

Course Description Form

1. Course Name:
Soil chemistry
2. Course Code:
SOCH350
3. Semester / Year:
First Autumn semester/2024-2023
4. Description Preparation Date:
2023/9/1
5. Available Attendance Forms:
My Presence
6. Number of Credit Hours (Total) / Number of Units (Total)
2 theoretical +3 practical /3.5 units
7. Course administrator's name (mention all, if more than one name)
Name: Assistant Prof.dr. Abdalkader Absh Sbak Email:dr.abdalkaderabshsbak@uomosul.edu.iq Name: Ahmed samer ghanim Email : ahmedaltaay1986@uomosul.edu.iq
8. Course Objectives
<ul style="list-style-type: none">• The learner should be able to understand and understand the relationship between the crystal and its systems and axes.• Enable the student to know the structural composition of silicate minerals• Enabling the student to understand and know the most important structural properties of minerals• Identify the transformations that occur in clay minerals• Enable the student to become familiar with the most important methods for detecting and distinguishing clay minerals and the special parameters for diagnosing soil minerals.• Enable the student to identify the crystalline structure of minerals• Identifying the surface charges of clay separations• Measurement of variable and fixed charges on clay surfaces
9. Teaching and Learning Strategies
<ul style="list-style-type: none">- Interactive lecture- Brainstorming- Dialogue and discussion- Field Training- Practical exercises- Field project- Self-education
10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
	2Theoretical	<p>A1: The student learns about the types of elements involved in the composition of the Earth's crust</p> <p>B1: The student distinguishes between types of rocks (igneous, sedimentary, metamorphic)</p>	Theoretical: About the chemical composition for the earth's crust	Interactive lecture, brainstorming, dialogue discussion, self-learning	Theoretical: Semester exam 1, final exam
	3practical	<p>C10: The student collects different soil samples</p> <p>C11: Grinds and sieves soil samples</p> <p>C12: Prepares soil samples analysis</p>	practical : The student plans to collect a comprehensive sample of the entire field for the purpose of preparing it for chemical analyses	practical : Interactive lecture, brainstorming, dialogue discussion, field training, practical exercises, self-learning	practical : Short practical test
	2Theoretical	<p>A2: The student identifies the close relationship between the three soil phases</p> <p>A3: The student describes the volumetric relationship between soil components</p>	Theoretical: The student understands the relationship of soil chemistry with other sciences	Interactive lecture, brainstorming, dialogue discussion, self-learning	Theoretical: Semester exam 1, final exam

	3practical	<p>A13: Recognizes the basic units</p> <p>C13: Converting units to other units according to international and basic units</p> <p>A14: Demonstrates the conversion of old units to new units</p>	practical : Basic and universal units	practical : Interactive lecture, brainstorming, dialogue discussion, field training, practical exercises, self-learning	practical : Short practical test
3	2Theoretical	<p>A3: The student differentiates between crystalline systems by the number of faces, axis length, and interfacial angle</p> <p>A4: The learner distinguishes between the cubic, hexagonal, triangular, monoclinic, and orthorhombic systems.</p>	Theoretical: Metal part chemistry	Interactive lecture, brainstorming, dialogue discussion, self-learning	Theoretical: Semester exam 1, final exam
	3practical	<p>C14: Measures soil pH</p> <p>C15: Measures total dissolved salts in the soil</p>	practical : Methods for estimating soil pH and total dissolved salts in the soil	practical : Interactive lecture, brainstorming, dialogue discussion, field training, practical exercises, self-learning	practical : Short practical test
4	2Theoretical	<p>A5: The student learns about the most important sources of organic matter</p> <p>C2: The student discovers the general structure of organic matter</p> <p>B3: The student evaluates the stages of decomposition of organic matter</p>	Theoretical: 1- Sources of organic matter 2-The general composition of organic matter	Interactive lecture, brainstorming, dialogue discussion, self-learning	Theoretical: Semester exam 1, final exam

