition, importance, types	Lecture, presentation, illustrations	Questions and answers + exercise solutions
14	3	1. The student will understand the basics of quantitative evaluation of pasture plants. 2. The student will understand the benefits of identifying these basics.	Fundamentals of quantitative evaluation of pasture plants, determining pasture productivity	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		3. The student will understand the benefits of determining pasture productivity.			
15	3	1. The student will identify the causes of the deterioration of natural pastures. 2. The student will understand methods for improving natural pastures and how to preserve them.	Causes of deterioration of natural pastures, methods of improving natural pastures and how to preserve them.		
11. Course Evaluation : Tests + Exercises + Discussions + Questions					
12. Learning and Teaching Resources					
Required textbooks (curricular books, if any)			The vocabulary prescribed by the Ministry of Higher Education and Scientific Research		
Main references (sources)			Al-Ani, Tariq Ali and Mr. Irfan Muhammad Arshad (1983). Production of fodder crops and pastures. Technical Institutes Foundation. Al-Tikriti, Ramadan Ahmed Al-Tayef and Tawakkul Younis Rizq and Hikmat Askar Al-Rumi (1981). Fodder crops and pastures. Dar Al-Kutub Foundation for Printing and Publishing, University		

	of Mosul. Mayouf, Mahmoud Ahmed and Abdullah Qasim Al-Fakhri (1982). Introduction to legumes in Iraq. Abdullah, Ghazi Mahmoud (1976). Some methods used in studies of natural pastures. Ministry of Agriculture and Agrarian Reform, Directorate of Natural Pastures, Department of Agricultural Affairs, Bulletin No.
Recommended books and references (scientific journals, reports...)	Google scholar, researcher gate
Electronic References, Websites	All sites that provide reliable sources and also artificial intelligence tools

Course Description Form

1. Course Name:	
Scientific research methodology	
2. Course Code:	
NTU410	
3. Semester / Year:	
Level 4 / 2024-2025	
4. Description Preparation Date:	
9/6/2025	
5. Available Attendance Forms:	
Paper form including name, date of attendance and signature	
6. Number of Credit Hours (Total) / Number of Units (Total)	
30 / 2	
7. Course administrator's name (mention all, if more than one name)	
Name: Fahd Khalaf Yassin Email: fahadbiologymycology@ntu.edu.iq	
8. Course Objectives	
Course Objectives	Training students in scientific thinking and research, how to conduct scientific experiments and apply them in the field, and how to take and analyze readings and provide a logical analysis of the results. This will enable students to think scientifically to solve any problem, develop a strategy for conducting research, investigate scientific facts to solve the problem, collect data,

	analyze it logically, and come up with recommendations to address the problem.

9. Teaching and Learning Strategies

Strategy	1. Dialogue- and discussion-based learning. 2. Brainstorming. 3. Collaborative learning. 4. Self-directed learning.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Student knowledge of the modern scientific method	modern scientific method	Lecture, presentation, illustrations	Questions and answers
2	2	The student learns about the scientific theory and its steps.	The beginning of scientific theory and its steps	Lecture, presentation, illustrations	Questions and answers
3	2	The student learns The most important hypotheses	Assumptions on which the scientific method is based in dealing with natural phenomena.	Lecture, presentation, illustrations	Questions and answers
4	2	The student learns the basic characteristics of scientific research.	Basic characteristics of scientific research.	Lecture, presentation, illustrations	Questions and answers
5	2	Characteristics of a successful researcher. Academic integrity.	Characteristics of a successful researcher.	Lecture, presentation, illustrations	Questions and answers
6	2	The student learns the academic and applied research	Types of research and its applications,	Lecture, presentation, illustrations	Questions and answers

7	2	The student learns the types of scientific research institutions	Scientific research institutions,	Lecture, presentation, illustrations	Questions and answers
8	2	The student learns the Problem selection principles	How to choose a research problem	Lecture, presentation, illustrations	Questions and answers
9	2	The student learns Information display methods	Information display methods	Lecture, presentation, illustrations	Questions and answers
10	2	The student learns how he can Writing the research	Research discussion	Lecture, presentation, illustrations	Questions and answers
11	2	The student learns Mechanism for publishing quality research and journals	Publish research	Lecture, presentation, illustrations	Questions and answers
12	2	The student learns how to use the Internet in writing scientific research	Introduction to the Internet and its uses	Lecture, presentation, illustrations	Questions and answers
13	2	The student learns view types of research	Exploratory readings and reviews of previous research,	Lecture, presentation, illustrations	Questions and answers
14	2	The student learns how to formulate research hypotheses	Formulating research hypotheses,	Lecture, presentation, illustrations	Questions and answers
15	2	The student learns types of designs in implementing agricultural experiments	Methods of implementing agricultural experiments	Lecture, presentation, illustrations	Questions and answers solutions

11. Course Evaluation	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Lectures on scientific research methodology / Professor Dr. Iyad Youssef Al-Haj Ismail / 2019
Main references (sources)	Lectures on scientific research methodology / Professor Dr. Iyad Youssef Al-Haj Ismail / 2019
Recommended books and references (scientific journals, reports...)	Google scholar, researcher gate
Electronic References, Websites	All sites that provide reliable sources and also artificial intelligence tools

Course Description Form

1. Course Name:
Design and analysis of experiments
2. Course Code:
TAMO 401
3. Semester / Year:
Fourth
4. Description Preparation Date:
8/6/2025
5. Available Attendance Forms:
A paper form that includes the student's name, date, and signature.
6. Number of Credit Hours (Total) / Number of Units (Total)
60 – 2
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Zahraa Abdulrahman Sabri *Email: 85zahraa@ntu.edu.iq*
8. Course Objectives

Course Objectives	1. The course aims to provide students with the knowledge and skills necessary to design effective scientific experiments and analyze their results using statistical methods. It introduces students to the importance of planning and implementing agricultural experiments, how to control experimental error, and studies the designs used in agricultural experiments. Students will then be able to plan, implement the

	design, and analyze its data.

9. Teaching and Learning Strategies

Strategy	1- Interactive lecture 2- Brainstorming 3- Dialogue and discussion 4- Writing on the board 5- Adapting assignments and reports

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	1- The student will learn the basic concepts of experimental design. 2- The student will understand the basic rules of design. 3- The student will be familiar with all the terms related to experimental design and analysis. 4- The student will learn the steps followed in experiments.	Basic Concepts The most important basic rules for designing and analyzing experiments	Lecture + Presentation	Test + Questions and Answers
2	4	1- The student should know the sources of variation in the design. 2- The student should understand how to create an analysis of variance table.	Completely Randomized Design 1- Design Advantages 2- Design Disadvantages 3- Analysis of Variance	Lecture + Presentation	Test + Questions and Answers + Exercise Solutions

		3- The student should be able to plan the experiment.			
3	4	1- The student will understand the design, whether the repetitions are equal or unequal. 2- The student will continue collecting observations even if most of them are lost.	Completely randomized design with unequal replications	Lecture + Presentation	Test + Questions and Answers + Exercise Solutions
4	4	1- The student will understand the randomized block design. 2- The student will understand the sources of variation in the design. 3- The student will understand how to apply the design in an experiment. 4- The student will learn how to create an analysis of variance table.	Randomized complete block design, conditions of use of the design, advantages and disadvantages of the design, sources of variation.	Lecture + Presentation	Test + Questions and Answers + Exercise Solutions
5		1- The student will be able to find the missing value. 2- The student will be able to analyze the results and apply them in the field.	Analysis of variance, determining the number of replicates, estimating the missing value (or more) in the sectors	Lecture + Presentation	Test + Questions and Answers + Exercise Solutions

