CEE 4114: FUNDAMENTALS OF PUBLIC HEALTH ENGINEERING

Spring 2018
Time and location: T, Th 12:30-1:45, 218 Randolph
Instructor: Dr. Peter Vikesland, 415 Durham Hall, pvikes@vt.edu, (540) 231-3568
Physical Office Hours: 2:00-4:00 Th (or by appointment)
Twitter: @petervikesland
Teaching Assistant: Kory Wait, korydw@vt.edu
Office Hours: TBA
Class notes, class problems, reading assignments, and homework solutions will be posted on the Canvas website.

This course examines the engineering aspects of public health protection. Emphasis is placed upon providing an introduction to many of the biological and chemical hazards faced by humankind. Basic epidemiological and toxicological concepts will be introduced and utilized throughout the course. These concepts provide a framework to assess both existing and emerging threats to human health.

Course Objectives:
1) To acquire an understanding of the basics of epidemiology and how they are used in public health engineering.
2) To obtain an awareness of the numerous health hazards, both biological and chemical, that threaten the well-being of humankind throughout the world.
3) To have a working knowledge of the public health engineering principles that have been developed for protection against biological and chemical threats.
4) To have knowledge about the major communicable diseases that plague humankind, the organisms that cause them, the ways they are transmitted, and the methods that are used to control them.
5) To know control methods and technologies applicable in both developed and lesser-developed regions of the world.

Course Format: The class will be taught interactively. Both lectures and in-class small group activities will be used. Online videos will be used both in class as well as out of class to augment the in-class activities – you are responsible for the material presented in these videos. A course outline is attached.

Lecture Notes: Supplemental material for each of the lectures will be posted on Canvas. You should download, read, and if desired print this material before coming to class. This will aid your understanding of the material discussed in class.

Textbook: No textbook is assigned. Reading materials will be posted on Canvas. These readings should be downloaded/printed/photocopied and read prior to the class during which they are being discussed.

Grading Policy: The course grade will be determined using the following distribution: 15% homework, 10% weekly quizzes, 10% in-class participation, 10% out-of-class participation, 10% project, and 45% for exams. The class will be graded on the following scale: (A) 96-100; (A-) 93-95; (B+) 90-92; (B) 86-89; (B-) 80-85; (C+) 77-79; (C) 74-76; (C-) 70-73; (D+) 67-69; (D) 64-66; (D-) 60-63; (F) <60.

Homework — Assigned approximately every week. Some of these assignments (which will be clearly indicated at the time of assignment) may be completed and turned in by small groups (1-3 people) of students. However, each individual is responsible for a complete understanding of the assignment. Late homework will not be accepted.

In-class Participation — Throughout the semester we will have a number of in-class 'case studies'. These 'case studies' are designed to illustrate the points raised in the lectures and readings and are considered an integral part of the class. (Contact me **in advance** if you will be unable to attend one of these classes so that we can work out an alternative activity.)

Out-of-class Participation — As a Virginia Tech student it is important that you engage with the world. One mechanism to do so is via social media. Twitter is one fairly simple means to share news stories of interest both with the class and with the larger world. Each of you should set up a Twitter account (or alternatively Instagram) and use it to tweet stories or pictures that you think are of interest with the hashtag #publichealth. [Note if you choose to use Instagram, you will need to email the GTA and I your posts.] Each person in class should share a minimum of **20** unique tweets over the course of the semester. [In other words, retweets of one another or new tweets of stories that have already been shared do not count.]

Exams — Three exams will be given throughout the semester, with the third scheduled for the final exam period. Each exam is worth 15% of the overall course grade. The final is NOT cumulative.

Honor System: *All aspects of the coursework for this class are covered by the University Honor System. As noted, some **homework** may be completed by small groups (1-3 people), however, each individual must put their name on the submitted copy of the homework. By doing so they attest that they contributed in some manner to the final product.*

The Undergraduate Honor Code pledge that each member of the university community agrees to abide by states:

"As a Hokie, I will conduct myself with honor and integrity at all times. I will not lie, cheat, or steal, nor will I accept the actions of those who do."

