Course Specification
(Bachelor)

Course Title:	*Plant Stress Physiology*
Course Code:	*BIO1415*
Program:	*Bachelor of Science in Biology*
Department:	*Department of Biology*
College:	*Faculty of Science*
Institution:	*University of Tabuk*
Version:	***Course Specification Version Number***
Last Revision Date:	*September 2023*

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours:					
3 Credit (2 theoretical + 1 practical) hours.					
2. Course type					
A.	☐University	☐ College	☒ Department	☐Track	☐Others
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered: (8th Level / 4th year)					
4. Course general Description:					
Types of environmental stresses. Effect of stress with emphasis on drought, high temperature, high light intensity and salt on growth, development and metabolism. Mechanisms of physiological and biochemical adaptation to stresses. Improvement of crop growth and production under stresses. Physiology of desert plants and halophytes.					
5. Pre-requirements for this course (if any)**:**					
Plant Physiology (BIO1310).					
6. Co-requirements for this course (if any)**:**					
None					
7. Course Main Objective(s):					
By the end of this course the students are expected to be able to: - To acquire the advanced knowledge about environmental stresses. - To understand the effect of stress with emphasis on drought, high temperature, high light intensity and salt on growth, development and metabolism. - To know the mechanisms of physiological and biochemical adaptation to stresses. - To understand the physiology of desert plants and halophytes. - To acquire the knowledge about the improvement of crop growth and production under stresses.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	2	50%
2	E-learning		

No	Mode of Instruction	Contact Hours	Percentage
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		
5	**Others (Lab work)**	2	50%

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		**60**

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Define the concepts and terminology of Environmental stress in plants and distinguish various environmental factors causing stress.	K1	-Lectures. -Class discussion. -Group discussion. -Case studies.	-Quizzes -Midterm examination. -Final examination. -Class discussion and participation. -Homework (Problem-solving).
1.2	Describe the Phenomena in the	K2	-Lectures. -Class discussion.	-Quizzes

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	Responses of Plants to Environmental Stress.		-Group discussion. -Homework assignments. -Case studies.	-Midterm examination. -Final examination. -Class discussion and participation. -Homework assignments.
2.0	**Skills**			
2.1	Carry out surveys and experiments to measure and evaluate various types of stress in plants.	S1	-Lab work. -Class discussion. -Group discussion. -Brainstorming.	-Quizzes -reports -Final examination. -Class discussion and participation. -Homework (Problem-solving).
2.2	Apply modern data analysis technologies and report writing skills to evaluate plant stress.	S2	-Lab work. -Class discussion. -Group discussion. -Brainstorming.	-Quizzes -reports -Final examination. -Class discussion and participation. -Homework (Problem-solving).
3.0	**Values, autonomy, and responsibility**			
3.1	Work independently and as a team leader in solving Environmental stress problems.	V1	-Self-learning. -Lab work -Class discussion. -Group discussion. -Individual or group presentation,	-Class discussion and participation. -Homework (Problem-solving).

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction: course outlines and definitions.	2
2.	Stress at plants at subcellular, cellular, organ, holistic.	2
3.	Stress factors, classification of biotic, abiotic factors, methods of measurement.	2
4.	signal transduction, molecular biological foundations of anti-stress reaction.	2
5	Stress proteins, antioxidants - anti-stress response mechanisms.	2
6.	Stress lack / excess of available water (mechanisms to avoid stress).	2
7.	Stress of substrate salinity, osmotic stress.	2
8.	Stress caused by toxic and foreign substances.	2
9.	Stress caused by cold, frost.	2
10.	Thermal stress (heat effects of physical, chemical) (Part1).	2
11.	Thermal stress (heat effects of physical, chemical) (Part2).	2
12.	Radiation stress (regularly, classification, mechanisms of formation) (Part1).	2
13.	Radiation stress (regularly, classification, mechanisms of formation) (Part2).	2
14.	Acclimation / adaptation to stress in extreme environments (deep oceanic waters, submarine volcanic eruptions, oceanic coastal areas, an extremely toxic habitats, alpine and polar regions, and desert biomes) (Part1).	2
15.	Acclimation / adaptation to stress in extreme environments (deep oceanic waters, submarine volcanic eruptions, oceanic coastal areas, an extremely toxic habitats, alpine and polar regions, and desert biomes) (Part2).	2
Total		30

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Class Participation	During whole teaching period	5
2.	Homework (Problem-solving)	3 to 13	5
3.	Short Exams (Quizzes)	During	5

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
		whole teaching period	
4.	Midterm Theoretical Examination	8-9	20
4.	Reports (For Practical)	During whole teaching period	10
5.	Final Practical Examination	15	15
6.	Final Theoretical Examination	17	40

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	- Plant Stress Physiology. (2017). Ed. Sergey Shabala 2nd edition, Shabala CABI. 376 Pages /ISBN-13: 978-1780647296 ISBN-10: 1780647298. - Recent Advances in Plant Stress Physiology (2016). Ed.: Praduman yadav, sunil Kumar and Veena Jain. Publisher: Daya Publishing House, India. ISBN 978-93-5130-948-2 (International Edition).
Supportive References	- The Physiology of Plants Under Stress: Soil and Biotic Factors. (2000). Ed. Orcutt, D.M and Nilsen, E.T. Wiley. ISBN: 0471170089. - The Physiology of Plants Under Stress, Abiotic Factors (Physiology of Plants Under Stress 1996 (Vol. 1). Ed. Nilsen, E.T. And Orcutt, D.M. Wiley. ISBN: 0471031526.
Electronic Materials	Websites on the internet that are relevant to the topics of the course: - Alastair H. Fitter, Robert K.M. Hay. Environmental Physiology of Plants. Vol 3rd. Academic Press; 2012. Accessed March 12, 2022. https://search-ebscohost-com.sdl.idm.oclc.org/login.aspx?direct=true&db=edsebk&AN=203121&site=eds-live.
Other Learning Materials	Multi-media associated with the textbook and the relevant websites

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Well-equipped classrooms and laboratories that accommodate a sufficient number of students
Technology equipment (projector, smart board, software)	Multimedia projectors and smart boards.
Other equipment (depending on the nature of the specialty)	- Lecture slides. - Reference Book - Well-equipped biology laboratory

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	- Students. - Faculty members.	Indirect & direct: - Questionnaires. - Meetings.
Effectiveness of Students assessment	- Quality and development committee. - Department chair.	- Course report. - Program annual report.
Quality of learning resources	- Plan and program committee. - Students. - Staff members.	Indirect & direct: - Questionnaires. - Meetings. - Reports.
The extent to which CLOs have been achieved	- Quality and development committee. - Peer Reviewer. - Program leaders.	Indirect & direct: - Questionnaires. - Meetings. - Reports.
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	PROGRAMS AND STUDY PLANS COMMITTEE
REFERENCE NO.	
DATE	SEPTEMBER 2023