

# SULTAN QABOOS UNIVERSITY

### **COURSE OUTLINE**

## **PROGRAM:** Soil Sciences and Water Technology

1.	Course Code	SWAE4401			
2.	Course Title	Water & Nutrient Cycling in Soil-Plant Environment			
3.	Credits	3 CR, 12 CP, 6 ECTS			
4.	Pre-requisite Course(s)	SWAE 2201			
5.	Co-requisite Course(s)	none			
6.	Equivalent Course(s)				
7.	Incompatible Course(s)				
8.	Course Category	University Requirement	University Elective		
		College Requirement	College Elective		
		Department Requirement	Department Elective		
		Specialization Requirement	Specialization Elective		
		Other (specify):			
9.	Course Owner	College: CAMS	Department: SWAE		
10.	Course Type	Lecture	⊠ Lecture/Lab		
		Lecture/Seminar	Lecture/Studio		
		Lecture/Tutorial	Lecture/Lab/Tutorial or Seminar		
			Laboratory (Practical)		
		Field or Work Placement	Studio		
		Seminar Seminar	Internship		
		Workshop	Project		
11.	Language of Instruction	English			
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#### 12. Course Description

This course will provide students with the understanding of the unique properties of water that make it essential for life in addition to being a solvent that moves through the soil pores where the essential pool of soil mineral nutrients are dissolved and absorbed by the root system through which the nutrients are then transferred and absorbed by the above plant parts. This absorption takes place at subcellular, cellular, tissue and organ levels to meet their nutrient and water requirements for the plant growth and its productivity. In addition, the excess water escapes through the microscopic stomata of the leaves and out into the atmosphere which exerts a deep gradient for water to move out of the stomata plant thus creating a continuous strong pull of water movement through the magnificent Soil-Water-Plant- Atmosphere continuum. The fundamental principles of soil fertility and fertilizer use will be detailed for each plant macronutrient. Practical implications of soil fertility principles to conventional and organic farming will be discussed as well as to hydroponic systems.

#### 13. Teaching/Learning Strategies

#### a) Discussions during lectures

Students will be encouraged to participate in the discussion during lectures.

b) Tests

There will be two exams each of one hour duration. The two exams will count for 40% of the course mark. Students who fail to take any of these tests without a valid reason will receive a mark of zero. Student with a valid reason for not taking any of these exams will be allowed to take a makeup exam or other arrangements are possible. c) Practical in lab

Hands on training for basic soil water and soil fertility concepts will be provided by practical work in lab each week.

14. Assessment Components and Weight [%]						
Quizzes	Practical 20	Other (specify):				

Homework assignments	Project					
$\square$ In-term examination(s) 40	$\square$ Final examination 40					
15. Grading Method						
A-F Scale Pass/Not pas	sed					
16. Textbook(s) and Supplemental Mat	erial					
The Nature and Properties of Soils. 2007. 14th . Edition. Nyle Brady and Ray Weil. Copyright © Pearson Education, Inc., Upper Saddle River, New Jersey USA.						
Principles of Soil and Plant Water Relations. 2005. M.B. Kirkham. Elsevier Academic Press						
Soil Fertility and Fertilizers. 1985. Tisdale, S.M., W.L. Nelson and J.D. Beaton.						
Macmillan Publishing Co.						
Lecture notes in the form of ppt. slides will be send by email or available on Moodle at least one day before the class						

