

Program	B.Sc. (Hons) Agriculture (Major: Soil Science)	Course Code	SS-401	Credit Hours	3(3-0)
Course Title	SOIL-WATER-PLANT RELATIONSHIP				
Course Introduction					
This course delves into the mechanisms of water and nutrient movement in soils and plants and their relationships with plant growth. It equips students with an understanding of water and nutrient dynamics in soil and plants and the adaptation strategies of plants to adverse soil water conditions					
Learning Outcomes					
Upon completion of the course, students will:					
<ol style="list-style-type: none"> 1. Understand the functions and properties of water. 2. Comprehend the components of soil and plant water potentials. 3. Analyze soil-plant-water relationships. 4. Explain the movement of water and ions in soil and plants. 5. Understand water absorption and root stem pressure mechanisms. 6. Describe water and mineral nutrient uptake. 7. Relate photosynthesis and transpiration processes to water dynamics. 8. Understand the soil-plant-atmosphere continuum. 9. Identify plant adaptation strategies to adverse soil-water conditions. 					
Course Content (Theory)					
Week	Unit	Topics	Assignments/Readings		
1	Unit 1	Functions and properties of water	Review on water properties from recommended textbooks.		
2		Importance of water in plant growth and development	Assignment on water functions in plants.		
3	Unit 2	Components of soil and plant water potentials	Practical problems on water potential calculations.		

4		Measurement techniques for water potentials	
5	Unit 3	Soil-plant-water relations	Case studies on soil and plant water interactions.
6		Factors affecting soil-plant-water relations	
7	Unit 4	Movement of water in soil	Exercises on water flow in soil.
8		Movement of ions in soil	Practical assignment on ion movement.
9	Unit 5	Water absorption mechanisms	Review on root water uptake.
10		Root stem pressure and its significance	
11	Unit 6	Water and mineral nutrient uptake	Practical problems on nutrient uptake mechanisms.
12		Factors affecting nutrient uptake	
13	Unit 7	Photosynthesis and transpiration	Review of photosynthesis and transpiration processes.
14		Relationship between water and gas exchange in plants	
15	Unit 8	Soil-plant-atmosphere continuum	Case studies on SPAC.
16		Plant adaptation strategies to adverse soil-water conditions	Final review and summary report on plant adaptations.

Textbooks and Reading Material			
10.	Hillel, D. 2008. <i>Soil in the Environment: Crucible of Terrestrial Life</i> . Elsevier Inc., Burlington, MA, USA.		
11.	Jury, W.A. and R. Horton. 2004. <i>Soil Physics</i> . 6th Ed. John Wiley & Sons, Inc., Hoboken, NJ, USA.		
12.	Kirkham, M.B. 2005. <i>Principles of Soil and Plant Water Relations</i> . 1st Ed. Elsevier Academic Press, San Diego, CA, USA.		
13.	Kramer, P.J. and J.S. Boyer. 1995. <i>Water Relations of Plants and Soils</i> . Academic Press, San Diego, CA, USA.		
14.	Rending, V.V. and H.M. Taylor. 1989. <i>Principles of Soil-Plant Interrelationships</i> . McGraw-Hill Publishing Co., NY. USA.		
Teaching Learning Strategies			
	<ul style="list-style-type: none"> • Multimedia • White Board • Group discussion • Quiz/Assignments • Demonstration/Activity 		
Assignments: Types and Number with Calendar			
15.	Review on water properties and functions in plants.		
16.	Practical problems on water potential calculations.		
17.	Case studies on soil-plant-water interactions.		
18.	Exercises on water and ion movement in soil.		
19.	Practical assignment on nutrient uptake mechanisms.		
20.	Review of photosynthesis and transpiration processes.		
21.	Case studies on soil-plant-atmosphere continuum.		
22.	Final summary report on plant adaptation strategies.		
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, quizzes, etc.
3	Final Assessment	40%	Written Examination at the end of the semester. It is mostly in the form of a test, but may include term papers, research proposals, and reports.

