PHC 6937: WATER QUALITY AND HUMAN HEALTH

INSTRUCTOR: Asfar Ali, Ph.D., Department of Environmental and Global Health
University of Florida, College of Public Health and Health Professions
EPI Building; Rm # 276
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PREREQUISITES: One semester of Chemistry or Biochemistry (100 or 200 level) and one semester of Biology or Microbiology (100 or 200 level)

OFFICE HOURS: Immediately Post Lecture or By Appointment

PURPOSE:
Provide a broad, in-depth overview of important relationship between water quality and human health (e.g., point and non-point source pollution, infectious diseases, human impact on water quality, preventative measures) and how the quality of water determines the health of people both in the developed and developing world.

CREDIT HOURS: 3

LECTURE TIMES: Tuesday/Thursday

LABORATORY: None

COURSE SUMMARY
Water is essential for life. No living being on planet Earth can survive without it. It is a prerequisite for human health and well-being as well as for the preservation of the environment. Every year millions of people die from diseases associated with the consumption of contaminated drinking water, inadequate water supply, sub-optimal or poor sanitation, and hygiene. Diseases transmitted through water or human and animal excrement are the second-leading cause of death among children worldwide, after respiratory diseases. This course will discuss a wide variety of waters and factors and processes affecting the microbial water quality. We will also discuss the approaches that may be taken to improve the quality of water. At the end of this course, students will learn how intentional, incidental or unintentional misuse of water resources can have a detrimental consequence on human health. The course will also cover water remediation and safeguard techniques for the improvement of water quality.

GUEST EXPERTS:
Guest experts in various topics covered in the course may be invited to give lectures in their areas of expertise.
COURSE OBJECTIVES:
The course will provide students with an understanding and appreciation of the complex interactions between microbial water quality and human health. Students will learn (i) how the quality of water is affected by natural, seasonal, accidental, intentional and man-made activities, (ii) how the contaminated water increases the burden of human diseases with particular emphasis on infectious diseases, and (iii) how best we can mitigate or eliminate such water contamination to improve the quality of human health. Students will also learn how environmental pressures such as contaminated water drives the emergence and reemergence of infectious diseases with increased/altered virulence, antibiotic resistance and other traits to outplay human effort to contain them. The course will cover multiple water-borne pathogens, their modes of transport and transmission, their public health effects, and existing methods for disease prevention and remediation. After successfully completing this course, you should be able to:

1. Sources of microbial water contamination and its impact of human health globally
2. Understand the relationship between human behavior and water quality
3. Understand various water sources and transmission mechanisms of infectious agents from those sources to humans
4. Understand epidemiological studies related to water quality and public health
5. Develop remediation strategies for several types of microbial water quality contamination
6. Organize and present well-synthesized scientific discussions on topics relevant to waterborne disease and public health
7. Critically evaluate the scientific literature on waterborne diseases

COURSE MATERIALS:
PRIMARY TEXTBOOK:
SUGGESTED OTHER TEXTS:
Waterborne Disease, 1st edition (January 15, 1997), Paul Hunter, ISBN 0125515707

Microbiology of Waterborne Diseases, Steven Percival, Rachel Chalmers, Martha Embrey, Paul Hunter, Jane Sellwood and Peter Wyn-Jones, ISBN 978012551570-2

Other course materials will include current literature dealing with waterborne infectious diseases and preventative measures

METHOD OF PRESENTATION:
The course will consist of lectures by the instructor combined with occasional guest lectures by invited experts in particular topics. In addition to lectures and class room discussion, appropriate film and visual aids may be utilized.

METHOD OF EVALUATION:
Each student will be evaluated on their performance on 2 closed-book examinations (worth 25% each) including multiple choice, matching and short answer. There will be a cumulative final examination (40%) and student presentation (10%). Issues arising over make-up tests will be dealt with on a case by case basis.
A: 93-100%
A-: 90-92.9%
B+: 87-89.9%
B: 83-86.9%
B-: 80-82.9%
C+: 77-89.9%
C: 73-76.9%
C-: 70-72.9%
D+: 67-69.9%
D: 63-66.9%
D-: 60-62.9%
E: <60%

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<th>Letter</th>
<th>A</th>
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ATTENDANCE/PARTICIPATION:
Valid excuses for missed classes must be submitted in writing, along with pertinent documentation. Acceptable reasons for absence from class include serious illness, family emergencies, special curricular requirements (e.g., judging trips, field trips, professional conferences), military obligation, severe weather conditions, religious holidays, court-imposed legal obligations and participation in official university activities such as athletic competitions. For more on the university’s attendance policies see the Graduate Catalogue.

