Introduction

This course introduces students to a variety of different biological concepts important to Public Health. It is intended to give students an understanding of the biological bases of many systems, including those (such as asthma, polio, and genetic screening) that they will encounter frequently in the Public Health core courses. During this course, students will learn about the biology of infectious diseases, inherited diseases, and cancer, and will develop an understanding of how these diseases affect individuals and populations in terms of Public Health.

Class Meeting Times

The weekly meetings for this class take place on Mondays (except for Labor Day), from 2PM-3:50PM, in room A115 of Crabtree Hall, Graduate School of Public Health. This is a full semester course, running from Monday August 26th to Monday December 2nd 2013. Please note that, due to the Pitt Fall Break, one class will take place on Tuesday October 15th.

Course Goals

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
   • Explain how the immune system functions normally to protect against disease
   • Describe how this normal function is enhanced by vaccination
   • Explain the consequences of a breakdown in normal immune function
5. Explain how genetics and genomics affect disease processes and Public Health practise
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

Course Materials

There is no required text for this class, although 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. The following texts are particularly relevant to the course:

- **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.

This material will be supplemented with additional material from the scientific literature throughout the course. If such material is made available on the PUBHLT2015 Courseweb site in advance of a lecture, students are expected to read it before the lecture.

Course requirements and grading

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 7th, and answers will be due by the start of class on Tuesday October 15th.
- Final student presentations (35%). The grade for this will be determined by a combination of the written and in-class parts of your presentation.

**Student Presentations**

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.

**Grading Scale**

The grading scale is as follows:

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<th>Grade</th>
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<tr>
<td>A+</td>
<td>98%-100%</td>
<td>87%-89.9% = B+</td>
<td>70%-79.9% = C</td>
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<td>A</td>
<td>92%-97.9%</td>
<td>82%-87.9% = B</td>
<td>65%-69.9% = D</td>
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<td>A-</td>
<td>90%-91.9%</td>
<td>80%-81.9% = B-</td>
<td>Below 65% = F</td>
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**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.

Course Schedule

Week 1-Introduction: The Ecological Model of Public Health (Monday August 26th 2013)

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 3-NO CLASS: Labor Day Holiday (Monday September 2nd 2013)

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](http://ncbi.nlm.nih.gov/books), using Janeway's *Immunobiology* as an example as this material will be useful in the upcoming series of three 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 9th 2013)

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.

Students' presentation topic choices must be made by September 15th
Week 4-Vaccination and Public Health importance of smallpox and polio (Monday September 16th 2013)

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 23rd 2013)

HIV 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.

Week 6-Emerging Infectious Diseases (Monday September 30th 2013)

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. This class will review the 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 7th 2013)

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 7th. Answers are to be returned by the start of class on Tuesday October 15th.

Week 8-Genetic Diseases: From the Simple to the Complex (Tuesday October 15th 2013)

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: Practise and Ethics (Monday October 21st 2013)

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 28th 2013)

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 4th 2013)

This week's class will be in two parts. The first part of this class will provide an
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 the Southeast Asian Tsunami, vaccination to prevent cocaine and nicotine addiction, the genetic basis of autism and other behavioral conditions, and the biological basis of cardiovascular disease.

**Week 12-Student Presentations (Monday November 11th 2013)**

Student presenters should be prepared to take questions from the audience.

**Week 13-Student Presentations (Monday November 18th 2013)**

Student presenters should be prepared to take questions from the audience.

**Week 14-Student Presentations (Monday November 25th 2013)**

Student presenters should be prepared to take questions from the audience.

**Week 15-Student Presentations (Monday December 2nd 2013)**

Student presenters should be prepared to take questions from the audience.

**Week 15-Finals Week (Monday December 9th 2013)**

This class does not have a final exam this week. I cannot say the same for your other courses!