Graduate School of Public Health
Department of Infectious Diseases and Microbiology
PUBHLT2015 Public Health Biology
Mondays, 2:00 – 3:50PM (except Labor Day)
A115 Crabtree Hall
Credit Hours: 2
Fall term 2017

Logistics/Contact Information
- Course director and Primary Instructor: Jeremy Martinson; (412) 624-5646, email jmartins@pitt.edu, office 2134 Parran Hall. Office hours by arrangement.
- Co-Instructor: Ryan Minster; (412) 624-6928, email rminster@pitt.edu, office A302A Crabtree Hall. Office hours by arrangement.

Course Description
Official description from University course catalog: This core course will provide an introduction to the biological foundations of many systems that are important in public health. The major determinants of human disease will be considered from an integrated ecological perspective that brings together molecular and population-based approaches to the study of infectious disease (with particular focus on HIV/AIDS, polio, emerging infections, and disease outbreaks following natural disasters) and genetically-determined diseases including “simple” genetic diseases such as cystic fibrosis and “complex” diseases such as hypertension). The host response to infection will be considered, as will the disorders that result from defects in this system, including allergy and asthma. Current developments in genomic science will be covered, including the ethical, legal and social implications of the increased capability to detect and predict disease outcome in individuals and populations. On completion of this course, students will have an understanding of the biological bases of many conditions that are important to public health, and that they will encounter as public health students and practitioners.

CEPH competencies: Pitt Public Health is accredited by the Council on Education in Public Health (CEPH) as a school authorized to offer the Master of Public Health (MPH) degree. Part of that accreditation requires us to provide instruction in a variety of core public health competencies to all our students. CEPH has identified a variety of competencies, which it expects all MPH graduates to demonstrate. This course most directly addresses CEPH competency Explain biological and genetic factors that affect a population’s health, although several other competencies will also be partially addressed (List major causes and trends of morbidity and mortality in the US or other community relevant to the school or program; Explain the critical importance of evidence in advancing public health knowledge; Explain how globalization affects global burdens of disease; and Explain an ecological perspective on the connections among human health, animal health and ecosystem health (eg, One Health)).

Learning Objectives
Upon completion of this course, students will be able to:
1. Explain the role of biology in the ecological model of Public Health
2. Integrate general biological and molecular concepts into issues affecting Public Health
3. Explain how infectious agents affect the health of individuals and populations
4. Describe the role of the immune system in individual and population health
   o Explain how the immune system functions normally to protect against disease
   o Describe how this normal function is enhanced by vaccination
   o Explain the consequences of a breakdown in normal immune function
5. Explain how genetics and genomics affect disease processes and Public Health practice
6. Identify the ethical, legal and social issues arising from Public Health biology
7. Understand the role of evidence-based biological concepts in the broader Public Health arena.

Required Textbooks/Articles/Readings
There is no required text for this class. Reading material will be drawn from the primary research literature and other in-depth articles, and will be posted on the course BlackBoard site.

Supplemental Readings/Bibliography
Schneider's *Introduction to Public Health* provides a good introduction to much of the material presented here. Rather than purchasing a specific text, students are encouraged to use online resources, such as the textbook library available at the National Library of Medicine website [http://www.ncbi.nlm.nih.gov/books](http://www.ncbi.nlm.nih.gov/books). The following texts are particularly relevant to the course, and are present on that site:

- **Immunobiology, 5th ed** by Janeway *et al* provides a good overview of the nature of the host response to infection.
- **An Introduction to Genetic Analysis** by Griffiths *et al*, and *Modern Genetic Analysis* by the same authors are both extremely good texts that provide a thorough introduction to genetics.
- **Genomes, 2nd ed** by Brown is an excellent introduction to genomic science.
- **Introduction to Genes and Disease** is a collection of online articles covering many genetic disorders, with links to key websites relevant to each disease.

CourseWeb/BlackBoard Instruction
This course will extensively use the University's BlackBoard site [also known as CourseWeb]. Each lecture will be accompanied by supporting material and further reading, all of which will be made available around the time of the lecture. It is the student's responsibility to check for, and read, this material. Each lecture will be accompanied by a quiz, which students are required to take. Discussion topics related to the course will also be posted on CourseWeb, and, for the purpose of determining a student's grade, participation in these discussions will be considered as equivalent to participation in class discussion. The instructors will use the CourseWeb site and Pitt email as the primary means of communicating with the students, who are expected to check these on a regular basis throughout the semester.

Required or Recommended Software
There is no required software package for this course.

Required or Recommended Equipment
No equipment is required for this course. Computers and a/v equipment will be provided for students’ use in the end-of-semester presentations.