6	4	1- The student will be familiar with the Latin square design. 2- The student will be able to identify the sources of variation in the design. 3- The student will understand how to apply the design in an experiment. 4- The student will learn how to create an analysis of variance table.	Latin square design, terms of use, advantages and disadvantages of the design.	Lecture + Presentation	Test + Questions and Answers + Exercise Solutions
7	4	The student learns which designs are more efficient than others.	Efficiency of randomized complete block and Latin square designs	Lecture + Presentation	Test + Questions and Answers + Exercise Solutions
8	4	The student learns how to find the missing value.	Sources of variation in the Latin square, analysis of variance, estimation of one or more missing values	Lecture + Presentation	Test + Questions and Answers + Exercise Solutions
9	4	1. The student should learn the testing method. 2. The student should understand when the test should be conducted before or after the experiment. 3. The student	Diagnosing the significance of differences between arithmetic means, 1-Independent comparisons	Lecture + Presentation	Test + Questions and Answers + Exercise Solutions

		should know when to use this test when the factor is quantitative or qualitative. 4. The student should know the number of independent comparisons included in the experiment, how to conduct the test, and how to find the sum of squares of the coefficients and the sum of squares of the comparisons.			
10	4	1- The student should understand when to conduct a test before or after the experiment, and when to use this test when the factor is quantitative or qualitative. 2- The student should learn how to conduct an analysis of variance table.	2- Trend Analysis 3- Duncan's Test	Lecture + Presentation	Test + Questions and Answers + Exercise Solutions
11	4	1- The student should be familiar with factorial experiments. 2- The student should learn whether these	Factorial experiments, their conditions, advantages, and disadvantages.	Lecture + Presentation	Test + Questions and Answers + Exercise Solutions

		experiments are designed to study one factor or more than one factor.			
12	4	1- The student will know how to create an analysis of variance table. 2- The student will know the number of levels for each factor.	Sources of variation in factorial experiments, analysis of variance.	Lecture + Presentation	Test + Questions and Answers + Exercise Solutions
13-14	4	1- The student will know the split-panel design. 2- The student will learn how to create an analysis of variance table. 3- The student will know which factors are more important than others. 4- The student will be able to divide the experiment into different levels.	Split-panel design, its conditions, advantages, and disadvantages. Sources of variation in split-panel experiments, analysis of variance.	Lecture + Presentation	Test + Questions and Answers + Exercise Solutions
15	4	The student understands the relationship between the dependent and dependent variables.	Regression analysis	Lecture + Presentation	Test + Questions and Answers + Exercise Solutions
11. Course Evaluation : Ask questions + Discussion + Test + Exercises .					
12. Learning and Teaching Resources					

Required textbooks (curricular books, if any)	Experimental Design and Analysis Book
Main references (sources)	
Recommended books and references (scientific journals, reports...)	Lectures and books published by Iraqi universities
Electronic References, Websites	Websites specializing in experimental design and analysis

Course Description Form

1. Course Name:	
Agricultural statistics	
2. Course Code:	
TAMO 452	
3. Semester / Year:	
Fourth Level / 2024-2025	
4. Description Preparation Date:	
8 \ 6 \ 2025	
5. Available Attendance Forms:	
Paper form including name, date of attendance and signature	
6. Number of Credit Hours (Total) / Number of Units (Total)	
30 \ 2	
7. Course administrator's name (mention all, if more than one name)	
Name: bashar Mohsin mohammed Email: bashar_mohsin.m@ntu.edu.iq	
8. Course Objectives	
Course Objectives	By the end of the course, the student is expected to be able to: 1. Understand the principles of agricultural marketing. 2. Analyze supply chains. 3. Apply marketing strategies. 4. Utilize modern technology. 5. Evaluate marketing performance.

9. Teaching and Learning Strategies	
Strategy	1. Dialogue- and discussion-based learning. 2. Brainstorming. 3. Collaborative learning. 4. Practical training. 5. Self-directed learning.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Identifying customer needs Boosting sales and market competitiveness Analyzing consumer behavior to make informed decisions Supporting innovation and product development Achieving sustainability and economic growth	The concept of marketing and its importance	Lecture, presentation, illustrations	Questions and answers + exercise solutions
2	2	Understanding its four elements (product, price, promotion, and distribution) and their impact on the agricultural market. Studying the stages of agricultural	The marketing mix, the concept of agricultural marketing, and the historical development of agricultural marketing	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		marketing's development from traditional to modern digital markets.			
3	2	Improving agricultural production efficiency Enhancing market access for agricultural products Analysis of supply chains Implementing modern marketing strategies Supporting economic development	Agricultural marketing objectives	Lecture, presentation, illustrations	Questions and answers + exercise solutions
4	2	Understand the basics of agricultural marketing and its importance in supporting agricultural production. Study modern marketing strategies and their impact on production and marketing efficiency. Analyze marketing functions such as	Introduction to the study of agricultural marketing and the functional approach	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		distribution, storage, and promotion and their impact on the agricultural market.			
5	2	Understand the role of organizations in developing and implementing marketing strategies. Analyze the impact of consumer behavior on marketing decisions. Develop effective strategies based on an analysis of organizational and marketing behavior.	Introduction to marketing organizations and the behavioral approach.	Lecture, presentation, illustrations	Questions and answers + exercise solutions
6	2	Understanding agricultural processes and their impact on the economy and sustainability. Analyzing influencing factors such as soil, climate, and water to ensure production efficiency. Studying the nature of agricultural products in terms of quality, storability,	Agricultural production, characteristics of agricultural production, and characteristics of agricultural products.	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		and marketability.			
7	2	Review of all previous topics and the student's understanding and comprehension.	First Month Exam	Lecture, presentation, illustrations	Questions and answers + exercise solutions
8	2	Understanding the characteristics of food products in terms of quality, storability, and health impact. Analyzing the factors influencing consumer behavior and food market trends.	The nature of food commodities and their consumption.	Lecture, presentation, illustrations	Questions and answers + exercise solutions
9	2	Understand food production processes and their impact on quality and safety. Analyze marketing strategies to ensure products reach target markets. Understand how to meet consumer needs through manufacturing innovation.	Food manufacturing and processing and the role of marketing in food manufacturing.	Lecture, presentation, illustrations	Questions and answers + exercise solutions
10	2	Using marketing to support innovation and ensure	Food marketing mix strategies	Lecture, presentation, illustrations	Questions and answers + exercise

		customer satisfaction. Analyzing product, price, promotion, and distribution in the food industry. Developing innovative strategies to ensure the success of food products.			solutions
11	2	Understanding food industry consumer groups and analyzing their needs. Studying the factors affecting demand and supply in the food sector. Developing effective marketing plans to reach target markets. Enhancing the competitiveness of food products in local and global markets.	Target markets for food industries	Lecture, presentation, illustrations	Questions and answers + exercise solutions
12	2	Study how supply and demand interact in wholesale and retail trade. Understand how	Wholesalers and retailers in supply and demand.	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		prices are set based on sales volume and competition. Improving warehousing and distribution processes to ensure market efficiency. Measuring the success of wholesalers and retailers in meeting consumer needs.			
13	2	Understanding Food Market Dynamics Evaluating Market Influencers	Food Markets	Lecture, presentation, illustrations	Questions and answers + exercise solutions
14	2	Analyze the factors influencing the organization of food markets. Study the impact of competition on price setting and pricing strategies. Understand how food products move from producer to consumer.	Structural characteristics of food markets.	Lecture, presentation, illustrations	Questions and answers + exercise solutions
15	2	Understanding dairy product marketing strategies and analyzing supply chains to ensure	Marketing milk and dairy products, and marketing fruits and vegetables	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		quality and competitiveness Implementing innovative methods to boost sales and increase market share of food products Evaluating market dynamics to ensure fresh products reach consumers efficiently			

11. Course Evaluation
Tests + Exercises + Discussions + Questions

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	The vocabulary prescribed by the Ministry of Higher Education and Scientific Research
Main references (sources)	Al-Diouji, Abi Saeed. 2001. Agricultural Economics. Ministry of Higher Education and Scientific Research. University of Mosul. Mosul. Al-Tarawneh, Salah Yousef. 2010. Electronic Marketing. Jordanian Ward Publishing and Distribution House
Recommended books and references (scientific journals, reports...)	Google scholar, researcher gate
Electronic References, Websites	All sites that provide reliable sources and also artificial intelligence tools

Course Description Form

1. Course Name:
Plant Breeding and Improvement 1
2. Course Code:
PLP 401
3. Semester / Year:
2024 – 2025
4. Description Preparation Date:
7 / 6 / 2025
5. Available Attendance Forms:
Paper form including name, date of attendance and signature
6. Number of Credit Hours (Total) / Number of Units (Total)
60 / 3
7. Course administrator's name (mention all, if more than one name)
Name: Haitham Abdul Sattar Saeed Email: haythem.a.adullah@ntu.edu.iq
8. Course Objectives

Course Objectives	By the end of the course, the student is expected to be able to: 1.Understand the basic principles of plant breeding: 2.Familiarize with various breeding methods: 3.Acquire practical skills in plant breeding programs: 4.Analyze agricultural production problems from a genetic perspective: 5.Raise awareness about the role of plant breeding in food security and resistance, and stress tolerance.

