Course Description Form

1. Course Name:
Soil Minerals
2. Course Code:
SOMI356
3. Semester / Year:
The Second Spring Semester
4. Description Preparation Date:
2025/2/1
5. Available Attendance Forms:
My presence + electronic
6. Number of Credit Hours (Total) / Number of Units (Total)
2 theortical +3 prtical /3.5 units
7. Course administrator's name (mention all, if more than one name)
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8. Course Objectives

Course Objectives	
Theoretical : 1- Enabling the student to understand And comprehend the relationship Between the crystal and its systems And axes 2- Enabling the student to know the structural composition of silicate minerals 3- Enabling the student to understand and know the most important structural properties of minerals - Clay 4- Identify the transformations that occur in clay minerals	practical : - Enabling the student to recognize the most important methods of detection Identification of clay minerals and procedures for diagnosing minerals the soil Enable the student to identify the crystalline structure of minerals
9. Teaching and Learning Strategies	
Strategy	
Theoretical: - The lecture is interactive	practical : - Assigning group work to reveal

- Brainstorming - Dialogue and discussion - Assigning tasks and reporting - Presentations of models of clay samples mounted o slides The student is assigned to prepare a report entitled from his own diligence and prepare it for discussion With the students	skills Leadership - Assigning tasks and reporting for each experiment

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2Theoretical	A1: The student identifies t most important rocks that make up the Earth's crust. B1: The student distinguish between types of rocks (igneous, sedimentary, metamorphic). B2: The student distinguish between chemical and physical weathering.	Mineral compositi of the Earth's cru	Interactive lect brainstorming, dialogue discussion, s learning	Midterm Exam 1, Final Exam
	3practical	C7: The student collects various soil samples. C8: Grinds and sieves soil samples. C9: Prepares soil samples f mineral analysis.	Preparing soil samples for miner analysis	Interactive lectu brainstorming, dialogue and discussion, field training, self-learning	Short practical t 1
2	2Theoretical	A2: The student identifies t main parts of a crystal. C1: The student describes crystal axes with a diagram	Crystal structure of minerals	Interactive lect brainstorming, dialogue discussion, s learning	Midterm Exam 1, Final Exam
	3practical	C10: The student uses the siphon method to separate t clay from the other separat	Clay separation	Interactive lectu brainstorming, dialogue and discussion, field training, self-learning	direct drawing
3	2Theoretical	A3: The student differentiat between crystal systems by the number of faces, axis length, and interfacial angle A4: The learner differenti between cubic, hexagonal, trigonal crystal systems, well as monoclinic and tricli crystal systems.	Crystal systems	Interactive lect brainstorming, dialogue discussion, s learning	Midterm Exam 1, Final Exam

	3practical	C11: The learner uses distil water to wash the soil from salts.	Removal of dissolv salts	Interactive lectu brainstorming, dialogue and discussion, field training, self-learning	Field evaluation
4	2Theoretical	B3: The student uses relationship between arrangement of atoms make up a mineral crystal. Determine the type of bond the strength and hardness of mineral.	Structural composition of minerals	Interactive lect brainstorming, dialogue discussion, s learning	Midterm Exam Final Exam, Report
	3practical	C12: The student removes carbonate minerals using H A12: The student uses a hydrogen peroxide solution remove organic matter.	Removal of calciur carbonate and orga matter	Interactive lectu brainstorming, dialogue and discussion, field training, self-learning	Short Practice T 2, Direct Drawi
5	2Theoretical	A5: The student is familiar with the most important rul governing the distribution o ions in the minerals of the Earth's crust. B4: The student distinguis silicate minerals based on type of structural unit.	Structural composition of silicate minerals	Interactive lect brainstorming, dialogue discussion, s learning	Midterm Exam Final Exam, Report
	3practical	C13: The student uses DCB remove iron oxides from th clay separator.	Removal of iron oxides	Interactive lectu brainstorming, dialogue and discussion, field training, self-learning	Field evaluation
6	2Theoretical	B5: The student judges the type of clay mineral from a soil sample. B6: The student distinguis primary minerals fr secondary minerals by t resistance to weathering.	soil minerals	Interactive lect brainstorming, dialogue discussion, s learning	short test, final t
	3practical	B11: The student examines clay slices with an X-ray machine.	Preparing clay slic for examination	Interactive lectu brainstorming, dialogue and discussion, field training, practica exercises, self-learning	Live drawing homework
7	2Theoretical	A6: The student differentia between silicate minerals	Silicate Minerals	Interactive lect brainstorming, dialogue	Midterm Exam 2, Final Exam

