



**PubH 7230 Section 102 Class # 88037**  
**Insects and Human Disease Impacts on Global Health: Medical Entomology**  
**for the Public Health Professional**

**May Term 2017**

---

<b>Credits:</b>	1 credit
<b>Meeting Days/Time:</b>	May 30, 31, June 1      1:00pm – 5:00pm June 2                      1:00pm – 4:00pm
<b>Meeting Place:</b>	Blegen Hall – Room 230
<b>Instructors:</b>	Ann Fallon, PhD Distinguished McKnight University Professor Department of Entomology University of Minnesota  Elizabeth Schiffman, MPH, MA Epidemiologist Senior Infectious Disease Epidemiology, Prevention, and Control Division Minnesota Department of Health
<b>Office Address:</b>	420 Hodson Hall 1984 Folwell Av St Paul, MN 55108
<b>Office Phone:</b>	+1-612-625-3728
<b>E-mail:</b>	<a href="mailto:fallon@umn.edu">fallon@umn.edu</a> <a href="mailto:elizabeth.schiffman@state.mn.us">elizabeth.schiffman@state.mn.us</a>
<b>Office Hours:</b>	By appointment

---

**I. Course Description**

What's so attractive about human blood? How have human interactions with insects evolved? Insects and ticks transmit viral, bacterial, protozoan and filarial diseases to humans, particularly in tropical countries. Zika, most recently, and also dengue and other mosquito-borne viruses pose an increasing challenge in the southern US as climate change increases the range of important vector species. Lyme disease and other tick-borne diseases are increasing in the US, and pose challenges in diagnosis and treatment. This course will provide an overview of arthropod-borne disease and its impacts on global health. Students will study the historical, contemporary and epidemiologic stories demonstrating exposure and control strategies via student-led discussions, laboratory examinations, and critical review of current best practices in medical entomology.

The core competencies identified in the HRSA Council of Linkages model that apply to this course include:

**Public Health Sciences Skills:**

6.2.3 Applies public health sciences (e.g., biostatistics, epidemiology, environmental health sciences, health services administration, social and behavioral sciences, and public health informatics) in the delivery of the 10 Essential Public Health Services

6.2.7 Uses evidence in developing, implementing, evaluating, and improving policies, programs, and services

**Leadership and Systems Thinking Skills:**

8.2.2 Describes public health as part of a larger inter-related system of organizations that influence the health of populations at local, national, and global levels

## II. Course Prerequisites

An undergraduate level course in biology, parasitology, or ecology

## III. Course Goals and Objectives

At the end of this course, participants will be able to:

- Describe the basic biology of mosquitoes, ticks, and other arthropod vectors and the mechanisms they use to transmit disease
- Discuss the epidemiology of important vector-borne diseases both locally and worldwide
- Appreciate the changing dynamics of vector-borne disease, including the importance of both historic and emerging infections
- Communicate strategies for the control and reduction of arthropod-borne disease

## IV. Methods of Instruction and Work Expectations

This course combines lectures, case study, group activities, and a field trip experience.

Students will be expected to review assigned course readings prior to class, participate in class discussion, write a daily journal entry, and complete the course final group oral presentation.

Student grades will be assigned as follows:

1. Class participation (25% of grade). Students will obtain credit for active classroom and field trip participation by completing in-class quizzes, asking questions, and participating in discussions and hands-on activities.
2. Completion of daily journal entries (25% of grade). Student teams will establish a daily journal in which they will enter three or more key ideas from class and pose one topic-question in a daily journal. Teams will discuss potential topics informally during the last 15 minutes of class, with input from faculty members. Teams will meet briefly at their convenience after class to finalize their ideas and post them on the course moodle site.
3. Final group oral presentation (50% of grade). Overall understanding of course material will be based on completion of an oral presentation on their assigned topic, to be completed on the final day of class.
  - There will one pre-course reading (Goma; see below).
  - There will be no post-course assignments.

## V. Course Text and Readings

The required and optional readings are available through the UMN Library, which can be accessed through the course Moodle site.