	3practical	B11: Cation exchange capacity is extracted by saturation with sodium acetate C16: Measures the cation exchange capacity with a flame photometer	practical : Exchange capacity cations	practical : Interactive lecture, brainstorming, dialogue discussion, field training, practical exercises, self-learning	practical : Short practical test
5	2Theoretical	A5: The student learns about the physical and chemical properties of humus through the color of the soil. B4: The student evaluates the nature of the relationship between humic compounds and their solubility in acidic and basic media	Theoretical: 1- Physical and chemical properties of humus 2- Basic totals For humic compounds	Interactive lecture, brainstorming, dialogue discussion, self-learning	Theoretical: Semester exam 1, final exam
	3practical	C17: Ammonium oxalate is used in the determination of active calcium carbonate C18: Analyze the remaining amount of oxalate by titration with potassium permanganate	practical : Effective calcium carbonate	practical : Interactive lecture, brainstorming, dialogue discussion, field training, practical exercises, self-learning	practical : Short practical test
6	2Theoretical	A6: The student determines the nature of the chemical composition of the soil solution from ionic species C3: The student is familiar with the nature of the chemical equilibrium of the soil solution	Theoretical: 1- Chemical composition of soil solution 2- The nature of the chemical equilibrium of the soil solution	Interactive lecture, brainstorming, dialogue discussion, self-learning	Theoretical: Semester exam 1, final exam

	3practical	C19: Determines gypsum in the soil using acetone C20: Draw the relationship between the electrical conductivity of the soil extract and the gypsum concentration	practical : Gypsum in the soil	practical : Interactive lecture, brainstorming, dialogue discussion, field training, practical exercises, self-learning	practical : Short practical test
7	2Theoretical	C4: The student explains the process of gaining or losing proton C5: The student explains the process of gaining or losing electron	Theoretical: 1- Neutralization reactions of acids and bases 2- Oxidation and reduction reactions	Interactive lecture, brainstorming, dialogue discussion, self-learning	Theoretical: Semester exam 1, final exam
	3practical	C21: Calculates the regulatory capacity in the soil through readings A15: Draw the relationship between the electrical conductivity of the soil extract and the gypsum concentration	practical : Regulatory capacity in soil	practical : Interactive lecture, brainstorming, dialogue discussion, field training, practical exercises, self-learning	practical : Short practical test
8	2Theoretical	A7: The student explains the phenomena that occur between the liquid and solid phases of soil B5 The student applies some equations to explain the reaction on clay surfaces	Theoretical: 1- Double electrical layer 2- Equations that describe the electrical double layer	Interactive lecture, brainstorming, dialogue discussion, self-learning	Theoretical: Semester exam 1, final exam

	3practical	C22: Soil pH is calculated through pH readings A16: Draws the relationship between soil pH and the concentration of the added acid or base	practical : Soil buffer	practical : Interactive lecture, brainstorming, dialogue discussion, field training, practical exercises, self-learning	practical : Short practical test
9	2Theoretical	A8: The student describes the ion exchange process using the law of mass action B6: The student evaluates the ion exchange process based on the type of charge and the size of the ion	Theoretical: 1- Characteristics of ion exchange 2- Factors affecting ion exchange reactions	Interactive lecture, brainstorming, dialogue discussion, self-learning	Theoretical: Semester exam 1, final exam
	3practical	C23: The student makes a soil extract C24: The student measures dissolved sodium element in the extract using a flame photometer A17: Draws the relationship between the reading obtained from the device and the element concentration from the standards of the standard solution.	practical : Calculating exchanged ions in soil	practical : Interactive lecture, brainstorming, dialogue discussion, field training, practical exercises, self-learning	practical : Short practical test
10	2Theoretical	B7: The student applies the Freundlich and Langmuir equation to describe the process of adsorption and release B8: The student applies the equations (Kerr, Fauslow, and Capon) to describe the exchange processes between positive ions of similar and different valences.	Theoretical: 1- Physicochemical equations (Freundlich, Langmuir) 2- Chemical equations (Kerr, Fauslow, Capon)	Interactive lecture, brainstorming, dialogue discussion, self-learning	Theoretical: Semester exam 1, final exam

	3practical	<p>C25: The student makes a soil extract</p> <p>C26: The student measures dissolved potassium element in the extract using a flame photometer</p> <p>A18: Draws the relationship between the reading obtained from the device and the element concentration from the standards of the standard solution.</p>	<p>practical : Calculating exchanged ions in soil</p>	<p>practical : Interactive lecture, brainstorming, dialogue discussion, field training, practical exercises, self-learning</p>	<p>practical : Short practical test</p>
11	2Theoretical	<p>A9: The student describes the process of dissolving CO₂ gas in water</p> <p>B9: The student evaluates the role of carbonic acid in the solubility of metals</p>	<p>Theoretical: 1- CO₂-H₂O system 2- CaCO₃-CO₂-H₂O system</p>	<p>Interactive lecture, brainstorming, dialogue discussion, self-learning</p>	<p>Theoretical: Semester exam 1, final exam</p>
	3practical	<p>C27: Measures calcium in soil extract by titration with EDTA</p> <p>C28: Measure calcium and magnesium in soil extract by titration with EDTA using the EBT index.</p>	<p>practical : calculating exchanged ions in soil</p>	<p>practical : Interactive lecture, brainstorming, dialogue discussion, field training, practical exercises, self-learning</p>	<p>practical : Short practical test</p>
12	2Theoretical	<p>C6: The student explains the nature of ionization of phosphoric acid</p> <p>A10: The student uses chemical equations to describe the reactions of phosphorus soil</p>	<p>Theoretical: 1- The nature of ionization of phosphoric acid 2- Phosphorus reactions in the soil</p>	<p>Interactive lecture, brainstorming, dialogue discussion, self-learning</p>	<p>Theoretical: Semester exam 1, final exam</p>

