VMED 5180
Ecology of Infectious Diseases
Fall Semester 2013

Credits:  3
Meeting Days:  Tuesday and Thursday
Meeting Time:  9:45 – 11:00
Meeting Place:  East Bank (room not yet assigned)
Instructor:  Dr. Randall Singer
Office Phone:  (612) 625-6271
Fax:  (612) 625-5203
E-mail:  rsinger@umn.edu
Office Hours:  By appointment

I. Course Description
This course focuses on the ways in which host, agent and environmental interactions influence the transmission of infectious agents. Specific topics related to these microbes include: transmission probability, herd immunity, evolution of virulence, host specificity, host-agent co-evolution, antimicrobial resistance, environmental dissemination, eradication and control, and use of analytical and molecular tools.

II. Course Prerequisites
None. Students may not obtain credit for VMED 5180 if they have previously taken PubH 6180, PubH 6380 or CMB 5180.

III. Course Goals and Objectives
To understand the ways in which host, agent and environmental interactions influence the transmission of infectious agents.

After completing the course, participants will be able to:

• Design a scientific study in infectious disease epidemiology
• Gain experience in the use of infectious disease models
• Understand the basis of molecular and spatial data in infectious disease studies
• Critically evaluate journal articles concerning infectious disease epidemiology

Student Learning Outcome (SLO)
• Can identify, define, and solve problems
• Can communicate effectively
Assignments or coursework related to the SLO:

- All lectures involve discussion. All students will present a poster on their final project. All students will write a critical review paper on their topic. Exams are short-answer and essay and examine ability to relate concepts clearly.

How is the related coursework assessed?

- Assignments are reviewed and graded by the instructor to determine level of understanding of material. These assignments will help determine if assistance is needed. The final poster and project is also evaluated by other students and professors.

IV. Methods of Instruction and Work Expectations

A. Students will develop skills in scientific writing and will be required to write a short critical review paper.

B. Students will be able to identify key issues concerning infectious diseases and will develop the skills needed to give written and oral presentations about this material.

C. Following class lectures and discussions, students will be able to describe and discuss the following issues.

1. Factors that affect transmission and environmental stability of specific infectious agents.

2. The life cycle (agent, host, and environment interaction) of specific infectious agents (source(s) or reservoir(s) and host-range).

3. Factors that influence the ability of a vaccine to work effectively.

4. Challenges of controlling and/or eradicating infectious diseases.

5. Ways in which laboratory methods, especially in molecular microbiology, are being used to improve our understanding of the ecology of infectious diseases.

6. Uses of analytical tools, such as Geographic Information Systems (GIS) for describing the distribution or predicting the spread of infectious diseases.

7. Effects of environmental disturbance and climate change on infectious disease transmission.

D. The first class period will include faculty/student introduction, general introduction to the study of infectious diseases (including definitions and classifications), and informational resources.

E. Prior to each class meeting, all students are expected to familiarize themselves with the assigned topic using the suggested text(s) and appropriate references if necessary.

V. Course Text and Readings

Course Materials: Class notes and review articles will be provided online, but students should expect to take notes during lectures and discussions. Material to augment the lectures will be placed on reserve in the Veterinary Library and in the Bio-Medical Library.
Recommended Text – There is no required text for the course. Strengths and weaknesses of various recommended texts will be discussed on the first day of class.

Possible Reference and Texts and Websites:


## VI. Course Outline/Weekly Schedule

<table>
<thead>
<tr>
<th></th>
<th>Topic</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction to course&lt;br&gt;Overview of host - agent - environment interaction</td>
<td>September 3</td>
</tr>
<tr>
<td>2</td>
<td>Global distributions of microbes</td>
<td>September 5</td>
</tr>
<tr>
<td>3</td>
<td>Direct transmission - Reed-Frost</td>
<td>September 10</td>
</tr>
<tr>
<td>4</td>
<td>Direct transmission - Examples</td>
<td>September 12</td>
</tr>
<tr>
<td>5</td>
<td>Vector-borne disease transmission</td>
<td>September 17</td>
</tr>
<tr>
<td>6</td>
<td>Vector-borne disease transmission - Examples</td>
<td>September 19</td>
</tr>
<tr>
<td>7</td>
<td>Sexually-transmitted diseases</td>
<td>September 24</td>
</tr>
<tr>
<td>8</td>
<td>Sexually-transmitted diseases - Examples</td>
<td>September 26</td>
</tr>
<tr>
<td>9</td>
<td>Molecular Tools in Infectious Diseases</td>
<td>October 1</td>
</tr>
<tr>
<td>10</td>
<td>Molecular Tools - Examples</td>
<td>October 3</td>
</tr>
<tr>
<td>11</td>
<td>Vaccine theory - Models</td>
<td>October 8</td>
</tr>
<tr>
<td>12</td>
<td>Vaccine theory - Examples</td>
<td>October 10</td>
</tr>
<tr>
<td>13</td>
<td>Metagenomics and the structure of microbial populations</td>
<td>October 15</td>
</tr>
<tr>
<td>14</td>
<td><strong>Midterm</strong></td>
<td>October 17</td>
</tr>
<tr>
<td>15</td>
<td>Host specificity - Theory</td>
<td>October 22</td>
</tr>
<tr>
<td>16</td>
<td>Evolution of virulence - Theory</td>
<td>October 24</td>
</tr>
<tr>
<td>17</td>
<td>Host Specificity - Virulence - Examples</td>
<td>October 29</td>
</tr>
<tr>
<td>18</td>
<td>Host Specificity - Virulence - Examples</td>
<td>October 31</td>
</tr>
<tr>
<td>19</td>
<td>Antimicrobial Resistance - Theory</td>
<td>November 5</td>
</tr>
<tr>
<td>20</td>
<td>Antimicrobial Resistance - Examples</td>
<td>November 7</td>
</tr>
<tr>
<td>21</td>
<td>GIS and medical geography</td>
<td>November 12</td>
</tr>
<tr>
<td>22</td>
<td>Spatial Epidemiology</td>
<td>November 14</td>
</tr>
<tr>
<td>23</td>
<td><strong>Poster Presentations</strong></td>
<td>November 19</td>
</tr>
<tr>
<td>24</td>
<td><strong>Poster Presentations</strong></td>
<td>November 21</td>
</tr>
<tr>
<td>25</td>
<td><strong>No Class - Thanksgiving</strong></td>
<td>November 26</td>
</tr>
<tr>
<td>26</td>
<td><strong>No Class - Thanksgiving</strong></td>
<td>November 28</td>
</tr>
<tr>
<td>27</td>
<td>Wildlife and the disease ecosystem</td>
<td>December 3</td>
</tr>
<tr>
<td>28</td>
<td>Disease Eradication</td>
<td>December 5</td>
</tr>
<tr>
<td>29</td>
<td>Summary</td>
<td>December 10</td>
</tr>
<tr>
<td></td>
<td><strong>Final Papers Due</strong></td>
<td>December 17</td>
</tr>
</tbody>
</table>
VII. Evaluation and Grading

Grades will be based on the following:

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>5%</td>
<td>assignment #1</td>
</tr>
<tr>
<td>5%</td>
<td>outline of proposed written critical review paper</td>
</tr>
<tr>
<td>25%</td>
<td>written in-class midterm examination</td>
</tr>
<tr>
<td>5%</td>
<td>assignment #2</td>
</tr>
<tr>
<td>10%</td>
<td>poster presentation and evaluation</td>
</tr>
<tr>
<td>25%</td>
<td>written critical review paper</td>
</tr>
<tr>
<td>25%</td>
<td>written take-home final examination</td>
</tr>
</tbody>
</table>

The grading in this course will be non-competitive and grades will be assigned based on mastery of the material. Grades will be based on the standard 90,80,70,60 scale:

A -- 93-100 %
A- -- 90-92 %
B+ -- 87-89 %
B  -- 83-86 %
B- -- 80-82 %
C+ -- 77-79 %
C  -- 73-77 %
C- -- 70-72 %
D+ -- 67-69 %
D  -- 63-66 %
D- -- 60-62 %
F  -- 0 - 60 % – Represents failure and signifies that the work was either (1) completed but at a level of achievement that is not worthy of credit or (2) was not completed and there was no agreement between the instructor and the student that the student would be awarded an I.

