Epidemiology 605: Introduction to Infectious Disease Epidemiology  
Winter Term, 2012  
3 Credits  
Tuesday, Thursday 1-2:30  
SPH I room 1755

Instructor: Mark L. Wilson  
Professor of Epidemiology and of Ecology and Evolutionary Biology  
Room M5507 SPH II  
936-0152  
wilsonml@umich.edu

Pre-requisites: This course assumes students have successfully completed Epid 600 or Epid 503 or the equivalent

Subsequent courses: Epid 605 is a pre-requisite for Epid 606.

Course philosophy: The goal is to introduce students to the special design, measurement, analysis and intervention issues associated with the epidemiology of infectious diseases. We will address contemporary infectious diseases of public health importance in the developed and underdeveloped world.

General objectives:
1. Introduce students to disease and transmission characteristics, and the descriptive epidemiology of infectious agents.
2. Help students understand the theoretical basis of pathogen and transmission characteristic interactions and how they produce patterns of disease occurrence.
3. Enable the student to apply this understanding to disease prevention and control.

Specific objectives:  
Upon completion of the course, the student should be able to:

1. Characterize the difference between viruses, fungi, bacteria, and parasites, their measurement, natural history and epidemiology.
2. Explain the different mechanisms of transmission as they relate to viruses, fungi, bacteria, and parasites, and use examples to illustrate these differences.
3. Explain the components of a surveillance system, describe different types and purposes of surveillance, and discuss the strengths and weaknesses of different surveillance systems.
4. Evaluate the pros and cons of different prevention and control measures, select the most appropriate measure, and be able to justify that selection.
5. Design control plans for diverse infectious disease problems in various settings.
Our intent is to present material in class that is aimed at helping students to comprehend, synthesize and analyze problems and processes in infectious disease epidemiology. Students are expected to acquire knowledge of the basic descriptive epidemiology of several diseases. Some of these diseases will be presented as examples in lectures, and others will be part of the readings. Students will be tested on their knowledge of these diseases, and an ability to apply such knowledge to the various problems presented.

**Course Structure:**
Lectures, discussion and exercises. Sessions will be led by Professor Wilson and various guest lecturers. During some sessions, there will be discussions and brief summaries by students.

**Forms of Evaluation**
- Class Participation: 5%
- Homework: 20%
- First examination: 20%
- Second examination: 25%
- Third examination: 30%

**Readings:**

**Control of Communicable Diseases Manual** (19th Ed. 2008) (David L. Heymann, ed.). This is an excellent reference on the epidemiology of virtually all infectious diseases. We will use this book as the primary reference for the diseases that you will be expected to know well (see exit competencies). Many of the terms and concepts used in the course are defined in the back of the book. Available at Ulrich's, Michigan Union, and Michigan Book and Supply. Earlier editions should be fine for most diseases.

**Infectious Disease Epidemiology: Theory and Practice 2nd Edition, 2007** (K. E. Nelson, C. M. Williams, eds.). This book provides an introduction to the epidemiology of infectious diseases, with chapters on fundamental principles and disease examples. It will serve as the text for most of the required reading and other material that will be covered in the course. Available at Ulrich's, Michigan Union, and Michigan Book and Supply.

Reading assignments in the schedule below refer to Chapters in Nelson and Williams 2nd Edition unless otherwise indicated. Other readings will be on CTools.

**CTools**
Much of the material from lectures (notes, discussions, etc.), as well as announcements, reminders, changes and other information, will be available through UM's CTools website. If you are registered for this course, you should access the Epid. 605 course there and consult the site regularly for new material that will be added frequently.
**Tentative Course Outline - Winter Term 2012**