**Access Course Moodle Site**

- go to [www.umn.edu](http://www.umn.edu) click on the “myU” button
- login with your University ID and password
- scroll to your course and click on the Moodle site link

## READING LIST

- Bell et al., 2006. West Nile virus epizootiology, Central Red River Valley, North Dakota and Minnesota, 2002-2005. *Emerging Infectious Diseases* 12 (8) 1245-1247.
- Benedict, MQ 2003. The first releases of transgenic mosquitoes: an argument for the sterile insect technique. *Trends Parasitol* 19:349-55. 2003
- Boggild, AK et al., 2010. Delusional parasitosis: six-year experience with 23 consecutive cases at an academic medical center. *International Journal of Infectious Diseases* 14 (2010) e317–e321.
- Conlon, J, Vectors and War - "Desert Storm." <http://entomology.montana.edu/historybug/dstorm-conlon.pdf>
- Day, JF and Curtis, GA, 1994. When it rains--they soar. *American Entomologist*: Fall, 1994, 162-167.
- Diamond, J, 1989. Blood, genes and malaria. *Natural History*: Feb. 1989, 8-18.
- Economist, 2016. Zika fever: Virus chequers, Jan 23, 72-73.
- Enserink, M, 2015. An obscure mosquito-borne disease goes global. *Science* 350, 1012-1013.
- Foster and Walker, in Mullen, G and Durden, L, 2002. *Medical and Veterinary Entomology*. Chapter 12. Mosquitoes (Culicidae) pp. 204-256.
- Fradin, MS and Day, JF, 2002. Comparative efficacy of insect repellents against mosquito bites. *New England J Medicine* 347, 13-18.
- Gladwell, M, 2001. The mosquito killer. *The New Yorker*, July 2, 2001, 42-51.
- Goma, LKH, 1966. The mosquito. 50 pages
- Higgs, S, 2016. Zika virus: Emergence and Emergency. *Vector-borne and Zoonotic Diseases*, 16, 75-76.
- Ken, KM et al., 2014. Dermatoses associated with mites other than Sarcoptes. *Seminars in Cutaneous Medicine and Surgery*, Vol. 33, 110-115.
- Kilpatrick, AM, 2011. Globalization, land use and the invasion of West Nile virus. *Science* 334, 323-327.
- Knols, BGJ et al., Transgenic Mosquitoes and the Fight Against Malaria: Managing Technology Push in a Turbulent GMO World. *Am. J. Trop. Med. Hyg.*, 77(Suppl 6), 2007, pp. 232–242.
- Kreston, R. 2014. Chagas disease in America: Undiagnosed, unappreciated. *Discover magazine*, Nov 20, 2014.
- Monath, 1985. Glad tidings from Yellow fever research. *Science* 229, 734-735.
- Norman, C. The unsung hero of yellow fever? *Science* 223, 1370-1372.
- Reisen, WK, in Mullen, G and Durden, L, 2002. *Medical and Veterinary Entomology*. Chapter 2; Epidemiology of Vector-borne diseases. pp. 16-27.
- Roberts, LS and Janovy, J, 2000. Schmidt and Roberts' Foundations of Parasitology, 6th ed. Chapter 5: Kinetoplasta: Trypanosomes and their Kin. pp. 55-81.
- Roberts, LS and Janovy, J, 2000. Schmidt and Roberts' Foundations of Parasitology, 6th ed. Chapter 29: Nematodes: Filarioidea, the Filarial Worms. pp. 447-459.
- Rodriguez, SD et al., 2015. The Efficacy of Some Commercially Available Insect Repellents for *Aedes aegypti* (Diptera: Culicidae) and *Aedes albopictus* (Diptera: Culicidae). *J. Insect Sci.* (2015) 15(1): 140-1145; DOI: 10.1093/jisesa/iev125
- Roueche, B, 1988. The Medical Detectives. Chapter 25: The foulest and nastiest creatures that be. pp 390-405.
- Ryan, SJ et al., 2015. Mapping Physiological Suitability Limits for Malaria in Africa Under Climate Change. *Vector-borne and Zoonotic Diseases* 15, (12), 1-8, 2015.
- Sonenshine et al, in Mullen, G and Durden, L, 2002. *Medical and Veterinary Entomology*. Chapter 24

Ticks (Ixodida), pp. 518-556.

- Sosa, O, 1989. Carlos J Finlay and Yellow Fever: A discovery. Bull Entomological Society America 35(2) 1989.
- Vogel, G, 2016. A race to explain Brazil's spike in birth defects. Science 351, 110-111.
- Weaver, SC and Forrester, NL 2015. Chikungunya: Evolutionary history and recent epidemic spread