S/N option must complete all assignments to a C- level (70%):

<table>
<thead>
<tr>
<th>S</th>
<th>Achievement that is satisfactory will be expected to complete all assignments and receive a minimum of 70% to receive a passing score (achievement required for an S is at the discretion of the instructor but may be no lower than a 70%).</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>Represents failure (or no credit) and signifies that the work was either (1) completed but at a level of achievement that is not worthy of credit or (2) was not completed and there was no agreement between the instructor and the student that the student would be awarded an I.</td>
</tr>
</tbody>
</table>

All assignments must be turned in by the assigned date. Each day that an assignment is late will result in a 10% reduction in the overall score for that assignment. Prior arrangements must be made with the instructor if an assignment is expected to be turned in late.
Incomplete Contracts
A grade of incomplete “I” shall be assigned at the discretion of the instructor when, due to extraordinary circumstances (e.g., documented illness or hospitalization, death in family, etc.), the student was prevented from completing the work of the course on time. The assignment of an “I” requires that a contract be initiated and completed by the student before the last official day of class, and signed by both the student and instructor. If an incomplete is deemed appropriate by the instructor, the student in consultation with the instructor, will specify the time and manner in which the student will complete course requirements. Extension for completion of the work will not exceed one year (or earlier if designated by the student’s college).

University of Minnesota Uniform Grading and Transcript Policy
A link to the policy can be found at onestop.umn.edu.

VIII. Other Course Information and Policies

Grade Option Change (if applicable)
For full-semester courses, students may change their grade option, if applicable, through the second week of the semester. Grade option change deadlines for other terms (i.e. summer and half-semester courses) can be found at onestop.umn.edu.

Course Withdrawal
Students should refer to the Refund and Drop/Add Deadlines for the particular term at onestop.umn.edu for information and deadlines for withdrawing from a course. As a courtesy, students should notify their instructor and, if applicable, advisor of their intent to withdraw.

Student Conduct, Scholastic Dishonesty and Sexual Harassment Policies
Students are responsible for knowing the University of Minnesota, Board of Regents’ policy on Student Conduct and Sexual Harassment found at www.umn.edu/regents/polindex.html.

Plagiarism is an important element of this policy. It is defined as the presentation of another’s writing or ideas as your own. Serious, intentional plagiarism will result in a grade of "F" or "N" for the entire course. For more information on this policy and for a helpful discussion of preventing plagiarism, please consult University policies and procedures regarding academic integrity: http://writing.umn.edu/tww/plagiarism/.

Students are urged to be careful that they properly attribute and cite others’ work in their own writing. For guidelines for correctly citing sources, go to http://tutorial.lib.umn.edu/ and click on “Citing Sources”.

In addition, original work is expected in this course. Unless the instructor has specified otherwise, all assignments, papers, reports, etc. should be the work of the individual student. It is unacceptable to hand in assignments for this course for which you receive credit in another course unless by prior agreement with the instructor. Building on a line of work begun in another course or leading to a thesis, dissertation, or final project is acceptable.
Disability Statement

It is University policy to provide, on a flexible and individualized basis, reasonable accommodations to students who have a documented disability (e.g., physical, learning, psychiatric, vision, hearing, or systemic) that may affect their ability to participate in course activities or to meet course requirements. Students with disabilities are encouraged to contact Disability Services to have a confidential discussion of their individual needs for accommodations. Disability Services is located in Suite 180 McNamara Alumni Center, 200 Oak Street. Staff can be reached by calling 612/626-1333 (voice or TTY).

The following policies apply to all courses at the University of Minnesota:

Teaching and Learning: Student Responsibilities (Twin Cities, Morris, Rochester)
Makeup Work for Legitimate Absences: Twin Cities, Morris, Rochester
Use of Personal Electronic Devices in the Classroom: Twin Cities, Morris, Rochester
Appropriate Student Use of Class Notes and Course Materials: Twin Cities, Morris, Rochester
Student Conduct Code
Sexual Harassment
Diversity, Equal Employment Opportunity, and Affirmative Action
Availability of Mental Health Services