

## FW467 – WILDLIFE DISEASE ECOLOGY – Fall 2019

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(office hours) Fri 10:00-11:30AM, informally after class, or by appointment

### Course Objectives:

This course will provide students with exposure to the ecological, epidemiological, and evolutionary principles needed to understand the impact that diseases have on wildlife populations and their link to agriculture, public health and conservation. Fundamental concepts in epidemiology and disease ecology will be presented as well as contemporary, emerging issues in disease ecology. The course will be concept-driven rather than taxon-based. At the same time, through 'case studies', lecture, discussion, examples, and activities, the course will cover the etiology, pathology, and impact of a wide variety of wildlife diseases caused by a diversity of agents including bacteria, viruses, protozoa, fungi, macroparasites, and environmental factors that affect the health of wildlife and fish.

### Prerequisites/Requirements:

The course is presented for students with upper-level undergraduate standing in the biological sciences (e.g., Biology, FWCB, Ecology, MIP, Pre-vet, Clinical Sciences, others welcome) and previous coursework in ecology. All students will be expected to research and develop a written perspectives/review paper on an issue in wildlife disease and to actively participate in discussions about papers from the primary literature (details below). Course readings will be provided on Canvas from the current scientific literature and other relevant texts. The course may also feature guest lectures and (perhaps) opportunities outside of class to learn more about current research on wildlife diseases and disease management.

### Course Reading:

Disease ecology is a rapidly evolving and expanding field, and although very good books have been published in recent years (see list below), finding a textbook that is at the same time comprehensive and current is a challenge. Instead, we will read from a variety of sources and use these readings and lectures to build a common foundation of key principles and concepts. Readings will come from some of the sources listed below and the primary literature. Papers or chapters listed on the course schedule will be provided as PDFs on the class Canvas site. Students are expected to be proficient at searching the peer-reviewed scientific literature; I can provide a refresher and some tips and tricks, if needed.

### Student Evaluation:

Students are expected to participate actively throughout the course through questions, comments, ideas, discussion, and feedback with all participants. We'll rely on the primary literature for readings about many contemporary topics and information for case studies so you should be proficient searching scientific databases (e.g., Web of Science, Google Scholar, etc.) for pertinent literature. The course will be writing and reading-intensive. Letter grades will be assigned with grade ranges – A (90% or higher), B (80-89%), C (70-79%), D (60-69%), and F (<60%) – and with the point distribution as follows:

'Perspectives'/Review Paper	40%
Concept note – 5%	
Peer review of draft – 5%	
IGNITE talk – 10%	
Final paper – 20%	
Discussions/Case Study	50%
Case Study presentation – 10%	
Discussion contributions, participation, etc. – 20%	
Leading discussion/discussion forum (x2, 10% each) – 20%	
Mid-term Exam (written)	10%
TOTAL	100%

## Course Assignments:

Student-led sessions – During the semester, we'll have ten (10) student-led sessions. Sessions will be led by groups of four students and will dig deeper into a topic presented in class the week before. Each session will include a case study presentation (led by two students) and a group discussion (led by the other two students of the group).

Case Study – the group will choose a pathogen/disease as a case study to illustrate the theme (concept/issue/idea) of the session. The Case Study leaders (2 students) will provide a short presentation (5-10 minutes, tops) about the case study disease/agent at the start of the session which will set the stage.

Discussion – The other 2 students will lead the discussion based on a paper that I provided and another paper chosen by the student group assigned to that session. The student-chosen paper will highlight the Case Study disease/pathogen and show how it illustrates the concept under discussion. This paper may also present an alternative perspective to the instructor-chosen paper or a novel approach to solving the problem/issue under discussion.

Student leaders should work together to develop a set of stimulating questions about the viewpoints expressed in the two papers (that's why choosing a paper that takes a contrary view may be especially helpful for leading a lively discussion). Finally, discussion leaders will monitor and promote a pre-discussion 'Forum' on Canvas.

Everyone will lead two sessions, one as case study leader and one as discussion leader.

'Perspectives'/Review Paper & IGNITE presentation – Over the course of the semester, everyone will research and develop a short review of an emerging issue in wildlife disease of their choosing (I'll provide some ideas, too). Students will develop a concept note outlining the topic s/he has chosen including the central thesis and pieces that will be included in the final paper. After getting feedback on the concept note, a complete draft of the written paper will be peer-reviewed by others in the class and this feedback should be incorporated into the final product. We'll read a couple of examples of "Perspectives" papers for length and style. Students will also present their Perspectives paper findings in an IGNITE-style talk at the end of the semester.

Exam- The course has one written exam at approximately the mid-term.

## Course Policies and Additional Information:

The course will adhere to CSU's Student Conduct Code and Classroom Conduct and Academic Integrity/Misconduct Policies which are found at (<http://catalog.colostate.edu/general-catalog/policies/students-responsibilities/>). At a minimum, violations will result in a grading penalty in this course and will be referred to the Office of Conflict Resolution and Student Conduct Services.

For me, academic integrity is at the heart of a University and is central to my job as an objective scientist. Academic integrity is conceptualized in this course as doing and taking credit for one's own work on written materials, exams, and other graded coursework. A number of excellent resources are available (<http://learning.colostate.edu/integrity/index.cfm>, [http://learning.colostate.edu/integrity/ways\\_to\\_avoid.cfm](http://learning.colostate.edu/integrity/ways_to_avoid.cfm)) to help students better understand what constitutes plagiarism and why it's so important to give credit where it's due. We will also talk in class about how to properly cite outside sources.

**\* Aspects of the syllabus and schedule may change as the course proceeds. Any change will be announced in class and schedule changes will be posted as an updated schedule on our Canvas site.**

## Additional Resources:

The literature in disease ecology is growing almost exponentially; in fact, a number of excellent books have come out in the last few years and I know of at least two more coming out in the next year. And every day, it seems, there's a new paper in the peer-reviewed literature. These resources might come in handy during your own research for this course or other endeavors. A number of websites with valuable information also exist.

### Texts

- Aguirre et al. (eds.) 2012. New Directions in Conservation Medicine. Oxford University Press: New York.
- Botzler RG and RN Brown. 2014. Foundations of Wildlife Diseases. University of California Press: Oakland, California.
- Brown C and C Bolin. 2000. Emerging Diseases of Animals. ASM Press: Washington DC.
- Childs, JE et al. (eds.) 2007. Wildlife and Emerging Zoonotic Disease: The Biology, Circumstances, and Consequences of Cross-Species Transmission. Springer Verlag: New York.
- Collinge, SK and C Ray. 2006. Disease Ecology: Community Structure and Pathogen Dynamics. Oxford University Press: New York.
- Conover MR and RM Vail. 2015. Human Diseases from Wildlife. CRC Press: Boca Raton, Florida.
- Grenfell, BT and AP Dobson (eds). 1995. Ecology of Infectious Diseases in Natural Populations. Cambridge University Press: Cambridge, UK.
- Hatcher, MJ and AM Dunn. 2011. Parasites in Ecological Communities. Cambridge University Press: New York.
- Hudson, PJ et al (eds). 2001. The Ecology of Wildlife Diseases. Oxford University Press: New York.
- Hughes, DP, J Brodeur, and F Thomas (eds). 2012. Host Manipulation by Parasites. Oxford University Press: New York.
- Morand, S and BR Krasnov (eds). 2010. The Biogeography of Host-Parasite Interactions. Oxford University Press: New York.
- Nunn, CL and S. Altizer. 2006. Infectious Diseases in Primates. Behavior, Ecology and Evolution. Oxford University Press: New York.
- Oosthuizen, J. 2017. Wildlife Disease Surveillance Systems. Lambert Academic Publishing.
- Ostfeld, RS, et al. 2008. Infectious Disease Ecology: The effects of ecosystems on disease and disease on ecosystems. Princeton University Press: Princeton, New Jersey.
- Ostfeld, RS. 2012. Lyme Disease: The Ecology of a Complex System. Oxford University Press: New York.
- Poulin, R and S. Morand. 2004. Parasite Biodiversity. Smithsonian Books: Washington DC.
- Romich, JA. 2008. Understanding Zoonotic Diseases. Thomson Delmar Learning: New York.
- Schmid-Hempel, P. 2011. Evolutionary Parasitology. Oxford University Press: New York.
- Scott, ME and G Smith. 1994. Parasitic and Infectious Diseases Epidemiology and Ecology. Academic Press: New York.
- Stearns, SC (ed). 1999. Evolution in Health and Disease. Oxford University Press: New York.
- Thomas, F, J-F Guegan, and F Renaud (eds). 2009. Ecology and Evolution of Parasitism. Oxford University Press: Oxford.
- Wobeser, GA. 2006. Essentials of Disease in Wild Animals. Blackwell: Ames, IA.
- Wobeser, GA. 2007. Disease in Wild Animals: Investigation and Management, 2<sup>nd</sup> ed. Springer Verlag: New York.

### Websites

<https://www.usgs.gov/centers/nwhc>  
<https://www.aphis.usda.gov/aphis/ourfocus/wildlifedamage/programs/nwrc>  
<http://www.cdc.gov/>  
<http://www.cwhc-rscf.ca/>  
<https://www.promedmail.org/>  
<https://oneworldonehealth.wcs.org/>  
<http://www.wildlifedisease.org/>  
<http://www.oie.int/en/standard-setting/specialists-commissions-working-ad-hoc-groups/working-groups-reports/working-group-on-wildlife/>