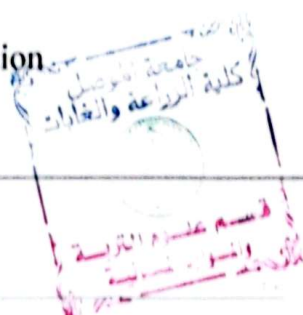


Course Description

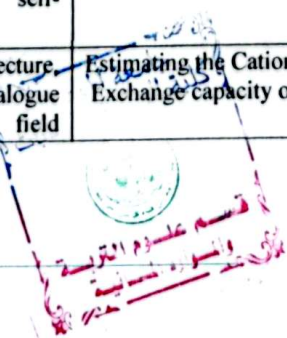
1. Course Title:	Plant nutrition
2. Course Code	PLNU214
3. Semester / Year:	Second semester –2024-2025
4. Description Preparation Date:	1/2/2025
5. Available Attendance Forms:	In presence
6. Number of Credit Hours /	Number of Units /
2 Theoretical + 3 Practical	3.5 units
7. Course administrator's name (mention all, if more than one name)	Name: Dr. ammar younis kashmolah Email: ammaryajk60@uomosul.edu.iq Assist. Lecturer: Reem Walid Al-Saffar Assist. Lecturer : Marwan Mahmod Yassen
8. Course Objectives	<ul style="list-style-type: none"> -Preparing students with the ability to work in the field of plant nutrition and the use of fertilizers according to the modern scientific method to keep pace with the development in this field and entry into the agricultural sector efficiently by participating in agricultural projects. - Enable the student to diagnose the symptoms of nutrient deficiency on the plant and processed. - Enable the student to identify the methods of plant sampling, digestion and preparation for chemical analysis. - Introducing the student to the most important methods of measuring the plant content of elements. - Introducing the student to the most important methods of preparing nutrient solutions.
9. Teaching and Learning Strategies	<ul style="list-style-type: none"> - Interactive Lecture - Brainstorming - Dialogue and discussion - Field Training - Practical exercises



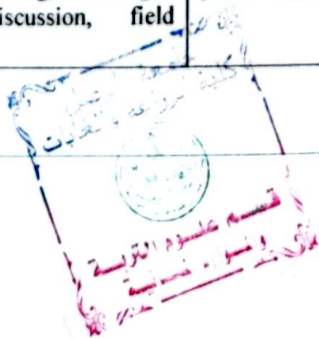
- Field Project
- Self-learning

10. Course Structure

Evaluation method	Learning method	Unit or subject name	Required Learning Outcomes	Hours	The week
Semester Exam 1, Final Exam	Interactive lecture, brainstorming, dialogue and discussion, self-learning.	Introduction to the importance of plant nutrition, the origin and development of science	A1: The student is aware of information about origin and stages of development of plant nutrition	2 Theoretical	1
Practical quiz 1	Interactive lecture, brainstorming, dialogue and discussion, field training, self-learning.	Laboratory work guidelines, identification Laboratory equipment .	A14: The student gets to know types of laboratory equipment and how it works and how to express the concentration of elements in the plant	3 Practical	
Semester Exam 1, Final Exam	Interactive lecture, brainstorming, dialogue and discussion, self-learning.	Essential components of the plant	A2: The student gets to know mineral composition of the plant and the factors affecting it	2 Theoretical	2
Home work	Interactive lecture, brainstorming, dialogue and discussion, field training, practical exercises, self-learning	Plant sampling and preparation for chemical analysis	B3: The student gets to know Conditions for taking the sample from field, drying and grinding and preparing it for chemical analysis	3 Practical	
Semester Exam 1, Final Exam	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Plant Growth culture	A3: The student knows the types of nutrient cultures and its importance and advantages and the disadvantages of each type	2 Theoretical	3
Home work	Interactive lecture, brainstorming, dialogue and discussion, field training, self-learning	Digestion of plant samples	B4: The student learns how to digest a plant sample, ways of digestion and the advantages of and the disadvantages of each method	3 Practical	
Semester Exam1, Final Exam, Report	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Nutrient absorption	B1: The student gets to know absorbing forms Nutrients and the factors affecting it	2 Theoretical	4
2 Practical quiz	Interactive lecture, brainstorming, dialogue and discussion, field training, practical exercises, self-learning	Preparation acidic extract of plant sample	B5: The student can Preparation of extract acidity of plant samples	3 Practical	
Semester Exam1, Final Exam, Report	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Root, water, absorption and nutrients	B2: The student learns about the structure of the root and how to absorb water and the factors affecting it	2 Theoretical	5
Home work	Interactive lecture, brainstorming, dialogue and discussion, field	Estimating the Cationic Exchange capacity of roots	B6: The student knows the methods of estimating Root exchange capacity	3 Practical	