Students enrolled in this course are responsible for abiding by the Honor Code. A student who has doubts about how the Honor Code applies to any assignment is responsible for obtaining specific guidance from the course

instructor before submitting the assignment for evaluation. Ignorance of the rules does not exclude any member of the University community from the requirements and expectations of the Honor Code. For additional information, please visit: https://www.honorsystem.vt.edu/

Special Needs: If you need adaptations or accommodations because of a disability (e.g. learning, attention deficit disorder, psychological, physical, etc.), if you have emergency medical information to share with me, or if you need special arrangements in case the building must be evacuated, please make an appointment or email me prior to January 29th.

Principles of Community Statement:

The VT Principles of Community are intended to increase access and inclusion and to create a community that nurtures learning and growth for all of its members. They are defined at: https://www.vt.edu/about/diversity/ and replicated here:

Virginia Tech is a public land-grant university, committed to teaching and learning, research, and outreach to the Commonwealth of Virginia, the nation, and the world community. Learning from the experiences that shape Virginia Tech as an institution, we acknowledge those aspects of our legacy that reflected bias and exclusion. Therefore, we adopt and practice the following principles as fundamental to our on-going efforts to increase access and inclusion and to create a community that nurtures learning and growth for all of its members:

- We affirm the inherent dignity and value of every person and strive to maintain a climate for work and learning based on mutual respect and understanding.
- We affirm the right of each person to express thoughts and opinions freely. We encourage open expression within a climate of civility, sensitivity, and mutual respect.
- We affirm the value of human diversity because it enriches our lives and the University. We acknowledge and respect our differences while affirming our common humanity.
- We reject all forms of prejudice and discrimination, including those based on age, color, disability, gender, national origin, political affiliation, race, religion, sexual orientation, and veteran status. We take individual and collective responsibility for helping to eliminate bias and discrimination and for increasing our own understanding of these issues through education, training, and interaction with others.
- We pledge our collective commitment to these principles in the spirit of the Virginia Tech motto of *Ut Prosim* (That I May Serve).

Tentative Schedule

Days	Week	Discussion Topic	Homework (Approximate dates)
Jan. 16,18	1	Introduction to the class Environmental disease Influenza case study*	HW 1 – assigned
Jan. 23,25	2	Global burden of disease and DALYs Disease emergence and reemergence	HW 1 – due HW 2 – assigned
Jan. 30, Feb. 1	3	Disease emergence and reemergence Antibiotic resistance case study*	HW 2 – due HW 3 – assigned
Feb. 6,8	4	Toxicology Toxicology case study*	HW 3 – due HW 4 – assigned
Feb. 13,15	5	Epidemiology Epidemiology case study*	HW 4 – due HW 5 - assigned
Feb. 20,22	6	Epidemiology **Exam 1 – Disease emergence and reemergence, toxicology**	HW 5 – due HW 6 - assigned
Feb. 27, Mar. 1	7	Public health measures for disease control Case Study*	HW 6 – due HW 7 – assigned
Mar. 13,15	8	Vector-borne disease Vector-borne disease control methods Case Study*	HW 7 – due HW 8 – assigned
Mar. 20,22	9	Pesticides and Herbicides **Exam 2 – Epidemiology, vector-borne disease, malaria**	HW 8 – due
Mar. 27,29	10	Malaria case study* Common source diseases – Food and Water	HW 9 – assigned
Apr. 3,5	11	Common source diseases – Food and Water Typhoid in Tajikistan Case Study*	HW 9 – due HW 10 – assigned
Apr. 10,12	12	Health aspects of excreta disposal On-site wastewater treatment	HW 10 – due
Apr. 17,19	13	Water demand and supply	
Apr. 24,26	14	Inorganic and Organic Hazards	
May 1	15		
May 5 (Sat.) 1:05-3:05		**Exam 3 – Common source diseases; Inorganic and Organic Hazards**	