9. Teaching and Learning Strategies	
Strategy	1. Dialogue- and discussion-based learning. 2. Brainstorming. 3. Collaborative learning. 4. Practical training. 5. Self-directed learning.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Explain the importance and historical development of plant breeding.	Introduction to Plant Breeding: History and Importance	Lecture, presentation, illustrations	Questions and answers + exercise solutions
2	4	Describe basic genetic laws and their relevance to plant improvement.	Genetic Principles in Plant Breeding	Lecture, presentation, illustrations	Questions and answers + exercise solutions
3	4	Analyze the concept of genetic variation and how it is	Variation and Heritability	Lecture, presentation, illustrations	Questions and answers + exercise

		measured.			solutions
4	4	Differentiate between mass and pure-line selection and apply their principles.	Selection Methods: Mass and Pure Line Selection	Lecture, presentation, illustrations	Questions and answers + exercise solutions
5	4	Describe hybridization techniques and their objectives.	Hybridization: Techniques and Objectives	Lecture, presentation, illustrations	Questions and answers + exercise solutions
6	4	Explain heterosis and the effects of self-pollination and cross-pollination.	Inbreeding and Heterosis	Lecture, presentation, illustrations	Questions and answers + exercise solutions
7	4	Apply breeding strategies for self- and cross-pollinated crops.	Breeding Self- and Cross-Pollinated Crops	Lecture, presentation, illustrations	Questions and answers + exercise solutions
8	4	Evaluate the use of mutation as a breeding tool and its advantages/risks.	Mutation Breeding	Lecture, presentation, illustrations	Questions and answers + exercise solutions
9	4	Explain the principles of backcrossing and recurrent selection.	Backcrossing and Recurrent Selection	Lecture, presentation, illustrations	Questions and answers + exercise solutions
10	4	Describe polyploidy and its applications in plant improvement.	Polyploidy in Plant Breeding	Lecture, presentation, illustrations	Questions and answers + exercise solutions
11	4	Analyze breeding methods for resistance to biotic and abiotic stress.	Resistance Breeding (Biotic and Abiotic Stress)	Lecture, presentation, illustrations	Questions and answers + exercise solutions
12	4	Apply concepts of Distinctness, Uniformity, and Stability in cultivar testing.	Testing and Evaluation of New Varieties	Lecture, presentation, illustrations	Questions and answers + exercise solutions
13	4	Explain the role of molecular markers in modern breeding programs.	Use of Molecular Markers in Plant Breeding (Intro)	Lecture, presentation, illustrations	Questions and answers + exercise solutions
14	4	Relate theoretical knowledge to	Field Visit / Case Studies	Lecture, presentation,	Questions and answers

		practical cases and field applications.		illustrations	+ exercise solutions
15	4	Summarize and evaluate knowledge and skills gained during the semester.	Final Review and Assessment	Lecture, presentation, illustrations	Questions and answers + exercise solutions
11. Course Evaluation					
12. Learning and Teaching Resources					
Required textbooks (curricular books, if any)			The vocabulary prescribed by the Ministry of Higher Education and Scientific Research		
Main references (sources)			Sleper, D.A., and Poehlman, J.M. (2006). *Breeding Field Crops*. 5th Edition. Fehr, W.R. (1987). *Principles of Cultivar Development*. Acquaah, G. (2012). *Principles of Plant Genetics and Breeding*.		
Recommended books and references (scientific journals, reports...)			Google scholar, researcher gate		
Electronic References, Websites			All sites that provide reliable sources and also artificial intelligence tools		

Course Description Form

1. 1. Course Name:
Medicinal Plants
2. 2. Course Code:
PMNP 103
3. 3. Semester/Year
First Semester/2024-2025
4. 4. Course Description Date
June 15, 2025
5. 1. Available Attendance Forms
In-person, practical laboratory and field work, online
6. 2. Number of Credit Hours (Total) / Number of Units (Total)
Number of Credit Hours: 45 / Number of Units: 2
7. 3. Name of Course Supervisor (List all names, if there is more than one)
Name: Asst. Prof. Dr. Fatima Ibrahim Sultan drfatimah@ntu.edu.iq
8. Course Objectives

Course Objectives	Introduction to Medicinal Plants • Provide students with basic knowledge about common medicinal plant species and their health and economic importance. 2. Distinguishing Between Plant Species • Enable students to identify and classify medicinal plants based on their morphological and physiological characteristics. *Understanding Active Compounds

	• Explain the types of active chemical compounds found in medicinal plants, such as alkaloids, volatile oils, flavonoids, tannins, and others. 4. Identifying Medical Uses • Explain the therapeutic uses of medicinal plants and their role in treating various diseases. * Methods of Collection, Drying, and Storage • Teach students the correct methods for collecting, drying, and storing medicinal plants while maintaining their potency. 6. Toxicological Aspects and Side Effects • Explain the risks and side effects of using some medicinal plants, and methods for their safe use. *Modern Applications of Medicinal Plants • Learn about the modern uses of medicinal plants in the pharmaceutical, cosmetic, and nutritional supplement industries. 8. Enhancing Practical and Field-Based Learning • Develop students' skills in identifying medicinal plants through field visits, herbariums, or laboratory preparations.
9. Teaching and Learning Strategies	
Strategy	Lecture-Based Learning • Providing basic scientific information about medicinal plants, their classification, properties, and active compounds through illustrated lectures supported by images and plant samples. 2. Practical and Laboratory Learning • Conducting experiments and extracting active compounds from medicinal plants, with practical exposure to preparation and storage methods. Field Learning (Field Visits) • Organizing visits to herbariums, botanical gardens, or agricultural research centers to directly observe medicinal plants in their natural environment. 4. Interactive Learning • Using open-ended questions, brainstorming, and group discussions to increase participation and understanding. Project-Based Learning

	• Assign students to prepare research or reports on specific medicinal plants, including their uses, active compounds, benefits, and risks. 6. Student Presentations • Encourage students to present PowerPoint presentations on selected topics, enhancing their presentation and research skills. Technology-Enabled Learning • Use educational videos, digital resources, and mobile apps to learn about plants and their characteristics. 8. Collaborative Learning • Divide students into groups to complete practical or research tasks to develop teamwork and critical thinking.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	The student lea Understanding concept medicinal pla and th importance	Introduction to Medici Plants	Interactive Lecture	Participation Quiz
2	2	Distinguishing between types medicinal pla and their benefit	Classification of Medici Plants	PowerPoint Presentation Discussion	Homework
3	2	Explaining meth of collecting a drying medici plants	Collecting and Drying Pla	Lecture + Video	Quiz
4	2	Explaining meth of preservation a storage	Storage of Medicinal Plan	Group Discussion	Assignment
5	2	Understanding biological activ	Active Compounds in Pla	Theoretical Explanation	Written Quiz

		of plants			
6	2	Distinguishing active ingredie and their effects	Volatile Oils and Glycosid	Lecture	Quiz
7	2	Identifying traditional uses	Uses of Plants in F Medicine	Case Study	Oral Presentati
8	2	Linking plants their therapeu uses	Therapeutic Applications Plants	Lecture + Example	Written Quiz
9	2	Distinguishing toxicity and d interactions	Safety of Plant Uses	Scientific Discussic	Written Exercis
10	2	Analyzing examp of well-kno plants	Study of Popular Pla (such as Hibiscus, Mint)	Interactive Explanation	Quiz
11	2	Comparing traditional a modern plants	Traditional Medicine Modern Medicine	Group Comparisor	Assignment
12	2	Using informat in multiple fields	Use of Plants in Industry	Lecture + Discussic	Presentation
13	2	Discussing ethics of use	Legal and Ethical Aspects	Case Study	Class Participat
14	2	Evaluating effectiveness of particular medicinal plant	Individual Research	Self-Learning	Written Report
15	2	Comprehensive review a evaluation	Review and Preparation the Final Exam	Interactive Activity	Final Exam
عملي					
Week	**Hours**	**Required**	**Unit or subject name**	**Learning method**	**Evaluation**

		Learning Outcomes			method
1	2	Familiarization w preparation tool	Introduction to the Lab	Practical Training	Attendance a Participation
2	2	Conducting collection of lo plants	Collecting Plants from Environment	Field Trip	Practical Repor
3	2	Applying dry methods	Drying Plants	Practical Implementation	Practical Assessment
4	2	Analyzing go storage methods	Storing Preserved Plants	Practical Discussio	Practical Test
5	2	Extracting essen oils	Extracting Oils	Experimental Application	Lab Report
6	2	Applying glycos extraction metho	Extracting Chem Compounds	Practical Explanation	Practical Assessment
7	2	Testing extr quality	Quality Testing	Laboratory Experiment	Practical Repor
8	2	Documenting preparation step	Preparing a Medici Extract	Individual Application	Practical Notebook
9	2	Conducting sim preparations	Manufacturing Sim Preparations	Group Training	Practical Presentation
10	2	Evaluating preparation safe	Preliminary Toxicity Analy	Scientific Experime	Report
11	2	Analyzing components of specific plant	Specific Plant Testing	Research a Application	Presentation
12	2	Applying results practical applications	Mini-Project	Group Work	Practical Projec
13	2	Reviewing previ reports	Analyzing Results	Scientific Discussio	Report Evaluati

