DEPARTMENT OF AGRONOMY
Faculty of Agricultural Sciences
University of the Punjab, Lahore

Course Outline

Programme	B.Sc. (Hons.) Agriculture (Agronomy)	**Course Code**	**AGR-401**	**Credit Hours**	3 (2-1)
Course Title	**CROP MANAGEMENT UNDER STRESSFUL ENVIRONMENT**				

Course Introduction

To elaborate on the concept of stress in field crops and approaches to sustain yields under such conditions.

Learning Outcomes

After studying this course, the students will be able to: -
1. Define basic terminologies regarding crop production and stress in field conditions.
2. Understand the concept of stress management in field conditions.
4. Identify the symptoms of stress on crops and lay out different management practices.
5. Manage or mitigate stress conditions on the field.

	Course Content	Assignments/Readings
Week 1	**Unit-I** 1.1 Concept of Crop Productivity	Plant Physiology. Sinauer Pub. U.S.A.
	Unit-I 1.1.2 Definition of Crop Production and Factors Affecting It (biotic/abiotic)	
	Practical • Studying the normal growth of plants • production of crops	
Week 2	**Unit-II** 1.2 Environment of Crops and Environmental Optimal	Crop Science Progress and Prospects. CABI Pub., Oxon, UK.
	Unit-II 1.2.1 Concept of Environmental factors on crop production 1.2.2 Optimum Environment	
	Practical	

	• Studying the importance of optimum environment on crop production via experiments	
Week 3	**Unit-III** 1.3 Concept of stress under field conditions	A. Hand Book of Stress Physiology, Marker and Deekar
	Unit-III 1.3.1 Definition of stress and its types and its impact on crop production in field conditions	
	Practical • Noting the symptoms of different stresses on crops in fields	Internet source
Week 4	**Unit-IV** 1.4. Types of stress	A. Hand Book of Stress Physiology, Marker and Deekar
	Unit-IV 1.4.1 Biotic Stress (pathogen attack) 1.4.2 Abiotic Stress (environmental causes)	
	Practical • Visit the fields to observe symptoms of stresses	Internet source
Week 5	**Unit-V** 1.5 Heat Stress	A. Hand Book of Stress Physiology, Marker and Deekar.
	Unit-V 1.5.1 Definition of Heat stress and its impact on Crop Physiology	
	Practical • Noting symptoms of heat stress on crops	
Week 6	**Unit-VI** 1.6 Physiological changes in plants due to heat stress	A. Hand Book of Stress Physiology, Marker and Deekar. 1. Internet Source
	Unit-VI 1.6.1 Plant's response towards heat stress 1.6.2 Anatomical changes in plants in response to heat stress	
	Practical	Internet source

	• Noting changes/symptoms of heat stress on crops	
Week 7	**Unit-VII** 1.7 Heat stress mitigation practices in the field	Agriculture in Drylands: Principles and Practices. Elsevier, Amsterdam.
	Unit-VII 1.7.1 Studying different methods to mitigate heat stress in the field	
	Practical • Noting changes/symptoms of heat stress on crops	
Week 8	**Unit-VIII** 1.8 Heat stress management strategies in the field	Agriculture in Drylands: Principles and Practices. Elsevier, Amsterdam.
	Unit-VIII 1.8.1 Studying the practices to manage the effects of heat stress on crops	
	Practical • Noting changes/symptoms of heat stress on crops	
Week 9	**Unit-IX** 1.9 Water stress on field crops	Agriculture in Drylands: Principles and Practices. Elsevier, Amsterdam.
	Unit-IX 1.9.1 Concept of water stress on crops 1.9.2 Drought/waterlogging	
	Practical • Measuring soil moisture in the Lab	Internet source
Week 10	**Unit-X** 1.10 Physiological changes in plants due to waterlogging	A. Hand Book of Stress Physiology, Marker and Deekar
	Unit-X 1.10.1 Impact of water logging on crop production and changes in plants due to waterlogging	
	Practical • Noting the effects of waterlogging on plants in field	
Week 11	**Unit-XI** 1.11 Crop production under waterlogged conditions	A. Hand Book of Stress Physiology, Marker and Deekar
	Unit-XI	

	1.11.1 Management practices of waterlogging on field and reclamation of waterlogged fields	
	Practical • Noting the effects of waterlogging on plants	Internet source
Week 12	**Unit-XII** 1.12 Physiological changes in plants due to drought stress	Agriculture in Drylands: Principles and Practices. Elsevier, Amsterdam.
	Unit-XII 1.12.1 Concept of drought stress its impact on plant growth and plant responses towards drought stress	
	Practical • Potential soil moisture deficit and its calculation	Internet Source
Week 13	**Unit-XIII** 1.13 Crop production in drought conditions	• Agriculture in Drylands: Principles and Practices. Elsevier, Amsterdam.
	Unit-XIII 1.13.1 Management practices for drought stress and strategies to avoid drought	
	Practical • Potential soil moisture deficit and its calculation	Internet source
Week 14	**Unit-XIV** 1.14 Physiological changes in plants due to salinity	Crop Management with focus on soil and water by Khan, S. R. A.
	Unit-XIV 1.14.1 Definition and concept of salt stress on crops response of plants towards salt stress	
	Practical • Noting the effects of salinity on plants in the field	Internet source
Week 15	**Unit-XV** 1.15 Crop production in salt affected areas	Crop Management with a focus on soil and water by Khan, S. R. A.

	Unit-XV 1.15.1 Management practices and reclamation of saline soils	
	Practical Measurement of EC in Lab	Internet source
Week 16	**Unit-XVI** 1.16 Course review 1.16.1 Review of whole course through class discussion	Group Discussion
	Unit-XVI 1.16.2 Review of whole course through class discussion	
	Practical Revision of Lab work	

Textbooks and Reading Material

1. Textbooks.
In the detail course outline, one may mention chapters of the textbook with the content topics

2. Suggested Readings

- Arnon, I. 1992 Agriculture in Drylands: Principles and Practices. Elsevier, Amsterdam.
- Nosberger, J.H. H. Geiger and P.C. Struik. 2001. Crop Science Progress and Prospects. CABI Pub., Oxon, UK.
- Pessaraskli, M. A. 2000. A. Hand Book of Stress Physiology, Marker and Deekar.
- Taize, L., E. Zeiger. 2006. Plant Physiology. Sinauer Pub. U.S.A.

Note:

1. It is preferable to use the latest available editions of books. Mention the publisher & year of publication.

2. The References/ bibliography may be by the typing manual of the concerned faculty/subject. Preferably follow the APA 7th Edition publication manual.

Teaching Learning Strategies

1. Lectures
2. Reports
3. Class discussion

Assignments: Types and Number with Calendar

1. Environment stress on crops
2. Global warming and food crisis due to Stress
3. Impact of Climate Warming and management of crop
4. Agriculture contribution to stress agronomy

Assessment			
Sr. No.	**Elements**	**Weightage**	**Details**
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Continuous assessment includes: Classroom participation, assignments, presentations, viva voce, attitude and behavior, hands-on-activities, short tests, projects, practical, reflections, readings, quizzes etc.
3.	Final Assessment	40%	Written Examination at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.