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| EXC-01-02-02A | **Form Number** | **Form:****Course Syllabus** |
| 2/3/24/2022/296305/12/2022 | **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 Fertility and Fertilizers |
| **2.** | **Course Number** | 0604223 |
| **3.** | **Credit Hours (Theory, Practical)** | 3 hours  |
| **Contact Hours (Theory, Practical)** | **Theory** :2 lectures a week, practical : 3 hours lab session per week |
| **4.** | **Prerequisites/ Corequisites** | 0604101  |
| **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)** | Fall 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: 12:30-13:30 Monday &WednesdayOffice number: 57 1st floor Phone number:22444Email: a.alkhreisat@ju.edu.jo |

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

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**19. Course Description:**

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| Soil fertility and fertilizers is a core course comprises two lecture hours and weekly lab session. The course is intended for students of soil science whose interest is focused on soil as a medium for plant growth and also for students of several disciplines. In both cases, diagnosis of fertility and fertility associated problem(s) then evaluation of soil needs from different nutrients aim at proper management of soil ecosystem to function at its maximum potential in terms of land productivity and soil capacity as a biochemical reactor. Because of the background variations of soil fertility students, details of the nature and functions of organic and inorganic fertilizers have also to be discussed. In addition, scientific concepts and theories of many subjects have to be simplified to the maximum possible limit. Soil fertility should be treated as the independent factor. Subsequently, fertilizers’ type and quantities are variables dependent on the evaluation of soil fertility. |

**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:**

1. To enable students diagnosing fertility and fertility associated problem(s) then evaluating of soil needs from different nutrients aim at proper management of soil ecosystem to function at its maximum potential in terms of land productivity and soil capacity as a biochemical reactor

2. To understand the nature and functions of organic and inorganic fertilizers

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

**A. Knowledge and Understanding**

A1- Develop the students’ understanding and comprehension of nutrient cycles.

A2- Develop the students’ appreciation for the complexity and importance of plant/soil/nutrient interactions.

A3- How to distinguish between soil fertility and soil productivity and how to manage or control factors affecting both fertility and productivity of the soil

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

B1- Students will know how Soil physical and chemical properties that affect availability of nutrients in the soil, and learn how to consider these properties for optimizing fertilizer management

**C. Subject- Specific Skills:**

C1. Learn how to manage and/or reclaim acid soils and salt affected soils (both saline and sodic soils) and how to optimize both crop and soil management to successfully use these types of soil without further degradation of the soil.

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| Course ILOs | The learning levels to be achieved |
| Remembering | Understanding | Applying | Analysing | evaluating | Creating |
| 1.A1 | √ | √ |  |  |  |  |
| 2.A2 | √ | √ | √ |  |  |  |
| 3A3 | √ | √ | √ |  |  |  |
| 4 B1 | √ | √ | √ |  |  |  |
| 5 C1 |  | √ | √ |  |  |  |

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

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Program ILOsCourse ILOs | ILO (1) | ILO (2) | ILO (3) | ILO (4) | ILO (5) | ILO (6) | ILO (7) | ILO (8) | ILO (9) |
| A1-  | √ |  | √ |  | √ |  |  |  |  |
| A2-  | √ |  | √ |  |  |  |  |  |  |
| A3-  | √ |  |  | √ |  |  |  |  |  |
| B1-  | √ |  |  |  |  | √ |  |  |  |
| C1-  | √ | √ |  | √ | √ | √ |  |  |  |

**23. Topic Outline and Schedule:**

| **Week**  | **Lecture (1.0 hr.)** | **Topic (Number and contents)** | **ILO of the course** | **Learning Methods** **(Platform)** | **Synch. / Asynch. Lecturing** | **Evaluation Methods\*** | **Resources** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 12 | 1,23,4 | Modern concept of soil fertility. Definition of soil as a natural system, soil fertility and land productivity. | A | Face to face | - | Interactive questions, quizzes and homeworks | R1-R2 |
| 34 | 5,67,8 | **Basic soil-plant relationships:*** Soil solution
* Ion exchange
* Examples on the capacity factors of: sandy soils, organic matter-rich soils and alluvial soils.
 | A&B | Face to face |  | Interactive questions, quizzes and homeworks | R1-R2 |
| 5 | 9,10 | **Soil acidity and alkalinity:*** **-**Acid and base concepts
* Soil acidity
* Active acidity
* Soil Ph
* Liming
* Soil acidification

Saline and sodic soils | A&C | Face to face |  | Interactive questions, quizzes and homework | R1-R2 |
| 67 | 11,1213,14 | **Nitrogen:*** The N cycle
* Nitrogen transformation in soil
* Nitrogen losses from soil

Nitrogen sources for crop production | A,B&C | Face to face |  | quizzes and homework | R1-R2 |
| 89 | 15,1617,18 | **Phosphorus and potassium in soil:*** The P cycle
* P sources for crop production
* The K cycle

K sources for crop production | A&B | Face to face |  | Interactive questions, QUIZ | R1-R2 |
| 1011 | 19,2021,22 | **Micronutrients in soil:**Iron, zinc, copper, manganese, boron, molybdenum and chlorine | A&B | Face to face |  | Interactive questions, ,quizzes and homeworks | R1-R2 |
| 12 | 23 | **Mid-term exam** | A,B &C | **At UOJ** |  |  | R1-R2 |
| 13 | 24,25 | **Evaluation of soil fertility and plant nutrition:*** Soil analysis

Plant analysis | A,B &C | Face to face |  | Interactive questions, quiz | R1-R2 |
| 1415 | 2627 | **Nutrient management:*** Crop characteristic
* Soil characteristic
* Nutrient placement

Specific recommendations | A&C  | Face to face |  | Term papers presentations | R1-R2 |
| 16 | 28 | **Final Hour Exam** | A,B &C | **At UOJ** |  |  | R1-R2 |

**24. Evaluation Methods:**

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Evaluation Activity** | **Mark** | **Topic(s)** | **ILO/s Linked to the Evaluation activity** | **Period (Week)** | **Platform** |
| Quizzes, homework | 10 | All topics | All | During semester | At University |
| Mid-term exam | 30 | Beginning to nitrogen | A,B,C | 12 | At University |
| Lab reports   | 5 | All lab experiments | All | During semester | At University |
| Final Lab exam | 15 | All lab experiments | All | 16 | At University |
| Final Exam | 40 | 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.  |

**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:**R1 Soil Fertility and Fertilizers. Samuel L. Tisdale, Werner L. Nelson, James D. Beaton and John L. Halvin (any recent edition).R2 All handed material.**B- Recommended materials and media:**Tisdale, S. L., W.L. Nelson, and J.D. Beaton.1993. Soil Fertility and Fertilizers. 8th ed. Macmillan Publishing Co., N. YHavlin, J.L; Beaton, J.D; Tisdale, S.L; and Nelson, W.R. 1999. Soil Fertility and Fertilizers, An introduction to Nutrient Management. 6th ed. Prentice Hall, New Jersey |

**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: ……..………… |