## VI. Course Outline/Weekly Schedule

Pre-course		Goma, 1966
<b>Day 1</b>	<b>Mosquito-borne diseases</b>	
1:00- 1:45	Biology of mosquitoes; adaptations for disease transmission	Goma, 1966
1:45 - 2:15	Epidemiology of vector-borne diseases	Reisen, 2002, 16-27 Weaver and Forrester, 2015
2:15 - 2:45	Types of pathogens transmitted by mosquitoes	Foster and Walker, 222-249
3:00 - 3:30	Zika virus; an emerging infection	Enserink, 2015 Vogel, 2016 Economist, 2016 Higgs, 2016
3:30 - 4:00	Mosquito-borne viruses Yellow fever; history and vaccine	Monath, 1985 Sosa, 1989 Norman, 1984
4:00 - 4:20	St. Louis encephalitis and West Nile viruses	Day and Curtis, 1994 Kilpatrick, 2011 Bell, 2006
4:20 - 4:40	Malaria, a protozoan parasite; global disease burden	Diamond, 1989 Ryan et al., 2015
<b>Day 2</b>	<b>Tick-borne diseases</b>	
1:00 - 1:45	Tick biology and adaptations for disease transmission	Sonenshine, 2002; 517-525
1:45 - 2:15	Lyme disease: The Connecticut story of discovery of a new disease	Roueche, 1988
2:30 - 3:15	Rickettsial Diseases: Rocky Mountain Spotted fever, Ehrlichia, and Anaplasma	Sonenshine, 534-547
3:30 - 5:00	Visit to the insect museum; mosquito and tick labs on the St. Paul Campus	

<b>Day 3</b>	<b>Global disease burden</b>	
1:00 - 1:45	Trypanosomiasis: Chagas Disease in South America; Sleeping sickness in Africa; kissing bugs and their relation to bedbugs; tsetse flies.	Roberts and Janovy, Chapter 5, 55-81 Kreston, 2014
1:45 - 2:30	Onchocerciasis and blackfly vectors; control	Roberts and Janovy, Chapter 29, 447-459
2:45 - 3:15	Filarial diseases; Wolbachia as an agent to manipulate vector mosquito populations	Roberts and Janovy, Chapter 29, 447-459
3:15 - 4:00	Insecticides and vector control	Gladwell, 2001
4:00 - 4:40	Sterile insect technique and transgenic mosquitoes	Knols et al., 2007; Benedict, 2003
4:40 - 5:00	Wrap up and discussion	
<b>Day 4</b>	<b>Strategies for reducing arthropod borne disease</b>	
1:00 - 1:30	Personal: DEET and other repellents	Fradin and Day, 2002 Rodriguez et al., 2015
1:30 - 2:15	Problems facing Military personnel	Conlon
2:15 - 2:45	Human interactions with insects	Boggild et al, 2010 Ken et al., 2014
2:45 - 3:45	Student-led discussions	
3:45 - 4:00	<b>Wrap-up and review</b>	

## VII. Evaluation and Grading

Student grades will be assigned as follows:

1. Class participation (25% of grade). Students will obtain credit for active classroom and field trip participation by completing in-class quizzes, asking questions, and participating in discussions and hands-on activities.
2. Completion of daily journal entries (25% of grade). Student teams will establish a daily journal in which they will enter three or more key ideas from class and pose one topic-question in a daily journal. Teams will discuss potential topics informally during the last 15 minutes of class, with input from faculty members. Teams will meet briefly at their convenience after class to finalize their ideas and post them on the course moodle site.
3. Final group oral presentation (50% of grade). Overall understanding of course material will be based on completion of an oral presentation on their assigned topic, to be completed on the final day of class.

This course is offered A/F or S/N

- **A/F letter grade will be determined by total effort as follows.**
- **S Represents achievement that is satisfactory, which is equivalent to a C- or better.**

A 4.000	Represents achievement that is outstanding relative to the level necessary to meet course requirements. <b>94-100 points/percent</b>
A- 3.667	<b>90-93 points/percent</b>
B+ 3.333	<b>87-89 points/percent</b>

B 3.000	Represents achievement that is significantly above the level necessary to meet course requirements. <b>83-86 points/percent</b>
B- 2.667	<b>80-82 points/percent</b>
C+ 2.333	<b>77-79 points/percent</b>
C 2.000	Represents achievement that meets the course requirements in every respect. <b>73-76 points/percent</b>
C- 1.667	<b>70-72 points/percent</b>
D+ 1.333	<b>65-69 points/percent</b>
D 1.000	Represents achievement that is worthy of credit even though it fails to meet fully the course requirements. <b>60-64 points/percent</b>
F = below 60%	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.
D 1.000	Represents achievement that is worthy of credit even though it fails to meet fully the course requirements.

**For additional information, please refer to:**

<http://policy.umn.edu/Policies/Education/Education/GRADINGTRANSCRIPTS.html>.

