**.**

**Department of Soil and Water Science**

**College of Agriculture**

**University of Salahaddin- Hawler**

**Subject: Soil Morphology**

**Course Book- (Year 3 )**

**Lecturer's name: Dr. Shwan Omar Ismael**

**Darsem Baker Ismael**

**Avan Mohammad Mustafa**

**Academic Year: 2022/2023**

**Course Book**

|  |  |  |
| --- | --- | --- |
| **1. Course name** | **Soil Morphology** | |
| **2. Lecturer in charge** | **Dr. Shwan Omar Ismael**  **Darsim Bakir Ismael**  **Avan Muhammed Mustafa** | |
| **3. Department/ College** | **Soil & water/ Agriculture** | |
| **4. Contact** | **e-mail: shwan.seeyan@ su.edu.krd**  **e-mail: d\_esmiel¬@yahoo.com**  **e-mail: avan.mustafa@ su.edu.krd** | |
| **5. Time (in hours) per week** | **Theory: 2 hr. & Practical: 3 hr.** | |
| **6. Office hours** | **12 hours** | |
| **7. Course code** |  | |
| **8. Teacher's academic profile** | **Dr. Shwan Omar Ismael**  **PhD in Hydrogeology (2012-2015); TU-Bergakademie Freiberg- Hydrogeology Institute/Germany**  **MSc. In Hydrochemistry and Hydrogeology (2005-2008); Salahaddin University- Science College-Geology Department.**  **BSc. In Geology (1994-1998); Salahaddin University-Science College-Geology Department.**  **Darsim Bakir Ismael**  **BSc. In Soil (1982-1983); College of Agriculture - Soil Department - Sulaymani University.**  **MSc Soil Survey and classification (2004-2005); College of Agriculture - Soil and Water Department Salahaddin University.**  **Avan Mohammad Mustafa**  **BSc. Geology (2000-2005) College of science, University of Salahaddin- Hawler.**  **MSc. Geology (2008-2011) College of science, University of Salahaddin - Hawler.** | |
| **9. Keywords** | **Soil types, Soil Horizons, Master horizons and Layers, Symbols definition of the soil forming processes.** | |
| **10. Course overview:**  Soil morphology is defined as the branch of soil science that deals with the description, using standard terminology, of in situ spatial organization and physical properties of soil regardless of potential use. Precise descriptions, using conventional terms, are necessary to all of the areas of science included in the field of soil science. The basic descriptors used today have been developed over the past 50 years and are continually added to. Prior to utilization of standard terminology, soils were described as clayey, sandy, stony, sedimentary, saline, marshy, dry or moist, heavy or light, soft or compact, fatty, friable, or lean. Soil horizons were described by terms such as ‘gray watery sand’ or ‘rusty brown clay.’ While these terms illustrate a fundamental understanding of soil properties, they do not impart any specific knowledge about the soils in question and cannot be compared with other soils described by other scientists. An objective, complete description of the soil is essential, because it serves as a basis for soil identification, classification, correlation, mapping, and interpretation.  Soil Morphology is a branch of soil science that studies the external characteristics of soils as a reflection of their internal genetic characteristics, regimes, present and past processes, and conditions of formation.  It deals with description using standard terminology of in situ special organization and physical properties of soil regardless of potential use.  Prior to utilization of standard terminology; soils were described as clayey, sandy, stony, sedimentary, saline, marshy, dry or moist, heavy or light, soft or compact, faty, friable or clean. | | |
| **11. Course objective:**  The course will cover selective topics of soil morphology which deals with shape, forms, and types of the soils. The course include the study of morphology of the soil surface area, the horizons and layers of the soil science, the changes of the soil surface and interior of the soil beneath earth. Also include different layer as a master layer and additional layers of the soil, types of the soil and practical aspects of the soil morphology. Master horizons are a layer approximately parallel to the surface of the soil, distinguishable from adjacent layer by a distinctive set of properties produced by the soil-forming processes. The term layer, rather than horizon is used if all of the properties are believed to be inherited from the parent material, or no judgment is made as to whether the layer is genetic. The depth to and thickness of the horizon should be recorded as well the horizon designation. Horizons are labelled according to diagnostic features and interpretations. | | |
| **12. Student's obligation**  Students are strongly encouraged to attend all the Lectures and laboratory exercises, Quizzes, exams and class participation.  Preparing the reports for the laboratory working. Preparing reports for the scientific field trips. Working as a group (group work).  Lab exercises can be completed only during class time. As some labs will require more than a single week, deadlines for each lab report will be announced at the start of each new lab. Quizzes will be given in class, cover the material covered in the lectures  and take 5 minutes each. The final exam will be comprehensive and will cover the lecture  material but will do so in more depth than the quizzes. | | |
