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

Drs. Kitt Farrell-Poe & Peter Livingston
kittfp@email.arizona.edu; Office: 626-9120; Cell: 334-9806; Shantz 417;
pal2@email.arizona.edu; Office: 621-1890; Shantz 509;
Office Hours: By Appointment*

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, inspection of systems for the Arizona Transfer of Ownership Program, biosolids and septage management, and water reuse.

Location and Time

Even-year spring semesters conducted online.

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. Demonstrate an awareness of the science and social disciplines that affect onsite wastewater treatment and the design of those systems.
2. Describe onsite wastewater treatment technologies and their design considerations.
3. Evaluate the choices of onsite wastewater technologies for clients' needs and desires, soil and site constraints, and regulatory environment.
4. Use creativity and innovation in designing wastewater collection and treatment systems for Arizona.

* I don't have set office hours, but you can usually connect with me 9 a.m. to 5 p.m. Monday through Friday by visiting my office, calling my office or cell phone, texting my cell phone, or emailing me. If you plan to visit, I suggest calling ahead to make sure that I am there.

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

Course Outcomes	Curriculum and Educational Activities
1	(a) Can apply mathematics, science, and engineering principles to solve problems.
2, 3, 4	(c) Can design a system, component or process to meet desired needs within realistic constraints.
2, 3, 4	(e) Can identify, formulate, and solve engineering problems.

Prerequisites

None.

Text/Reading Materials

Required

1. 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://apps.azsos.gov/public_services/Title_18/18-09.rtf
      ii. http://apps.azsos.gov/public_services/Title_18/18-09.pdf

   b. You should pay particular attention to the following Sections:
      i. **R18-9-A309** (General Provisions for On-site Wastewater Treatment Facilities) through **R18-9-A316** (Transfer Inspection for On-site Wastewater Treatment Facilities)
      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)
      iii. **Table 1** (Unit Daily Design Flows)
2. NAWT Inspection Training Manuals [*available through the instructor for $17*]

Supplemental Reading (Optional but Recommended)

1. Burks, Bennette D. and Mary Margaret Minnis. 1994. *Onsite Wastewater Treatment Systems*. Hogarth House, Ltd, Madison, WI. [*I have 4 available in my office for $25 or you can obtain it directly from the author by sending her a check for $23, with your mailing address and a lovely note to: M.M. Minnis, 15 Burchard Lane, Rowayton, CT 06853*]
2. Crites, Ron and George Tchobanoglous. 1998. *Small and Decentralized Wastewater Management Systems*. McGraw-Hill, Boston, MA.

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

Tentative Topics to be Covered

- History, terminology, regulations, national picture, introduction to course
- Review of onsite wastewater treatment processes, microbiology, wastewater characteristics
- Soil and site evaluation
- Introduction to pretreatment and pretreatment technologies
- Introduction to soil treatment systems using both gravity and pressure distribution, pumping systems
- System selection, the design process
- Controls, wiring, operation and maintenance, management
- Arizona Transfer of Ownership Inspection Program
- Septage, biosolids, water reuse

Grading & 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. Homework will be accomplished in two ways: the Homework (Quizzes) Tool AND files submitted to the course Dropbox folder. The Homework Tool uses true/false, multiple choice, and matching to assess comprehension of reading and video assignments. The Dropbox will be used for files containing answers for long-answer questions (calculations & short answer). Although I want you to learn from the D2L homework/quizzes, it is expected that you do this type of homework assignment on your own. The day and time the assignments are due will be indicated within the assignment, and typically you will be given at least one week to complete most assignments.
2. Students may work together on *design projects*, but everyone will be required to turn in their own work.
3. 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.
4. To submit your homework, you will submit a file (HTML, RTF, TXT, DOC, WPD) through the Dropbox feature in D2L. **NOTE:** Please DO NOT submit a PDF file as grading it is very difficult to do electronically. The title of the file should be "**your last name_Assignment**#." For instance, farrell-poe_Hmwk3. I don't need the course name or number.
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

Discussion questions are intended to promote class discussion, much like class participation/oral responses in a traditional classroom setting. Online discussions enhance learning as you share your ideas, perspectives, and experiences with the class. You develop and refine your thoughts through the writing process, plus broaden your classmates' understanding of the course content.