	training, practical exercises, self-learning				
Quiz 1, Final Quiz	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Nutrient absorption theories – theories of negative and active absorption	A4: The student gets to know absorption theories Negative and active	2 Theoretical	6
Home work	Interactive lecture, brainstorming, dialogue and discussion, field training, practical exercises, self-learning	Preparation of nutrient solutions	B7: The student can prepare Nutrient solutions of three or four salts	3 Practical	
Semester Exam 2, Final Exam, Report	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Nitrogen in plant	A5: The student gets to know the importance of nitrogen, the way it is absorbed and its transformations within the plant, the symptoms of its deficiency and methods addressed	2 Theoretical	7
Home work	Interactive lecture, brainstorming, dialogue and discussion, field training, practical exercises, field project, self-learning	Determination of Total Nitrogen in Plant Samples	B8: The student can Determination nitrogen- by Kjeldahl method- and how to calculate Concentration in different units	3 Practical	
Semester Exam 2, Final Exam	Interactive lecture, brainstorming, dialogue and discussion, self-learning	phosphorus in plant	A6: The student gets to know the importance of phosphorus, the way it is absorbed, its transformations within the plant and the symptoms of its deficiency	2 Theoretical	8
Home work	Interactive lecture, brainstorming, dialogue and discussion, field training, practical exercises, self-learning	Determination of phosphorus in plant samples	B9: The student can estimate Phosphorus in the chromatic way and how to calculate the concentration in different units	3 Practical	
Semester Exam 2, Final Exam	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Potassium in plant	A7: The student gets to know the importance of magnesium and the way it is absorbed, the symptoms of its deficiency, methods Processed and the most important Magnesium fertilizers	2 Theoretical	9
Home work	Interactive lecture, brainstorming, dialogue and discussion, field training, practical exercises, self-learning	Determination of potassium in plant samples	B10: The student can estimate Potassium using a flame device and how to calculate the concentration In different units	3 Practical	
Semester Exam 2	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Calcium in plant	A8: The student can recognize on the importance of calcium, the way it is absorbed, its transformations within the plant and the symptoms of its deficiency and methods addressed	2 Theoretical	10
Home work	Interactive lecture, brainstorming, dialogue and discussion, field	Determination of calcium in plant samples	B11: The student can estimate calcium using chelating substances and how to calculate the concentration In different units	3 Practical	



	training, practical exercises, self-learning				
Final Exam	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Magnesium in plant	A9: The student can recognize on the importance of magnesium, the way it is absorbed, its transformations within the plant, the symptoms of its deficiency	2 Theoretical	11
Home work	Interactive lecture, brainstorming, dialogue and discussion, field training, practical exercises, self-learning	Determination of magnesium in plants	B12: The student can estimate magnesium using recombination with chelating substances	3 Practical	
Final Exam	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Sulfur in plant	A10: The student gets to know the importance of sulfur, the way it is absorbed, its transformations within the plant and the symptoms of its deficiency	2 Theoretical	12
Home work	Interactive lecture, brainstorming, dialogue and discussion, field training, practical exercises, self-learning	Determination of sulfur in plant samples	B13: The student can estimate Sulfur using turbidity method	3 Practical	
Final Exam	Interactive lecture, brainstorming, dialogue and discussion, self-learning	iron and zinc in plant	A11: The student can recognize on the importance of both Iron and zinc, method absorption, transformation within plant and symptoms of deficiency	2 Theoretical	13
Home work	Interactive lecture, brainstorming, dialogue and discussion, field training, practical exercises, self-learning	Determination of iron in plant by the chromatography method	B14: The student can estimate iron by the color method	3 Practical	
Quiz 2, Final Quiz, Report	Interactive lecture, brainstorming, dialogue and discussion, self-learning	manganese and copper in plant	A12: The student can recognize on the importance of both manganese, copper, method Absorption and transformation within plant and symptoms of deficiency	2 Theoretical	14
Practical quiz3	Interactive lecture, brainstorming, dialogue and discussion, field training, practical exercises, self-learning	Determination of iron, zinc, manganese and copper in Plant using atomic absorber	B15: The student can estimate micro element cations	3 Practical	
Quiz 3, Final Quiz	Interactive lecture, brainstorming, dialogue and discussion, self-learning	Boron and molybdenum in plant	A13: The student gets to know the importance of boron molybdenum, absorption transformation within the plant, Symptoms of deficiency.	2 Theoretical	15
Home work	Interactive lecture, brainstorming, dialogue and discussion, field training, practical exercises, self-learning.	Determination of boron and molybdenum in plants	B16: The student can estimate Boron and molybdenum	3 Practical	

11. Course Evaluation				
% Relative Weight	Grade	Calendar date (week)	Evaluation methods	t
2.5	2.5	Fourth week	Report 1	1
2.5	2.5	Fifth week	Report 2	2
2	2	Sixth week	Quiz (1)	3
2	2	Fourteenth week	Quiz (2)	4
1	1	Fifteenth week	Quiz (3)	5
7.5	7.5	Sixth week	Semester Exam (1)	6
7.5	7.5	The first week is difficult	Semester Exam (2)	7
40	40	Final Semester Exams	Final theoretical test	8
5	5	seven Week	Report3	9
2	2	Fourteenth week	Report4	10
1	1	First week	Practical Quiz (1)	11
0.5	0.5	Fourth week	Practical Quiz (2) Quiz	12
1	1	Fourteenth week	Practical Quiz (3) Quiz	13
5.5	5.5	weeks 14,13,12,11,10,9,8,7,6,5,3	and homework	14
20	20	Final Semester Exams	Final Practical Test	15
%100	% 100	100	Total	

12. Learning and Teaching Resources	
Plant Nutrition - Mengele and Kirkby - translated by Dr. Saad Allah Al-Nuaimi	Required textbooks (methodology, if any)
Fertilizers and soil fertility Dr. Saad Allah Al-Nuaimi	Main references (sources)
Soil fertility and fertilization-Dr.Kazem Mashhoot awad	Recommended books and references (scientific journals, reports...)
Plant physiology. Dr. Abdul azim Kazem	Electronic References, Websites

Theoretical subject lecturer:
Dr. Ammar Younis Kashmoula

Practical subject lecturer:
Assist. Lecturer: Reem Walid Al-Saffar

Marwan Mahmod Yassen

Chairman of the Scientific Committee:
Dr. Abdul Qader Abash sbak

Head of the Department of Soil Science and Water Resources:
Dr. Khalid Anwar Khalid

