



Department of Soil &Water

College of Agriculture

University of Salahaddin

Subject: Fundamental of Soil science

Course Book – *For example* (class 3)

Lecturer's name: Mc. Dedawan khursheed Rahman

Academic Year: 2017/2018

Course Book

1. Course name	principle of Soil science
2. Lecturer in charge	Dedawan khursheed Rahman
3. Department/ College	Soil and water Dept./ college of Agriculture
4. Contact	e-mail: dedawan.rahman@su.edu.krd Tel: (optional)
5. Time (in hours) per week	For example practical: 2* 3
6. Office hours	Sat. 9:00-1:00 off Su. 8.5.-2.5 . principle of Soil science (A, B) Mo. 9:00-1:00 Office hours Tu. 10.30-12.30 student seminar We. 8:30 – 3:00 Office hours Th. student project research.
7. Course code	
8. Teacher's acadqaq.m,,eemic profile	High School:2003 BSc at 2007 Master degree at 2014
9. Keywords	Soil physical Chemistry, Principle of soil science
10. Course overview:	This course is designed to introduce to the students our current knowledge and understanding as well as the fundamental concepts and principles of soil science. Through this course, the students will build chemical, physical, and biological views of the soil and its processes and behaviors, both in natural and perturbed states. The core concepts of soil are centered on soil profile, soil formation factors and processes, texture, density, temperature color, soil solution, cation and anion exchange capacity, soil acidity and alkalinity, plant elements in soil, soil microorganisms, soil mineralogy, and soil classification, and Studies the physical and chemical properties of soil; soil formation and classification. Also studies the essential plant nutrients and their availability in soil. Balances theoretical and practical aspects of soil fertility and includes soil testing and fertilizer products.
11. Course objective:	To learn how to conserve and utilize soils properly. Poorly managed soils lose up to 30 tons/acre/year to erosion.

<p>To understand how soil chemical and physical properties affect various uses of soils. To understand soil variability. To understand how soil properties can be modified to improve their quality for a particular use.</p>	
<p>12. Student's obligation Lack of attendance and tardiness to class are unacceptable in lecture courses. Obviously unforeseen events can lead to absenteeism and/or tardiness, but those instances are expected to be rare. So, please report to class on time! Due to limitations in support personnel, opportunities to make up missed lecture will not be feasible. If a student is absent for any reason, he/she should email or contacted to departments and the teaching assistant as soon. On as possible. Late assignments will only be accepted at the discretion of the instructor. Typically prompt written documentation will be required to justify the acceptance of late assignments as a result of absenteeism</p>	
<p>13. Forms of teaching We use data show and white board</p>	
<p>14. Assessment scheme The overall grading is 35% and distribute as in this scheme for this course is as follows: 5% Reports, Homework and quiz 10% 1st exam 20% Final Examinations</p>	
<p>15. Student learning outcome: Students should understand the basic concepts and the principle of soil chemistry and the general information . what is solution and how to prepare the solution concentrations inorganic and what is complex , In physical chemistry what is PH enthalpy and free energyand many other simple information in chemistry like electrochemistry. A successful student will learn how to prepare reports in the style of a chemical journal, and have some lectures in chemical techniques that would be expected of a student applying to quantities and qualitative experiments in lab.</p>	
<p>16. Course Reading List and References: - Havlin, J. L., J. D. Beaton; Tisdale S. L., and W. L. Nelson. 2005. Soil fertility and fertilizers.7thED. Pearson Education Inc., New Jersey. - Nyle C. Brady and Ray R. Weil. 2002. The Nature and Properties of Soils, 14th Edition. Prentice Hall, Publisher. - Mark S. Coyne and James A. Thompson. 2006. Fundamental Soil Science, 1st Edition, Thomson Delmar Learning - http://steenbock.library.wisc.edu/subjectguide/soilsci.htm -http://www.rdg.ac.uk/library/colls/policies/soilscience.html</p>	
<p>17. The Topics:</p>	<p>Lecturer's name</p>
<p>In this section the lecturer shall write titles of all topics he/she is going to give during the term. This also includes a brief description of the objectives of each topic, date and time of the lecture Each term should include not less than 16 weeks</p>	<p>Lecturer's name ex: (2 hrs) ex: 14/10/2015</p>

18. Practical Topics (If there is any)

- 1- How to take soil sample
- 2- Soil Profile description 1
- 3- Soil Profile description in the field
- 4- Determination of soil color by using munsell soil color charts
- 5- Determination of soil moisture content
- 6- Determination of Soil saturation degree.
- 7- Determination of Soil reaction (pH),
- 8- Estimation Electrical conductivity (E_c) $ds\ m^{-1}$.
- 9- Determination of soil texture by hydrometer method
- 10- Determination of Bulk density by paraffin method
- 11- Determination of soil Real density by pycnometer.
- 12- Determination of soil organic matter content
- 13- Determination of calcium carbonate ($CaCO_3$) in the soil