### **Course Evaluation**

The SPH will collect student course evaluations electronically using a software system called CourseEval: [www.sph.umn.edu/courseeval](http://www.sph.umn.edu/courseeval). The system will send email notifications to students when they can access and complete their course evaluations. Students who complete their course evaluations promptly will be able to access their final grades just as soon as the faculty member renders the grade in SPHGrades: [www.sph.umn.edu/grades](http://www.sph.umn.edu/grades). All students will have access to their final grades through OneStop two weeks after the last day of the semester regardless of whether they completed their course evaluation or not. Student feedback on course content and faculty teaching skills are an important means for improving our work. Please take the time to complete a course evaluation for each of the courses for which you are registered.

### **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). For more information and to initiate an incomplete contract, students should go to SPHGrades at: [www.sph.umn.edu/grades](http://www.sph.umn.edu/grades).

**University of Minnesota Uniform Grading and Transcript Policy** - A link to the policy can be found at [onestop.umn.edu](http://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](http://onestop.umn.edu).

### Course Withdrawal

Students should refer to the Refund and Drop/Add Deadlines for the particular term at [onestop.umn.edu](http://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.

Students wishing to withdraw from a course after the noted final deadline for a particular term must contact the School of Public Health Office of Admissions and Student Resources at [sph-ssc@umn.edu](mailto:sph-ssc@umn.edu) for further information.

### Student Conduct Code

The University seeks an environment that promotes academic achievement and integrity, that is protective of free inquiry, and that serves the educational mission of the University. Similarly, the University seeks a community that is free from violence, threats, and intimidation; that is respectful of the rights, opportunities, and welfare of students, faculty, staff, and guests of the University; and that does not threaten the physical or mental health or safety of members of the University community.

As a student at the University you are expected adhere to Board of Regents Policy: *Student Conduct Code*. To review the Student Conduct Code, please see:

[http://regents.umn.edu/sites/default/files/policies/Student\\_Conduct\\_Code.pdf](http://regents.umn.edu/sites/default/files/policies/Student_Conduct_Code.pdf).

Note that the conduct code specifically addresses disruptive classroom conduct, which means "engaging in behavior that substantially or repeatedly interrupts either the instructor's ability to teach or student learning. The classroom extends to any setting where a student is engaged in work toward academic credit or satisfaction of program-based requirements or related activities."

### Use of Personal Electronic Devices in the Classroom

Using personal electronic devices in the classroom setting can hinder instruction and learning, not only for the student using the device but also for other students in the class. To this end, the University establishes the right of each faculty member to determine if and how personal electronic devices are allowed to be used in the classroom. For complete information, please reference:

<http://policy.umn.edu/Policies/Education/Education/STUDENTRESP.html>.

### Scholastic Dishonesty

You are expected to do your own academic work and cite sources as necessary. Failing to do so is scholastic dishonesty. Scholastic dishonesty means 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; altering, forging, or misusing a University academic record; or fabricating or falsifying data, research procedures, or data analysis. (Student Conduct Code:

[http://regents.umn.edu/sites/default/files/policies/Student\\_Conduct\\_Code.pdf](http://regents.umn.edu/sites/default/files/policies/Student_Conduct_Code.pdf)) If it is determined that a student has cheated, he or she may be given an "F" or an "N" for the course, and may face additional sanctions from the University. For additional information, please see:

<http://policy.umn.edu/Policies/Education/Education/INSTRUCTORRESP.html>.

The Office for Student Conduct and Academic Integrity has compiled a useful list of Frequently Asked Questions pertaining to scholastic dishonesty: <http://www1.umn.edu/oscai/integrity/student/index.html>. If you have additional questions, please clarify with your instructor for the course. Your instructor can respond to your specific questions regarding what would constitute scholastic dishonesty in the context of a particular class-e.g., whether collaboration on assignments is permitted, requirements and methods for citing sources, if electronic aids are permitted or prohibited during an exam.

## **Makeup Work for Legitimate Absences**

Students will not be penalized for absence during the semester due to unavoidable or legitimate circumstances. Such circumstances include verified illness, participation in intercollegiate athletic events, subpoenas, jury duty, military service, bereavement, and religious observances. Such circumstances do not include voting in local, state, or national elections. For complete information, please see:

<http://policy.umn.edu/Policies/Education/Education/MAKEUPWORK.html>.

## **Appropriate Student Use of Class Notes and Course Materials**

Taking notes is a means of recording information but more importantly of personally absorbing and integrating the educational experience. However, broadly disseminating class notes beyond the classroom community or accepting compensation for taking and distributing classroom notes undermines instructor interests in their intellectual work product while not substantially furthering instructor and student interests in effective learning. Such actions violate shared norms and standards of the academic community. For additional information, please see: <http://policy.umn.edu/Policies/Education/Education/STUDENTRESP.html>.

