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| EXC-01-02-02A | **Form Number** | **Form:**  **Course Syllabus** |
| 2/3/24/2022/2963  05/12/2022 | **Issue Number and Date** |
|  | **Number and Date of Revision or Modification** |
| 2/3/24/2023 | **Deans Council Approval Decision Number** |
| 23/01/2023 | **The Date of the Deans Council Approval Decision** |
|  | **Number of Pages** |

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| **1.** | **Course Title** | Soil laboratory |
| **2.** | **Course Number** | 0634102 |
| **3.** | **Credit Hours (Theory, Practical)** | 1 |
| **Contact Hours (Theory, Practical)** | 3 hours practical |
| **4.** | **Prerequisites/ Corequisites** | 604101or synchronized |
| **5.** | **Program Title** | Bachelor Land, Water and Environment |
| **6.** | **Program Code** | 4 |
| **7.** | **School/ Center** | Agriculture |
| **8.** | **Department** | Land, Water and Environment |
| **9.** | **Course Level** | Undergraduate-BSc |
| **10.** | **Year of Study and Semester (s)** | Spring 2023 /2024 |
| **11.** | **Other Department(s) Involved in Teaching the Course** | -------- |
| **12.** | **Main Learning Language** | English |
| **13.** | **Learning Types** | √ Face to face learning ☐Blended ☐Fully online |
| **14.** | **Online Platforms(s)** | ☐Moodle √ Microsoft Teams |
| **15.** | **Issuing Date** | 4/7/2024 |
| **16.** | **Revision Date** | 9/7/2024 |

**17. Course Coordinator:**

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| Name: Areej AL Khreisat Contact hours: Thursday :1.30 - 2:30 pm & All the time on Microsoft teams platform  Office number: 57, 1st floor Phone number:22444  Email: [a.alkhreisat@ju.edu.jo](mailto:a.alkhreisat@ju.edu.jo) |

**18. Other Instructors: --------**

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**19. Course Description:**

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| This laboratory course is designed for students who plan to work directly with soils. By conducting weekly laboratory and writing reports on their work, students will deepen their understanding of, and learn to apply, the fundamental soil properties and processes introduced in Principles of Soil course (0604101). This laboratory course will provide foundational learning in soil science and prepare students for upper level soil science courses. This laboratory course is also designed to provide students with hands on experience in analytical procedures for soil assessment, testing, and interpretation, |

**20. Program Intended Learning Outcomes:** Land, Water and Environment BSc Program ILOS

1. Demonstrate comprehensive understanding of the scientific and theoretical knowledge of land, water and environment.
2. Contribute to agricultural development, as well as food and water security.
3. Demonstrate problem solving skills and well developed linguistic and communication skills while upholding professional ethics
4. Assess land characteristics and their suitability for different agricultural uses.
5. Tackle basic problems of water, land and agricultural environment.
6. Analyse and interpret soil and water quality parameters.
7. Use sound scientific principles for the determination of crop water requirement, and design of irrigation systems for the proper management of agricultural water.
8. Determine the optimal use of water and land to ensure the sustainability of resources and the environment.
9. Develop​ innovative solution for tackling the adverse effects of water scarcity caused by climate change and desertification​

**21. Course Intended Learning Outcomes:**

* Provide hands-on, practical experience with many of the tools and techniques utilized in determine various physical properties of soil.
* Enhance student understanding of essential soil physical, chemical and morphological properties.
* To reinforce, with practical exercises, the concepts presented in the lecture course.

To provide experience in performing calculations utilizing the data collected from testing procedures.

Upon completion of the course, the student will achieve the following ***intended learning outcomes***:

**A. Knowledge and Understanding**

A1- Test and analyze the properties of soil.

**B. Intellectual, Analytical and Cognitive Skills:**

B1- Determine ranges of numerical values expected from soil tests

**C. Subject- Specific Skills:**

C1- Recognize how to use those properties in geotechnical designs

**D. Transferable Key Skills:**

D1-Design and complete a custom experiment, analyze data and draw conclusions.

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| Course ILOs | The learning levels to be achieved | | | | | |
| Remembering | Understanding | Applying | Analysing | evaluating | Creating |
| A1 |  |  | √ | √ |  |  |
| B1 |  | √ |  |  | √ |  |
| C1 | √ | √ | √ |  |  |  |
| D1 | √ | √ | √ | √ | √ | √ |

**22. The matrix linking the intended learning outcomes of the course with the intended learning outcomes of the program:**

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| --- | --- | --- | --- | --- | --- |
| Program ILOs  Course ILOs | ILO (1) | ILO (2) | ILO (3) | ILO (4) | ILO (5) |
| A1. Test and analyze the properties of soil. | √ |  |  |  |  |
| B1. Determine ranges of numerical values expected from soil tests | √ | √ | √ |  |  |
| C1. Recognize how to use those properties in geotechnical designs |  |  | √ | √ |  |
| D1. Design and complete a custom experiment, analyze data and draw conclusions. |  |  |  |  | √ |