Class Expectations/ Behavior and Ground Rules
To ensure the free and open discussion of ideas, students may not record classroom lectures, discussion and/or activities without the advance written permission of the instructor, and any such recording properly approved in advance can be used solely for the student’s own private use.

Grading Scale (required)
This course is letter graded, and grades will be assigned as follows:

- 90-100% A
- 80-89% B
- 70-79% C
- 60-69% D
- < 60% F
Student Performance Evaluation (Assessments and Weights) (required)

Grades will be assigned on the basis of:

- Class participation (15%). Please join in the discussions in class or on the Courseweb site. If I don't know who you are by the end of the course, it will be hard to give you a grade for this!
- Online weekly quizzes (20%). The weekly meetings will be accompanied by material presented on the Courseweb site. There will be a short (typically 20 multiple-choice questions) online quiz posted to accompany each lecture. The quizzes will remain available for the whole of the semester and can be taken at any time, not just in the week of the particular class.
- Midterm exam (30%). There will be one midterm exam. It will be a take-home written paper that will be made available after class on Monday October 9th, and answers will be due by the start of class on Monday October 16th.
- Final student presentations (35%). The grade for this will be determined by a combination of the written and in-class parts of your presentation.

Assignments and Descriptions

Each student will work collaboratively with other students (groups of 2-3 students at most) to prepare and present a project on the Public Health significance of a particular disease, genetic trait, or other biological system. The project should be designed to explain the basic biology and the Public Health significance of the chosen topic to a lay audience. Each student group will produce a piece of work (a paper, a poster, a leaflet, or some other piece approved by the instructors) and then describe this piece in a brief in-class presentation (5-10 minutes at most, plus time for questions) at the end of the semester.

Schedule of Sessions and Assignments

Week 1-Introduction: The Ecological Model of Public Health (Monday August 28th 2017)
This class will introduce students to the course itself, and will cover the major historical advances in disease treatment and prevention. It will also compare and contrast patterns of health and disease between the modern and historical US population, and between the developed and developing worlds. If they wish, students should read chapters 9-12 of Schneider's An Introduction to Public Health to gain the necessary background to the course.

Week 2-NO CLASS: Labor Day Holiday (Monday September 4th 2017)
Although there is no formal class this week, reading material and discussion topics will be available on CourseWeb. Students should also familiarize themselves with the online references at the NCBI website http://ncbi.nlm.nih.gov/books, using Janeway's Immunobiology as an example as this material will be useful in the upcoming series of lectures. This week is also a good time to find workgroup partners and to decide on your end-of-semester presentation topic.

Week 3-The Host Response to Infectious Disease (Monday September 11th 2017)
This class will review the role of the immune system in host defense. The different strategies used to defend the host against the wide variety of pathogens we all face will be covered, and this class will also consider the disease states that arise when the normal function of the immune system is impaired.

Week 4-Vaccination and Public Health importance of smallpox and polio (Monday September 18th 2017)
This class will cover the ways in which the normal immune response can be augmented by vaccination strategies. The Public Health significance of this approach to disease prevention will be discussed in class, including concepts like herd immunity, opposition to vaccination, and
compulsory vaccination laws. Smallpox and polio highlight the successes and challenges of mass vaccination campaigns. The successful eradication of smallpox will be compared with the challenges remaining in the eradication of polio. In each case the biology of the disease, the basis of their vaccination campaigns, and the Public Health implications will be discussed.

**Week 5-Emerging Infectious Diseases I: HIV/AIDS (Monday September 25th 2017)**
Although many advances have been made in the treatment of infectious diseases, the pathogens themselves are able to respond to these and are still able to pose a threat to the health of the public. HIV is one of the most successful of these, and achieves its devastating effect on the host by attacking the immune response itself. The biology of HIV disease and AIDS will be covered, as will the changing demographics of HIV/AIDS in the USA and the impact of this disease in developing nations.

*Students’ presentation topic choices must be made by midnight on September 30th at the latest.*

**Week 6-Emerging Infectious Diseases II (Monday October 2nd 2017)**
This class will review many other types of emerging threats, including drug resistance, re-emergence of “classic” infections, and the introduction of disease agents, such as West Nile Virus, into new environments.

**Week 7-Bioterrorism: Public Health in reverse (Monday October 9th 2017)**
This module will consider the intentional use of infectious diseases as agents of warfare and terrorism, a phenomenon that has been called “Public Health in Reverse”. The historical use of biological agents in warfare will be covered, as will their more recent use in the 20th and 21st centuries. The CDC classification of bioterrorism agents will be presented as well.