## **Sexual Harassment**

"Sexual harassment" means unwelcome sexual advances, requests for sexual favors, and/or other verbal or physical conduct of a sexual nature. Such conduct has the purpose or effect of unreasonably interfering with an individual's work or academic performance or creating an intimidating, hostile, or offensive working or academic environment in any University activity or program. Such behavior is not acceptable in the University setting. For additional information, please consult Board of Regents Policy:

<http://regents.umn.edu/sites/default/files/policies/SexHarassment.pdf>

## **Equity, Diversity, Equal Opportunity, and Affirmative Action**

The University will provide equal access to and opportunity in its programs and facilities, without regard to race, color, creed, religion, national origin, gender, age, marital status, disability, public assistance status, veteran status, sexual orientation, gender identity, or gender expression. For more information, please consult Board of Regents Policy: [http://regents.umn.edu/sites/default/files/policies/Equity\\_Diversity\\_EO\\_AA.pdf](http://regents.umn.edu/sites/default/files/policies/Equity_Diversity_EO_AA.pdf).

## **Disability Accommodations**

The University of Minnesota is committed to providing equitable access to learning opportunities for all students. Disability Services (DS) is the campus office that collaborates with students who have disabilities to provide and/or arrange reasonable accommodations.

If you have, or think you may have, a disability (e.g., mental health, attentional, learning, chronic health, sensory, or physical), please contact DS at 612-626-1333 to arrange a confidential discussion regarding equitable access and reasonable accommodations.

If you are registered with DS and have a current letter requesting reasonable accommodations, please contact your instructor as early in the semester as possible to discuss how the accommodations will be applied in the course.

For more information, please see the DS website, <https://diversity.umn.edu/disability/>.

## **Mental Health and Stress Management**

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance and may reduce your ability to participate in daily activities. University of Minnesota services are available to assist you. You can learn more about the broad range of confidential mental health services available on campus via the Student Mental Health Website: <http://www.mentalhealth.umn.edu>.

## **The Office of Student Affairs at the University of Minnesota**

The Office for Student Affairs provides services, programs, and facilities that advance student success, inspire students to make life-long positive contributions to society, promote an inclusive environment, and enrich the University of Minnesota community.

Units within the Office for Student Affairs include, the Aurora Center for Advocacy & Education, Boynton Health Service, Central Career Initiatives (CCE, CDes, CFANS), Leadership Education and Development – Undergraduate Programs (LEAD-UP), the Office for Fraternity and Sorority Life, the Office for Student Conduct and Academic Integrity, the Office for Student Engagement, the Parent Program, Recreational Sports, Student and Community Relations, the Student Conflict Resolution Center, the Student Parent HELP Center, Student Unions & Activities, University Counseling & Consulting Services, and University Student Legal Service.

For more information, please see the Office of Student Affairs at <http://www.osa.umn.edu/index.html>.

### **Academic Freedom and Responsibility: for courses that do not involve students in research**

Academic freedom is a cornerstone of the University. Within the scope and content of the course as defined by the instructor, it includes the freedom to discuss relevant matters in the classroom. Along with this freedom comes responsibility. Students are encouraged to develop the capacity for critical judgment and to engage in a sustained and independent search for truth. Students are free to take reasoned exception to the views offered in any course of study and to reserve judgment about matters of opinion, but they are responsible for learning the content of any course of study for which they are enrolled.\*

Reports of concerns about academic freedom are taken seriously, and there are individuals and offices available for help. Contact the instructor, the Department Chair, your adviser, the associate dean of the college, or the Vice Provost for Faculty and Academic Affairs in the Office of the Provost.

**OR:**

### **Academic Freedom and Responsibility, for courses that involve students in research**

Academic freedom is a cornerstone of the University. Within the scope and content of the course as defined by the instructor, it includes the freedom to discuss relevant matters in the classroom and conduct relevant research. Along with this freedom comes responsibility. Students are encouraged to develop the capacity for critical judgment and to engage in a sustained and independent search for truth. Students are free to take reasoned exception to the views offered in any course of study and to reserve judgment about matters of opinion, but they are responsible for learning the content of any course of study for which they are enrolled.\* When conducting research, pertinent institutional approvals must be obtained and the research must be consistent with University policies.

Reports of concerns about academic freedom are taken seriously, and there are individuals and offices available for help. Contact the instructor, the Department Chair, your adviser, the associate dean of the college, or the Vice Provost for Faculty and Academic Affairs in the Office of the Provost.

\* Language adapted from the American Association of University Professors "Joint Statement on Rights and Freedoms of Students".

Template update 9/2014