	3practical	C29: Measures dissolved chloride in soil extract by titration with silver nitrate	practical : Calculating exchanged ions in	practical : Interactive lecture, brainstorming, dialogue discussion, field training, practical exercises, self-learning	practical : Short practical test
13	2Theoretical	A11: The student draws dissolution diagrams to determine the metal controlling the dissolution C7: The student draws dissolution diagrams to determine the metal controlling the dissolution	Theoretical: 1- Melting schemes for carbonate minerals 2- Melting schemes for phosphorus minerals	Interactive lecture, brainstorming, dialogue discussion, self-learning	Theoretical: Semester exam 1, final exam
	3practical	C30: Extracts humic compounds in the soil by neutralizing them with sodium bicarbonate solution C31: Extracts humic compounds in the soil by neutralizing them with sodium hydroxide solution C32: The percentage of organic carbon in it is calculated using wet oxidation	practical : Humic compounds soil	practical : Interactive lecture, brainstorming, dialogue discussion, field training, practical exercises, self-learning	practical : Short practical test
14	2Theoretical	C8: The student explains the importance of soil pH A12: The student learns about the most important sources of acidity in the soil	Theoretical: 1- The importance of studying soil pH 2- Sources of acidity in the soil	Interactive lecture, brainstorming, dialogue discussion, self-learning	Theoretical: Semester exam 1, final exam

	3practical	<p>C33: Calculates the ionic strength of single-charged compounds</p> <p>C34: Calculates the ionic strength of double-charged compounds</p> <p>C35: Calculates the ionic strength of triple-charged compounds</p>	<p>practical : Ionic strength in so</p>	<p>practical : Interactive lecture, brainstorming, dialogue discussion, field training, practical exercises, self-learning</p>	<p>practical : Short practical test</p>
15	2Theoretical	<p>C9: The student identifies the type of salinity and its source</p> <p>B10: The student evaluates salt composition of the soil based on knowledge of the dominant ions</p>	<p>Theoretical: 1- Sources of salinity in the soil 2- The salt composition of saline soils</p>	<p>Interactive lecture, brainstorming, dialogue discussion, self-learning</p>	<p>Theoretical: Semester exam 1, final exam</p>
	3practical	<p>C36: Calculates the effectiveness factor for single charge compounds</p> <p>C37: Calculates the reactivity coefficient for double-charged compounds</p> <p>C38: Calculates the reactivity coefficient for triple-charged compounds</p>	<p>practical : Coefficient of effectiveness and effectiveness in soil</p>	<p>practical : Interactive lecture, brainstorming, dialogue discussion, field training, practical exercises, self-learning</p>	<p>practical : Short practical test</p>

11. Course Evaluation

	Calendar methods	Calendar date (week)	degree	Relative weight %
1	Report 1	fourth week	brother	2.5
2	Report 2	The fifth week	brother	2.5

3	Short test (1) Quiz	the sixth week	a	2
4	Short test (2) Quiz	The fourteenth week	a	2
5	Short test (3) Quiz	The fifteenth week	1	1
6	Semester test (1)	the sixth week	H.K	7.5
7	Semester test (2)	The eleventh week is difficult	H.K	7.5
8	Final theoretical test	Final semester exams	40	40
9	Practical field project	The fifteenth week	Kh	5
10	Field evaluation	The third and fifth week	a	2
11	Practical short test (1) Quiz	The first week	1	1
12	Short practical test (2) Quiz	fourth week	0.kh	0.5
13	Short practical test (3) Quiz	The fourteenth week	1	1
14	Live drawings and homework	Weeks 6, 8, 9, 10, 11, 12 and 13	Kh.kh	5.5
15	Final practical test	Final semester exams	20	20
	total	100	100%	%100

12. Learning and Teaching Resources

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

dr.Abd Alkader Absh Sbak

Theoretical subject teacher

dr.Abd Alkader Absh Sbak

Chairman of Scientific Committee

Ahmed Samir Ghanem

Practical subject teacher

dr.Amar Kashmoula

Head of the Department

