

Course Description Form

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| 1. Course Name: | |
| Environmental stress | |
| 2. Course Code: | |
| ECST464 | |
| 3. Semester / Year: | |
| Second Semester (Spring) / 2023-2024 | |
| 4. Description Preparation Date: | |
| 1/2/2024 | |
| 5. Available Attendance Forms: | |
| Presence | |
| 6. Number of Credit Hours (Total) / Number of Units (Total) | |
| (2 theoretical + 3 practical = 5 hours) × 15 weeks = 75 hours / 3.5 units | |
| 7. Course administrator's name (mention all, if more than one name) | |
| Name: Assist. Prof. dr. Omar A. Abdulqader Email: edu3ab@uomosul.edu.iq Name: Assist. Lect. Saddam Ibrahim Yahya Email: saddam.alobaidi@uomosul.edu.iq | |
| 8. Course Objectives | |
| Theoretical: <ul style="list-style-type: none">- Enable the student to understand the effect of environmental stresses on plant organ functions and plant production.- Enable the student to understand the effects of environmental changes on crop productivity.- Enable the student to possess scientific methods and concepts that enable him to neutralize or reduce the effects of environmental stresses and environmental changes.- Enable the student to estimate and identify crops suitable for cultivation in marginal or stressful environments of crops and follow scientific methods in increasing the ability of plants to withstand environmental stresses. | Practical: <ul style="list-style-type: none">- Enable the student to identify the impact of environmental stresses through scientific experiments.- Enable the student to measure environmental stresses on plants and predict their effects on the yield.- Enable the student to apply the coefficients that increase the resistance of plants to environmental stresses. |

9. Teaching and Learning Strategies

Theoretical:

- Interactive Lecture
- Brainstorming
- Dialogue and discussion
- Assignment and report
- Presentations of models of the effects of environmental changes and their impact on crop growth and vital processes in those crops.
- Tasks the preparation of a report on one of the topics of environmental stress and discusses it.
- Scientific visits.

Practical:

- Commissioning teamwork to reveal leadership skills.
- Assigning tasks and a report for each experiment.

10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|------|----------------------------|---|---|---|---|
| 1 | 2Theoretical 3Practical | Theoretical(a1.c1): The student learns about the types and causes of environmental stresses, how to apply the concepts of environmental stress resistance to crops Practical(b1): examines and distinguishes cells and tissues of all kinds under stress | Theoretical: Types of Environmental Stresses Practical: Examination and differentiation of cells and tissues of all kinds under stress | Theoretical: auditory styles, blackboard writing style, direct dialogue style Practical: assignment and report | Quizzes, assignments, discussions |
| 2 | 2Theoretical 3Practical | Theoretical(a2.c2): The student learns about the physiology of environmental stresses, It regulates and controls the concentration of solutions to suit the needs of plants Practical(c7): determines the concentration and type of solution | Theoretical: Stress measurement methods Practical: determination of concentration and type of solutions | Theoretical: auditory styles, blackboard writing style, direct dialogue style Practical: assignment and report | Quizzes, assignments, discussions |
| 3 | 2Theoretical 3Practical | Theoretical(a3): Knows what environmental stress measures are Practical(b2): Using tinctures, reveals diffusion, osmosis and imbibition | Theoretical: Metabolic stress Practical: Environmental stress measurement | Theoretical: auditory styles, blackboard writing style, direct dialogue style Practical: assignment and report | Quizzes, assignments, discussions, field assessment |
| 4 | 2Theoretical 3Practical | Theoretical(a4): The student judges by the | Theoretical: Stress Simulation Methods | Theoretical: auditory styles, | Quizzes, assignments, |

