

# **BE456/556 Biosystems Analysis and Design**

**Shantz 440, MWF, 11 – 11:50 Spring 2021**

## **Description of Course**

Application of systems analysis to biologically-related problems; computer modeling and use of simulations, optimization methods, decision support systems.

## **Course Prerequisites or Co-requisites**

Adv. Stdg: Engineering and BE205

## **Instructor and Contact Information**

Peter Waller, Shantz 536, 520-440-5803, pwaller@email.arizona.edu

Monday 1-2 "Open Door Policy"

Course is conducted in D2L. All videos, pdfs, homeworks, and exams are in D2L.

## **Course Format and Teaching Methods**

Online lectures and notes will be available prior to class. Students will be expected to watch lectures or read notes, answer quiz questions, and write computer programs prior to class. The quiz is due the night before each class period, and students are expected to make a good faith effort on this first attempt. Class periods will be oriented toward discussing the questions and completing the required computer programs in the quiz, and then students can resubmit the quiz with correct answers and programs on the day of the next class. You can take the quiz three times, and count the highest score. Students self-grade their quiz, and then review the submitted work with the instructor during Zoom meetings.

## **Course Objectives and Expected Learning Outcomes**

### **Course objectives**

This course is designed to give upper division students in ABE and other engineering disciplines the ability to analyze and design water and chemical application systems in agriculture and environmental systems.

### **Learning objectives**

1. Students design irrigation systems based on economics and environmental protection.
2. Students understand fundamentals of surface, sprinkler, drip, and bubbler irrigation design.
3. Students understand fundamentals of chemical injection systems and water quality parameters.

## **Absence and Class Participation Policy**

The UA's policy concerning Class Attendance, Participation, and Administrative Drops is available at: <http://catalog.arizona.edu/policy/class-attendance-participation-and-administrative-drop>

The UA policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable, <http://policy.arizona.edu/human-resources/religious-accommodation-policy>.

Absences pre-approved by the UA Dean of Students (or Dean Designee) will be honored. See: <https://deanofstudents.arizona.edu/absences>

Good faith efforts on quizzes are 6% of the class grade. It is important that you attend classes, especially when we schedule group meetings.

### **Makeup Policy for Students Who Register Late**

Students who sign up late can make up assignments for 75% credit. A low fraction of the course points come in the first few weeks so it is not important.

### **Course Communications**

All course communications will be conducted with UA e-mail address, and D2L

### **Required Texts or Readings**

This course uses the book. *Irrigation and Drainage Engineering*, P Waller, M. Yitayew, Springer, 2016.

### **Required or Special Materials**

No special materials are required. Let me know if you don't think that your laptop is reliable for exams.

### **Required Extracurricular Activities**

There are no required extracurricular activities.

### **Assignments and Examinations: Schedule/Due Dates**

A D2L quiz is due prior to almost all class periods. 6% of the course grade will be based on making a good faith effort on these quizzes prior to the following class period. I will make a quick check on student quizzes each morning prior to class. Then you can resubmit the quiz after we discuss the problems in class.

There will be 5 zoom exams. Students will present their homework programs and describe them. The instructor will ask random questions from the quizzes and questions related to the homework problems. A rubric will be posted soon.

### **Final Examination**

Students can drop in for the zoom final exam on Monday May 10 (3-8 pm) or Tuesday May 11 (8 am – 12 noon)

### **Grading Scale and Policies**

<u>Criteria</u>	<u>423</u>	<u>523</u>	<u>Grading Scale</u>	
Zoom meetings	42%	42%	90.0 – 100.0	A
Homework (quizzes)	25%	20%	80.0 – 89.9	B
Group project	25%	20%	65.0 – 79.9	C
Graduate project		10%		
Good faith effort on quizzes	8%	8%	50.0 – 65	D

University policy regarding grades and grading systems is available at <http://catalog.arizona.edu/policy/grades-and-grading-system>

**Requests for incomplete (I) or withdrawal (W)** must be made in accordance with University policies, which are available at <http://catalog.arizona.edu/policy/grades-and-grading->

[system#incomplete](#) and <http://catalog.arizona.edu/policy/grades-and-grading-system#Withdrawal> respectively.

**Dispute of Grade Policy** Students are welcome to dispute a grade on a quiz, project, or exam at any time during the semester.