		the number of tetrahedral / octahedral units.		discussion, s learning	
	3practical		Mineralogical analysis of clay	Interactive lectu brainstorming, dialogue and discussion, field training, practica exercises, field project, self-learning (scienti visit to the Colle of Earth Science	Field Project (Scientific Visit the College of Earth Sciences)
8	2Theoretical	B7: The student distinguish silicate minerals from non-silicate minerals through silicon dioxide.	non-silicate minera	Interactive lectu brainstorming, dialogue discussion, s learning	Short exams, assignments, discussions
	3practical	A14: Classify clay minerals during a magnesium saturat and air-drying treatment. A15: Classify clay minerals during a magnesium saturat and ethylene glycol treatme A16: Classify clay minerals during a potassium saturatic and air-drying treatment. A17: Classify clay minerals during a potassium saturatic and heating at 350°C. A18: Classify clay minerals during a potassium saturatic and heating at 550°C. A19: The student identifies the types and proportions o clay minerals in a soil samp	Practical applicatio for diagnosing and calculating clay mineral ratios	Interactive lectu brainstorming, dialogue and discussion, field training, practica exercises, self-learning	Live drawing an homework
9	2Theoretical	A7: The student understand the importance of clay minerals. C2: The student judges structural composition by th number of tetrahedral and octahedral units.	clay minerals	Interactive lectu brainstorming, dialogue discussion, s learning	Midterm Exam Final Exam
	3practical	A20: The student uses the washing and sedimentation method to separate sand. A21: The learner uses a ligh microscope to observe cryst of different colors and sizes	sand separation	Interactive lectu brainstorming, dialogue and discussion, field training, practica exercises, self-learning	Live drawing an homework

10	2Theoretical	A8: The student classifies c minerals into crystalline and amorphous. B8: The student identifies expanded clay minerals wit crystal dimension of 18 Angstroms.	Clay mineral classification	Interactive lect brainstorming, dialogue discussion, s learning	Term 2 Exam
	3practical	A16: The student uses bromoform to separate coar sand from fine sand.	Separating light sa minerals from heav ones	Interactive lectu brainstorming, dialogue and discussion, field training, practica exercises, self-learning	Live drawing an homework
11	2Theoretical	A9: The student classifies kaolinite as a non-expansiv mineral. C3: The student identifies kaolinite by its 7 Angstrom reflectance.	Clay minerals 1:1	Interactive lect brainstorming, dialogue discussion, s learning	Final exam
	3practical	C14: The student uses cannabalsam to stabilize sa grains.	Preparing sand slid for analysis	Interactive lectu brainstorming, dialogue and discussion, field training, practica exercises, self-learning	Live drawing an homework
12	2Theoretical	A10: The student classifies smectite minerals as expans minerals. C4: The student identifies smectite minerals by their 1 Angstrom reflection.	Clay minerals 1:2 (expanded)	Interactive lect brainstorming, dialogue discussion, s learning	Final exam
	3practical	A22: The student identifies the type of charges through correction curves.	Estimation of permanent soil charges	Interactive lectu brainstorming, dialogue and discussion, field training, practica exercises, self-learning	Live drawing an homework
13	2Theoretical	C5: Mica appears hexagona under an electron microsco C6: The student identifies mica minerals by their lamellar structure.	Clay minerals 1:2 (non-expanding)	Interactive lect brainstorming, dialogue discussion, s learning	Final exam
	3practical	A23: The student distinguishes between varia charges and permanent charges by the degree of interaction of the medium.		Interactive lectu brainstorming, dialogue and discussion, field training, practica	Live drawing an homework

				exercises, self-learning	
14	2Theoretical	A11: The student identifies chlorite by the presence of a brucite layer. B9: The student identifies chlorite by the constant reflectance in all parameter: 14 angstroms.	Clay minerals 1:1:2	Interactive lectu brainstorming, dialogue discussion, s learning	short test, final t
	3practical	B13: The student examines iron oxides extracted using chelating materials.	Estimation of total iron oxides in soil	Interactive lectu brainstorming, dialogue and discussion, field training, practica exercises, self-learning	Short practical t 3
15	2Theoretical	B10: The student judges the transformations of clay minerals by hydrothermal reactions and weathering.	Clay mineral transformations	Interactive lectu brainstorming, dialogue discussion, s learning	short test, final t
	3practical	A24: The student uses an X device to examine crystallin iron oxides.	Estimation of crystalline iron oxi in soil	Interactive lectu brainstorming, dialogue and discussion, field training, practica exercises, field project, self-learning	Field project

11. Course Evaluation

	Calendar methods	Calendar date (week)	degree	Relative weight %
1	Final theoretical report + practical experience reports	My theory is 15 weeks My work is 15 weeks	7 theoretical + 6 practical	13%
2	Short test (1) Quiz	week (3)	4 theoretical + 2 practical	6%
3	Midterm Exam (theoretical and practical)	week (9)	10 theoretical + 5 practical	15%
4	Short test (2) Quiz	week (12)	4 theoretical + 2 practical	6%

5	Final practical test	Practical exams week	20	20%
6	Final theoretical test	The week of theoretical exams	40	40%
	total		100	100%

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

12. Learning and Teaching Resources

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

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