Periodically through the semester, I will be asking you to go to a site, or read a paper, or just plain reflect on some topic or other and "talk" to the class. Here's how the Discussion will work:

1. I will assign the discussion question on a Wednesday.
2. You will need to post your initial/original discussion by the following Saturday by 10 p.m. in the Discussions Tool of the D2L course site. NOTE: You will not be able to see any of your classmates' initial/original posts until *after* you submit your initial/original post.
3. If there is a response required, you will respond to a minimum of 2 of your classmates' responses.
4. Discussion questions will close typically by 10 p.m. Wednesday after your original Saturday post.
5. Unless otherwise indicated, discussion questions will be worth 12 points. There are rubrics for the discussion questions. All rubrics are found in the course Content > Course Administration > Rubrics folder.

Ways to Improve your Discussion Question Grade:

I will be evaluating your contributions to the discussion (content, frequency, etc.). Use the following feedback to improve the quality of your discussion contributions:

1. Initial post should address the task assigned thoroughly and succinctly. You will ***not*** be allowed to see your classmates' original post until after you post your original post.
2. Did you raise any new points either in the discussion or in your response to a classmate's response? -- *a measure of the quality of participation and the understanding of concepts.*
3. Did you raise any new questions or cause new discussions to happen? -- *a measure of the amount of participation and synthesis; I'm looking for methods to keep discussion going.*
4. Number of responses to classmates' responses -- *a measure of the amount of participation and analysis.*
5. Did you disagree or provide a counterpoint to a response? -- *a measure of the quality of participation; to provide alternate points of view can be risky, therefore, I want to acknowledge the risk.*
6. Did you provide any evidence of outside research? -- *a measure of the quality of participation and how much effort is apparent from discussion; I'm looking for various forms of evidence like web pages, interviews, papers cited, reference books cited.*

Discussion Question Rules:

1. We will use polite "tones of voices" and respectful language within our discussions.
2. Although we may not agree with all of the statements or opinions of our classmates, we will respect those opinions and allow a healthy forum for discussion.

3. Racist, sexist, and demeaning remarks are unacceptable. The students and the instructor are expected to hold each other to an appropriate level of professionalism while maintaining an environment conducive to teaching and learning.
4. Please avoid using CAPITAL letters, unless you really are shouting at us, in which case you should count to 10, breathe deeply, take a break, and rethink your response.
5. Everyone is expected to participate.

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 tentative following points:

	ABE 459	**ABE 559**
Homework	520	545
Discussion Questions	57	57
Graduate Project	0	100
Total	**577**	**677**

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 percentages:
A: 90%+
B: 80-89%
C: 70-79%
D: 60-69%
E: (Failure) <60%

Additional Grading Information

Submissions to the Dropbox. You need to save anything that you turn into the course Dropbox in a format that is universal (.doc, .wpd, .rtf, .xls, etc.). Please do not use .pdf as it is a lot more difficult for me to edit and leave comments in this type of file. It is your responsibility to make sure that the file can be read. If you have a question about format or you think something went wrong while you were submitting it, check the file before the deadline and ask me for help if you need it. No credit can be given for submissions that can't be opened unless a technical difficulty exists that is beyond your control.

Late Submissions. My policy is no late submissions. Any homework turned in after the due date 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 in the course D2L Contents >> Course Administration. However, I will allow up to 50% of the points for submissions which are less than 24 hours late.

Academic Integrity & Student Behavior

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 abide by the University of Arizona Code of Academic Integrity and other policies found at http://dos.web.arizona.edu/uapolicies/.

Students are expected to be familiar with the UA Policy on Disruptive Behavior in an Instructional Setting found at http://web.arizona.edu/~policy/disruptive.pdf and the Policy on Threatening Behavior by Students found at http://policy.web.arizona.edu/~policy/threatening.pdf.

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

The instructor complies with and encourages students with special needs to gain permission for special accommodations as allowed by the Americans with Disabilities Act. Students with disabilities who require reasonable accommodations to fully participated in course activities or meet course requirements must register with the Disability Resource Center (DRC). If you qualify for services through the DRC, bring your letter of accommodations to me as soon as possible.

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.

NOTE: Items on the syllabus may be changed at the discretion of the instructor. Any changes will be brought to your attention by the instructor.