

**SWS 5551**  
**Soils, Water, and Public Health**  
**Course Syllabus**

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**Instructors**

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**Meeting Times**

M/W/F 2<sup>nd</sup> period

**Meeting Room**

McCarty A 2186

**Office Hours**

Email to arrange

**Course Description**

We highlight important instances where soil and water science and public health overlap, and develop student skills required for competency in both disciplines. Prerequisites: Graduate status.

**Course Objectives**

- Describe the various disciplines of public health and discuss issues/trends currently shaping the field
- Describe basic soil characteristics and physical/chemical reactions that enable preliminary estimates of how various contaminants may move, react, and dissipate in a dynamic soil environment
- Describe factors which influence exposure pathways, exposure behaviors, and health outcomes as they relate to soil properties, water/soil quality, and water/soil management
- Highlight important and/or innovative environmental contamination prevention strategies and remediation techniques that serve to protect and promote public health
- Examine processes of site evaluation, health impact assessment, data reporting, and public communication through in-class review of “real life” water/soil contamination examples
- Critically review, understand, critique, and apply information in published soil and water science and public health literature

**Texts**

**Provided by Instructors:**

Loynachan, T., Brown, K., Cooper, T., Kimble, J., Milford, M., Smith, D. 2005. Soils, society, and the environment. AGI Environmental Awareness Series, 9.

**Reading List (see Detailed Topic Outline for readings)**

**Optional:**

National Research Council (U.S.) Committee on Bioavailability of Contaminants in Soils and Sediments. Bioavailability of Contaminants in Soils and Sediments: processes, tools, and applications. [electronic resource] Washington, D.C. National Academies Press. 2003.  
[http://books.nap.edu/openbook.php?record\\_id=10523&page=1](http://books.nap.edu/openbook.php?record_id=10523&page=1)

**Course Format and Credit**

Classes consist of three 50-minute lectures each week. 3 credits

**Class Structure**

The course is divided into four units: 1. Public Health, 2. Soil/Water Science, 3. Application of Soil/Water Science Principles to Public Health Promotion and Protection: Illustrative Examples and Guest Lectures, and 4. Detailed Case Studies. Unit 1 addresses the field of public health, approaches to measuring health, exposure routes, risk assessment, environmental monitoring, and legal and regulatory frameworks. Unit 2 introduces the field of soil/water science and includes lectures on soil physicochemical properties, soil/water microbiology, soil water, contaminant bioavailability, and environmental fate of contaminants.

Unit 3 incorporates guest lectures by experts in specific fields exemplifying the intersection of public health and soil/water science. Material presented in Units 1 and 2 will be actively applied to exploring and understanding the illustrative topics presented in Unit 3. Lastly, Unit 4 allows the class to take a detailed look at multiple case studies of the interaction between public health and soil and water science. The class will participate in an in-depth examination of selected public health issues and investigate case-specific means of environmental contamination, health assessment, risk communication, and remediation/prevention strategies. In addition, students will each select individual case studies to research as a final term paper topic.

Separate SWS course sections are provided for students from the College of Agriculture and Life Sciences and the College of Public Health. Students from other colleges may select either section.

### **Student Responsibilities**

- *Attendance and reading:* We expect you to attend all meetings of the class, and to come prepared to discuss the readings at each and every class meeting.
- *Handing in assignments:* Unless otherwise stated, all assignments must be turned in at the beginning of class on the due date.
- *Late or make-up assignments:* Assignments will be marked down 20% for each day late. Homework in this class is assigned to prepare the student for class discussions. If you do not complete the homework in time for discussion, your participation will suffer.
- *Completion of all assignments:* Completion of all assignments and participation in class is required to pass the course. We will not average a grade that is missing for any assignment.
- *Common courtesies:* Cell phones and other electronic devices must be turned off during class. Students who receive or make calls/messages, or otherwise engage in disruptive behavior, during class will be asked to leave.

