Invisible Killers: Infectious Diseases in Developing Countries

COURSE DESCRIPTION:
Every year, millions of people in developing nations die of diseases that are rare and easily treated elsewhere. This course will investigate the health concerns prevalent in these impoverished areas with a focus on infectious diseases. We will highlight a variety of bacterial, viral, and parasitic pathogens from a historical, social, and medical perspective. This course will discuss their molecular bases of infection and transmission and how the immune system battles such infections. Additionally, we will explore the history of these illnesses, discuss their underlying causes, and investigate different methods to alleviate these health crises. We will not only study current plans to solve these medical problems, but also study the flaws within those programs.

This class will be based on lectures and documentaries, and students will be expected to participate in classroom discussion. Discussion will provide students with the opportunity to address their interests and explore novel ideas with their classmates. By the end of the course, students will have a general understanding of the different infectious agents, their modes of replication and propagation inside the human host, and how they are transmitted. In addition, students will also be expected to know the basic signs and symptoms, prevention, as well as how socioeconomic factors affect treatment, outcome, and spread of the disease. Students will learn to think critically about methods that can be used to solve these health issues. This course aims to pique students' interests in infectious disease, and students will gain insight on these public health issues from a biological, medical, and social perspective.

Each lecture topic will address:

- A brief history of the infectious disease
- Biology of the pathogen
- The molecular mechanism of infection
- The immune response
- Symptoms, diagnosis, treatment, prognosis
- Transmission & prevention
- Areas affected around the world
- Barriers to treatment: culture & socioeconomic factors
- Efforts to resolve these health issues

FACILITATORS:

Megan Lu	meganlu@berkeley.edu
Jennifer Tran	j-tran@berkeley.edu
Y-Nhy Duong	y-nhyduong@berkeley.edu

COURSE DETAILS:
This course will meet once a week for two hours and is worth two units.

ATTENDANCE:
There may be no more than two unexcused absences. Students must attend the exam session to pass the class; there will be no make-up exams.

COURSEWORK:
For every lecture, students will be asked to write down a few interesting facts or comments regarding the lecture (~5 sentences will suffice). They will also be required to answer a question pertaining to the day's lecture. Both will be turned in at the end of each class period and will be used to mark attendance.

EXAM:
At the end of the course, students will take an exam to assess what they have learned in the class. One double-sided handwritten sheet of notes will be permitted on the exam.

REQUIREMENTS TO PASS THE COURSE:
Students must attend at least 12 classes (out of 14 total) AND score at least 70% on the exam. Anyone caught cheating will receive an automatic fail.

COURSE SYLLABUS:
Week 1: Introduction to the course
- Administrative details
- Syllabus and exam
- Overview of infectious diseases around the globe

Week 2: Infectious diseases at a glance
- Bacterial, viral, and parasitic pathogens
- Factors that affect the spread of a disease
- Barriers to treatment, malnutrition, genetically modified foods
- Vaccination, smallpox eradication

Week 3: Malaria & other mosquito-borne diseases
- Protozoan parasites
- Mosquito control, prophylactic drugs
- Encephalitis: Japanese, St. Louis, West Nile, La Crosse
- The Global Fund to fight AIDS, Tuberculosis, and Malaria

Week 4: Hemorrhagic Fevers & Meningitis
- Viral hemorrhagic fevers: *Arenavirus, Filovirus, Bunyavirus, Togavirus, Flavivirus*
    - Dengue Fever, Yellow Fever, Ebola
- Typhoid: bacterium *Salmonella enterica*
- Meningitis: Bacterial, Viral, Fungal

Week 5: Maternal Health and Child Mortality
- Complications of pregnancy and childbirth
- Bacterial infection, pre-eclampsia, HELLP syndrome, hemorrhage, puerperal sepsis, etc
- Neonatal health
- Mother-to-child transmission of diseases

Week 6: Hepatitis A/B/C
- Hepatitis A: *Picornaviridae*
- Hepatitis B: *Hepadnaviridae*
- Hepatitis C: *Flaviviridae*

Week 7: HIV/AIDS
- Origin, history, misconceptions
- Lentivirus (member of retrovirus family)
- Mother-to-child transmission
- Evolution of HIV & current research

Week 8: Enteric/Diarrheal Diseases
- Childhood hospitalization & death
- Cholera – bacterium *Vibrio cholerae*
- Salmonellosis – *Salmonella* bacteria
- Rotavirus - *Reovirus*
- Giardia – protozoan parasite *Giardia lamblia*
- Shigellosis – *Shigella* bacteria

Week 9: Respiratory Infections – The #1 Killer
- Lower respiratory tract infections, pneumonia
- Influenza A/B/C: *Orthomyzoviridae*
- SARS: *Coronavirus*

Week 10: Tuberculosis, Tetanus, Syphilis
- Tuberculosis: *Mycobacterium tuberculosis*
- Tetanus: bacterium *Clostridium tetani*
- Syphilis: bacterium *Treponema pallidum pallidum*

Week 11: Measles, Pertussis, Rotavirus
- Measles: *Paramyxovirus*
- Pertussis (whooping cough): bacterium *Bordetella pertussis*
- Rotavirus: *Reovirus*

Week 12: Parasitic diseases & lesser known infections
- African sleeping sickness: protozoan parasite *Trypanosoma brucei*
- River blindness: nematode *Onchocerca volvulus*
- Schistosomiasis: parasitic *Schistosoma*
- Chagas: protozoan *Typanosoma cruzi*
- Trachoma: bacterium *Chlamydia trachomatis*
- Ascariasis: parasitic roundworm *Ascaris lumbricoides*

Week 13: Ebola & Exam preparation
- Ebola: *Filvoviridae* family
- NOVA documentary: *Ebola – The Plague Fighters*
- Exam details & course review

Week 14: Exam