**23. Topic Outline and Schedule:**

| **Week** | **Lab session (3 hr)** | **Topic (Number and contents)** | **ILO of the course** | **Learning Methods**  **(Platform)** | **Synch. / Asynch. Lecturing** | **Evaluation Methods\*** | **Resources** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 1 | * Moisture determination of air-dried soil | A1, B1, C1&D1 | Face to Face | -- | Report | 9.1-9.5 &9.7. |
| 2 | 1 | Soil texture by feel method | A1, B1, &D1 | Face to Face | - | Report Quiz 1 | 9.6-9.8 |
| 3 | 1 | Soil texture by hydrometer method | A2, B1&D1 | Face to Face | -- | Report Quiz 1 | 9.5& 9.7 |
| 4 | 1 | Density and pore space | A2, B1&D1 | Face to Face | -- | Report Quiz 1 | 9.1-9.2,9.4,9.5 & 9.7 |
| 5&6 | 1 | Soil forming rocks and minerals | C1 | Face to Face | -- | Report | 9.6 &  9.7. |
| 7 | 1 | Properties of soil colloids | A1, D1 | Face to Face | - | Report Quiz 1 | 9.7 &  9.10 |
| 8 | 1 hour | **Mid-term exam** |  | **At UOJ** |  |  |  |
| 9 | 1 | Soil reaction (pH) | A1, B1, C1&D1 | Face to Face | - | Report Quiz 1 | 9.1,9.2,9.3,9.5,9.7& 9.10 |
| 10 | 1 | Soil carbonate by acid neutralization | A1, B1, C1&D1 | Face to Face | -- | Report Quiz 1 | 9.1, 9.3,9.4, 9.5,9.6&9.7 |
| 11 | 1 | Soil salts | A1, B1, C1&D1 | Face to Face | -- | report | 9.1, 9.3,9.4, 9.5,9.6&9.7 |
| 12 | 1 | Soil organic matter | A1, B1, C1&D1 | Face to Face | -- | Report | 9.1, 9.3,9.4, 9.5,9.6&9.7 |
| 13 | 1 | Soil test phosphorus | A1, B1, C1&D1 | Face to Face | -- | Report | 9.1, 9.3,9.4, 9.5,9.6&9.7 |
| 14  15 | 1 | Soil profile description | C1 | Face to Face | -- | Report | 9.6 & 9.7 |
| 16 | 2 hours | **Final Hour Exam** |  | **At UOJ** |  |  |  |

**24. Evaluation Methods:**

Opportunities to demonstrate achievement of the ILOs are provided through the following assessment methods and requirements:

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| --- | --- | --- | --- | --- | --- |
| **Evaluation Activity** | **Mark** | **Topic(s)** | **ILO/s Linked to the Evaluation activity** | **Period (Week)** | **Platform** |
| Quizzes, homework | 20 | All topics | All | During semester | At University |
| Mid-term exam | 30 | Beginning to Properties of soil colloids | A2,B1,C,D1 | 8 | At University |
| Final Exam | 50 | All topics | All | 16 | At University |

**25. Course Requirements:**

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| Students should have internet access and an account on Microsoft team’s platform.  These are list of course equipments:  Lab  Board  Basic Laboratory Glassware  Chemical reagents  pH meter  Conductivity bridge and cell  Spectrophotometer  Hydrometer  Shaker  Electric mixer with baffled cup  Electronic Balance  Soil samples  Distilled water  Training trips.  SieveS  Mortar and pestle  Digital Oven with Temp. Control  Fume hood  Desiccators |

**26. Course Policies:**

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| A- Attendance policies:  B- Absences from exams and submitting assignments on time:  C- Health and safety procedures:  D- Honesty policy regarding cheating, plagiarism, misbehavior:  E- Grading policy:  F- Available university services that support achievement in the course: |

**27. References:**

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| **A- Required books:**  9.1 Estefan, G., Sommer, R., and Ryan, J. 2013. Methods of soil, plant and water analysis. A manual for the West Asia and North Africa region. International Center for Agricultural Research in the Dry Areas (ICARDA).  9.2 Klute, A. (ed.). 1986. Methods of soil analysis, Agron. 9, Part 1: Physical and mineralogical methods. Am. Soc. Agron., Madison, WI, USA.  9.3 Bingham, F. T. 1982. Boron, p. 431 – 448. In A. L. Page (ed.), Methods of soil analysis, Part 2: Chemical and mineralogical properties. Amer. Soc. Agron., Madison, WI, USA.  9.4 Chapman, H. D., and P. F. Pratt. 1961. *Methods of analysis for soils, plants and water*. Univ. California, Berkeley, CA, USA.  9.5 Bashour ,I. I and Sayegh, A.H.2007. Methods of analysis for soils of arid and d semi-arid regions.FAO.  9.6 Brady, N C and Weil, R R, 2008. The Nature and Properties of Soils. 14th ed. Pearson-Prentice Hall, Upper Saddle River, NJ. 990 pp. (11th edition of 1996 is available at the UOJ Library).  9.7. Soil Laboratory manual  9.8 S.J. Thien. 1979. A flow diagram for teaching texture by feel analysis. Journal of Agronomic Education. 8:54-55.  9.9 Bouyoucos, G.J. 1962. Hydrometer method improved for making particle size analyses of soils. 535 Agronomy journal 54: 464-465.  9.10 Colby Moorberg and David Crouse. 2021.Soils Laboratory Manual  **B- Recommended materials and media:** |

**28. Additional information:**

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| 1- Attendance is obligatory.  2- Any disturbance to class lectures will result in expulsion of the student and considering him absent from the lecture. Repetition of this behavior will subject the student for further actions according to UOJ regulations. |

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| Name of the Instructor or the Course Coordinator:  **Areej AL Khreisat Areej** | Signature: | Date:  7/7/2024 |
| Name of the Head of Quality Assurance Committee/ Department  …………………………………………………. | Signature:  …………...……………… | Date:    ……..………… |
| Name of the Head of Department  …………………………………………………. | Signature:  …………...……………… | Date:  ……..………… |
| Name of the Head of Quality Assurance Committee/ School or Center  …………………………………………………. | Signature:  …………...……………… | Date:  ……..………… |
| Name of the Dean or the Director  …………………………………………………. | Signature:  …………...……………… | Date:  ……..………… |