14	2	Preparing a sim plant product	Preparing a Final Product	Workshop	Product Evaluation
15	2	Final evaluation practical learning	Comprehensive Pract Test	Comprehensive Practical Exam	Practical Fi Exam

1. Course Evaluation

Grade out of 100	Evaluation
5	Daily Exams
70	Monthly Exams
5	Report
10	Attendance and Participation
10	Laboratory Performance Evaluation
100	Total Grade

2. Learning and Teaching Resources

Main references (sources)	• Pharmacognosy Trease and Evans A well-known reference in pharmacology th includes chapters on volatile oils, their constituen and their biological effects. • Medicinal Plants: Chemistry and Properties – A.K. Sharma Provides a chemical and medicinal overview plants containing volatile oils.
Recommended books and references (scientific journals, reports...)	1. Medicinal Plants: Chemistry, Biology, and Omics Barbara M. Filipowicz Covers the chemical and biological aspects medicinal plants. 2. Pharmacognosy and Phytochemistry By Vinod D. Rangari A comprehensive book on the pharmacological a chemical properties of medicinal plants. 3. Textbook of Pharmacognosy By T. E. Wallis A classic reference book on the study of medici

	plants and their uses. 4. Medicinal Plants of the World: Chemi Constituents, Traditional, and Modern Uses By Ivan A. Ross An encyclopedic book on medicinal plants fr around the world

Course Description Form

1. Course Name:	
Crop Quality	
2. Course Code:	
PlP403	
3. Semester / Year:	
2024 - 2025	
4. Description Preparation Date:	
17 – 7 - 2025	
5. Available Attendance Forms:	
Paper form including name, date of attendance and signature	
6. Number of Credit Hours (Total) / Number of Units (Total)	
4/3	
7. Course administrator's name (mention all, if more than one name)	
Name: Muhammad Amin Walid Taha Amin Email: mohmadameenm@ntu.edu.iq	
8. Course Objectives	
Course Objectives	By the end of the course, the student is expected to be able to: 1. Understand the basic concepts of crop quality assessment 2. Explain the mechanisms by which various environmental and climatic factors and crop service processes affect the quality of the produced crops 3. Identify methods for assessing crop

	quality 4. Analyze the effects of various service processes, storage, and marketing on crop quality 5. Understand the relationship between chemical composition and basic components and their impact on crop quality 6. Identify a segment of agricultural crops in terms of crop quality 7. Understand the importance of crop quality assessment and its consequent impact on profitability and returns

9. Teaching and Learning Strategies

Strategy	There are several effective strategies for teaching Crop quality, which aim to foster a deep understanding of the effects of various plant physiological processes and develop students' critical thinking skills. These include: 1. Dialogue- and discussion-based learning. 2. Brainstorming. 3. Cooperative learning. 4. Simulation-based learning. 5. Practical training. 6. Self-directed learning.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	1. The student will understand the basic concepts of grain quality.	Grain and seed quality: the foundation of successful agricultural production.	Lecture, presentation, illustrations	Questions and answers + exercise solutions

2	4	2. The student will understand the importance of seed quality. 3. The student will understand that improving grain and seed quality is a step toward sustainable agriculture.	Grain and seed quality: the foundation of successful agricultural production.	Lecture, presentation, illustrations	Questions and answers + exercise solutions
3	4	1. The student will understand the seed quality criteria. 2. The student will understand the quality characteristics of wheat grains.	Seed strength and quality	Lecture, presentation, illustrations	Questions and answers + exercise solutions
4	4	1. The student will know the chemical composition of wheat grains. 2. The student will understand the effects on the	Types of wheat grown in Iraq	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		wheat milling process. influences on alfalfa seed production.			
5	4	1. The student will learn about wheat cultivation. 2. The student will understand the various influences on wheat cultivation.	wheat cultivation	Lecture, presentation, illustrations	Questions and answers + exercise solutions
6	4	1. The student will identify the parts of a rice seed. 2. The student will understand the requirements for high-quality milled rice.	rice:	Lecture, presentation, illustrations	Questions and answers + exercise solutions
7	4	1. The student will be familiar with the uses of durum wheat. 2. The student will be familiar with the components of	Triticale Wheat: Uses and Importance	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		the grain in triticale. 3. The student will understand.			
8	4	1. The student will understand the economic importance of barley and the principles of production. 2. The student will understand why barley is special.	Economic importance and uses of barley	Lecture, presentation, illustrations	Questions and answers + exercise solutions
9	4	1. The student will know the uses and importance of sunflowers. 2. The student will understand the components of the seeds. 3. The student will know the quality of sunflower oil.	Sunflower: Uses, Importance, Seed Components, and Oil Quality	Lecture, presentation, illustrations	Questions and answers + exercise solutions
10	4	1. The student will know the uses, importance,	cotton	Lecture, presentation, illustrations	Questions and answers +

		and components of the seeds and the quality of the oil. 2. The student will understand the components of cotton seeds. 3. The student will know the quality of cottonseed oil.			exercise solutions
11	4	1. The student will understand what legumes are, their types, and their importance. 2. The student will understand the importance of legumes.	Leguminous plants - their types and importance.	Lecture, presentation, illustrations	Questions and answers + exercise solutions
12	4	1. The student should know the components of yellow corn. 2. The student should know how to identify the structure of a corn kernel.	maize	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		3. The student should know the techniques used in corn processing.			
13	4	1. The student should know: What are the classifications of enzymes? 2. The student should know the difference between enzymes and hormones.	enzymes	Lecture, presentation, illustrations	Questions and answers + exercise solutions
14	4	1. The student should know the properties and structure of oils. 2. The student should know that fatty acids are the building blocks of fats.	Fats and Oils: Composition, Uses, and Importance	Lecture, presentation, illustrations	Questions and answers + exercise solutions
15	4	1. The student will identify the types of grain proteins. 2. The student will understand the amino acids	Cereal proteins and amino acids		

		in grain proteins.			
11. Course Evaluation : Tests + Exercises + Discussions + Questions					
12. Learning and Teaching Resources					
Required textbooks (curricular books, if any)			The vocabulary prescribed by the Ministry of Higher Education and Scientific Research		
Main references (sources)			1. "Field Crops" Authored by: Dr. Muhammad Amin Al-Ali 2. "Improving Field Crops" – Dr. Kazim Jabr Alwan 3. "Physiology of Field Crops" – Dr. Ahmed Abdel Qader.		
Recommended books and references (scientific journals, reports...)			Google scholar, researcher gate		
Electronic References, Websites			All sites that provide reliable sources and also artificial intelligence tools		

Course Description Form

1. Course Name:	
Weed control	
2. Course Code:	
PLP 404	
3. Semester / Year:	
2024 – 2025	
4. Description Preparation Date:	
8 / 6 / 2025	
5. Available Attendance Forms:	
Paper form including name, date of attendance and signature	
6. Number of Credit Hours (Total) / Number of Units (Total)	
45 / 2	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr.Whdhah Thabit Abed Email: wadah8324@ntu.edu.iq	
8. Course Objectives	
Course Objectives	By the end of the course, the student is expected to be able to: 1. Define the concept of weeds (harmful weeds): - Understand the nature of weeds and their impact on plant production. - Distinguish between their types (annual, perennial, broad-leaved, narrow-leaved). 2- Study the impact of weeds on crops: - Competition for resources (water, nutrients, light). - Their impact on crop quality and quantity. - Their role as hosts for diseases and pests. 3- Mechanical control: such as hoeing and plowing. - Chemical Control: Understanding Herbicides (Types, Methods of Use, and Safety Precautions). - Biological control: Using living organisms (fungi, insects) to limit their spread. - Agricultural control, such as crop rotation and intensive planting.

	4. Learn the basics of weed management in agricultural systems: - Select appropriate methods based on crop type and cropping system. - Evaluate the effectiveness of different control methods. 5- Field training in weed diagnosis: - Identify common weeds in the area. - Understand the weed life cycle and times of peak damage. 6- Enhancing environmental awareness: - Understanding the impact of herbicides on the environment and non-target organisms. - Learning integrated pest management practices (balanced management). 7- Practical applications and field exercises: - Field visits to analyze crop infestations. - Practical experiments on various pest control methods.