17. N	17. Matching Course Objectives with Program Outcomes and SQU Graduate Attributes						
S	SQU Graduate Attributes						
<ul> <li>A. SQU graduates should be able to:</li> <li>1. apply the knowledge and skills relevant to the specialization</li> <li>2. communicate effectively and use information and communication technologies</li> <li>3. critically analyze complex information and present it in simple clear manner</li> </ul>		<ul> <li><b>B.</b></li> <li>1.</li> <li>2.</li> <li>3.</li> <li>4.</li> </ul>	<b>SQU graduates possess</b> interpersonal communication skills and alignment with culture of international labour market to assist them in practical life and in living successfully skills and motivation for independent learning and engagement in lifelong learning and research work ethics and positive values, and intellectual independence and autonomy teamwork skills and display potential leadership qualities		C. SQU graduates should relish good citizenship qualities, be conscious of their national identity and be socially responsible, engage in community affairs and be mindful of contemporary issues.		
#	# Intended Student Learning Out /Course Learning Objective		come	Relevant Program Outcome(s)		Applicable Attribute(s)	
1.	Understand the Unique water continuity in the Soil- Water-Plant- Atmosphere-Continuum			Demonstrate proficiency in the application of Soil- Water- Plant- Atmosphere- continuum concepts in real world problems			
2.	To explain the importance of water by describing the plant, soil and climatic factors that control the plant water balance showing how they affect the physiological status of the plant. Show how these factors affect the physiological processes that determine the quantity and quality of			Demonstrate proficiency in science in solving soil management problems	application of and water		
3.	To present the fundamental principles of soil fertility and fertilizer use with emphasis placed on describing each nutrient, its occurrence, forms, and behavior in soils. As well as to clarify the difference between conventional and organic farming as it relates to the soil mineral nutrients and cron productivity		Demonstrate proficiency in the application of soil fertility principles in agricultural management, namely in the application and management of fertilizers at different types of crop systems.				
4.	Conducting the basic laboratory methods and techniques relating to soil sampling, preparation and analyses.		Perform the experiments using relevant equipment and following safe procedure to collect data Analyze and interpret data in terms of identifying trends, comparing with predictive equations and drawing conclusions				
5.	Gaining the basic skills of scientific writing of lab reports.		Present a technical report with demonstrated good command of English				

		and language of the discipline	
6	The ability to work in teams and explain	Contribute to the team in a meaningful	
0.	experimental data relevant to soil and water.	manner to achieve the team's	
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#### **16. Student Responsibilities**

It is the student's responsibility to know and comply with all University Academic Regulations relevant to participation in this course. These regulations specifically include attendance requirement and students' academic code of conduct.

For attendance, it is the student's responsibility to be punctual and to attend all classes.

Students are expected to perform their work with honesty and avoid any academic misconduct, which is defined as the use of any dishonest or deceitful means to gain some academic advantage or benefit. This can take many forms, including but not limited to, the following: copying, plagiarism, collusion and forging documents. For full details, please refer to the Undergraduate Academic Regulations and to the Student Academic Misconduct Policy.

Additionally, this course requires that you:

COURSE INFORMATION						
Course Code		SWAE4401	Course Title	Water & Nutrient Cycling in S Environment	Soil-Plant	
Semest	er/ Year		Section(s)			
Day, Ti	ime, and Pla	ce				
Course	Coordinato	r				
Office ]	Location		Office Hours			
Office '	Tel. Ext.		Email			
			Tentative Schedu	lle		
Week	Lecture #	Тој	pic/Material to be co	overed	Assessment	
1		Introduction				
2		Functions and Properties of	f Water;			
3		Soil Water behaviour, measurement and Control;				
4	4 Cell Water Relations and Basic Soil-Plant Relationships					
5		Root growth and functions				
6		EXAM I (Sunday Class, 15 <sup>th</sup> October 2017)			20%	
7		Elements Required in P Materials,	Elements Required in Plant Nutrition and Mineral Contents of Plant Materials,			
8		Nutrient Cycling and Main	taining Soil Fertility;			
9		Chemistry and soil cycling	of plant macronutrie	nts: Nitrogen		
10		Chemistry and soil cycling	of plant macronutrie	nts: Phosphorus		
11		Chemistry and soil cyclin calcium and magnesium	Chemistry and soil cycling of plant macronutrients: Potassium, sulphur, calcium and magnesium			
12		EXAM II (Sunday Class, 26st November 2017)			20%	
13		Soil Fertility Evaluation an	oil Fertility Evaluation and Economics of Plant Nutrient Use			
14	4 Use of Hydroponics for Growing Plants					
15		Conventional and organic farming				
16		FINAL EXAM (Tuesday, 26st December 2017, 8:00-11:00)			40%	
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APPENDIX A: INSTRUCTORS OF MULTIPLE SECTIONS							
Section	Instructor	Day, Time, and Place	Office Location and Extension	Email	Office Hours		

# **APPENDIX B: ADDITIONAL INFORMATION**