THE OHIO STATE UNIVERSITY
COLLEGE OF PUBLIC HEALTH

PUBHEHS 5335
Cross-listed as ENR 5335 and
VETPREV 5335

Ecology of Infectious Diseases 3
credit hours – Spring, 2026

Instructors:

Name	Email	Office Address	Office Hours
Dr. Risa Pesapane	Pesapane.1@osu.edu	A100K Sisson Hall	by appointment
Dr. Troy Koser	Koser.15@osu.edu	A100U Sisson Hall	by appointment

Class Time: Tuesdays and Thursdays, 12:45 pm to 2:05pm 160

Class Location: Cunz Hall room 150

Course description: Ecology of infectious diseases is a scientific field that studies the relationships between pathogens, humans, other animal species, and the environment. The course is taught by two disease ecologists – Dr. Pesapane and Dr. Koser – who will integrate their unique perspectives to introduce students to disease ecology in the context of One Health. Together, students studying various disciplines will investigate infectious disease transmission and control in single-and multi-host systems as well as vector-borne diseases, variation in time and place, emerging diseases, and reemerging vaccine-preventable diseases, major infectious diseases that affect humans, livestock, and wildlife, the management of disease in free-ranging and captive populations, and disease control policy. This course is suitable for undergraduate students, graduate students, and professional students.

Prerequisites: Biology 1101, 1113, or equivalent course; or permission of instructor.

Course Objectives: Upon successful completion of the course, students will be able to:

1. Describe general concepts in the field of Ecology of Infectious Diseases, including population-level transmission, disease control, environmental effects, variation though time, and variation by location.
2. Recognize differences in transmission and control among single-host, multi-host, and vector-borne infectious disease systems.
3. Distinguish effects of host population dynamics and environmental factors on infectious disease transmission and control.
4. Examine a population-level model of infectious disease transmission and control.
5. Critique case studies of pathogens affecting wildlife, livestock, and human populations.
6. Investigate a current problem in infectious disease ecology using the scientific method, data, and findings from primary sources or journal articles.

Public Health Core Competencies:

Foundational Public Health Knowledge (for MHA, MPH, MS and PhD Degrees in CPH):

- Explain the role of quantitative & qualitative methods and sciences in describing and assessing a population's health (3)
- List major causes and trends of morbidity & mortality in the US or other community relevant to the school or program (4)
- Discuss the science of primary, secondary and tertiary prevention in population health, including health promotion, screening, etc. (5)
- Explain the critical importance of evidence in advancing public health knowledge (6)
- Explain effects of environmental factors on a population's health (7)

- Explain biological and genetic factors that affect a population's health (8)
- Explain how globalization affects global burdens of disease (11)
- Explain an ecological perspective on the connections among human health, animal health and ecosystem health (e.g., One Health) (12)

Foundational Competencies (for MPH Degrees in CPH):
- Interpret results of data analysis for public health research, policy or practice (4)
- Discuss multiple dimensions of the policy-making process, including the roles of ethics and evidence (12)
- Communicate audience-appropriate public health content, both in writing and through oral presentation (19)
- Apply systems thinking tools to a public health issue (22)

Foundational Domains (for BSPH degree in CPH):
- The basic concepts, methods and tools of public health data collection, use and analysis and why evidence-based approaches are an essential part of public health practice (2)
- The concepts of population health, and the basic processes, approaches and interventions that identify and address the major health-related needs and concerns of populations (3)
- The underlying science of human health and disease, including opportunities for promoting and protecting health across the life course (4)
- The socioeconomic, behavioral, biological, environmental and other factors that impact human health and contribute to health disparities (5)
- Basic concepts of public health-specific communication, including technical and professional writing and the use of mass media and electronic technology (9)

Foundational Competencies (for BSPH degree in CPH):
- The ability to communicate public health information, in both oral and written forms, through a variety of media and to diverse audiences (1)
- The ability to locate, use, evaluate and synthesize public health information (2)

Cross-Cutting Concepts/Experiences (for BSPH degree in CPH):
- Community dynamics (2)
- Critical thinking and creativity (3)
- Ethical decision making as related to self and society (5)
- Independent work and a personal work ethic (6)
- Professionalism (9)
- Research methods (10)
- Systems thinking (11)

Specialization Competencies (for BSPH degree in Environmental Public Health in CPH):
- Apply principles of math, chemistry, biology to applied science of environmental public health (1)
- Summarize management, technical measures and approaches to reduce and prevent environmentally related human diseases (3)

Text/Readings

There is no required textbook. The readings will consist of journal articles, textbook chapters, and technical websites that will be provided through Carmen.