19. Examinations:

Q1/Fill in the blanks by suitable terms:

(4Mark)

1-(E-Horizon)

2-(Saturation)

3-

- a) Saving as a foundation
- b) Emitting and absorbing gases
- c) Providing habitat
- d) Interacting with water
- e) Recycling nutrients
- f) Supporting human settlements

4-Methods of determination soil moisture content

- a) Thermo gravimetric method. (Oven)
- b) Neutron probe method.

- c) Tensiometer method.
- d) Gypsum blocks method.
- e) Pressure method.

5- Factor affecting on soil bulk density

- 1- Soil texture
- 2- Organic matter
- 3- Soil depth
- 4- Soil management

Q2/What is a soil sampling? What are the objectives of soil sampling?

ANSWER(3Mark)

Soil sampling can be defined as amount of soil that represents all or most properties of the soil in which field has been taken.

the objectives

- 1- To collect a soil sample that is representative of a field or portion of a field
- 2- Determine the minerals and organic matter status of the soil.
- 3- Classify the soil.
- 4- Determine the effect of (eco system) factors on soil development.
- 5- To obtain information about a field and use that information to make management decisions
 - i. Nutrient management
 - ii. Herbicides
 - iii. How to irrigated
- 6- Studying the soil fertility status.
- 7- Evaluate the soil fertility by analyzing soil samples (chemical , physical and biological)
- 8- Studying the soil chemical properties (pH , EC , cat ions , anions ,... etc)

Q3/ What are the Factors of soil Formation?

ANSWER(2Mark)

- 1. **Parent Material:** the original “Mom & Pop” soil transported from elsewhere, usually by wind or water, at different speeds
- 2. **Climate:** the amount, intensity, timing, and kind of precipitation that breaks down parts of ecosystem (i.e. rocks, trees) into soil
- 3. **Topography:** *Slope* and *Aspect* affect the angle of the land and position toward/away from the sun that soil will be exposed to
- 4. **Biological:** Plants, animals, microscopic organisms, and humans interact with soil in different ways
- 5. **Time:** the amount of time it takes for the four factors (above) to interact with each other

$$S=f(Cl,O,r,p,t,\dots)$$

These factors can be remembered by the acronym CIORPT

- 1- Climate,
- 2- Organic activity (plants and animals),
- 3- Relief (topography),
- 4- Parent material,
- 5- Time.

Q4/ Correct the following EC meter reading (marks) EC
=4.1 dSm⁻¹ at temperature = 35C°. and EC=3.8dSm⁻¹ at temperature = 15C°

More than 25 C° 35-25=10

$$10*0.02=0.2$$

$$EC =4.1-0.2=3.9 \text{ dSm}^{-1} \text{ .at } 35\text{C}^{\circ}$$

Less than 25 C° 25-15=10

$$10*0.02=0.2$$

$$EC =3.8+0.2=4.0 \text{ dSm}^{-1} \text{ .at } 15\text{C}^{\circ}$$

Q5/What are the objectives of soil moisture determination?

ANSWER(3Mark)

1. To estimation amount of water must be added to soil for plant growth.
2. To delimited the best times for irrigation

Q6/ ANSWER(4Mark)

$$\text{Weight of wet (moisture) soil} = 900 - 300 = 600 \text{ g}$$

$$\text{Weight of dry soil} = 760 - 300 = 460 \text{ g}$$

$$\text{bulk density} = 460/345 = 1.33 \text{ g cm}^{-3}$$

$$\text{Gravimetric moisture content} = (600-460)/460 = 0.30 \text{ or } 25\%$$

$$\text{Volumetric moisture content} = \text{bulk density} * \text{Gravimetric moisture content (w)} = 1.33*0.3 = 0.40 \text{ or } 40\%$$

$$\text{Porosity} = (1-\text{bd}/\text{ps})*100$$

$$\text{Porosity} = (1-1.33/2.65)*100 = (1-0.501)*100 = 49 \text{ or } 0.49$$

Q7/ what is The Objective of soil saturation paste?

ANSWER(1Mark)

The Objective of soil saturation paste

To determine the chemical properties like PH, Ec, Cation and Anion.

Q8/(2Mark)

Soil texture= % (sand +silt+ clay) =100%

40 % Sand

30 % Silt

30 % Clay

=% (sand+30+30) = \Rightarrow sand =40

Soil texture=CLAY LOAM