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Read Before Lecture</th>
<th>Assignments/Exams</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 Jan</td>
<td>Introduction and overview</td>
<td>IOM* pp.1-17</td>
<td>Class participation</td>
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<tr>
<td>10</td>
<td>Special features of infectious disease epidemiology</td>
<td>Chapt. 1 IOM* Chapt. 2</td>
<td>Class participation</td>
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<tr>
<td>12</td>
<td>Introduction to transmission mechanisms</td>
<td>Chapt. 2 CTools readings</td>
<td>Class participation</td>
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<tr>
<td>17</td>
<td>Characteristics of pathogens – parallels and differences (Duane Newton, PhD)</td>
<td>Chapt. 8 CTools readings</td>
<td>Class participation</td>
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<tr>
<td>19</td>
<td>Introduction to outbreak investigations</td>
<td>Chapt. 5 CTools readings</td>
<td>Class participation</td>
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<tr>
<td>24</td>
<td>Outbreak Investigation in practice</td>
<td>CTools readings</td>
<td>Class participation</td>
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<tr>
<td>26</td>
<td>Introduction to role of immunity: individual and population</td>
<td>Chapt. 10 CTools readings</td>
<td>Homework 1 Due</td>
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<tr>
<td>31</td>
<td>Eradication vs. Control</td>
<td>CTools readings</td>
<td>Class participation</td>
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<tr>
<td>2 Feb</td>
<td>Examination I</td>
<td></td>
<td>Examination</td>
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<tr>
<td>7</td>
<td>Vaccines: Disease Prevention (Arnold Monto, MD)</td>
<td>Chapt. 11 CTools readings</td>
<td>Class participation</td>
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<tr>
<td>9</td>
<td>Introduction to Surveillance</td>
<td>Chapt. 4 CTools readings</td>
<td>Class participation</td>
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<tr>
<td>14</td>
<td>Surveillance in practice - HIV/AIDS (Eve Mokotoff, MPH)</td>
<td>CTools readings</td>
<td>Class participation</td>
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<tr>
<td>16</td>
<td>Simulation modeling - Ro applications</td>
<td>CTools readings</td>
<td>Class participation</td>
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<tr>
<td>21</td>
<td>Hospital infections (Christy Zalewski, MPH)</td>
<td>CTools readings</td>
<td>Homework 2 due</td>
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<td>23</td>
<td>Antibiotic resistance</td>
<td>CTools readings</td>
<td>Class participation</td>
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<td>25 Feb</td>
<td>Break</td>
<td>---</td>
<td>Enjoy</td>
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<tr>
<td>6</td>
<td>Agent Factors/Disease Patterns</td>
<td>CTools readings</td>
<td>Class participation</td>
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<tr>
<td>8</td>
<td>Environment and Disease Patterns</td>
<td>CTools readings</td>
<td>Class participation</td>
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<tr>
<td>13</td>
<td>Social Factors and Disease Patterns</td>
<td>CTools readings</td>
<td>Class participation</td>
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<tr>
<td>15</td>
<td>Examination II</td>
<td></td>
<td>Examination</td>
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<tr>
<td>20</td>
<td>Airborne transmission</td>
<td>Chapt. 15, 19</td>
<td>Class participation</td>
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<tr>
<td>22</td>
<td>Sexually transmitted diseases</td>
<td>Chapt. 23</td>
<td>Homework 3 due</td>
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<tr>
<td>27</td>
<td>Preparing for Bioterrorism (Eden Wells, MD, MPH)</td>
<td>CTools readings</td>
<td>Class participation</td>
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<td>29</td>
<td>Fecal-Oral, Food/water transmitted diseases</td>
<td>Chapt. 20</td>
<td>Class participation</td>
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<td>3 Apr</td>
<td>Vector-borne disease transmission</td>
<td>Chapt. 24</td>
<td>Class participation</td>
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<td>5</td>
<td>Emerging and re-emerging infections</td>
<td>CTools readings</td>
<td>Class participation</td>
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<tr>
<td>10</td>
<td>Policy implications and policy development</td>
<td>CTools readings</td>
<td>Homework 4 due</td>
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<tr>
<td>12</td>
<td>Chronic diseases and infectious agents (Allison Aiello, PhD, MS)</td>
<td>CTools readings</td>
<td>Class participation</td>
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<tr>
<td>17</td>
<td>Examination III</td>
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<td>Examination</td>
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*Microbial Threats to Health: Emergence, Detection, and Response. Institute of Medicine. 2003*
Class Participation:
Larger classes tend to limit opportunities for class participation. We will use several
different teaching strategies to keep the class as interactive as possible. In order to regularly
evaluate our performance and keep in touch with your concerns, we will ask that at the end of
each class session you turn in a sheet of paper indicating:

1) Your name and date
2) What were the most important points presented at the days session?
3) Do you have any questions about the content of the day’s session?
4) What comments or suggestions on the lecture or material might improve it?