COURSE OUTLINE:

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Material Covered</th>
<th>Readings/Comments</th>
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<tbody>
<tr>
<td>August 21-24</td>
<td>Introduction</td>
<td>-Understanding the significance of the environment for human health</td>
<td>Aquatic Pollution Chapter 16</td>
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<td>-Human population pressures and pollution dynamics</td>
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<td>-Common terms and definitions in water quality</td>
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<td>-Aquatic resources of the world &amp; Sources of drinking water</td>
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<td>-Common contaminants of drinking water and linkages to disease</td>
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<td>August 28-31</td>
<td>Point and Non-Point Sources of Pollution</td>
<td>-Non-point source pollution</td>
<td>Aquatic Pollution Chapter 5</td>
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<td>-Agricultural runoff</td>
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<td>-TMDLs</td>
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<td>-Best management practices (BMPs)</td>
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<td>-Numeric vs narrative standards</td>
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<td>September 4-7</td>
<td>Water Pollution and the Evolution of Microbial Pathogens</td>
<td>-Virulence evolution</td>
<td>TBD supplementary reading materials from the literature</td>
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<td>-Subpopulation Selection of Bacterial Pathogens</td>
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<td>September 11-14</td>
<td>Climate Change</td>
<td>-What is Climate Change?</td>
<td>TBD supplementary</td>
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<td>Date</td>
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<td>Reading Materials</td>
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| September 18-21 | Sewage Treatment             | - Sewage treatment in developed countries  
- Primary, secondary, and tertiary treatments  
- Land application of sewage  
- Sewage treatment in developing countries |
| September 25-28 | Protozoa                     | Cryptosporidiosis, Giardiasis, Toxoplasma gondii                                  |
| October 2-5   | Bacteriology                 | Shigella, *Vibrio cholerae*, *Pseudomonas*                                        |
| October 9-12  | Virology                     | - The survival and persistence of viruses in water  
- Adenovirus, Norovirus and Rotavirus                                                |
| October 16-19 | EXAM 2 Biofilms              | - Implications of industrial application and Human Health  
- Vibrio and Biofilms                                                               |
| October 23-26 | Antibiotic Resistance        | - Antibiotic resistance to *V. cholerae*, *V. vulnificus*, and *V. parahaemolyticus* in aquatic reservoirs  
- Case studies  
- Group discussion                                                               |
| October 30- November 2 | Vaccines            | - Available vaccines for waterborne diseases  
- Water sanitation practices                                                     |
| November 6-9  | Preventative Measures        | - Improving the quality of drinking water at the source  
- Education and proper hygiene  
- Proper waste disposal  
- Water chlorination  
- Improving surveillance                                                       |
| November 13-16 | Changes in Human Behavior    | - Human population growth  
- Modern lifestyle affects on the water                                              |
ACADEMIC HONESTY:

As a result of completing the registration form at the University of Florida, every student has signed the following statement: “I understand that the University of Florida expects its students to be honest in all their academic work. I agree to adhere to this commitment to academic honesty and understand that my failure to comply with this commitment may result in disciplinary action up to and including expulsion from the University.” Students are expected to act in accordance with the University of Florida policy on academic integrity (see Student Conduct Code, the Graduate Student Handbook or this website for more details: www.dso.ufl.edu/judicial/procedures/academicguide.php).

Cheating, lying, misrepresentation, or plagiarism in any form is unacceptable and inexcusable behavior.

*We, the members of the University of Florida community,*

*pledge to hold ourselves and our peers to the highest standards of honesty and integrity.*

UF COUNSELING SERVICES:

Students may occasionally have personal issues that arise in the course of pursuing higher education or that may interfere with their academic performance. If you find yourself facing problems affecting your coursework, you are encouraged to talk with an instructor and to seek confidential assistance at the University of Florida Counseling Center, 352-392-1575, or Student Mental Health Services, 352-392-1171. Visit their websites for more information: http://www.counsel.ufl.edu/ or http://www.health.ufl.edu/shcc/smhs/index.htm#urgent

The Student Health Care Center at Shands is a satellite clinic of the main Student Health Care Center located on Fletcher Drive on campus. Student Health at Shands offers a variety of clinical services, including primary care, women’s health care, immunizations, mental health care, and pharmacy services. The clinic is located on the second floor of the Dental Tower in the Health Science Center. For more information, contact the clinic at 392-0627 or check out the web site at: www.health.ufl.edu/shcc

Crisis intervention is always available 24/7 from:

Alachua County Crisis Center: (352) 264-6789.

BUT – Do not wait until you reach a crisis to come in and talk with us. We have helped many students through stressful situations impacting their academic performance. You are not alone so do not be
afraid to ask for assistance.

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.
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ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES
If you require classroom accommodation because of a disability, you must first register with the Dean of Students Office (http://www.dso.ufl.edu/). The Dean of Students Office will provide documentation to you, which you then give to the instructor when requesting accommodation. The College is committed to providing reasonable accommodations to assist students in their coursework.

DISCLOSURE:
Instructor reserves the right to modify and adjust course outline as needed.