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| | | shape of plants the type of environmental stress Practical(b3): Measures growth and its rates | Practical: Measuring Growth and its Rates | blackboard writing style, dialogue direct style, scientific visit Practical: assignment and report | discussions, report I |
| 5 | 2Theoretical 3Practical | Theoretical(a5): The student judges the nature of growth in plants through the metabolism of demolition and construction in plants Practical(b4): reveals the phase of growth in plants | Theoretical: Water Stress Practical: Measuring Water Equilibrium | Theoretical: auditory styles, blackboard writing style, dialogue direct style Practical: assignment and report | Quizzes, assignments, discussions, report I, field assessment |
| 6 | 2Theoretical 3Practical | Theoretical(a6,c3): Identify the importance of secondary metabolic compounds and their role in protecting plants from environmental stresses, identify problems of low photosynthesis processes, identify and treat the causes of high respiratory Practical(b5): Distinguish primary and secondary metabolic compounds and their functional roles in plants | Theoretical: the movement of water within the plant when water tension occurs Practical: Identification of stress -induced metabolic compounds | Theoretical: auditory styles, blackboard writing style, dialogue direct style Practical: assignment and report | Semester test, assignment, discussions |
| 7 | 2Theoretical 3Practical | Theoretical(a7,c4): The student learns about the mechanism of water equilibrium and how direct and indirect factors are affected by it, determining the zero growth and determining photosynthesis times based on that, predicting the date of flowering, maturity and water consumption Practical(b6): Reveals the types and amount of transpiration and its speed in different parts of plants | Theoretical: The effect of water stress on physiological processes Practical: Transpiration Measurement | Theoretical: auditory styles, blackboard writing style, dialogue direct style Practical: assignment and report | Quizzes, assignments, discussions |
| 8 | 2Theoretical 3Practical | Theoretical(a8,c5): Learn about the method of measuring growth of environmentally stressed plants, adjusting and determining the flowering and maturation period based on aggregate temperatures | Theoretical: Anatomical comparison between stress-prone plants and water-balanced plants Practical: Measuring Growth | Theoretical: auditory styles, blackboard writing style, dialogue direct style, scientific visit Practical: assignment and report | Quizzes, assignments, discussions |

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| | | Practical(b7): Tests the amount of daily growth and net photosynthesis | | | |
| 9 | 2Theoretical 3Practical | Theoretical(a9): water absorption by plants and how it is transmitted within plants Practical(b8): Conducts experiments on plants that demonstrate the mechanism of water absorption by plants | Theoretical: The Effect of Water Stress on Productivity Practical: Water Absorption | Theoretical: auditory styles, blackboard writing style, dialogue style Practical: assignment and report | Quizzes, assignments, discussions |
| 10 | 2Theoretical 3Practical | Theoretical(a10,c6): Identify the mechanism of absorption of nutrients by plants and the effect of salinity stress and pH on that process, addressing the causes of low water consumption efficiency Practical(b9): Examines the absorption of salt-sensitive and resistant plants in solutions of different concentrations | Theoretical: Metabolic Components Practical: Absorbing Elements | Theoretical: auditory styles, blackboard writing style, dialogue style Practical: assignment and report | Quizzes, assignments, discussions |
| 11 | 2Theoretical 3Practical | Theoretical(a11): Recognizes the disadvantages of soil subdues on the absorption process Practical(e1): Determines the preference for the growth of c3 and c4 crops in climatically different regions | Theoretical: The Morphology of Stress-Prone Plants Practical: Photosynthesis | Theoretical: auditory styles, blackboard writing style, dialogue style Practical: assignment and report | Semester test , assignment, discussions |
| 12 | 2Theoretical 3Practical | Theoretical(a12): respiration is judged at every stage of growth and its relationship to aging Practical(b10): Measures aerobic and anaerobic respiration | Theoretical: Acclimatization Practical: respiration and senescence | Theoretical: auditory styles, blackboard writing style, dialogue style Practical: assignment and report | Quizzes, assignments, discussions |
| 13 | 2Theoretical 3Practical | Theoretical(a13): Manages and judges a scientific debate on plant acclimatization Practical(e2): determines from the characteristics of the plant how well it adapts to grow in a particular environment | Theoretical: Heat Stress Practical: Anatomical features of stressed plants | Theoretical: auditory styles, blackboard writing style, dialogue style Practical: assignment and report | Quizzes, assignments, discussions |
| 14 | 2Theoretical 3Practical | Theoretical(a14): Determining the positive and negative role of the anatomical and morphological features | Theoretical: saline stress and degree of reaction Practical: morphological features of stressed plants | Theoretical: auditory styles, blackboard writing style, dialogue style | Quiz, assignment, discussions |

