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**Departments of …Fish resource and Aquatic Animal**

**College of …Agriculture Engineering sciences**

**University of …Salahaddin**

**Subject: …Principles of Soil Science**

**Course Book – ( *2nd* Year )**

**Lecturer's name PhD. Ismaeel Tahir Ahmed**

**Academic Year: 2022/2023**

**Course Book**

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| **1. Course name** | **Autumn**  |
| **2. Lecturer in charge** | **Dr. Ismaeel Tahir Ahmed** |
| **3. Department/ College** | **Soil & water / Agriculture** |
| **4. Contact** | **E-mail: Ismaeel. ahmed @ su.edu.krd****Tel: 07504760935** |
| **5. Time (in hours) per week**  | **For example Theory: 2** **Practical: 6**  |
| **6. Office hours** | **Availability of the lecturer to the student during the week** |
| **7. Course code** |  |
| **8. Teacher's academic** **profile**  | **1990 - BSc – Mosul Univ. Agriculture College –Soil**  **Science Dept.****2005 - MSc – Salahaddin Univ. Agriculture College – Soil** **and Water Dept.****2012 - PhD – Salahaddin Univ. Science College –Biology** **Dept.**  |
| **9. Keywords** |  |
| **10. Course overview:****1- Collecting the information about the very important things against the humans life**  **in (15) lectures were declared in the syllabus.****2- Studying the soil physical , chemical and biological properties which affect on** **human animal and plants requirements of food obtained on the soil .****3-Soil definition in different specialization geological definition engineering definition..****4-All of sides and specialty which have the relations with the main contents and** **changes were taken place in the soil** **5-Explaining the essentiality and producing of soil sciences and its relations with other** **different sciences.**  |
| **11. Course objective:** Collecting the huge information about the very important things of life and one of the important things of ecology which represent in soil and its relation with the other components in the world  |
| **12. Student's obligation**.1- The student must be already in the lecture.2- The student must success in the average of the two examination were must be done.3- Prepare the report and presentation about one of the titles were taken the lectures or syllabus. 4- Quizzes must be done weekly. |
| **13. Forms of teaching.**1- Data show and power point.2- White board.3- Papers (Which collected some headline ) |
| **14. Assessment scheme** final grade will be derived as follows: * **Quizzes and homework's**: About 10 quizzes will be given throughout the semester. They will be given at the beginning of the class period and last 10 minutes.3-5% of your grade.
* **Exams**: There will be two closed book exams given throughout the semester..
* **Final Exam:** The Final Exam is Comprehensive in all course outlines.

Mean of two examinations (Theoretical Part) - 15% Practical part - 35% = 50% Final examination: Theory = 50% |
| **15. Student learning outcome:**1-Taking knowledge about the main characteristics of the soil.2-The impotency of the soil in a scientific method.3-Personal ability and its responsibility against the soil.4-All processes and formations were happened of the bulk soil.5- Studying the soil physical, chemical and biological properties ------.6- And at the end must the student feel what's the duty of one of them, like each academic person and take the information of development countries. |
| **16. Course Reading List and References‌:**▪ Key references:1. **Brady, N.C. (2000) The nature and properties of soils: Prentice Hall of India, New Delhi.**
2. **Das, D.K. (2005) Introductory Soil Science: at Ajit printers, Maujpur, Delhi-53 and Kalyani Publishers, New Delhi.**
3. **Gupta, P.K. and D. Singh (2004) Soil fertility and plant nutrition (India) Jodhpur.**

▪ Useful references:1. **Somani, L.L. and P.C. Kanthalyia (2004) Soils and fertilizers at a galance: AGROTech Publishing Academy. H.F.Offset Printers NewDelhi**

