



## AYDIN ADNAN MENDERES UNIVERSITY COURSE INFORMATION FORM

Course Title		Plant Nutrition and Water Use Efficiency Interactions							
Course Code		ZTO620		Course Level		Third Cycle (Doctorate Degree)			
ECTS Credit	7	Workload	173 ( <i>Hours</i> )	Theory	2	Practice	0	Laboratory	0
Objectives of the Course		The course coverages of the physiology of water use efficiency at whole plant level especially in terms of plant nutrition.After description of main concepts about the subject, interactions between water use efficiency and plant, plant nutrients, water, soil as an environment, yield will be examined in the course.							
Course Content		What is water use efficiency? Moisture stress and plant response. Soil environment and root development. Soil water movement and root absorption. Energy conversion and water use efficiency in plants. Importance of plant nutrition on water use efficiency. Nutrient transfer and plant absorptions mechanisms. Crop yields in relation to water supply and soil fertility. Increasing water use efficiency by crop management. Increasing water use efficiency by soil management. Physiological approaches to enhance water use efficiency. Agronomic approaches to increasing water use efficiency.							
Work Placement									
Planned Learning Activities and Teaching Methods				Explanation (Presentation), Experiment, Demonstration, Discussion, Case Study, Project Based Study, Individual Study, Problem Solving					
Name of Lecturer(s)									

### Assessment Methods and Criteria

Method	Quantity	Percentage (%)
Midterm Examination	1	40
Final Examination	1	60

### Recommended or Required Reading

1	Water Use Efficiency in Plant Biology. Mark Bacon (ED.) John Wiley & Sons (2004) ISBN. 978-1-4051-1434-9.
2	Plant Environment and Efficient Water Use. W. H. Pierre, D. Kirkham, J. Pesek, R. Shaw (Eds.). American Soc. Of Agronomy, Soil Sci. Soc. Of America. 4th Printing. (1981).
3	Plant Physiology. L. Taiz & Zeiger. Sinauer Assoc. Inc. US. (2010).
4	Principles of Plant Nutrition. 5th Edition. K. Mengel & E. A. Kirkby. ISBN-13:978-2000089.(2001).

Week	Weekly Detailed Course Contents	
1	Theoretical	What is water use efficiency?
	Preparation Work	Power point presentation
2	Theoretical	Moisture stress and plant response.
	Preparation Work	Power point presentation
3	Theoretical	Soil environment and root development.
	Preparation Work	Power point presentation.
4	Theoretical	Soil water movement and root absorption.
	Preparation Work	Power point presentation.
5	Theoretical	Energy conversion and water use efficiency in plants
	Preparation Work	Laboratory work
6	Intermediate Exam	Mid-Term exam
7	Theoretical	Importance of plant nutrition on water use efficiency
	Preparation Work	Laboratory work
8	Theoretical	Nutrient transfer and plant absorptions mechanisms
	Preparation Work	Laboratory work
9	Theoretical	Crop yields in relation to water supply and soil fertility
	Preparation Work	Laboratory work
10	Theoretical	Increasing water use efficiency by crop management
	Preparation Work	Laboratory work
11	Theoretical	Increasing water use efficiency by soil management.
	Preparation Work	Experimental Study at greenhouse
12	Theoretical	Physiological approaches to enhance water use efficiency



12	Preparation Work	Power point presentation
13	Theoretical	Agronomic approaches to increasing water use efficiency
	Preparation Work	Experimental Study at greenhouse
14	Final Exam	Final exam

**Workload Calculation**

Activity	Quantity	Preparation	Duration	Total Workload
Lecture - Theory	14	0	2	28
Assignment	1	0	23	23
Seminar	2	0	20	40
Reading	6	0	2	12
Midterm Examination	1	0	30	30
Final Examination	1	0	40	40
Total Workload (Hours)				173
[Total Workload (Hours) / 25*] = ECTS				7
*25 hour workload is accepted as 1 ECTS				

**Learning Outcomes**

1	To recognize nutrition in plants
2	To recognize water use efficiency in plants
3	To recognize nutrition and water use efficiency interactions in plants
4	To understand the importance of plant nutrition in water use activity
5	To develop agricultural approaches to effective water use

**Programme Outcomes (Soil Doctorate)**

1	To be able to apply the theoretical information achieved during the graduate study
2	To be able to collect data by scientific means, to evaluate and interpret
3	To be able to update himself continuously
4	To be able to assess the convenient analytical methods during the process of the scientific study
5	To be able to put forth solutions to soil use and plant development

**Contribution of Learning Outcomes to Programme Outcomes** 1:Very Low, 2:Low, 3:Medium, 4:High, 5:Very High

	L1	L2	L3	L4	L5
P1	3	4	4	4	4
P2	4	4	4	2	2
P3	3	3	4	2	2
P4	4	4	4	2	2
P5	4	4	4	2	2

