VIBS 607

Applied Epidemiology

Spring 2020; 3 credit hours
Tu/Th 9:35-10:50
Room: VMTH 101

Stacked with VIBS 413

Instructor

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Overview

The interconnections among human health, domestic animal health, wildlife, and the environment are increasingly recognized in this 'one health' era. 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

- 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.
- Review published studies in and review papers on key epidemiology topics.
- Gain experience with field and lab protocols used in epi research.
- Synthesize concepts through infectious disease outbreak case study.
- Gain oral presentation experience on a public health topic.

Teaching Assistant

Rachel Busselman
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Materials

Course Website: An E-campus website will be used for quizzes, grades, and course management.
Required Text: Gordis, Leon. Epidemiology, Fifth Edition. 2014. Elsevier Saunders, PA.
Also available as an e-book (Kindle, PDF, VitalSource, or ePub).

Prerequisites

Graduate classification

Evaluation

A total of 500 points are available:

- **Exams 1-3 (100 pts each)**
- **Top 10 of 11 quizzes (100 pts)**
- **Attendance/participation (50 pts)**
- **Disease detectives project (50 pts)**
- **A = 90 -100%**
  B = 80 – 89%
  C = 70 – 79%
  D = 60 – 69%
  F = Below 60%

Quizzes

Eleven weekly quizzes will be administered through the E-campus 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 Sunday. The top ten scores will be used in calculating the course grade. Quizzes will not be given on during exam weeks.

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 a wildlife field epidemiology research project. One lecture period will be used to meet at a local field site for the activity. Opportunity is available for student volunteers to meet the evening before at the field site to set out traps. More information will be provided as the date approaches.

Laboratory Research Experience

To better understand some laboratory equipment and methods used in molecular epidemiology, students will participate in a demonstration in a Biosafety Level 2 research laboratory on campus. Students will gain practical skills in molecular diagnostics of field-collected samples, and will gain a better understanding of lecture topics including assay sensitivity and specificity.

'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.

Disease Detectives Presentations

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 select one disease outbreak to study in detail, and I will approve the topic. Due to class size, students will work in small groups (4-5 per group). Students will develop a 12-15 minute presentation to characterize the disease outbreak and its epidemiological investigation. Further instructions will be provided.

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 attendance and 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

Texas A&M University is committed to providing equitable access to learning opportunities for all students. If you experience barriers to your education due to a disability or think you may have a disability, please contact Disability Resources in the Student Services Building or at (979) 845-1637 or visit http://disability.tamu.edu. Disabilities may include, but are not limited to attentional, learning, mental health, sensory, physical, or chronic health conditions. All students are encouraged to discuss their disability related needs with Disability Resources and their instructors as soon as possible.

Academic Integrity Statement

"An Aggie does not lie, cheat or steal, or tolerate those who do." For additional information, please visit http://aggiehonor.tamu.edu.

Student Resources

A variety of student resources focused on health and safety are available to you should you need them: https://wfsc.tamu.edu/additional-info/student-support-resources/

SCHEDULE IS SUBJECT TO CHANGE

Week	Date	Topic	Quiz	Readings
1	Tu, Jan 14	Intro to course; Dynamics of disease transmission	1	Gordis Ch. 1- 2
1	Th, Jan 16	NO CLASS		
2	Tu, Jan 21	Measures of disease frequency	2	Gordis Ch. 3-4
2	Th, Jan 23	Infectious disease epidemiology I: Zoonoses		Daszak et al. (2000)
3	Tu, Jan 28	Infectious disease epidemiology II: Herd immunity, basic reproductive number	3	Fine et al. (2011)
3	Th, Jan 30	**'Epi in Action' guest lecture**: Dr. Martial Ndeffo Epidemiological Modeling		none
4	Tu, Feb 4	Study designs I: Cohort, case-control and cross sectional	4	Gordis Ch. 9, 10, 13
4	Th, Feb 6	Study designs I, continued		
5	Tu, Feb 11	Study designs II: Controlled trials	none	Gordis Ch. 7-8
5	Th, Feb 13	**EXAM I**		none
6	Tu, Feb 18	Diagnostic tests: sensitivity, specificity and other metrics	5	Gordis Ch. 5
6	Th, Feb 20	Estimating Risk: Relative risk, odds ratios, attributable risk		Gordis Ch. 11-12
7	Tu, Feb 25	Outbreak Investigation; Public Health Surveillance Systems	6	none
7	Th, Feb 27	Eco-epidemiology: Natural nidality of disease, environmental determinants of disease Mid-term class evaluation		Wilson (2001)
8	Tu, Mar 3	**Epi in Action' guest lecture**: Dr. Gabriel Hamer Spatial epidemiology: Geographic information systems, risk models	7	Ostfeld et al. (2005)
8	Th, Mar 5	**'Epi in Action' guest lecture:** Dr. Christine Budke Neglected Tropical Diseases		Hotez (2009); Hotez (2012)
9	Tu, Mar 10	**SPRING BREAK**		
9	Th, Mar 12			
10	Tu, Mar 17	Vector-borne disease epidemiology	8	Reisen (2002)
10	Th, Mar 19	Association, Causation, and Biases		Gordis Ch. 14-15
11	Tu, Mar 24	**EXAM 2**	none	none
11	Th, Mar 26	Digital Epidemiology		Park et al. (2018); Google 'epidemiology apps' to get a feel for available tools
12	Tu, Mar 31	***tentative* 'Epi in Action' guest lecture:** Dr. Rebecca Fischer. Field epidemiology in Nicaragua	9	
12	Th, Apr 2	**'Epi in Action' guest lecture:** Dr. Keri Norman Food-borne disease and antimicrobial resistance		none

13	Tu Apr 7	**Epi Field or Lab Experience**: Field team- meet at Biodiversity Research and Teaching Collections. Lab team- meet at designated time at 261 VMR. Closed-toe shoes and pants required.	10	none
13	Th, Apr 9	**Epi Field or Lab Experience:** Field team- meet at Biodiversity Research and Teaching Collections. Lab team- meet at designated time at 261 VMR. Closed-toe shoes and pants required.		none
14	Tu, Apr 14	Disease Detective Presentations (Grad students present)	11	Submit quiz/exam questions
14	Th, Apr 16	To be determined.		
15	Tu, Apr 21	Career Opportunities in Epidemiology; Course Evaluations	None	
15	Th, Apr 23	**LAST CLASS. EXAM 3**		
16	Tu, Apr 28	Redefined Day (Attend Friday Classes)		

*****There will be NO FINAL EXAM during finals week for VIBS 413*****