▪ Magazines and review (internet): The core materials of the course consists of the above book, articles from media and internet, and lecture’s notes, make sure you read all the materials and prepare well before going for the examinations. Students are encouraged to search for any other materials that may help improve their English language ability in reading, writing, listening and speaking plant communities' texts. |
| **17. The Topics:** | **Lecturer's name** |
| 1. 1- Introductory of soil science, soil definition, soil science
2. classifications, Pedology and Pedology sciences ,
3. Edaphology and Edaphology sciences,
4. 2- Traditional and modern classification of soil science, soil
5. science relations with other sciences, soil and ecosystem.
6. 3- Soil components, soil profile, horizons, soil formations and
7. processes of soil formation, weathering produced soils.
8. 4- Soil physics, soil characterization, soil texture, soil texture
9. classification, systems,, triangle ,Canadian soil classification.
10. 5- Water molecules with clay surface. Soil water, soil water
11. composition, soil water classification, soil type and moisture,
12. soil moisture calculation.
13. 6- Structure, classification, factors affects on structure, soil density,
14. soil bulk density, bulk density and compactions, bulk density and
15. particle density.
16. 7- Porosity, soil component, pore spaces, porosity c, soil colour.
17. 8- Soil chemistry, soil reactions, pH ranges, water molecules, pH
18. importance, soil buffer capacity, Buffer mechanism, base
19. saturation. Acidity, soil structure and pH
20. 9- Cation Exchange Capacity( CEC) ,CEC importance, CEC and
21. plant growth, colloids, CEC illustrated, CEC process,
22. comparison between high and low CEC.
23. **10 - (**Soil organic matter, fertilizers, global fertilizer usage,
24. inorganic fertilizers,
25. 11- Land degradation and soil conservation, erosion, eroded
26. methods , prevent erosion, desertification, productivity andcosts,
27. 12- The crop rotation, soil terracing and planting, plant cover
28. and erosion,
29. 13- 16 Soil microbiology, abundance of soil organisms, Bacteria, some important bacteria, earth worm, actinomycetes, important products, Fungi.
 | Dr. Ismaeel Tahir AhmedWeekly (2 hrs)ex: 14/10/2016 |
| **18. Practical Topics (If there is any)** |  |
| **19. Examinations: *Typical Questions and Answers.*****Q1/** **What are the key functions of the soil in the global ecosystem?****Ans.:** The key functions are:1. 1- Medium for plant growth. 2- Regulator of water supplies. 3-Recycler of raw materials.
2. 4- Habitat for soil organisms, and 5- Landscaping and engineering mediums.

**Q2/ List the main components of the soil.** **Ans.:** The soil consists of: a) Solid phase: includes minerals and organic matter. b) Porous phase: holds water and gases. Accordingly, soils often treated as a three-state system: Solid phase, liquid phase, and gas phase.**Q3/** **Express why water is essential to plant?****Ans.:** Water is essential to plant because of the following reasons: 1- It constitutes 80%-95% of the plant's protoplasm.2- It is essential for photosynthesis.3- It is the solvent in which nutrients are carried to, into and throughout the plant.4- It provides the turgidity by which the plant keeps itself in proper position.**Q4/** **List the most common types of soil structure**. **Ans.:** There are eight structural types commonly recognized in soil profiles: 1- Granular, 2- single grain, 3- blocky, 4-prismatic,  5- Columnar, 6- platy-, 7- wedge, and 8- massive.**Q5/** Explain briefly the importance of the soil structure.**Ans.:** Soil structure affects permeability by influencing the path by which water can flow through the soil. The type of structure determines the number of interconnected macro pores, which readily permit downward movement of water.**Q6/** A 1.2kg moist soil sample having a volume of 800cm3 and its ovendry mass is 1000g, if the particle density is 2.65g/cm3, Calculate: a) Bulk density of the soil b) Porosity of the soil**Solution:-** **Given**: **Mt= 1200g Vt=800cm Ms=1000g ρs=2.65g/cm3 Mw= 200g****a)** $ ρb=\frac{Ms}{Vt}=\frac{1000}{800}=1.25 g/cm3$$b) $$Porosity=(1-\frac{ρb}{ρs}$**) = (1- 1.25/2.65) =0.52****Q7 / Say True (T) or False (F), if false, correct the statement with a suitable word or phrase.**1-Soil profile consists of layers called horizons. **(T)**2- According to modern division soil& water conservations belongs to soil properties and process**. (F) …..to soil use and management.**3-Soil layers are exactly parallel to the soil surface**.(F) ….are approximately parallel….**4- A vertical exposure of a soil consisting of the horizons is a soil profile**. (T)**5-Tree roots are one of the physical weathering agents**. (F) … the biological**  **weathering agents.**6- Soil physics deals with the state and movement of matter and transformation of  |
| **20. Extra notes:** |
| **21. Peer review**  |