Course Description Form

1. Course Name:

Environmental stress

2. Course Code:

ECST464

3. Semester / Year:

Second Semester (Spring) / 2024-2025

4. Description Preparation Date:

1/2/2025

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:

- 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:

- 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:	**Practical:**
- 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.	- 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,

		shape of plants the type of environmental stress **Practical(b3):** Measures growth and its rates	**Practical:** Measuring Growth and its Rates	blackboard writing style, direct dialogue style, scientific visit **Practical:** assignment and report	discussions, report1
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, direct dialogue style **Practical:** assignment and report	Quizzes, assignments, discussions, report1, 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, direct dialogue 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, direct dialogue 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, direct dialogue style, scientific visit **Practical:** assignment and report	Quizzes, assignments, discussions

		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, direct 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, direct 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, direct 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, direct 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, direct 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, direct dialogue style	Quiz, assignment, discussions

		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:** assignn 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

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

	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:
Assist. Lec. Saddam Ibrahim Yahya

Theoretical Lecturer
Assist. Prof. Dr. Omar A. Abdulqader

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

Head of Field Crops Dep.
Assist. Prof. Dr. Moyassar Mohammed Aziz

أ.م.د. ميسر محمد عزيز
رئيس قسم المحاصيل الحقلية