## Scheduled Topics/Activities

		Class Activity (homework due the night before) (resubmit for more effort credit)
Jan 14	Thurs	Class introduction – Center pivots
Jan 19	Tue	Chapter 12. Center pivots
Jan 21	Thurs	Chapter 12. Center pivots
Jan 26	Tue	Chapter 13. Turf irrigation
Jan 28	Thurs	Chapter 13. Turf irrigation
Feb 2	Tue	Chapter 14. Agricultural sprinkler irrigation
Feb 4	Thurs	Chapter 14. Agricultural sprinkler irrigation
<b>Feb 4</b>	<b>Thurs</b>	<b>Zoom meeting. Schedule a half hour period between 3-8 pm</b>
Feb 9	Tue	Chapter 15. Landscape irrigation systems
Feb 11	Thurs	Chapter 15. Landscape irrigation systems
Feb 16	Tue	Chapter 16. Landscape irrigation design (First presentations)
Feb 18	Thurs	Chapter 16. Landscape irrigation design
Feb 23	Tue	Chapter 16. Landscape irrigation design
Feb 25	Thurs	No class – reading day
Mar 2	Tue	Chapter 17. Agricultural drip irrigation systems
<b>Mar 2</b>	<b>Tue</b>	<b>Zoom meeting. Schedule a half hour period between 3-8 pm</b>
Mar 4	Thurs	Chapter 17. Agricultural drip irrigation systems
Mar 9	Tue	No class – reading day
Mar 11	Thurs	Chapter 18. Agricultural drip irrigation design
Mar 16	Tue	Chapter 18. Agricultural drip irrigation design
Mar 18	Thurs	Chapter 18. Agricultural drip irrigation design
Mar 23	Tue	Chapter 19. Chemigation
Mar 25	Thurs	Chapter 19. Chemigation
<b>Mar 25</b>	<b>Thurs</b>	<b>Zoom meeting. Schedule a half hour period between 3-8 pm</b>
Mar 30	Tue	Chapter 19. Chemigation
Apr 1	Thurs	Chapter 20. Surface irrigation (second presentation)
Apr 6	Tue	Chapter 20. Surface irrigation
Apr 8	Thurs	Chapter 20. Surface irrigation
Apr 13	Tue	Chapter 20. Surface irrigation
Apr 15	Thurs	Chapter 21. Greenhouse irrigation
<b>Apr 15</b>	<b>Thurs</b>	<b>Zoom meeting. Schedule a half hour period between 3-8 pm</b>
Apr 20	Tue	Chapter 21. Greenhouse irrigation
Apr 22	Thurs	Chapter 21. Greenhouse irrigation
Apr 27	Tue	Chapter 21. Greenhouse irrigation
Apr 29	Thurs	Chapter 22. Bubbler irrigation
May 4	Tue	Chapter 22. Bubbler irrigation (third presentation)
<b>Apr 9-10</b>	<b>Fri-Sat</b>	<b>Zoom meeting. Schedule a half hour period between 3-8 pm</b>

## Classroom Behavior Policy

To foster a positive learning environment, students and instructors have a shared responsibility. We want a safe, welcoming, and inclusive environment where all of us feel comfortable with each other and where we can challenge ourselves to succeed. To that end, our focus is on the tasks at hand and not on extraneous activities (e.g., texting, chatting, reading a newspaper, making phone calls, web surfing, etc.).

Students are asked to refrain from disruptive conversations with people sitting around them during lecture. Students observed engaging in disruptive activity will be asked to cease this behavior. Those who continue to disrupt the class will be asked to leave lecture or discussion and may be reported to the Dean of Students.

There are no restrictions on phones or computers in this class. However, during exams, no cell phone use is allowed.

## **Threatening Behavior Policy**

The UA Threatening Behavior by Students Policy prohibits threats of physical harm to any member of the University community, including to oneself. See <http://policy.arizona.edu/education-and-student-affairs/threatening-behavior-students>.

## **Accessibility and Accommodations**

Our goal in this classroom is that learning experiences be as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, please let me know immediately so that we can discuss options. You are also welcome to contact the Disability Resource Center (520-621-3268) to establish reasonable accommodations. For additional information on the Disability Resource Center and reasonable accommodations, please visit <http://drc.arizona.edu>.

If you have reasonable accommodations, please plan to meet with me by appointment or during office hours to discuss accommodations and how my course requirements and activities may impact your ability to fully participate. Please be aware that the accessible table and chairs in this room should remain available for students who find that standard classroom seating is not usable.

## **Group Projects**

Groups of 4 students will complete a group project. The group will design an irrigation system or process. Each student will design a component of the system. The first presentation will describe the project, proposed models, and estimated time investment. Each group member will write a minimum of a three-page report (2% of course grade), and prepare a PowerPoint presentation (2% of course grade) The first page (one-page single-spaced) will describe the site. The second page will include a brief description of the design approach. The third page will include a brief summary of the tasks in the design. Each group member will speak for a minimum of 4 minutes on their part of the project. The presentation will include a PowerPoint that includes the information in the report. The group will also prepare a written and flowchart summary that describes how the individual designs will mesh together (1% of class grade). One member of the group will also present the group report, which will be a minimum of 3 minutes. These presentations will be used to help students and groups refine their projects.

Students will need to have completed their individual designs by the time of the second report. Each student's second report (8% of course grade) and presentation (2% of course grade) will describe their individual design. Individual reports will begin with the already completed three-page proposal. Subsequent pages will describe the finalized design.

The third report (7% of course grade) and presentation (3 % of course grade) will describe the complete irrigation system designed by the group. The group will write a five-page report on their overall design. The third presentation will take 3 minutes per person and describe how the group has integrated the models into a single model of the entire system.

## **Code of Academic Integrity**

Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of independent effort unless otherwise instructed. Students are expected to adhere to the UA Code of Academic Integrity as described in the UA General Catalog. See: <http://deanofstudents.arizona.edu/academic-integrity/students/academic-integrity>.

*Selling class notes and/or other course materials to other students or to a third party for resale is not permitted without the instructor's express written consent.* Violations to this and other course rules are subject to the Code of Academic Integrity and may result in course sanctions. Additionally, students who use D2L or UA e-mail to sell or buy these copyrighted materials are

subject to Code of Conduct Violations for misuse of student e-mail addresses. This conduct may also constitute copyright infringement.

## **UA Nondiscrimination and Anti-harassment Policy**

The University is committed to creating and maintaining an environment free of discrimination; see <http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy>

Our classroom is a place where everyone is encouraged to express well-formed opinions and their reasons for those opinions. We also want to create a tolerant and open environment where such opinions can be expressed without resorting to bullying or discrimination of others.

## **Additional Resources for Students**

UA Academic policies and procedures are available at <http://catalog.arizona.edu/policies>

Student Assistance and Advocacy information is available at <http://deanofstudents.arizona.edu/student-assistance/students/student-assistance>

## **Confidentiality of Student Records**

<http://www.registrar.arizona.edu/personal-information/family-educational-rights-and-privacy-act-1974-ferpa?topic=ferpa>

## **Subject to Change Statement**

Information contained in the course syllabus, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor.