

VMED 5180
Ecology of Infectious Diseases
Fall Semester 2014

Credits:	3
Meeting Days:	Tuesday and Thursday
Meeting Time:	9:45 – 11:00
Meeting Place:	Tuesdays, Mayo 3-125 Thursdays, Mayo D199
Instructors:	Dr. Randall Singer and Dr. Tiffany Wolf
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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.

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:

1. **Anderson, R. M.** 1982. The population dynamics of infectious diseases: Theory and applications. Chapman and Hall, London.
2. **Anderson, R. M. and R. M. May.** 1991. Infectious diseases of humans: Dynamics and control. Oxford University Press, Oxford.
3. **Brock, T. D.** 1999. Milestones in microbiology: 1546 to 1940. ASM Press, Washington, DC.
4. **Day, R. A.** 1998. How to write & publish a scientific paper. Oryx Press, Phoenix, Az.
5. **Diamond, J. M.** 1997. Guns, germs, and steel: The fates of human societies. W.W. Norton & Co, New York.
6. **Garrett, L.** 1994. The coming plague: Newly emerging diseases in a world out of balance. Penguin, New York.
7. **Grenfell, B. T. and A. P. Dobson.** 1995. Ecology of infectious diseases in natural populations. Cambridge University Press, Cambridge.
8. **Karlen, A.** 1995. Man and microbes: Disease and plagues in history and modern times. Putnam, New York.
9. **McNeill, W. H.** 1998. Plagues and peoples. Anchor Books/Doubleday, New York.
10. **Nelson, K. E., C. M. Williams, and N. M. H. Graham.** 2001. Infectious disease epidemiology: Theory and practice. Aspen Publishers, Gaithersburg, Md.
11. **Rollinson, D. and R. M. Anderson.** 1985. Ecology and genetics of host-parasite interactions. Orlando, Fla, London.
12. **Scott, M. E. and G. Smith.** 1994. Parasitic and infectious diseases: Epidemiology and ecology. Academic Press, San Diego, CA.
13. **Sherman, I. W.** 2006. The Power of Plagues. ASM Press, Washington, D.C.
14. **Stearns, S. C.** 1999. Evolution in Health and Disease. Oxford University Press, Oxford.
15. **Stearns, S. C. and J. C. Koella.** 2008. Evolution in Health and Disease. Oxford University Press, Oxford.

VI. Course Outline/Weekly Schedule

1	Introduction to course Overview of host - agent - environment interaction	September 8
2	Global distributions of microbes	September 10
3	Direct transmission - Reed-Frost	September 15
4	Direct transmission - Examples	September 17
5	Sexually-transmitted diseases	September 22
6	Sexually-transmitted diseases - Examples	September 24
7	Vector-borne disease transmission	September 29
8	Vector-borne disease transmission - Examples	October 1
9	Vaccine theory - Models	October 6
10	Vaccine theory - Examples	October 8
11	Metagenomics and the structure of microbial populations	October 13
12	Midterm	October 15
13	Case study	October 20
14	Host specificity - Theory	October 22
15	Evolution of virulence - Theory	October 27
16	Host Specificity - Virulence - Examples	October 29
17	Molecular Tools in Infectious Diseases	November 3
18	Molecular Tools - Examples	November 5
19	Antimicrobial Resistance - Theory	November 10
20	Antimicrobial Resistance - Examples	November 12
21	Poster Presentations	November 17
22	Poster Presentations	November 19
23	No Class - Thanksgiving	November 24
24	No Class - Thanksgiving	November 26
25	GIS and medical geography	December 1
26	Spatial Epidemiology	December 3
27	Wildlife and the disease ecosystem	December 8
28	Other	December 10
29	Summary	December 15
	Final Papers Due	December 18

VII. Evaluation and Grading

Grades will be based on the following:

- 5% - assignment #1 (**due no later than October 8**)
- 30% - written in-class midterm examination (**October 15**)
- 5% - outline of proposed written critical review paper (**due no later than November 5**)
- 10% - poster presentation and evaluation (**November 17 and 19**)
- 25% - written critical review paper (**due no later than December 3**)
- 25% - written take-home final exam (**assigned December 4, due no later than December 21**)

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%):

S	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%).
F	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.

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.

Students are responsible for maintaining scholastic honesty in their work at all times. Students engaged in scholastic dishonesty will be penalized, and offenses will be reported.

The University's Student Conduct Code defines scholastic dishonesty as "plagiarizing; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; or altering, forging, or misusing a University academic record; or fabricating or falsifying of data, research procedures, or data analysis."

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:

Grading and Transcripts: Twin Cities, Morris, Rochester.

Teaching and Learning: Instructor and Unit Responsibilities: Twin Cities, Morris, Rochester).

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