### **Student Evaluation**

- Three examinations
  - 125 points each (375 points total)\*
- Periodic homework assignments (100 points total) are designed to guide reading comprehension and to develop quantitative skills.
- Term paper (100 points)
  - Paper topics will address an example of the intersection of public health and soil and water science and will be selected in consultation with the instructors.
  - All papers require proper citation of references, and must be  $\geq 15$  typed pages.
- Total Points = 575
- Course grades are determined by summing all scores, dividing by the maximum score possible (500 points), and multiplying by 100. Grading follows University standards: 100-90 = A, 89-85 = B+, 84-80 = B, 79-75 = C+, 74-70 = C, 69-65 = D+, 64-60 = D, <59 = E. The instructors reserve the right to add 0-5 points to the final percentage score on the basis of meaningful class participation, demonstrated student interest, and overall student dedication. Utilizing professor and teaching assistant office hours is encouraged.
- \*Students registered for the graduate course will complete the same requirements as undergraduates, plus an additional essay question (additional 25 points) on each exam and a term paper of  $\geq 15$  pages.

### Academic Honesty

In 1995 the UF student body enacted a new honor code and voluntarily committed itself to the highest standards of honesty and integrity. When students enroll at the university, they commit themselves to the standard drafted and enacted by students. In adopting this honor code, the students of the University of Florida recognize that academic honesty and integrity are fundamental values of the university community. Students who enroll at the university commit to holding themselves and their peers to the high standard of honor required by the honor code. Any individual who becomes aware of a violation of the honor code is bound by honor to take corrective action. The quality of a University of Florida education is dependent upon community acceptance and enforcement of the honor code. **The Honor Code: We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.** On all work submitted for credit by students at the university, the following pledge is either required or implied: **“On my honor, I have neither given nor received unauthorized aid in doing this assignment.”** The university requires all members of its community to be honest in all endeavors. A fundamental principle is that the whole process of learning and pursuit of knowledge is diminished by cheating, plagiarism and other acts of academic dishonesty. In addition, every dishonest act in the academic environment affects other students adversely, from the skewing of the grading curve to giving unfair advantage for honors or for professional or graduate school admission. Therefore, the university will take severe action against dishonest students. Similarly, measures will be taken against faculty, staff and administrators who practice dishonest or demeaning behavior. Students should report any condition that facilitates dishonesty to the instructor, department chair, college dean or Student Honor Court. (*Source: 2007-2008 Undergraduate Catalog*) It is assumed all work will be completed independently unless the assignment is defined as a group project, in writing by the instructor. This policy will be vigorously upheld at all times in this course.

### Software Use

All faculty, staff and students of the university are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate.

### Campus Helping Resources

Students experiencing crises or personal problems that interfere with their general wellbeing are encouraged to utilize the university’s counseling resources. Both the Counseling Center and Student Mental Health Services provide confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance. The Counseling Center is located at 301 Peabody Hall (next to Criser Hall). Student Mental Health Services is located on the second floor of the Student Health Care Center in the Infirmary.

- *University Counseling Center*, 301 Peabody Hall, 392-1575, [www.counsel.ufl.edu](http://www.counsel.ufl.edu)
- *Career Resource Center*, CR-100 JWRU, 392-1602, [www.crc.ufl.edu/](http://www.crc.ufl.edu/)
- *Student Mental Health Services*, Rm. 245 Student Health Care Center, 392-1171, [www.shcc.ufl.edu/smhs/](http://www.shcc.ufl.edu/smhs/)
  - Alcohol and Substance Abuse Program (ASAP)
  - Center for Sexual Assault / Abuse Recovery & Education (CARE)
  - Eating Disorders Program
  - Employee Assistance Program
  - Suicide Prevention Program

### Students with Disabilities

The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues.

0001 Reid Hall, 392-8565, [www.dso.ufl.edu/drc/](http://www.dso.ufl.edu/drc/)

## General Topic Outline

<b>I. Public Health (Weeks 1-4)</b>
A. General field overview B. Environmental health regulations C. Risk assessment D. Approaches to the study of public health E. Health in environmental impact assessments
<b>Exam 1</b>
<b>II. Soil and Water Science (Weeks 5-10)</b>
A. Soil functions B. General soil properties: physical, chemical, biological C. Relationship between soil properties and environmental health a. Contaminant retention/release b. Microbial degradation c. Leaching and runoff D. Soil degradation and public health E. Soil remediation F. Water quality and public health G. Water quantity and public health
<b>Exam 2</b>
<b>III. Application of Soil and Water Science Principles to Public Health Promotion and Protection: Illustrative Examples and Guest Lectures (Weeks 11-13)</b>
Potential Discussion Topics: A. Trace element contamination of soils and waters B. Organic chemical contamination of soils and waters C. Land degradation, dust storms, and respiratory distress D. Soil and waterborne pathogens E. Industrial development and land degradation F. Human sanitation, water quality, and disease G. Land application of wastes H. Acid rain and effect on mobilization of soil contaminants/components I. Soil quality, food availability, crop nutritional value J. Nutrient management K. Constructed wetlands L. Degraded water reuse
<b>Exam 3 (Take-home)</b>
<b>IV. Detailed Case Studies (Weeks 14-15)</b>
A. Role of soil and water in selected public health issues a. Means of contamination/degradation b. Means of contamination assessment, reporting, and communication c. Public health implications d. Prevention/Remediation strategies B. Student selected topics