9. Teaching and Learning Strategies

Strategy	1. Dialogue- and discussion-based learning. 2. Brainstorming. 3. Collaborative learning. 5. Practical training. 6. Self-directed learning.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	1- The student will understand what weed plants are. 2- Identify them and the losses they cause to agricultural, social, and human health. 3- Analyze the expected results of leaving weeds uncontrolled through propagation and seed production.	Definition of weeds and losses caused by jungles	Lecture, presentation, illustrations	Questions and answers
2	3	1- The student should know the benefits of weed	Benefits of weeds plants	Lecture, presentation, illustrations	Questions and answers

		plants, including protecting the soil from erosion. 2- The student should be able to identify weeds. 3- Through identifying weeds, a control method is determined.			
3	3	1- The student will be able to classify weed plants according to their growing season, lifespan, damage they cause, and methods of weed propagation. 2- The student will understand the life cycle of weeds. 3- The student will identify the strengths and weaknesses of weeds. 4- The student will be able to choose the appropriate control method.	Classification of weed plants, according to the growing season, according to the life span,	Lecture, presentation, illustrations	Questions and answers
4	3	1- The student will understand what Antibiotics and inhibition and inhibition are in weed plants. 2- The student will know the benefits and harms of	Allelopathy and inhibition	Lecture, presentation, illustrations	Questions and answers

		Allelopathy and inhibition. 3- How it can be used to benefit Allelopathy production.			
5	3	1- The student will understand methods for preventing weeds. 2- The student will analyze the appropriate methods for each weed. 3- The student will apply these methods and compare the results.	Weed control	Lecture, presentation, illustrations	Questions and answers + exercise solutions
6	3	1. The student will understand the mechanical method of weed control. 2. The student will be able to use agricultural mechanized equipment to control weeds. 3. The student will implement a perennial weed control program. 4. The student will analyze the results.	Mechanical method of weed control	Lecture, presentation, illustrations	Questions and answers
7	3	1. The student will understand the biological method of pest control.	Biological method of control	Lecture, presentation, illustrations	Questions and answers

		2. The student will apply methods of natural enemies such as insects, pathogens, fish, goats, etc. 3. Analyze the results and compare them with other methods.			
8	3	1- The student will understand how to use agricultural methods for control. 2- The student will use temporary suppressive crops, crop rotations, planting methods, etc. 3- The student will analyze the results and compare the methods.	Using agricultural methods in control	Lecture, presentation, illustrations	Questions and answers
9	3	1- The student should know what chemical weed control is. 2- The student should understand what herbicide concentration is. 3- The student should know what selectivity is, its classifications, and how the herbicide affects the plant.	Chemical weed control	Lecture, presentation, illustrations	Questions and answers + exercise solutions
10	3	1- The student should know the methods of absorption and transport of herbicides.	Methods of absorption and transport of herbicides	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		2- Understand the root transport system and common cell wall transport.			
11	3	1- The student will understand the relationship between herbicides and soil. 2- The student will know the fate of the herbicide in the soil. 3- The student will analyze the results.	herbicides and soil	Lecture, presentation, illustrations	Questions and answers + exercise solutions
12	3	1- The student should know the factors affecting the effectiveness of herbicides in the soil. 2- Understand the residual effect of herbicides in the soil. 3- Analyze the relationship between herbicides and soil.	Factors affecting the effectiveness of herbicides in soil	Lecture, presentation, illustrations	Questions and answers
13	3	1- The student will be able to identify the herbicides in the Piperdillium paraquat group, and Diquat. 2- Apply these herbicides to different types of weeds. 3- Analyze and compare the results.	Study of Piperdillium group herbicides	Lecture, presentation, illustrations	Questions and answers
14	3	1- The student will be able to identify phenoxy group herbicides.	Study of phenoxy group herbicides	Lecture, presentation, illustrations	Questions and answers

		2- Apply these herbicides and analyze the results.			
15	3	1- The student will be introduced to the Triazine group. 2- Apply these herbicides to various types of weeds. 3- Analyze the results.	Triazine group study	Lecture, presentation, illustrations	Questions and answers

11. Course Evaluation	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	The vocabulary prescribed by the Ministry of Higher Education and Scientific Research
Main references (sources)	كتاب (weed and weed control) مقاومة الحشائش والاعشاب د. محمد محمود زين الدين د. كمال محمد الهباشة 1992م
Recommended books and references (scientific journals, reports...)	Google scholar, researcher gate
Electronic References, Websites	All sites that provide reliable sources and also artificial intelligence tools

Course Description Form

1. Course Name:
Plant Breeding and Improvement 2
2. Course Code:
PLP 405
3. Semester / Year:
2024 – 2025
4. Description Preparation Date:
7 / 6 / 2025
5. Available Attendance Forms:
Paper form including name, date of attendance and signature
6. Number of Credit Hours (Total) / Number of Units (Total)
60 / 3
7. Course administrator's name (mention all, if more than one name)
Name: Haitham Abdul Sattar Saeed Email: haythem.a.adullah@ntu.edu.iq
8. Course Objectives

Course Objectives	By the end of the course, the student is expected to be able to: 1. Equip students with advanced knowledge of methods and techniques used in breeding field and horticultural crops. 2. Understand the genetic principles underlying hybridization and trait improvement programs. 3. Apply techniques of genetic variance analysis in selection and breeding programs. 4. Learn the theories explaining heterosis (hybrid vigor) and methods for its measurement. 5. Understand hybrid production systems, synthetic varieties, and how to evaluate their performance in different environments. 6. Study breeding techniques for vegetatively propagated plants and their genetic improvement.

	7. Distinguish between general and specific combining ability and apply them for parent selection. 8. Understand strategies for breeding resistance to diseases and insect pests. 9. Recognize the role of chromosomal duplication and genetic mutations in enhancing diversity and crop improvement. 10. Explore the applications of genetic engineering and gene transfer techniques in modern plant breeding programs.

9. Teaching and Learning Strategies

Strategy	1. Dialogue- and discussion-based learning. 2. Brainstorming. 3. Collaborative learning. 5. Practical training. 6. Self-directed learning.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Analyzing gene frequency using the Hardy-Weinberg law.	Analyzing gene frequencies using the Hardy-Weinberg law.	Lecture, presentation, illustrations	Questions and answers + exercise solutions
2	4	Identifying important genetic traits in plant breeding programs.	Identifying key genetic traits in plant breeding programs.	Lecture, presentation, illustrations	Questions and answers + exercise solutions
3	4	Explaining and estimating hybrid vigor (heterosis) using genetic theories.	Interpreting and estimating hybrid vigor (heterosis) using genetic theories.	Lecture, presentation, illustrations	Questions and answers + exercise solutions
4	4	Applying different hybridization methods in self-pollinated and cross-	Applying various hybridization methods in self-pollinated and cross-	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		pollinated crops.	pollinated crops.		
5	4	Evaluating the performance of hybrids and synthetic varieties and predicting their yield.	Evaluating the performance of hybrids and synthetic varieties, and predicting their yield.	Lecture, presentation, illustrations	Questions and answers + exercise solutions
6	4	Recognizing the methods of breeding vegetatively propagated plants.	Understanding the methods of breeding vegetatively propagated plants.	Lecture, presentation, illustrations	Questions and answers + exercise solutions
7	4	Analyzing components of genetic variance and calculating heritability.	Analyzing components of genetic variance and calculating heritability.	Lecture, presentation, illustrations	Questions and answers + exercise solutions
8	4	Estimating general and specific combining abilities and interpreting the results.	Estimating general and specific combining ability (GCA and SCA) and interpreting the results.	Lecture, presentation, illustrations	Questions and answers + exercise solutions
9	4	Designing breeding programs to improve resistance to diseases and pests.	Designing breeding programs for improving resistance to diseases and pests.	Lecture, presentation, illustrations	Questions and answers + exercise solutions
10	4	Utilizing chromosome doubling and mutations in cultivar development.	Utilizing chromosomal duplication and induced mutations in cultivar development.	Lecture, presentation, illustrations	Questions and answers + exercise solutions
11	4	Applying genetic engineering tools and gene transfer	Applying genetic engineering tools and gene transfer	Lecture, presentation, illustrations	Questions and answers + exercise

		techniques.	techniques.		solutions
12	4	Comparing different plant breeding methods in terms of efficiency and outcomes.	Comparing different breeding methods in terms of efficiency and outcomes.	Lecture, presentation, illustrations	Questions and answers + exercise solutions
13	4	Utilizing gene banks to improve plant populations.	Utilizing gene banks to improve genetic populations.	Lecture, presentation, illustrations	Questions and answers + exercise solutions
14	4	Understanding progeny testing techniques and integrating theoretical and practical aspects.	Understanding the concept of progeny testing in plant breeding, its importance, and comparison with other breeding methods.	Lecture, presentation, illustrations	Questions and answers + exercise solutions
15	4	Learning inbreeding and outbreeding methods for plant populations.	Breeding plant populations through inbreeding and outbreeding approaches, and using genetic information databases.	Lecture, presentation, illustrations	Questions and answers + exercise solutions