| **13. Forms of teaching**  **Lectures:** Different forms of teaching will be used to reach the objectives of the course: power point presentation for the head titles and definitions and summary of conclusions, classification of materials and any other illustration.  There will be classroom discussions and the lecture will give enough background to translate, solve, analyse and evaluate problems sets, and different issues discussed throughout the course.  To get the best of the course, it is suggested that the student attend classes as much as possible, read the required lectures, teachers notes regularly as all of them are foundations for the course. Lectures notes are for supporting and not for submitting the reading material including the hand-outs. Try as much as possible to participate in classroom discussions, preparing the assignments given in the course.  **Practical:** We will be using lab's white board and work sheets in addition to work on source materials, soil types and horizons, to illustrate given exercises throughout the course. | | |
| **14. Assessment scheme**  **Course assessment will be**  There will be quizzes and exams during the semester, given during regular lecture periods. The course grade will be based on the exams and quizzes and weekly reports as shown below:   * Theory Exam 15% * Theory Quiz 5% * Theory Attendance 5% * Laboratory Reports 3% * Practical Quiz 2% * Practical Exam 10% * The total will be 40%   ‌ | | |
| **15. Student learning outcome:**  Students should learn the following:  1. Knowledge of Characteristics, description and macroscopic identification of soil formation.  3. Simplified classification of the soil.  4. Characterization, description and identification of the master horizones.  5. Characterization, description and identification of the master layers.  6.Characterization, description and identification of the different types of soil.  7. The student should be able to understand soil and the effect of parent material to the Characteristics of the soil formation.  8. The student should be able to define the different soil layers like water layer, parent materials, and bedrocks.  9. The student should be able to construct the cross –section and soil profile.  10. Get a good idea about the material and the soil minerals and different stratigraphic formations.  11. Analysis and interpretation of the secondary and partitions of the horizon. | | |
| **16. Course Reading List and References‌:**  1. Schaetzl, R. and Sharon Anderson (2005). Soils, genesis and geomorphology. Cambridge university press  2. Das, D.K. (2004). Introductory soil science.Kalyani publishers. New Delhi, India.  3. Bardy, N.C. and R.R. Weil (2004). Elements of the Nature and Properties of Soils. Second edition. Pearson Prentice Hall. New Jersey, USA.  4. Eswaran H., T. Rice, R. Ahrens and B.A. Stewart (2003). Soil classification, a global desk reference. CRC Press, USA.  5. Lutgens, F.K. and E.J.Tarbuck ( 2003). Foundation of Earth Science, third edation. Prentice Hall. New Jersey, USA.  [www.soils.ag.udaho.edu/soilorders/orders.htm](http://www.soils.ag.udaho.edu/soilorders/orders.htm)  <http://soils.usda.gov/classification/taxonomy/main.htm> | | |
| **17. The Topics:** This includes labs on different topics covered in the theory as follows: | | **Lecturer's name** |
| **Week - 1**  **Theory: Introduction to morphology and soil morphology**  **Lab.: Soil profile- Soil profile description- Soil horizons**  **Week - 2**  **Theory: Master Horizons and Layers**  **Lab.:**  **Morphology and field description of soil- Site description**  **Week - 3**  **Theory: Transitional Horizons and Diagnostics Horizon**  **Lab.:**  **Soil Color**  **Week - 4**  **Theory: Top soil and Sub soil**  **Lab.: Soil structure**  **Week - 5**  **Theory: Combination Horizon**  **Lab.:**  **Soil consistence**  **Week - 6**  **Theory: Soil Quality**  **Lab.:** **Soil texture**  **Week - 7**  **Theory: Concepts of Soil Genesis:**  **Lab.:** **Soil boundary**  **Week - 8**  **Theory: Examination**  **Lab.:** **Examination**  **Week - 9**  **Theory: Suffix symbol in soil morphology**  **Lab.:** **Soil carbonate**  **Week - 10**  **Theory: Soil Structures**  **Lab.:** **Soil pH**  **Week - 11**  **Theory: Factors affecting to soil Morphology in different**  **environments**  **Lab.:** **Fauna and other biological features**  **Week - 12**  **Theory: Examination**  **Lab.:** **Examination** | | **Dr. Shwan Omar**  **Darsim Bakir**  **Avan Mohammad** |
| **18. Practical Topics (If there is any)** | |  |
| **19. Examinations:** The theoretical exams are focused on material studied in lectures and lab material, plus the required reports and quizzes, the formats will be include short answer, definition, multiple choice, and differences. For the practical exam format will be a mixture of short answer, and short essay questions, usually with one to three problems that involve calculations. The quiz will be similar to the exams in terms of the type and difficulty of questions, but shorter.  ***1. Compositional:***  **Theoretical:** includes the comparison between the different materials, the definitions, explanation, discussion, and the selecting materials.  **Practical:**  The type of examination will be :   1. Choose the correct answer. 2. Complete the following. 3. Compare between the following. 4. Define the following. 5. Answer the following.   ***2.Questions that need to be calculated:*** | | |
| **20. Extra notes:** | | |
| **21. Peer review ‌** | | |