These comments will not be graded, but will be reviewed for content and used in
planning upcoming course sessions and as a measure of your participation. To receive this
participation credit, you must complete at least 1 & 2 and turn it in on a separate sheet of paper.
In addition, we expect your oral participation with questions and answers during the lecture.

Homework:
During the course there will be four "homeworks." These are intended to be individual
assignments. Although you may consult with each other (and are encouraged to do so if that
helps you to learn), the preparation of the assignment that you turn in is your individual
responsibility. Those students who turn in identical homework will be considered in violation
of ethical standards of our institution, and will receive no credit for that assignment.

Exit Competencies:
By the end of the course, you should be familiar with the vocabulary, terminology, and
general principles of surveillance, outbreak investigation, and the host, environmental, agent and
socio-cultural determinants of transmission. In addition, you should understand the principles
underlying mathematical modeling of infectious processes and of policy development. Consider
the following to be useful as a study guide for the class examinations.

For each transmission system, you should possess the following skills and knowledge:
1) an understanding of the general biology of that transmission system
2) a familiarity with some paradigmatic diseases transmitted by this route
3) an ability to construct informed hypotheses of causation based on the observed
   epidemiology and knowledge of that general pattern
4) an understanding socio-cultural and environmental factors that influence transmission
   by that route
5) the capacity to propose appropriate responses and intervention strategies
Although not all of these diseases will be discussed in detail during class, you are expected to be familiar with the epidemiology and transmission of the following diseases at the level described in Control of Communicable Diseases Manual. These diseases are of public health importance and/or are illustrative of particular epidemiologic patterns.

Chlamydial infection  Legionnaire's Disease
Cholera  Lyme Disease
Cryptosporidiosis  Malaria
Dengue  Measles
Gonorrhea  Plague
Group A strep  Polio
Hantaviral pulmonary syndrome  Rabies
Hepatitis A  Schistosomiasis
Herpes  Syphilis
HIV/AIDS  Tetanus
Hookworm  Tuberculosis
Influenza

**Computer resources of interest:**

**ProMED:** A list serve and web site that functions as a world-wide epidemiologic surveillance system. You can visit the web site to see current and past postings (http://www.promedmail.org) and you may subscribe to this list serve by sending an email message with only the text "subscribe" to: majordomo@promedmail.org. If you have questions, you can ask a real person at owner-promed@promedmail.org. A valuable resource.

**WHO Outbreak reports:** Part of WHO's Communicable Disease Surveillance and Response (CSR) network (http://www.who.int/csr/don/en/). This site also has many other kinds of information on pathogens, resistance, surveillance, etc. through its home page (http://www.who.int/emc/index.html)

**CDC outbreak information:** Through CDC's web site, you can find information on recent outbreaks (http://www.bt.cdc.gov/recentincidents.asp), and a diverse array of information on study design, example questionnaire, etc. (http://www.cdc.gov/outbreaknet/).

**Web Epidemiology:** Site with a large number of diverse web sites with epidemiological information and resources. (http://www.epibiostat.ucsf.edu/epidem/epidem.html#INF)
Standards of Academic Conduct

The faculty of the School of Public Health expects the conduct of a student registered or taking courses in the school to be consistent with that of a professional person. Courtesy, honesty, and respect should be shown by students toward faculty, guest lecturers, administrative support staff, and fellow students. Similarly, students should expect faculty to treat them fairly, showing respect for their ideas and opinions and striving to help them achieve maximum benefits from their experience in the school.

Student academic misconduct includes behavior involving plagiarism, cheating, fabrication, falsification of records or official documents, intentional misuse of equipment or materials, and aiding and abetting the perpetration of such acts. The preparation of reports, papers, and examinations, assigned on an individual basis, must represent each student’s own effort. Reference sources should be indicated clearly. The use of assistance from other students or aids of any kind during a written examination, except when the use of books or notes has been approved by an instructor, is a violation of the standard of academic conduct.