Assignments

There are four types of graded assignments for this course (A-D below). Undergraduate students have the option of completing a fifth type of assignment (E below).

A. Weekly assignments will be administered through Carmen. All course content and instructions for assignments will be available on Tuesday at the end of class and will be due the following Tuesday by 11:59 pm. Assignments will ask students to complete an activity and then answer questions about the activity as a one- to two-page write up. More information will be provided on Carmen and in class. Weekly written assignments are graded **individually**.

B. Weekly journal article discussions. Students will read one peer-reviewed journal article each week that emphasizes a research application of the weekly disease ecology topic before the Thursday class. We will discuss the journal article in class on Thursdays using a "journal club" format. All students will be encouraged to share their thoughts, questions, and ideas about the articles; however, all personalities are respected, and no student is required to speak. Journal article discussions are graded **individually**.

C. Graduate and professional students will work together on a semester-long project. Students will form groups of 3-4 students, select a project type (Data Exploration and Analysis or Science Communication and Outreach), chose a host-pathogen system of interest, use student-designed research methods to address the question, and present findings to the class. To encourage steady progress, three interim assignments will be due throughout the semester. These interim assignments will be graded as complete or incomplete and should be about 1 page in length. Instructors will give extensive feedback on these interim written assignments that will guide students towards successful completion of their final projects. Additionally, the second-to-last week of class has been allotted for group project worktime. Dr. Koser and Dr. Pesapane are happy to help and plan to facilitate all steps. More detailed information will be provided on Carmen and in class. Project presentations are graded as a group. More information will be provided on Carmen and in class. Case study presentations are graded as a **group**.

D. Undergraduate students are required to view group project presentations during the final week of class and complete a peer-review for each group presentation. Peer reviews will be graded **individually**.

E. If undergraduate students wish, they may complete a small project that can substitute for their lowest weekly assignment grade. For this project, they should find a peer-reviewed disease ecology journal article of their choice, read it, and submit a short report summarizing it and reviewing it. More detail will be provided on Carmen and in class.

Graduate and professional students are required complete assignments A – C as described above. They may not complete assignments D nor E.

Undergraduate students are required to complete assignments A – B and D as described above. They may not complete assignment C. Undergraduates have the option to complete assignment E. If assignment E is completed, the grade earned can be substituted for the lowest grade earned on a single assignment (A).

Grading

Table 1. Grade distribution for graduate and professional students

Assignment Type	Number of assignments	Points per assignment	Points for this assignment type	Percentage of final grade
Assignments (A)	10	40	400	40%
Journal Article Discussions (B)	10	30	300	30%
Case study interim reports (C)	3	33	100	10%
Final case study presentation (C)	1	200	100	20%
Total			**1000**	**100%**

Table 2. Grade distribution for undergraduate students

Assignment Type	Number of assignments	Points per assignment	Points for this assignment type	Percentage of final grade
Assignments (A)	10	60	600	60%
Journal Article Discussions (B)	10	30	300	30%
Presentation peer-reviews (D)	1	100	100	10%
Total			**1000**	**100%**

Grading Scale:

A = 93.0 - 100
A- = 90.0 - 92.9
B+ = 87.0 - 89.9
B = 83.0 - 86.9
B- = 80.0 - 82.9
C+ = 77.0 - 79.9
C = 73.0 - 76.9
C- = 70.0 - 72.9
D+ = 67.0 - 69.9
D = 60.0 - 66.9
E = Below 60

Exams

There are no exams in this course.

Course technology

Required equipment: Students will need a computer, tablet, or phone with high-speed internet connection and a mobile device (smartphone or tablet) to use for BuckeyePass authentication to access course material on Carmen and participate optional zoom office hours.

Required software: We will use a spreadsheet program (e.g., Excel, Numbers) and a word processor program (e.g., Microsoft Word, Pages etc.). As an Ohio State student, you get free access to Microsoft Office products. You can find instructions on downloading and installing Microsoft products at https://osuitsm.service-now.com/selfservice/kb_view.do?sysparm_article=kb04733. If you have any questions or concerns, please email Dr. Koser and/or Dr. Pesapane.

Carmen access: There will be a Carmen site for this course where all course materials will be posted (carmen.osu.edu). Students will submit all assignments on the Carmen site for this course. You will need to use BuckeyePass (buckeyepass.osu.edu) multi-factor authentication to access your courses in Carmen.

Technology support: For help with your password, university email, Carmen, or any other technology issues, questions, or requests, contact the Ohio State IT Service Desk. Standard support hours are available at ocio.osu.edu/help/hours, and support for urgent issues is available 24/7.

- **Self-Service and Chat support:** ocio.osu.edu/help
- **Phone:** 614-688-4357(HELP)
- **Email:** servicedesk@osu.edu
- **TDD:** 614-688-8743

Office of Student Life: Disability Services

The university strives to make all learning experiences as accessible as possible. Any student who needs an accommodation based on the impact of a disability should contact me privately to discuss your specific needs. Please also contact the Office of Student Life: Disability Services by email at slds@osu.edu or phone at 614-292-3307 in Room 098 Baker Hall 113 W. 12th Ave. to coordinate accommodations for students with documented disabilities (https://slds.osu.edu/).

In light of the current pandemic, students seeking to request COVID-related accommodations may do so through the university's request process, managed by Student Life Disability Services. If you anticipate or experience academic barriers based on your disability (including mental health, chronic, or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life

Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. *SLDS contact information:* slds@osu.edu; 614-292-3307; slds.osu.edu; 098 Baker Hall, 113 W. 12th Avenue.

Mental Health Services

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 or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing. If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life's Counseling and Consultation Service (CCS) by visiting ccs.osu.edu or calling 614-292-5766. CCS is located on the 4th Floor of the Younkin Success Center and 10th Floor of Lincoln Tower. You can reach an on-call counselor when CCS is closed at 614-292-5766 and 24-hour emergency help is also available through the 24/7 National Suicide Prevention Hotline at 1-800-273-TALK or at suicidepreventionlifeline.org.

Health and Safety Requirements

All students, faculty and staff are required to comply with and stay up to date on all university safety and health guidance (https://safeandhealthy.osu.edu), which includes wearing a face mask in any indoor space and maintaining a safe physical distance at all times. Non-compliance will be warned first and disciplinary actions will be taken for repeated offenses.

Academic integrity

Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, The Ohio State University, the College of Public Health, and the Committee on Academic Misconduct (COAM) expect that all students have read and understood the University's *Code of Student Conduct* and the School's *Student Handbook*, and that all students will complete all academic and scholarly assignments with fairness and honesty. The *Code of Student Conduct* and other information on academic integrity and academic misconduct can be found at the COAM web pages (https://oaa.osu.edu/academic-integrity-and-misconduct). Students must recognize that failure to follow the rules and guidelines established in the University's *Code of Student Conduct*, the *Student Handbook*, and in the syllabi for their courses may constitute "Academic Misconduct."

The Ohio State University's *Code of Student Conduct* (Section 3335-23-04) defines academic misconduct as: "Any activity that tends to compromise the academic integrity of the University, or subvert the educational process." Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. Please note that the use of material from the Internet without appropriate acknowledgement and complete citation is plagiarism just as it would be if the source were printed material. Further examples are found in the *Student Handbook*. Ignorance of the *Code of Student Conduct* and the *Student Handbook* is never considered an "excuse" for academic misconduct.

If I suspect a student of academic misconduct in a course, I am obligated by University Rules to report these suspicions to the University's Committee on Academic Misconduct. If COAM determines that the student has violated the University's *Code of Student Conduct* (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in the course and suspension or dismissal from the University. If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact me.

Course Schedule

Week	Dates	Topic	Reading	Instructor	Assignments (Due Dates)
1	Tues 1/13	Course overview & Introduction to disease ecology	"Prevention of Population Cycles by Parasite Removal" by Hudson et al.	Koser & Pesapane	
	Thurs 1/15				
2	Tues 1/20	Pathogens & host responses to infection	"Host species heterogeneity in the epidemiology of Neospora caninum" by Moreno-Torres et al.	Pesapane	Written assignment #1
	Thurs 1/22				*Group & topic choice
3	Tues 1/27	Population disease ecology	"Sociality, density-dependence and microclimates determine the persistence of populations suffering from a novel fungal disease, white-nose syndrome" by Langwig et al.	Koser	Written assignment #2
	Thurs 1/29				
4	Tues 2/3	SIR models	" Examination of the interaction between age-specific predation and chronic disease in the Greater Yellowstone Ecosystem" by Brandell et al.	Koser	Written assignment #3
	Thurs 2/5				*Interim report #1
5	Tues 2/10	Movement	" Dissecting a wildlife disease hotspot: the impact of multiple host species, environmental transmission and seasonality in migration, breeding and mortality" by Brown et al.	Koser	Written assignment #4
	Thurs 2/12				
6	Tues 2/17	Host heterogeneity, fecundity, and behavior	"The effect of cowpox virus infection on fecundity in bank voles and wood mice" by Feore et al.	Pesapane	Written assignment #5
	Thurs 2/19				
7	Tues 2/24	Community disease ecology	"Trophically Transmitted Parasites and the Conservation of Small Populations: Raccoon Roundworm and the Imperiled Allegheny Woodrat" by LoGiudice 2003	Pesapane	Written assignment #6
	Thurs 2/26				
8	Tues 3/3	Biodiversity, community composition, and disease	"Species diversity concurrently dilutes and amplifies transmission in a zoonotic host–pathogen system through competing mechanisms" by Luis et al.	Koser	Written assignment #7
	Thurs 3/5				*Interim report #2
9	Tues 3/10	Case studies of vector-borne diseases and other multi-host pathogens	"Host heterogeneity dominates West Nile virus transmission" by Kilpatrick et al	Koser	Written assignment #8
	Thurs 3/12				
10	Tues 3/17	SPRING BREAK!	(no reading)		No assignments
	Thurs 3/19				
11	Tues 3/24	Human & environmental influences	"Urban habituation, ecological connectivity and epidemic dampening: the emergence of Hendra virus from flying foxes (Pteropus spp.)" by Plowright et al	Pesapane	Written assignment #9
	Thurs 3/26				
12	Tues 3/31	Disease Control	"Raccoon rabies outbreak in Hamilton, Ontario: A progress report" by Lobo et al.	Koser	Written assignment #10
	Thurs 4/2				
13	Tues 4/7	Conservation & population management	"Effects of Disease, Dispersal, and Area on Bighorn Sheep Restoration" by Goss et al 2000	Pesapane	
	Thurs 4/9				
14	Tues 4/14	Project work week	(no reading)	Pesapane & Koser	*Presentations
	Thurs 4/16				
15	Tues 4/21	Project Presentations	(no reading)	Pesapane & Koser	^reviews
	Fri 4/23				^reviews

*** Only grad/prof students complete these assignments**
^ only undergrads complete this assignment

Alignment of Course Objectives, Foundational Knowledge, Competencies, Domains, and Cross-Cutting Concepts

Week	Topic	Assessments (WA = written assignment; disc = group discussion)	Course Learning Objectives	Foundational Public Health Knowledge (MHA, MPH, MS, PhD)	Foundational Competencies (MPH)	Foundational Domains (BSPH)	Foundational Competencies (BSPH)	Cross-cutting Concepts (BSPH)	Specialization Competencies (BSPH-EHS)
1	Introduction & overview	Journal article disc	1,5	4,8,11,12	12	2,3,4,5	1,2	2,3,5,6,9	1
2	Pathogens, & host response to infection	Journal article disc; pathogen diversity WA	1,2,5	3,4,5,6,8	4,12	2,3,4,5	1,2	6,9	1
3	Population disease ecology	Journal article disc; epidemics and endemics WA	1,3,5	3,6,8	4,12	2,3,4,5,9	1,2	2,6,9	1
4	SIR models (systems thinking tools)	Journal article disc; SIR model WA	1,3,4,5	3,6,7,8	4,12,22	2,3,4,5,9	1,2	2,3,6,9,10,11	1
5	Disease control	Journal article disc; disease control WA	1,2,3,4,5	3,5,6,8	4,12,22	2,3,4,5	1,2	2,3,5,6,9,10,11	1,3
6	Connectivity, movement, and spatial spread	Journal article disc; host movement SA	1,3,5	3,6,7,8,11	4,12	2,3,4,5	1,2	2,6,9	1
7	Host heterogeneity, fecundity, and behavior	Journal article disc; host heterogeneity WA	1,3,5	3,6,7,8	4,12	2,3,4,5	1,2	2,6,9	1
8	Biodiversity, community composition, and disease	Journal article disc; biodiversity and disease WA	1,2,3,5	3,6,7,8,12	4,12	2,3,4,5	1,2	2,6,9	1
9	Community disease ecology	Journal article disc	1,2,3,5	3,6,7,8,11,12	4,12	2,3,4,5	1,2	2,6,9	1
11	Case studies of multi-host pathogens	Journal article disc; case study WA	1,2,3,4,5,6	3,4,5,6,7,8,12	4,12	2,3,4,5	1,2	2,3,5,6,9,10	1,3
12	Human & environmental influences	Journal article disc; influences WA	1,2,3,5	3,4,5,6,7,8,11,12	4,12	2,3,4,5	1,2	2,5,6,9	1
13	Conservation and population management	Journal article disc; population management WA	1,2,3,5	3,4,5,6,7,8,12	4,12	2,3,4,5	1,2	2,6,9	1

14-15	Group projects & presentations	Project choice WA; literature review WA; project planning WA; final presentation	1,2,3,5,6	3,4,5,6,7,8,11,12	4,12,19	2,3,4,5,9	1,2	2,3,5,6,9,10	1,3