SULTAN QABOOS UNIVERSITY

COURSE OUTLINE

PROGRAM: Agricultural Engieering

1. Course Code	SWAE3402	
2. Course Title	Irrigation Principles	
3. Credits	3CR, 12 CP, 6 ECTS	
4. Pre-requisite Course(s)	SWAE2001, SWAE2201	
5. Co-requisite Course(s)		
6. Equivalent Course(s)	WATR3402(2-way)	
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
	☐ Tutorial	☐ Laboratory (Practical)
	☐ Field or Work Placement	☐ Studio
	☐ Seminar	☐ Internship
	☐ Workshop	☐ Project
11. Language of Instruction	English	

12. Course Description

This intermediate course deals with water as a valuable resource in arid environments and as an essential factor in food productivity and security. The physical properties and processes involved in irrigation are studied to determine the crop water requirements, and the models used in irrigation scheduling are overviewed. Irrigation water quality and management of salt-affected soils are studied. Methods of water application and irrigation systems are described as a prerequisite for the design course.

13. Teaching/Learning Strategies

a. Lectures
b. Teamwork problem-solving
c. Experiments
d. Field visits
e. Homework assignments (classroom evaluation, not graded)
f. Reading assignments

14. Assessment Components and Weight [%]

☒ Quizzes 15	☒ Practical 15	☐ Other (specify):
☐ Homework assignments	☐ Project	
☒ In-term examination(s) 30	☒ Final examination 40	

15. Grading Method

☒ A-F Scale ☐ Pass/Not passed

16. Textbook(s) and Supplemental Material

- Irrigation Principles and Practices

Hansen, V. E., O. W. Israelsen and G. E. Stringham

- Lecture Notes

17. Matching Course Objectives with Program Outcomes and SQU Graduate Attributes

SQU Graduate Attributes

A. SQU graduates should be able to:	**B. SQU graduates possess**	**C. SQU graduates should**
1. apply the knowledge and skills relevant to the specialization 2. communicate effectively and use information and communication technologies 3. critically analyze complex information and present it in simple clear manner	1. interpersonal communication skills and alignment with culture of international labour market to assist them in practical life and in living successfully 2. skills and motivation for independent learning and engagement in lifelong learning and research 3. work ethics and positive values, and intellectual independence and autonomy 4. teamwork skills and display potential leadership qualities	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 Outcome /Course Learning Objective	Relevant Program Outcome(s)	Applicable Attribute(s)
1.	An ability to apply knowledge of Mathematics, Science & Engineering	2. Demonstrate proficiency in application of science in solving engineering problem	A2
2.	An ability to design experiments as well as to analyze & interpret data	1. Ability to design experiments by choosing appropriate testing parameters and standard procedures 3. Process the collected data using needed formulae, check the data viability, and present the results in the form of tables or figures 4. Analyse and interpret data in terms of identifying trends, comparing with predictive equations and drawing conclusions	B1, B3, B4
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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	SWAE3402	**Course Title**	Irrigation Principles
Semester/ Year	Spring 2018	**Section(s)**	10
Day, Time, and Place	MON & WED 12:00-13:40 am, classroom B13		

Course Coordinator	Dr. Abdulrahim Al-Ismaili		
Office Location	CAMS 246	**Office Hours**	MON & WED, 11:00-12:00 TUE & THU, 12:00-13:00
Office Tel. Ext.	1226	**Email**	abdrahim@squ.edu.om

Tentative Schedule

Week	Lecture #	Topic/Material to be covered	Assessment
1	1. Introduction	Arid Environments: Aridity, Aridity Index, Aridity Zones Irrigation: Definition, Water Sources	Class-evaluated Assignments
2	1. Introduction	Hydrologic Cycle: Terminology, Theory, Evaporation, Condensation, Clouds, Precipitation Water Resources of Oman Assigned Reading#01	Class-evaluated Assignments
3	2. Basic Soil-Water Relationships	Soil Physical Properties: Soil composition, Texture, Structure, Density, Porosity, temperature, color, Soil moisture content (MC) Soil Water	Quiz#01
4	2. Basic Soil-Water Relationships	Expression of Soil MC Measurement of Soil MC Lab Exercise#01	Class-evaluated Assignments
5	3. Crop Water Requirement	Introduction: Evaporation, Transpiration Evapotranspiration	Lab Report#01
6	3. Crop Water Requirement	Pan evaporation method FAO Modified P-M equation FAO Paper#56	Quiz#02
7	3. Crop Water Requirement	FAO Modified P-M equation Tutorial	Class-evaluated Assignments
8	4. Irrigation Efficiencies	Introduction Conveyance Efficiency Application Efficiency	Midterm Exam
9	4. Irrigation Efficiencies	Storage Efficiency Distribution Efficiency Tutorial	
10	5. Irrigation Scheduling	When & How much Lab Exercise#02	
11	5.	Tutorial	Quiz#03