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| | | of drought-resistant plants Practical(c8): Determines by anatomy and phenotypic the extent of adaptation to environmental stress factors | | Practical: assignment and report | |
| 15 | 2Theoretical 3Practical | Theoretical(a15): Enumerates the types of materials used in seed priming and their functional importance in stressed plants Practical(b11): distinguish the effects of seed priming on plants | Theoretical: seed priming Practical: Perform seed priming experiments | Theoretical: auditory styles, blackboard writing style, direct dialogue style Practical: assignment and report | Quiz, assignment, discussions, practical field project |

11. Course Evaluation

| No. | Evaluation methods | Calendar date (week) | Grade | Relative weight % |
|-----|--------------------------|-----------------------------|-------|-------------------|
| 1 | Report 1 | Fourth week | 2.5 | 2.5 |
| 2 | Report 2 | Fifth week | 2.5 | 2.5 |
| 3 | Quiz (1) | Sixth week | 2 | 2 |
| 4 | Quiz (2) | Fourteenth week | 2 | 2 |
| 5 | Quiz (3) | Fifteenth week | 1 | 1 |
| 6 | Semester Exam (1) | Sixth week | 7.5 | 7.5 |
| 7 | Semester Exam (2) | The first week is difficult | 7.5 | 7.5 |
| 8 | Final theoretical test | Final Semester Exams | 40 | 40 |
| 9 | Practical field project | Fifteenth week | 5 | 5 |
| 10 | Field Assessment | Third and fifth week | 2 | 2 |
| 11 | Practical Quiz (1) | First week | 1 | 1 |
| 12 | Practical Quiz (2) Quiz | Fourth week | 0.5 | 0.5 |
| 13 | Practical Quiz (3) Quiz | Fourteenth week | 1 | 1 |
| 14 | Homework and discussions | All weeks | 5.5 | 5.5 |
| 15 | Final Practical Test | Final Semester Exams | 20 | 20 |
| | Total | 100 | 100% | 100% |


12. Learning and Teaching Resources

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| Required textbooks (curricular books, if any) | Lectures prepared by the subject teacher |
| Main references (sources) | <p>Matthew, A.J and P. M. Hasegawa (2003). Plant Abiotic Stress. 2nd Edition. Wiley Pub. PP: 336.</p> <p>Shabala S. (2017). Plant Stress Physiology. 2nd Edition. CABI Pub. PP: 376.</p> <p>Rao, K. M., Raghavendra, A. S., & Reddy, K. J. (Eds.). (2006). Physiology and molecular biology of stress tolerance in plants. Springer Science & Business Media.</p> <p>Kumar, R. R., Praveen, S., & Rai, G. K. (Eds.). (2022). Thermotolerance in Crop Plants. Springer Nature.</p> <p>Ansari, S. A., Ansari, M. I., & Husen, A. (Eds.). (2022). Augmenting Crop Productivity in Stress Environment. Springer Nature Singapore.</p> |

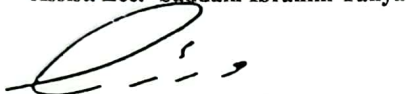
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| | Larcher, W. (2003). Physiological plant ecology: ecophysiology and stress physiology of functional groups. Springer Science & Business Media. |
| Recommended books and references (scientific journals, reports...) | Plant Stress Journal https://www.sciencedirect.com/journal/plant-stress |
| Electronic References, Websites | https://study.com/learn/lesson/environmental-stressors-concept-examples.html https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9141089/ https://explore.globalhealing.com/what-is-environmental-stress/ https://onlinelibrary.wily.com/doi/10.1111/j.1420-9101.2005.00962. |


Practical Lecturer:


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Theoretical Lecturer

Assist. Prof. Dr. **Omar A. Abdulqader**


Chairman of the Scientific Committee
Prof. Dr. **Weam Yahya Rashid**

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