

ABE 459/559
Design of Onsite Wastewater Treatment & Dispersal Systems
Course Syllabus

Course Description

The course will cover issues and concepts relating to the design of onsite wastewater treatment and recycling systems, including: Arizona regulations, site and soil evaluation, soil interactions with treated effluent, technology selection, design of simple and specialized treatment systems, operation and monitoring of simple and complex systems, biosolids and septage management, and water reuse.

Location and Time

Even-year spring semesters conducted online using D2L and a course home page:
<http://ag.arizona.edu/classes/abe459/index.htm>.

Instructor Information

	Instructor	Teaching Assistant
	Dr. Kitt Farrell-Poe	Janine Lane
Office Location	Agricultural & Biosystems Engineering Dept, 504A Shantz, Tucson, AZ 85721-0038	Yuma Agricultural Center 6425 W. 8 th Street Yuma, AZ 85365
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Course Objectives

To help the student develop their problem solving abilities, with an emphasis on the management of domestic wastewater waste streams. Specifically, this course is designed to help students:

1. Develop a general understanding of the sources and characteristics of residential and non-residential wastes.
2. Apply engineering fundamentals to design systems for management and treatment of residential wastewater.
3. Understand the scope and impact of regulations and permitting processes on engineering solutions to treating residential wastewater.

Student Learning Objectives

Upon completion of this class, students are expected to:

1. Have an awareness of the science and social disciplines that affect onsite wastewater treatment.
2. Understand onsite wastewater treatment technologies and their design considerations.
3. Use creativity and innovation in designing wastewater collection and treatment systems for Arizona.

Relationship of course to program outcomes for ABET (high level contribution only):

Course Outcomes	Curriculum and Educational Activities
1	Can apply mathematics, science, and engineering principles to solve problems.
2, 3	Can design a system, component or process to meet desired needs within realistic constraints.
2, 3	Can identify, formulate, and solve engineering problems.

Prerequisites

None.

Required Text/Reading Materials

1. Burks, Bennette D. and Mary Margaret Minnis. 1994. Onsite Wastewater Treatment Systems. Hogarth House, Ltd, Madison, WI. [*available from instructor for \$25*]
2. Arizona Administrative Code, Aquifer Protection Permits [Title 18. Environmental Quality, Chapter 9. Department of Environmental Quality Water Pollution Control, Article 3. Aquifer Protection Permits-General Permits].
 - a. The original code is available in the following formats:
 - i. http://www.azsos.gov/public_services/Title_18/18-09.htm
 - ii. http://www.azsos.gov/PUBLIC_SERVICES/Title_18/18-09.rtf
 - iii. http://www.azsos.gov/PUBLIC_SERVICES/Title_18/18-09.pdf
 - b. Limit yourself to:
 - i. **R18-9-A310.** Site Investigation For On-site Wastewater Treatment Facilities through **R18-9-A316.** Transfer Inspection For On-site Wastewater Treatment Facilities AND
 - ii. **R18-9-E302. 4.02** General Permit: Septic Tank With Disposal by Trench, Bed, Chamber Technology, or Seepage Pit, Less Than 3000 Gallons Per Day Design Flow through **R18-9-E322. 4.22** General Permit: Subsurface Drip Irrigation Disposal, Less Than 3000 Gallons Per Day Design Flow AND
 - iii. **Table 1.** Unit Daily Design Flows

Supplemental Reading (Optional but Recommended)

Crites, Ron and George Tchobanoglous. 1998. *Small and Decentralized Wastewater Management Systems*. McGraw-Hill, Boston, MA.

There will be one or more copies of the Crites & Tchobanoglous textbook in the library for check-out use. The instructor will be obtaining electronic copies of the Chapters and sections for use on D2L.

Additionally, there will be additional supplemental reading or websites listed at the end of many learning modules.

Course Evaluation

Student Attendance

Since this is a web-instructed course, attendance is not taken.

Homework

The objectives of the homework assignments are to: 1) evaluate whether or not you did the reading assignment, read the learning module, and/or viewed the recorded lecture; 2) evaluate your understanding of the principals covered in the reading assignments, learning modules, and recorded lectures; and 3) provide a safe environment to synthesize science principals and design elements.