	Irrigation Scheduling	Lab Exercise#03	Lab Report#02
12	6. Irrigation Water Quality & Salt Affected Soils	Introduction Irrigation Water Quality Tutorial Lab Exercise#04 & 5	Lab Report#03
13	6. Irrigation Water Quality & Salt Affected Soils	Salt-Affected Soils Sources of Soluble Salts Effect on Plant Growth Tutrial	Lab Report#04 & 5
14	6. Irrigation Water Quality & Salt Affected Soils	Reclamation of Saline Soils Reclamation of Sodic Soils Tutorial	Quiz#04
15	7. Irrigation Systems	Irrigation Methods Gravity-fed Irrigation Methods: Furrow Irrigation, Siphon Irrigation, Border Irrigation, Flood Irrigation, Dethridge Wheels, Laser Leveling Pressurized Irrigation Methods: Drip Irrigation, Bubbler Irrigation, Sprinkler Systems Combined Irrigation	
16	Final Exams		
17	Final Exams	Final Exam	Final Exam

APPENDIX A: INSTRUCTORS OF MULTIPLE SECTIONS					
Section	**Instructor**	**Day, Time, and Place**	**Office Location and Extension**	**Email**	**Office Hours**

APPENDIX B: ADDITIONAL INFORMATION

Performance Indicators for the ABET A tdesign and conduct experimentso K Outcome for the Agricultural Engineering Program

A An ability to apply knowledge of Mathematics, Science & Engineering
1. Demonstrate proficiency in application of mathematics to solve engineering problems
2. Demonstrate proficiency in application of science in solving engineering problem
3. Demonstrate proficiency in application of engineering principles in real world problems

B. An ability to design experiments as well as to analyze & interpret data
1. Ability to design experiments by choosing appropriate testing parameters and standard procedures
2. Perform the experiments using relevant equipment and following safe procedure to collect data
3. Process the collected data using needed formulae , check the data viability, and present the results in the form of tables or figures
4. Analyse and interpret data in terms of identifying trends, comparing with predictive equations and drawing conclusions

C. An ability to design a system, component or process to meet desired needs within realistic constraints
1. Formulate requirements to design a system, and components of a system for desired needs in agricultural engineering sector
2. Identify realistic constraints that needs to be considered while making the design of systems
3. Construct a prototype and evaluate the performance
4. Improve the prototype based on performance evaluation results

D. An ability to function in multi-disciplinary teams
1. Ability to form a team based on the goal in real world agricultural engineering design projects
2. Explain the role in the team in a well-defined context and bring a particular experience in solving the problem
3. Contribute to the team in a meaningful manner to achieve the team's goals

E. Ability to identify, formulate & solve engineering problems
1. Identify an engineering problem and break it down into manageable parts
2. Formulate the agricultural engineering problems related to the specified areas and identify the key variables
3. Analyze alternate solutions for a problem and justify the selected solution

F. An understanding of professional and ethical responsibility
1. Understanding of the professional responsibility; become aware of professional responsibilities and commitments as an engineer
2. Understanding of the ethical responsibility; identify and respond with respect to ethical aspects and cultures

G. An ability to communicate effectively
1. Identify the resources required for the presentation and organize the material
2. Provide sufficient statistical data to support claims and convince audience
3. Present a technical report with demonstrated good command of English
4. Deliver an effective oral presentation

H. The broad education necessary to understand the impact of engineering solutions in a global context
1. Identify the problems in global context of agricultural systems and engineering
2. Explain the impact of engineering decisions in global context of agricultural systems and engineering, and provide solutions

I. Recognition of the need for, and an ability to engage in life-long learning

1. Demonstrate the awareness of the continuing process of education after graduation
2. Demonstrate ability to learn independently from various sources

J. Knowledge of contemporary issues
1 Identify contemporary issues related to social, economic and environmental, and explain potential solutions

K. An ability to use the techniques, skills & modern engineering tools necessary for engineering practice
1. Use design and drawing in solving various engineering problems
2. Use modeling and simulation tools in solving real worldproblems
3. Use standards, codes and regulations in solving problems related to engineering practices
4. Demonstrate proficiency to integrate tools and techniques in solving problems and communicating solutions