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**Department of Soil and Water**

**College of Agriculture**

**University of Salahaddin**

**Subject: practical soil chemistry**

**Course Book- for Year 2**

**Lecturer's name:MSc Chra Othman HamaAmeem**

**Academic Year: 2021/2022**

**Course Book**

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| **1. Course name** | **Practical soil chemistry** | |
| **2. Lecturer in charge** | **Chra Othman HamaAmeen** | |
| **3. Department/ College** | **Soil and water/ college of agriculture** | |
| **4. Contact** | **e-mail: chra1985@yahoo.com**  **Tel: (07504196619)** | |
| **5. Time (in hours) per week** | **Practical: 3** | |
| **6. Office hours** | **12 hr/week** | |
| **7. Course code** |  | |
| **8. Teacher's academic profile** | **BSc.(2006), MSc.(2012) Salahaddin University** | |
| **9. Keywords** | **Soil, water, chemistry, practical, agriculture** | |
| **10. Course overview:**  **This includes about 8-12 labs on different topics covered in the theory as follows:**  **Week 1:** Introduction, course outline and main definitions.  **Week 2:** Soil sampling in general.  **Week 3:** Determination of Soil Reaction (pH).  **Week 4:** Determination of Electrical Conductivity (EC) of soil.  **Week 5:** Determination of Total Carbonate in the soil.  **Week 6:** Determination of Active Forms of Carbonate in the soil.  **Week 7:** Determination of Total Gypsum CaSO4  **Week 8:** Determination of Cation Exchange Capacity (CEC) of soil.  **Week 9:** Estimation of Calcium & Magnesium in the soil.  **Week 10:** Determination of Na and K in the soil.  **Week 11:** Determination of available Phosphorus in soil.  **Week 12:** Adsorption Isotherm for Phosphorus.  **Final exam** will be determined by the examine board | | |
| **11. Course objective:**  Fundamentals of practical soil science  Soil sampling: Explain practically how to take soil samples, and how to prepare the sample for storage.  Doing some of the most important tests on the soils, like soil pH, electrical conductivity, cation exchange capacity, organic matter, carbonates, nutrients, and the importance of these tests in practical soil management. | | |
| **12. Student's obligation**  the attendance and completion of all tests  Exams.  Assignments.  Quiz. | | |
| **13. Forms of teaching**  Data show and white board | | |
| **14. Assessment scheme**  Mid-term practical exam: 10%  Laboratory participation, report and weekly quizzes 5%  Final Practical exam: 20 % | | |
| **15. Student learning outcome:**  The student should learn how to take soil samples and perform many important tests to assess soil fertility and to find soil problems and improve soil management for best agricultural production. | | |
| **16. Course Reading List and References‌:**  Barzangi, A.F. 1973. Gypsiferous soils of Iraq. Ph.D. Thesis. University of Ghent,Belgium.  Bashour, I.I. 2001. Fertility and fertilizer requirements. In Rural Integrated  Development of the Mountains of Northern Lebanon. FAO Report to Ministry of Agriculture, Beirut, Lebanon.  Bashour, I.I. and Al-Jaloud, A. 2000. Phosphorus fractionation in calcareous arid soils in Saudi Arabia. The Land Journal, Vol. 3.1.  Coutinet, S. 1965. Methodes d'analyse utilisables pour les sols sales, calcaires et  gypseux. Agronomie Tropicale, Paris, 12:1242-1253.  Deb, B.G. and Chadha, S.P. 1970. Mechanical analysis of calcareous soils and  distribution of CaCO3 in various fractions. Journal of Indian Society of  Soil Science, 18:227-232.  Sayegh, A.H., Alban, L.A. and Petersen, R.G. 1958. A sampling study in a saline  and alkali area. Soil Sci. Soc. Am. Proc., 22:252-254.  Willard, H.H. and Diehl, H. 1943. Advanced Qualitative Analysis. Van Nostrad,  New York, NY. | | |
| **17. The Topics:** | | **Lecturer's name** |
| 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 | | Lecturer's name  ex: (2 hrs)  ex: 14/10/2021 |
| **18. Practical Topics (If there is any)** | |  |
| **This includes about 8-12 labs on different topics covered in the theory as follows:**  **Week 1:** Introduction, course outline and main definitions.  **Week 2:** Soil sampling in general.  **Week 3:** Determination of Soil Reaction (pH).  **Week 4:** Determination of Electrical Conductivity (EC) of soil.  **Week 5:** Determination of Total Carbonate in the soil.  **Week 6:** Determination of Active Forms of Carbonate in the soil.  **Week 7:** Determination of Total Gypsum CaSO4  **Week 8:** Determination of Cation Exchange Capacity (CEC) of soil.  **Week 9:** Estimation of Calcium & Magnesium in the soil.  **Week 10:** Determination of Na and K in the soil.  **Week 11:** Determination of available Phosphorus in soil.  **Week 12:** Adsorption Isotherm for Phosphorus.  **Final exam** will be determined by the examine board | | Asst. lecturer Chra Othman HamaAmeen  ex: (3 hrs) |
| **19. Examinations:**  **The type of examination will be as follow**  Fill each of the following blanks:-   1. The objective of determination active lime (active CaCO3) are:-   A/----------------------------------------------------------------------------------  B/----------------------------------------------------------------------------------  **Answer**  ***Objective of determination of active lime (active CaCO3)***  *1-For calculating the ratio between active and total lime (active/total lime)*  *2-the active lime regards as a best indicate for limiting nutrient status and fertilizer recommendation.*  **Explain the effect of pH on availability of nutrient in the soil forest?**  **Answer**  pH effect on phosphrs in to the soil solution the mole fraction of (H2PO4) and (HPO4) depends on pH, at 7.2 the amount of H2PO4 is equal to the amount of HPO4, thes phases are availabile for uptake by plant root, whiel H3PO4 and PO4 is increase when change of pH value.  **What is the principle of determination of active carbonates in soil?**  **Answer**  ***The principle of determination of active carbonates***  *Mainly exchangeable Ca and Mg carbonate, bicarbonate and also partly the highly dispersed carbonate minerals contained in colloidal clay and fine silt, the more active and mobile from of soil carbonates are extracted during this reaction**.*  *Active carbonates react rapidly with ammonium oxalate to form insoluble calcium oxalate*  *(NH4)2C2O4+CaCO3 CaC2O4+ (NH4)2CO3*  *And the excess oxalate (NH4)2 C2O4 can be titrated with potassium permanganate (with a known normality) in acidic medium due to the following equation.*  *(NH4)2C2O4+2KMnO4+8H2SO4 2MnSO4+K2SO4+10CO2+5(NH4)2SO4+8H2O* | | |
| **20. Extra notes:**  Here the lecturer shall write any note or comment that is not covered in this template and he/she wishes to enrich the course book with his/her valuable remarks. | | |
| **21. Peer review پێداچوونه‌وه‌ی هاوه‌ڵ**  This course book has to be reviewed and signed by a peer. The peer approves the contents of your course book by writing few sentences in this section.  *(A peer is person who has enough knowledge about the subject you are teaching, he/she has to be a professor, assistant professor, a lecturer or an expert in the field of your subject).*  ئه‌م کۆرسبووکه‌ ده‌بێت له‌لایه‌ن هاوه‌ڵێکی ئه‌کادیمیه‌وه‌ سه‌یر بکرێت و ناوه‌ڕۆکی بابه‌ته‌کانی کۆرسه‌که‌ په‌سه‌ند بکات و جه‌ند ووشه‌یه‌ک بنووسێت له‌سه‌ر شیاوی ناوه‌ڕۆکی کۆرسه‌که و واژووی له‌سه‌ر بکات.  هاوه‌ڵ ئه‌و که‌سه‌یه‌ که‌ زانیاری هه‌بێت له‌سه‌ر کۆرسه‌که‌ و ده‌بیت پله‌ی زانستی له‌ مامۆستا که‌متر نه‌بێت.‌‌ | | |