
VIBS 413

Introductory Epidemiology

Overview

As the interconnections among human health, domestic animal health, wildlife, and the environment are increasingly recognized in this 'one health' era, the breadth of epidemiology is deepening. Epidemiology is the study of the distribution and determinants of disease in populations and is distinguished from other medical disciplines in its focus at the population-level, and not individual-level. Epidemiological principles guide the collection of data in the field and clinic, diagnostic laboratory protocols, statistical analyses, medical surveillance, and disease reporting. Epidemiology is the key science that guides public health policy and interventions. This course will train students to understand the concepts of epidemiology and fundamental tools used by epidemiologists, and how this field blends with other disciplines (ecology, human and veterinary clinical medicine, statistics, genetics, wildlife biology and more) to address some of society's more pressing stressors.

Learning Outcomes

- Understand how epidemiology relates to the core functions of public health.
- Explain methods of disease transmission using appropriate terminology.
- Calculate disease occurrence using epidemiological metrics.
- Explain and calculate diagnostic/screening test accuracy and precision.
- Identify study designs and ways to correct them design and/or analysis.
- Understand the principles of causal inference and risk analysis.
- Understand health and disease in an ecological context.
- Critically review published studies in the context of bias and confounding.
- Gain experience with field and lab protocols used in epi research.
- Synthesize concepts through presentation of an outbreak investigation.

Spring 2013; 3 credit hours
Tu/Th 12:45-2:00
Room 308 Vet Med Research Bldg.

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Materials

Course Website: E-learning website will be posted here once established.

Required Text: Rothman, Kenneth J. Epidemiology, an introduction. Second edition. 2012. Oxford University Press, New York, 280 pages.

Readings: Additional course readings will be made available electronically.

Evaluation

A total of 400 points are available:

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- Mid-semester exam (100 points)
 - Final exam (100 points)
 - Top 10 of 12 weekly quizzes (100 points)
 - Participation in class discussions, field and laboratory exercises (50 points)
 - Final course project (50 points)
 - A = 90 -100%
B = 80 – 89%
C = 70 – 79%
D = 60 – 69%
F = Below 60%

Quizzes

Twelve weekly quizzes will be administered through the E-learning website to be taken outside of class. Quizzes will be posted following the Thursday lecture, and will cover topics from the Tuesday and Thursday lectures of that week. Quizzes must be completed by midnight the following Sunday. The top ten scores will be used in calculating the course grade.

Disease Detective Course Project

Throughout the semester, students should track infectious disease emergence in human and animal populations in real time through the Program for Monitoring Emerging Diseases (ProMed) organization of the International Society of Infectious Diseases (<http://www.promedmail.org/>). Students may subscribe to email posts: (<http://ww4.isid.org/promedmail/subscribe.php>). By mid-semester, students should choose one disease outbreak to study in detail, and I will approve the topic. Students will develop a 15-minute presentation to deliver to the class in the final week to characterize the disease outbreak and its epidemiological investigation. A review of at least three pertinent peer-reviewed publications on the disease should be included. This presentation will be an opportunity to synthesize course concepts in the context of a real-time disease outbreak.

Field Research Experience

To contribute to the process of standardized epidemiological data collection and gain an appreciation for population-level sampling, students will participate in ongoing wildlife epidemiology field research projects. This will occur outside of the regularly scheduled lecture time, and I will ensure that students with conflicting schedules are not penalized. Opportunities to participate will occur at least monthly (dates will be advertised) when members of my research team will trap wild rodents and birds at local field sites for longitudinal research studies to assess patterns of tick parasitism and tick-borne pathogen infection. The minimum expected participation is for one mammal and one bird experience. Participation in mammal trapping will include one evening (setting traps; approximately 1.5 hours) plus one morning (checking traps and processing animals; approximately 2 hours). Participation in bird netting will include one morning (running mist nets; approximately 3 hours).

Laboratory Research Experience

To better understand the laboratory equipment and methods used to measure pathogen occurrence in samples, students will participate in a demonstration in my infectious disease eco-epidemiology research laboratory on campus. Through this experience, students will gain practical skills in molecular diagnostics of field-collected samples from wildlife populations, and will gain a better understanding of lecture topics including assay sensitivity and specificity. This will occur during lecture period.

'Epi in Action' Guest Lectures

A series of guest lectures are planned in which epidemiologists will provide case studies of the ways in which they practice epidemiology. These lectures are intended to emphasize epidemiological concepts presented earlier in class and show their utility in the real world. Invited speakers will be asked to share their educational background and career path.