Homework Rules

1. Students may work together on *design projects*, but everyone will be required to turn in their own work.
2. Any work resulting from a cooperative effort **MUST BE CLEARLY DESIGNATED** as such, and not represented as an individual's work on design projects turned in for grade. Cooperative work represented as a student's own individual work will be considered cheating.
3. Homework may be submitted electronically (email or fax) by the time indicated within the assignment on the day it is due. Any homework turned in after that time will receive a grade of zero unless prior written arrangements have been made. An executed copy of the Request for Late Homework form (HTML, PDF, RTF) constitutes prior written arrangements. The Request for Late Homework form can be found on the class website.
4. To submit your homework, you may:
 - a. Submit a file (HTML, PDF, RTF, TXT, DOC, WPD) through the Dropbox feature in D2L. The title of the file should be "your last name-Assignment#." For instance, farrell-poeAssignment3. Note: the dash between your last name and the word "Assignment" is optional; you may also use an underline "_" or nothing. I don't need the course name and number.
 - b. Copy and paste from a text file into the body of an email message. The email message subject should be formatted "your last name-Assignment#." For instance, farrell-poe-Assignment3. Note: the dash between your last name and the word "Assignment" is optional; you may also use an underline "_" or nothing. I don't need the course name and number.
 - c. Email it as an attachment (in some text file like PDF, WordPerfect, Word, or ASCII file formats). The email message subject should be formatted "your last name-Assignment#." For instance, farrell-poe_Assignment3. Note: the dash between your last name and the word "Assignment" is optional; you may also use an underline "_" or nothing. I don't need the course name and number.
 - d. Fax it to me: 520-621-3963.
 - e. Hand delivered to my office: Shantz, room 504A.
5. When possible, solutions will be posted on the web.

Format for Design Projects

1. Front page should contain: a) problem assignment number, b) your name(s), c) course identification number, and d) date assignment is due.
2. To receive full credit, you MUST show ALL work including calculations, assumptions, and references to specific regulations, tables, graphs, figures, etc.
3. System layout on plot plan including all elevations, setback distances.

Discussion Questions

The grade for Discussion Questions will be based on your response(s) to the discussion question and your response(s) to your classmates' response(s). So, I'm looking for you to make at least one response to each discussion question and at least one response to one of your classmates' response for each discussion question. The more responses, the better your grade.

Exams and Final

No examinations or Final Exam will be given.

Graduate Credit

Students enrolled for ABE 559 will be required to do an additional project to receive graduate credit. Please see Instructor for more details.

Grade Evaluation

The final grade will be based on the following points:

	ABE 459	ABE 559
Homework	520	545
Discussion Questions	100	100
Graduate Project	0	100
Total	620	745

NOTE: There may be more or less discussion questions and homework assignments.

Grading Scale

To earn the grade of your choice, you will need to obtain the following total points:

	Points ABE 459	Points ABE 559
A: 90%+	558 - 620	670 - 745
B: 80-89%	496 - 557	596 - 669
C: 70-79%	434 - 495	521 - 595
D: 60-69%	372 - 433	447 - 520
E: (Failure) <60%	Less than 371	Less than 446

Some Class Rules

1. Cheating in any manner will result in a grade of E (failure) in the course and a letter placed in the student's records.
2. Make-up work must be scheduled in advance in writing except in an emergency.

- Late homework receives zero points unless a written request for turning in late homework has been made by the student and accepted by the instructor.

Academic Integrity

Students are encouraged to share intellectual views and freely discuss the principles and application of course materials. However, graded work must be the product of independent effort unless otherwise instructed. Students are expected to adhere to the UA Code of Academic Integrity. Students are encouraged to review academic policies regarding conduct, honesty, rights, and privileges stated at:

<http://deanofstudents.arizona.edu/policiesandcodes/codeofacademicintegrity>

Confidentiality of Student Records

Grades will be posted on the D2L website for the class. If you have any questions regarding your student record confidentiality rights, please refer to:

<http://www.registrar.arizona.edu/privacyguidelines.htm>

Special Needs and Accommodations

Students who need special accommodation or services should contact the:

SALT (Strategic Alternatives Learning Techniques) Center for Learning Disabilities

Old Main, P.O. Box 210021

Tucson, AZ 85721-0021

Telephone: 520-621-1242

FAX: 520-521-9448

TTY: 520-626-6072

<http://www.salt.arizona.edu/>

and/or

Disability Resources Center

1540 E. 2nd Street, P.O. Box 210064

Tucson, AZ 85721-0064

Telephone: 520-621-3268

FAX: 520-621-9423

<http://drc.arizona.edu/>

The need for accommodation must be documented by the appropriate office.