11. Course Evaluation	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	The vocabulary prescribed by the Ministry of Higher Education and Scientific Research
Main references (sources)	Sleper, D.A., and Poehlman, J.M. (2006). *Breeding Field Crops*. 5th Edition. Fehr, W.R. (1987). *Principles of Cultivar Development*. Acquaah, G. (2012). *Principles of Plant*

	Genetics and Breeding.
Recommended books and references (scientific journals, reports...)	Google scholar, researcher gate
Electronic References, Websites	All sites that provide reliable sources and also artificial intelligence tools

Course Description Form

1. Course Name:	
Plant tissue culture	
2. Course Code:	
PLP 406	
3. Semester / Year:	
Level Four / 2024-2025	
4. Description Preparation Date:	
9/6/2025	
5. Available Attendance Forms:	
Paper form including name, date of attendance and signature	
6. Number of Credit Hours (Total) / Number of Units (Total)	
60 / 3	
7. Course administrator's name (mention all, if more than one name)	
Name: Khawla Mahmoud Yahya Email: kawllamhmood@ntu.edu.iq	
8. Course Objectives	
Course Objectives	By the end of the course, the student is expected to be able to: 1- The student will be aware of the importance of plant tissue culture and the prospects of its use 2- The student will be familiar with the types of culture media and methods of preparing the culture media

	3- The student will be familiar with sterilization methods and types of sterilizers used and sterilization devices 4- The student will be able to use tissue culture technology in propagating different plants. 5- The student will have learned the importance of cell suspensions and the prospects of their uses 6- The student will know the methods of propagating plants free of disease infections

9. Teaching and Learning Strategies

Strategy	1. Dialogue- and discussion-based learning. 2. Brainstorming. 3. Collaborative learning. 4. Practical training. 5. Self-directed learning.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	1- Introducing the student to plant tissue culture technology and its applications. 2- Introducing the student to the economic value of plant tissue culture technology.	plant tissue culture and application	Lecture, presentation, illustrations	Questions and answers + exercise solutions

2	4	1- The student will be familiar with the benefits and advantages of plant tissue culture. 2- The student will be able to identify the plant tissue culture laboratory and its sections. 3- The student will be familiar with the most important laboratory equipment required in each part of the plant tissue culture laboratory.	Benefits, features and terms in plant tissue culture	Lecture, presentation, illustrations	Questions and answers + exercise solutions
3	4	Main components of the growing medium Types of energy sources added to the environment	The student -1 will distinguish between the types of growing media, the characteristics of each, and the conditions for .using each The student -2 will be familiar with the energy sources added to the growing media, the importance of each type, and the	Lecture, presentation, illustrations	Questions and answers + exercise solutions

			purpose of its .addition		
4	4	Organic additions to the medium Hardening of the growing medium	- The student will learn about the types of organic additives in the growing medium. 2- The student will learn about the importance of amino acids added to the growing medium and their role in the growth and development of the cultivated plant. 3- The student will learn about the most important vitamins added to the growing medium and their role in the growing medium. 4- The student will be familiar with the role of agar added to the growing medium, and will understand the source of agar production and its advantages.	Lecture, presentation, illustrations	Questions and answers + exercise solutions

5	4	Growth regulators and their role in plant tissue culture	1- The student will be able to distinguish between the types of growth regulators. 2- The student will be able to identify the type of growth regulator added to the culture medium, based on the purpose of cultivation.	Lecture, presentation, illustrations	Questions and answers + exercise solutions
6	4	Growth regulators and their role in plant tissue culture	The student will be able to deal with growth regulator groups, methods of dissolving each type, how to store them in the laboratory, methods of sterilization, and reasons for their spoilage.	Lecture, presentation, illustrations	Questions and answers + exercise solutions
7	4	Methods of sterilizing (Wet Sterilization Dry Sterilization)	1- The student understands the purpose of sterilization. 2- The student distinguishes between the types of sterilization. 3- The student can perform various sterilization methods	Lecture, presentation, illustrations	Questions and answers + exercise solutions

			in the plant tissue culture laboratory.		
8	4	Methods of sterilizing	1- The student will be able to distinguish between the types of chemicals and their concentrations used to sterilize plant parts and the duration of sterilization. He will also be aware of their harmful effects.	Lecture, presentation, illustrations	Questions and answers + exercise solutions
9	4	Callus farms development	1- By the end of the lecture, the student will be able to identify callus farms. 2- The student will be familiar with the most important aspects in which callus farms are used.	Lecture, presentation, illustrations	Questions and answers + exercise solutions
10	4	Callus farms development	1- Be familiar with the most important reasons for failure of	Lecture, presentation, illustrations	Questions and answers

			callus culture growth and sustainability. 2- Be able to establish a callus culture.		+ exercise solutions
11	4	Callus farms development	1- The student will be able to distinguish between callus types. 2- The student will have full knowledge of how to maintain a callus culture and direct it toward production, whether for breeding or metabolite production.	Lecture, presentation, illustrations	Questions and answers + exercise solutions
12	4	Cell suspensions, culture	1- The student will be familiar with the mechanism of cell suspensions, their benefits, and the materials produced in cell suspensions. 2- The student will be familiar with the type of medium used in cell suspensions.	Lecture, presentation, illustrations	Questions and answers + exercise solutions

13	4	Cell suspensions, culture(Bioreactors Secondary Metabolism	Introducing the student to the concept of the bioreactor and its most important uses in tissue cultures.	Lecture, presentation, illustrations	Questions and answers + exercise solutions
14	4	Tissue culture stages	After the end of the lecture, the student will be familiar with the stages of establishing and preparing tissue cultures, from the initial stage to acclimatization and transfer to the field.	Lecture, presentation, illustrations	Questions and answers + exercise solutions
15	4	Production of disease-free plants (Apex meristem cultivation)	Introducing the student to the term apical meristem. The student will be familiar with how to produce disease-free plants.	Lecture, presentation, illustrations	Questions and answers + exercise solutions

11. Course Evaluation

Tests + exercises + discussions + asking questions

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	The vocabulary prescribed by the Ministry of Higher Education and Scientific Research
Main references (sources)	Introduction to Plant Tissue Culture,M.K.Razdan, Ph.D.,FSCG.Delhi,INDIA Plant Biotechnology Commercial Protspects and Problems,Jitendra Prakash And R.L.M. Pierik 2020

Recommended books and references (scientific journals, reports...)	Google scholar, researcher gate
Electronic References, Websites	All sites that provide reliable sources and also artificial intelligence tools

Course Description Form

1. Course Name:	
Landscape Engineering and Design	
2. Course Code:	
PLP407	
3. Semester / Year:	
the fourth / 2024-2025	
4. Description Preparation Date:	
9/6/2025	
5. Available Attendance Forms:	
Paper form including name, date of attendance and signature	
6. Number of Credit Hours (Total) / Number of Units (Total)	
75 / 3	
7. Course administrator's name (mention all, if more than one name)	
Name: Khawla Mahmoud Yahya Email: kawllamhmood@ntu.edu.iq	
8. Course Objectives	
Course Objectives	1. Students will learn about the types of global designs used in garden design and the advantages and disadvantages of each. 2. The student will be familiar with the types of public and private gardens and their uses. 3.Students will be able to study the sites where gardens are to be implemented and will be able to identify the site's advantages to incorporate them into the design, as well

	as to understand the site's disadvantages and problems to avoid including them in the design or to try to adapt them to the design. 4. Students will be able to design a geometric map for designing a garden, and will be knowledgeable about how to distribute the plant elements and service facilities on the map. 5. Students will learn how to project the paper garden design onto the garden site, as well as how to project geometric shapes onto the ground.

9. Teaching and Learning Strategies

Strategy	Dialogue- and discussion-based learning. 2. Brainstorming. 3. Collaborative learning. 4. Practical training. 5. Self-directed learning.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	5	The student will learn about the science of landscape architecture and its purpose. They will be familiar with the development of gardens throughout history. They will explore the most important	Introduction to Landscape Design and Engineering The history of garden design.	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		gardens throughout history.			
2	5	The student will be aware of the types of designs used in garden design. The student will be able to choose the appropriate design for the appropriate location.	Types of garden designs (The engineering system)	Lecture, presentation, illustrations	Questions and answers + exercise solutions
3	5	The student will learn about the features of engineering design. The student will be able to design an engineering garden. The student will be able to employ engineering design in appropriate places.	Types of garden designs (The natural system)	Lecture, presentation, illustrations	Questions and answers + exercise solutions
4	5	The student will learn about the features of natural design. The student will be able to design a natural garden. The student will be able to employ natural design in	Types of garden designs (The mixed system)	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		appropriate locations.			
5	5	The student will learn the features of the literal system for garden design. The student will be able to design a garden using the free-form system. The student will be able to employ the free-form system in appropriate locations.	General principles for garden design (General principles for garden design)	Lecture, presentation, illustrations	Questions and answers + exercise solutions
6	5	The student will be familiar with the most important basic rules required for garden design. Be able to study the environmental conditions available in the area designated for garden construction and their impact on the garden's prosperity and success. Be able to study the areas surrounding the garden and be able to utilize them	Steps to design the garden	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		within the garden design.			
7	5	The student will have a thorough understanding of the main steps involved in creating a garden and the importance of each step. The student will understand the importance of the sequence of steps involved in creating a garden. By the end of the lecture, the student will be able to create a garden on the ground.	Costs of building the garden	Lecture, presentation, illustrations	Questions and answers + exercise solutions
8	5	The student will be able to calculate the costs of establishing a garden and will be able to develop a comprehensive feasibility study for any garden. They will also be able to estimate maintenance costs after the garden is completed.	The relationship of the garden with neighboring places	Lecture, presentation, illustrations	Questions and answers + exercise solutions

9	5	The student will be able to integrate the design with the garden's surroundings and utilize the garden's surroundings to enhance the garden's aesthetics. The student will also be familiar with some of the methods used to screen the garden from unwanted views.	Types of gardens	Lecture, presentation, illustrations	Questions and answers + exercise solutions
10	5	The student will be familiar with the types of public and private gardens (parks, hospital gardens, children's gardens, hotel gardens, company gardens), the features of each one, and the purpose of its establishment.	Types of private gardens	Lecture, presentation, illustrations	Questions and answers + exercise solutions
11	5	The student will distinguish the sections of the home garden (front and back) and the uses of each one, and will be able to employ the home	Home gardens.	Lecture, presentation, illustrations	Questions and answers + exercise solutions

		garden in a way that suits the garden owner's desires to achieve maximum benefit from it.			
12	5	The student will be able to design a rooftop garden and implement it in a way that suits the nature of plant growth. He will also be familiar with the most important problems facing rooftop gardens and ways to address them.	Rooftop and balcony gardens	Lecture, presentation, illustrations	Questions and answers + exercise solutions
13	5	The student will be familiar with the types of rock gardens and will be able to design a rock garden and implement it in a way that suits the nature of plant growth. He will also be familiar with the most important problems facing rock gardens and ways to treat them.	Rock Gardens Steps to Create Rock Gardens	Lecture, presentation, illustrations	Questions and answers + exercise solutions
14	5	The student will be able to design a water garden and	Water parks Steps to create water gardens	Lecture, presentation, illustrations	Questions and answers +

		implement it in a way that suits the nature of the land on which it is located. He will also be familiar with the most important problems facing water gardens and ways to address them.			exercise solutions
15	5	The student will learn about botanical gardens, the most important botanical gardens around the world, the purpose of their establishment, the types of gardens attached to them, and the plant herbariums in them. He will also be familiar with the most important industrial facilities attached to them.	Botanical Gardens	Lecture, presentation, illustrations	Questions and answers + exercise solutions
11. Course Evaluation Tests + exercises + discussions + asking questions					
12. Learning and Teaching Resources					
Required textbooks (curricular books, if any)			The vocabulary prescribed by the Ministry of Higher Education and Scientific Research		

Main references (sources)	هندسة وتصميم الحدائق .طلال محمود الجلبي /وزارة التعليم العالي والبحث العلمي / جامعة الموصل 1990
Recommended books and references (scientific journals, reports...)	Google scholar, researcher gate
Electronic References, Websites	All sites that provide reliable sources and also artificial intelligence tools

Course Description Form

1. Course Name:	
Conservation Agriculture	
2. Course Code:	
PLP 458	
3. Semester / Year:	
2024 – 2025	
4. Description Preparation Date:	
8 / 6 / 2025	
5. Available Attendance Forms:	
Paper form including name, date of attendance and signature	
6. Number of Credit Hours (Total) / Number of Units (Total)	
45 / 2	
7. Course administrator's name (mention all, if more than one name)	
Name: muqdad daham jasim Email: muqdad.da@ntu.edu.iq	
8. Course Objectives	
Course Objectives	- **Understand the principles** : Grasp the fundamental concepts of conservation agriculture and its importance to sustainable farming - **Analyze soil and water management techniques:** Assess approaches that preserve soil biodiversity and optimize water use - **Identify sustainable practices:** Recognize methods such as reduced tillage, cover cropping, and organic amendments that drive environmental stewardship - **Evaluate environmental impact:** Understand how conservation techniques limit erosion and reduce chemical dependency while boosting ecosystem resilience - **Develop practical skills:** Gain hands on experience in applying conservation methods in real world scenarios
9. Teaching and Learning Strategies	

Strategy	- Discussion-based learning - Brainstorming - Asking questions and trying to answer them through cooperation Self-learning.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	- Explaining conservation agriculture and understanding its principles - Understanding the reasons that led to the emergence and adoption of conservation agriculture technology Basic principles of conservation agriculture Understanding the principle of no-tillage	Introduction to Conservation Agriculture	Lecture, presentation, illustrations	Short answer questions on specific topics
2	4	understand the principle of crop rotation nderstand the principle of vegetation cover Understand the techniques that help in adopting conservation agriculture - Machinery used in adopting conservation agriculture	Water Conservation Strategies Clarifying Soil Components, Nature, and Management erosion,	Lecture, presentation, illustrations	Questions and answers
3	4	Clarify soil components, -their nature, and how to	Soil Health and Management in Conservation	Lecture, presentation,	Questions and answers

		manage them - Factors affecting soil fertility - Physical and chemical properties of soil	Agriculture	illustrations	
4	4	Identifying Water Sources and Finding the Best Methods for their Sustainability	Crop Rotation and Diversity	Lecture, presentation, illustrations	Questions and answers
5	4	Understanding Crops and Diversification Methods in their Cultivation Using Crop Rotation	Organic Matter Incorporation & Mulching Techniques	Lecture, presentation, illustrations	Questions and answers + exercise solutions
6	4	Understanding the Importance of Soil Cover	Reduced Tillage and No Till Practices	Lecture, presentation, illustrations	Questions and answers
7	4	Understanding the Importance of Reduced Tillage	Cover Crops and Green Manuring	Lecture, presentation, illustrations	Questions and answers
8	4	Understanding Soil Cover Techniques	Integrated Pest and Weed Management	Lecture, presentation, illustrations	Questions and answers
9	4	Identifying Agricultural Pests and Control Methods	Climate Change Adaptation in Agriculture	Lecture, presentation, illustrations	Questions and answers + exercise solutions
10	4	Understanding Climate Change, its Causes, and Methods to Reduce its Impact	Sustainable Farm Management	Lecture, presentation, illustrations	Questions and answers + exercise solutions
11	4	Farm Management and Sustainability of Production	Advanced Soil Fertility Management	Lecture, presentation, illustrations	Questions and answers + exercise solutions
12	4	Identifying Soil Fertility Sources and Methods for	Modern Technologies in	Lecture, presentation,	Questions

		their Sustainability	Conservation Agriculture	illustrations	and answers
13	4	Understanding Technologies Used in Agriculture and Assessing their Local Applicability	Economic and Policy Perspectives in Conservation Agriculture	Lecture, presentation, illustrations	Questions and answers
14	4	Understanding the Economic Impacts of Conservation Agriculture	Course Review and Integration of Learning Outcomes	Lecture, presentation, illustrations	Questions and answers
15	4	Community Impact and Environmental Benefits Understanding Community Acceptance of Conservation Agriculture Technology		Lecture, presentation, illustrations	Questions and answers

11. Course Evaluation

- **Continuous Assessment**: Regular quizzes, field reports, and participation in practical sessions
- **Final Examination:** Written exam assessing both theoretical understanding and the application of practices

Final Project: A comprehensive project where students design a conservation agriculture plan based on a case study

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Select textbooks and manuals related to conservation agriculture
Main references (sources)	Scientific journals, industry reports, and case studies
Recommended books and references (scientific journals, reports...)	Google scholar, researcher gate
Electronic References, Websites	Databases, websites of agricultural ministries, FAO, and other relevant

	organizations

Course Description Form

1. Course Name:	
Biological resistance	
2. Course Code:	
PLP 453	
3. Semester / Year:	
Fourth	
4. Description Preparation Date:	
11/6/2025	
5. Available Attendance Forms:	
A paper form that includes the student's name, date, and signature.	
6. Number of Credit Hours (Total) / Number of Units (Total)	
45 – 2	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr.Alaa younis zanoun *Email: alaa.alsafawy89@ntu.edu.iq*	
8. Course Objectives	
Course Objectives	Understand the theoretical foundations of 1-biological control Learn about the concept of vital control and its importance in controlling the numbers of harmful insects Study the history and development of vital control in agriculture .2- Learn about the types of vital enemies Study predators such as the insect of the

	Prophet's horse Learn about parasites such as parasitic worms 3-Study the mechanisms of biomed enemies Understand how vital enemies affect harmful insects Identify the factors that affect the effectiveness of vital enemies 4-Evaluation of vital control effectiveness Learn how to measure the effect of vital enemies on the numbers of insects.