Attendance

Both the university and I view class attendance as an individual student responsibility and I expect you to attend class regularly. Your grade will be based in part by class discussion participation. Make-up examinations must be scheduled ahead and will be made available for excused absences in accordance with TAMU Student Rule #7 (<http://student-rules.tamu.edu/rule07>).

ADA Policy Statement

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, in Cain Hall, Room B118, or call 845-1637. For additional information visit <http://disability.tamu.edu>.

Academic Integrity Statement

The Texas A&M University Honor Code, based on the long-standing affirmation that "An Aggie does not lie, cheat, or steal or tolerate those who do" is fundamental to the value of the A&M learning experience and requires that Aggies will not involve themselves in any form of academic dishonesty. According to the Office of the Aggie Honor System, academic dishonesty consists of cheating, fabrication, falsification, multiple submission, plagiarism, and multiplicity. Clarification of each of actions may be found at the Aggie Honor System website at <http://www.tamu.edu/aggiehonor>. This list, however, is not exclusive of any other acts that may reasonably be termed academic dishonesty. The penalty for a violation of academic dishonesty in this class shall be an "F" in the course and filing of an Honor Code Violation Report with the Office of the Aggie Honor System. Less severe penalties may be imposed if the circumstances warrant

Week	Date	Topic	Quiz	Readings
1	Tu, Jan 15	What is epidemiology? History and the iceberg principle	1	Rothman Ch. 1
1	Th, Jan 17	General epidemiologic concepts		Thrusfield Ch. 3
2	Tu, Jan 22	Disease classification and transmission	2	Thrusfield Ch. 6
2	Th, Jan 24	What is causation?		Rothman Ch. 3
3	Tu, Jan 29	Measures of disease frequency and the concept of risk	3	Rothman Ch. 4
3	Th, Jan 31	Infectious disease epidemiology I: zoonoses		Rothman Ch. 6; Daszak (2000) Science 287: 443-449
4	Tu, Feb 5	Infectious disease epidemiology II: herd immunity, basic reproductive number	4	To be announced
4	Th, Feb 7	Study designs I: Descriptive (Case Reports, Case Series, Survey)		Rothman Ch. 5
5	Tu, Feb 12	Study designs II: Analytic-Observational (Cross-sectional, Cohort, Case-Control)	5	
5	Th, Feb 14	Study designs III: Analytic-Experimental (Laboratory, Controlled Trials, informed consent and ethics)		
6	Tu, Feb 19	Diagnostic tests: sensitivity, specificity and other metrics	none	Rothman Ch. 13 (first half)
6	Th, Feb 21	MIDTERM EXAM		none
7	Tu, Feb 26	‘Epi in Action’ guest lecture: Dr. Christine Budke Neglected Tropical Diseases	6	To be announced
7	Th, Feb 28	‘Epi in Action’ guest lecture: Dr. Kevin Cummings Food-borne disease epidemiology		Cummings et al. (2012) EID. December.
8	Tu, Mar 5	Sources of bias, confounding	7	Rothman Ch. 7; Weaver (2010). Nature Sena et al. (2010) PLoS One
8	Th, Mar 7	Analyzing simple epidemiologic data, power analysis		Rothman Ch. 8-10
9	Tu, Mar 12	SPRING BREAK		
9	Th, Mar 14			
10	Tu, Mar 19	Eco-epidemiology I: Natural nidity of disease, environmental determinants of disease	8	Wilson, Mark L. 2001. Ecology and Infectious Disease chapter
10	Th, Mar 21	Eco-epidemiology II		To be announced
11	Tu, Mar 26	Molecular epidemiology	9	Ambrosone (1997) Molecular epi

11	Th, Mar 28	Epi Lab Experience: 261 VMR. Closed-toe shoes required.		Lab protocols
12	Tu, Apr 2	Vector-borne disease epidemiology	10	Reisen (2002) Epi of Vector-borne diseases
12	Th, Apr 4	Spatial epidemiology: Geographic information systems, risk models		Ostfeld et al. 2005. Spatial epidemiology; Kitron et al. 1998 Landscape epi
13	Tu Apr 9	New tools in epidemiology (social media, google)	11	Signorini 2011. PLoS ONE
13	Th, Apr 11	Career opportunities in epidemiology		None
14	Tu, Apr 16	Student Presentations	12	None
14	Th, Apr 18	Student Presentations		None
15	Tu, Apr 23	Student Presentations	None	None
15	Th, Apr 25	FINAL EXAM (Note this is <u>prior</u> to the University final exam week)		None
16	Tu, Apr 30	Redefined Day (Attend Friday Classes)		
16	Th, May 2	Reading Day, No Class		