**Term Papers Due On or Before Scheduled Final Exam**

## Detailed Topic Outline and Reading List

Reading assignments are to be completed **PRIOR TO** the topic discussion and will be made available on the course website.

### • Unit 1: Public Health

- **Week 1 – Class Introduction and Environmental Health History, Trends, and Regulations**
  - Abrahams, P.W. 2002. Soils: Their implications to human health. *The Science of the Total Environment*. 291: 1-32.
- **Week 2 – Hazard Identification, Exposure, Dose, and Health Outcomes**
  - Ziegler, J. 1993. Toxicity tests in animals: extrapolating to human risks. *Environmental Health Perspectives*. 101(5).  
<http://www.ehponline.org/docs/1993/101-5/focus.html>
- **Week 3 – Quantifying Risk**
  - Hansen, Peter-Diedrich. 2007. Risk assessment of emerging contaminants in aquatic systems. *Trend in Analytical Chemistry*. 26(11): 1095-1099.
  - Setzer Jr., R. W. and Kimmel, C.A. 2003. Use of NOAEL, benchmark dose, and other models for human risk assessment of hormonally active substances. *Pure and Applied Chemistry*. 75(11-12): 2151-2158.
- **Week 4 – Risk Characterization, Risk Management, and Environmental Impact Statements**
  - Rodricks, J. 1994. Risk assessment, the environment, and public health. *Environmental Health Perspectives*. 102(3).  
<http://www.ehponline.org/members/1994/102-3/rodricks-full.html>
  - Hrudey, S. and Leiss, W. 2003. Risk management and precaution: insights on the cautious use of evidence. *Environmental Health Perspectives*. 111(13).  
<http://www.ehponline.org/members/2003/6224/6224.html>

### • Unit 2: Soil and Water Science

- **Week 5 – Basic Soil Properties and Soil Health**
  - Doran, J.W. 2002. Soil health and global sustainability: translating science into practice. *Agriculture, Ecosystems, and Environment*. 88:119-127.
- **Week 6 – Basic Chemical Properties and Soil/Water Contamination**
  - Class handout: Soils, Society, and the Environment
- **Week 7 – Soil Quality and Nutrition**
  - Buol, S.W. 2008. Elements Essential for Life and What it Takes to Do Our Job. In *Soils, Land, and Life* (p. 67-89, 213-247). Upper Saddle River, NJ: Pearson Prentice Hall.
- **Week 8 – Soil Biota and Bioremediation**
  - Santamaria, J. and Toranzos, G. 2003. Enteric pathogens and soil: a short review. *International Microbiology*. 6(1):5-9.
  - Tongarun, R., Luepromachai, E., and Vangnai, A. 2008. Natural attenuation, biostimulation, and bioaugmentation in 4-chloroaniline-contaminated soil. *Current Microbiology*. 56:182-188.
- **Week 9 – Soil- and Water-borne Pathogens**
  - Santamaria, J. and Toranzos, G. 2003. Enteric pathogens and soil: a short review. *International Microbiology*. 6(1):5-9.
- **Week 10 – Water Scarcity and Water Quality**
  - Jury, W. and Vaux, H. 2007. The emerging global water crisis: Managing scarcity and conflict between water users. *Advances in Agronomy*. 95:1-76.

### Unit 3: Application of Soil and Water Science Principles to Public Health Promotion and Protection: Illustrative Examples and Guest Lectures

- **Weeks 11 – 13** : To be determined by guest lecturer

### Unit 4: Detailed Case-Studies

- **Week 14 and 15**: To be determined following class selection of Case Studies #1 and 2, respectively