9. Teaching and Learning Strategies

Strategy	1- Interactive lecture 2- Brainstorming 3- Dialogue and discussion 5- Assignment of tasks and reports 6- Educational videos

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	The student must know the concept of biological resistance and the programs used in biological resistance	The importance of biocontrol, methods used in biocontrol programs.	Lecture + Presentation	Test + Questions and Answers + discussion
2	3	The student must understand the types of methods used in biological resistance	Natural resistance to insects, methods used to introduce biological enemies.	Lecture + Presentation	Test + Questions and Answers + discussion

3	3	The student must know the forms and types of insect parasitoids with their scientific names and the behavior of adult parasites in pest resistance	Insect parasites, their types, reproduction, biological characteristics of adult parasites, adult behavior.	Lecture + Presentation	Test + Questions and Answers + discussion
4	3	The student must know the forms and races of predators used in bioresistance programs	Insect predators, predator biology, and their strategies	Lecture + Presentation	Test + Questions and Answers
5	3	The student must understand the term bacterial resistance, its features, and the types of viruses used in the biological resistance program	Bacterial resistance to pests, viruses causing insect diseases.	Lecture + Presentation	Test + Questions and Answers discussion
6	3	The student must distinguish the types and guns of bacteria used in vital resistance programs	Bacterial resistance to insect-causing bacterial pests	Lecture + Presentation	Test + Questions and Answers + discussion
7	3	The student must understand the term snake worms and distinguish the types of fungi used in biological resistance	Nematodes and fungi causing insect diseases.	Lecture + Presentation	Test + Questions and Answers + discussion
8	3	The student must know what is the defense mechanism and what are the means used in	Defense mechanism in insects, external defense, internal defense	Lecture + Presentation	Test + Questions and Answers + discussion

		external and internal defense			
9	3	The student must distinguish what is the resistance of insect parasitoids to the means of defense of the host	Resistance of insect parasites to host defenses	Lecture + Presentation	Test + Questions and Answers
10	3	The student must understand what is the biological resistance to fungal plant pathogens	Biological resistance to fungal plant pathogens.	Lecture + Presentation	Test + Questions and Answers
11	3	The student must distinguish what are the pathogens of the bacteria and virus genera and how to resist the plant	Biological resistance to bacterial and viral plant pathogens	Lecture + Presentation	Test + Questions and Answers
12	3	The student must know what is integrated control and what are the races of snake worms parasitizing on plants	Integrated management of plant-parasitic nematodes	Lecture + Presentation	Test + Questions and Answers
13	3	The student must know what are plant resistance, agricultural resistance and pest resistance methods in order to penetrate the plant	Methods of biological pest control, plant resistance, agricultural resistance.	Lecture + Presentation	Test + Questions and Answers
14	3	The student must know what is genetic	Genetic	Lecture +	Test + Questions and

		resistance and how to apply it in plant biological resistance	resistance	Presentation	Answers discussion +
15	3	The student must understand what are the means of biological resistance used in the fight against bushes	Biological control of weeds.	Lecture + Presentation	Test + Questions and Answers + discussion
11. Course Evaluation test , discussion , asking questions					
12. Learning and Teaching Resources					
Required textbooks (curricular books, if any)			The book of biological resistance, Dr. Hamza Kazim Al-Zubaidi		
Main references (sources)					
Recommended books and references (scientific journals, reports...)					
Electronic References, Websites			https://uomustansiriyah.edu.iq/books/65309.html		

Course Description Form

1. Course Name:	
Seed Technology	
2. Course Code:	
PLP452	
3. Semester / Year:	
2024 – 2025	
4. Description Preparation Date:	
7 / 6 / 2025	
5. Available Attendance Forms:	
Paper form including name, date of attendance and signature	
6. Number of Credit Hours (Total) / Number of Units (Total)	
45 / 2	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Wadhah Thabit Abed Email: wadah8324@ntu.edu.iq	
8. Course Objectives	
Course Objectives	By the end of the course, the student is expected to be able to: 1. Understand the basics of seed technology - Study the structure of a seed and the functions of its parts. - Understand the seed life cycle from formation to germination. 2. Improve seed quality and production. - Learn techniques for producing high-quality seeds. - Study seed selection criteria (purity, germination vigor, and disease freedom). 3. Seed Treatment and Storage Techniques - Learn about seed treatment methods (diagnosis, disinfection, inoculation, coating). - Understand appropriate storage conditions (humidity, temperature, ventilation) to maintain seed viability. 4. Biotechnology Applications in Seeds - Use modern technologies such as genetic modification and tissue culture to produce improved seeds. - Study the impact of technology on resistance to diseases and environmental stresses. 5. Quality Control and Seed Inspection - Learn about seed quality testing according to international standards (such as ISTA). - Analyze laboratory test results (germination rate, vigor). - The Role of Seeds in Food Security and Sustainable Agriculture - Understand the importance of seeds in increasing agricultural productivity. - Promote the use of improved seeds to achieve agricultural sustainability. 7. Practical and applied aspects

	- Training on the use of modern seed testing equipment. - Application of theories in experimental fields or research projects.

9. Teaching and Learning Strategies

Strategy	1. Dialogue- and discussion-based learning. 2. Brainstorming. 3. Collaborative learning. 5. Practical training. 6. Self-directed learning.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Introduction to seed technology and for the student to know the objectives of seed technology	Introduction to seed technology and objectives of seed technology	Lecture, presentation, illustrations	Questions and answers + exercise solutions
2	3	A brief history of ISTA seed inspection	A brief history of ISTA seed inspection	Lecture, presentation, illustrations	Questions and answers + exercise solutions
3	3	The student should know general information about the plant kingdom and the specifications of good seeds prepared for planting.	Learn about fruits, types of fruits, importance of seeds, benefits of seeds, harms of seeds, seed formation, types of fruits, importance of seeds, benefits of seeds, harms of seeds, seed formation,	Lecture, presentation, illustrations	Questions and answers + exercise solutions
4	3	The student should know how the seed embryo is formed.	Polyembryony, physiological maturity, and full maturity Yield and components	Lecture, presentation, illustrations	Questions and answers + exercise solutions
5	3	The student will know the chemical composition of seeds and its relationship to their value as seeds.	Chemical components of seeds	Lecture, presentation, illustrations	Questions and answers + exercise solutions

6	3	The student should know how to identify seeds.	Seed structure Seed germination Seed germination requirements Sequence of processes occurring during germination Seed dormancy	Lecture, presentation, illustrations	Questions and answers + exercise solutions
7	3	Seed vitality	**Seed Strength Purity Test.**	Lecture, presentation, illustrations	Questions and answers + exercise solutions
8	3	Seed quality tests	Improving seed production Seed treatments	Lecture, presentation, illustrations	Questions and answers + exercise solutions
9	3	Seed activation	Definition of seed activation Benefits of seed activation	Lecture, presentation, illustrations	Questions and answers + exercise solutions
10	3	Seed response to magnetic seed treatment	The importance of seeds Seed propagation	Lecture, presentation, illustrations	Questions and answers + exercise solutions
11	3	Field principles of seed propagation	Field principles of seed propagation	Lecture, presentation, illustrations	Questions and answers + exercise solutions
12	3	Grain behavior during storage and handling	Factors causing deterioration of stored seeds.	Lecture, presentation, illustrations	Questions and answers + exercise solutions
13	3	Manifestations of stored seed deterioration	discharge, odor	Lecture, presentation, illustrations	Questions and answers + exercise solutions
14	3	Seed stores and warehouses	The Importance of Storage Storage Requirements, Storage Methods, and Challenges	Lecture, presentation, illustrations	Questions and answers + exercise solutions
15	3	Review previous chapters and discuss reports	Poor storage Long storage period	Lecture, presentation, illustrations	Questions and answers + exercise solutions

11. Course Evaluation	
Tests + Exercises + Discussions + Questions	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	The vocabulary prescribed by the Ministry of Higher Education and Scientific Research
Main references (sources)	Seed Technology • تكنولوجيا البذور / عبد الستار سمير الرجبو • معجم مصطلحات تكنولوجيا البذور 2013
Recommended books and references (scientific journals, reports...)	Google scholar, researcher gate
Electronic References, Websites	All sites that provide reliable sources and also artificial intelligence tools