*The take-home midterm exam will be made available after class on October 9th. Answers are to be returned by the start of class on Monday October 16th.*

**Week 8-Genetic Diseases: From the Simple to the Complex (Monday October 16th 2017)**
This class will cover the basic inheritance patterns shown by simple Mendelian disorders. The concepts of modifier genes, gene-gene and gene-environment interactions will be introduced, and extended to consider the complex nature of multifactorial diseases. The additional challenges of discovering, diagnosing and preventing these disorders will be considered.

**Week 9-Genetic Testing: Practice and Ethics (Monday October 23rd 2017)**
The methods and procedures used to diagnose inherited disorders have undergone rapid development in recent years. This class will review those techniques, highlighting the range of conditions that it is now possible to detect. The far-reaching implications of such tests will be considered, both in terms of disease detection and individual rights.

**Week 10-Cancer: Genes, Environment, Pathogens (Monday October 30th 2017)**
Cancer at its most fundamental is a disease of gene dysregulation, but this dysregulation can be caused by environmental agents, infectious pathogens, or innate genetic defects. This class will consider tumor-suppressor genes and oncogenes, explaining how they interact with environmental and infectious mutagens to cause disease.

**Week 11-Part I: Influenza / Part II: Student choice (Monday November 6th 2017)**
This week's class will be in two parts. The first part of this class will provide a review of the 2009 H1N1 influenza pandemic in the US and worldwide. The Public Health lessons learned from this outbreak will be discussed.
The content of the second part of this lecture is determined by the students. A voting forum will be set up on Courseweb for you to nominate and vote on issues of current Public Health significance that have not been covered in earlier lectures. Previous topics have included: vaccination to prevent cocaine and nicotine addiction; the genetic basis of autism and other behavioral conditions; the biological basis of cardiovascular disease; and the biology of opioid addiction and dependency.

Week 12-Student Presentations (Monday November 13th 2017)
Student presenters should be prepared to take questions from the audience. Students are also expected to attend and discuss the presentations, even if they are not presenting in this session.

Week 13-Student Presentations (Monday November 20th 2017)
Student presenters should be prepared to take questions from the audience. Students are also expected to attend and discuss the presentations, even if they are not presenting in this session.

Week 14-Student Presentations (Monday November 27th 2017)
Student presenters should be prepared to take questions from the audience. Students are also expected to attend and discuss the presentations, even if they are not presenting in this session.

Week 15-Student Presentations (Monday December 4th 2017)
Student presenters should be prepared to take questions from the audience. Students are also expected to attend and discuss the presentations, even if they are not presenting in this session.

Accommodation for Students with Disabilities
If you have any disability for which you may require accommodation, you are encouraged to notify both your instructor and the Office of Disability Resources and Services, 140 William Pitt Union (Voice or TTD 412-648-7890) as early as possible in the term.

Academic Integrity Statement
All students are expected to adhere to the school’s standards of academic honesty. Any work submitted by a student for evaluation must represent his/her own intellectual contribution and efforts. The Graduate School of Public Health’s policy on academic integrity, approved by EPCC on 10/14/08, which is based on the University policy, is available online in the Pitt Public Health Academic Handbook (http://www.publichealth.pitt.edu/home/academics/academic-requirements/academic-integrity-and-plagiarism). The policy includes obligations for faculty and students, procedures for adjudicating violations, and other critical information. Please take the time to read this policy.

Students committing acts of academic dishonesty, including plagiarism, unauthorized collaboration on assignments, cheating on exams, misrepresentation of data, and facilitating dishonesty by others, will receive sanctions appropriate to the violation(s) committed. Sanctions include, but are not limited to, reduction of a grade for an assignment or a course, failure of a course, and dismissal from the school.

All student violations of academic integrity must be documented by the appropriate faculty member; this documentation will be kept in a confidential student file maintained by the Office of Student Affairs. If a sanction for a violation is agreed upon by the student and instructor, the record of this agreement will be expunged from the student file upon the student’s graduation. If the case is referred to the Pitt Public Health Academic Integrity Hearing Board, a record will remain in the student’s permanent file.

Diversity Statement
In this course, students, faculty and guests represent a diversity of individual perspectives, backgrounds, and experiences, which enriches our classes. We urge all to be respectful of others. While intellectual disagreement may be constructive, no harsh statements, or demeaning or discriminatory behavior will be permitted. If you feel uncomfortable, please feel free to approach me to discuss the situation.

Copyright Notice
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Sources: Center for Instructional Design and Distance Education (CIDDE) Syllabus Template and Syllabus Checklist, Office of Disability Resources and Services, EPCC syllabus checklist.