Course Approval Form

For approval of new courses and deletions or modifications to an existing course.

registrar.gmu.edu/facultystaff/curriculum

Action Requested:

- [X] Create new course
- [ ] Inactivate existing course
- [ ] Modify existing course (check all that apply)
  - [ ] Title
  - [ ] Credits
  - [ ] Repeat Status
  - [ ] Grade Type
  - [ ] Prereq/coreq
  - [ ] Schedule Type
  - [ ] Restrictions
  - [ ] Other:

Course Level:

- [ ] Undergraduate
- [X] Graduate

College/School: College of Science
Department: Biology
Submitted by: Alonso Aguirre
Ext: 7069
Email: aaguirr3@gmu.edu

Subject Code: BIOL
Number: 560
(Do not list multiple codes or numbers. Each course proposal must have a separate form.)

Effective Term:

- [ ] Fall
- [X] Spring
- [ ] Summer

Year 2016

Title:
Current:
Banner (30 characters max including spaces): Infectious Disease of Wildlife
New: Infectious Diseases of Wildlife

Credits: (check one)

- [3] Fixed
- [ ] Variable

or
to

Repeat Status: (check one)

- [X] Not Repeatable (NR)
- [ ] Repeatable within degree (RD)
- [ ] Repeatable within term (RT)

Maximum credits allowed: 3

Grade Mode: (check one)

- [X] Regular (A, B, C, etc.)
- [ ] Satisfactory/No Credit
- [ ] Special (A, B C, etc. +IP)

Schedule Type: (check one) LEC can include LAB or RCT

- [X] Lecture (LEC)
- [ ] Lab (LAB)
- [ ] Recitation (RCT)
- [ ] Internship (INT)
- [ ] Independent Study (IND)
- [ ] Seminar (SEM)
- [ ] Studio (STU)

Prerequisite(s):
Courses on Evolution, Ecology, Zoology and Conservation Biology or Instructor's permission

Corequisite(s):
N/A

Instructional Mode:

- [X] 100% face-to-face
- [ ] Hybrid: ≤ 50% electronically delivered
- [ ] 100% electronically delivered

Restrictions Enforced by System: Major, College, Degree, Program, etc. Include Code.

Are there equivalent course(s)?

- [X] Yes
- [ ] No

If yes, please list EVPP560

Catalog Copy for NEW Courses Only (Consult University Catalog for models)

Description (No more than 60 words, use verb phrases and present tense)	**Notes** (List additional information for the course)
During this course, diseases of wildlife will be examined with emphasis on causes and mechanisms, pathobiology, ecology and epidemiology and population significance. We will explore methods of diagnosis, control, prevention and outbreak investigation as they apply to management and conservation of wildlife populations. Also, diseases crossing species barriers will be examined.	

Indicate number of contact hours: Hours of Lecture or Seminar per week: 3 Hours of Lab or Studio:

When Offered: (check all that apply) [ ] Fall [ ] Summer [X] Spring

Approval Signatures

Department Approval Date

College/School Approval Date

If this course includes subject matter currently dealt with by any other units, the originating department must circulate this proposal for review by those units and obtain the necessary signatures prior to submission. Failure to do so will delay action on this proposal.

Unit Name	Unit Approval Name	Unit Approver's Signature	Date

For Graduate Courses Only

Graduate Council Member

Provost Office

Graduate Council Approval Date

For Registrar Office's Use Only: Banner_____Catalog_____

revised 11/8/11

Course Proposal Submitted to the Curriculum Committee of the College of Science

1. COURSE NUMBER AND TITLE: BIOL 560 Infectious Diseases of Wildlife

Course Prerequisites: Courses on Evolution, Ecology, Zoology and Conservation Biology or Instructor's permission

Catalog Description: During this course, diseases of wildlife will be examined with emphasis on causes and mechanisms, pathobiology, ecology and epidemiology and population significance. We will explore methods of diagnosis, control, prevention and outbreak investigation as they apply to management and conservation of wildlife populations. Also, diseases crossing species barriers will be examined.

2. COURSE JUSTIFICATION: The importance of wildlife diseases has increased in recent years due to globalization, habitat loss and fragmentation, the illegal trade and other human activities. More state and federal agencies and organizations are required to understand the wildlife-domestic animal-human interface in relation to infectious agents, biosecurity and potential zoonotic diseases. This course provides the framework for undergraduate students from Biology, Environmental Science and Policy, Public Health, Pre-med, Pre-vet, Nursing, Global Health and other majors, to understand the fundamental principles of infectious wildlife diseases and their interactions with conservation of species and ecosystems, impacts to domestic animal health and public health.

Course Objectives: Students will participate in individual and team assignments to be able to:

1. Identify important infectious diseases of wildlife, including diseases transmissible between humans, domestic animals, and wildlife.
2. Understand the evolution of pathogens and their hosts linked to environmental conditions.
3. Understand the proximate mechanisms of pathogenesis in wildlife diseases.
4. Describe the epidemiological principles and models of disease spread in wildlife populations.
5. Describe primary methods of diagnosis, prevention and control of wildlife diseases.
6. Outline a wildlife disease outbreak investigation
7. Integrate wildlife diseases into principles of wildlife management and conservation.

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Course Necessity:

See above 2. Course Justification.

Course Relationship to Existing Programs: N/A

Course Relationship to Existing Courses: Complements BIOL 435/507

3. APPROVAL HISTORY:

4. SCHEDULING AND PROPOSED INSTRUCTORS:

Semester of Initial Offering: Spring 2016

Proposed Instructor: Alonso Aguirre

5. TENTATIVE SYLLABUS: See attached

INFECTIOUS DISEASES OF WILDLIFE
EVPP 560-00X (CRN____)
BIOL 560-00X (CRN____)
3 Credit Hours

GEORGE MASON UNIVERSITY
Spring Semester 2016
Lecture: 4:30–7:10 p.m.
[Building], Room [number]

Instructor:	Dr. A. Alonso Aguirre
Office:	3026 David J. King Hall MSN: MSN: 5F2, Fairfax 420 Occoquan Building PW MSN: 4D4, Manassas
Office Hours:	Tuesdays & Thursdays 1:00-3:00 pm or BY APPOINTMENT (send email request)
Phone:	703.993.7069
Cell:	304.200.0145
Email:	aaguirr3@gmu.edu
Prerequisite(s):	Courses on Evolution, Ecology, Zoology and Conservation Biology or Instructor's permission.

Sign up for Mason Alert (e.g., weather closings, emergencies) at **https://alert.gmu.edu**

Syllabus

Course Description

The importance of wildlife diseases has increased in recent years due to globalization, habitat loss and fragmentation, the illegal trade and other human activities. More state and federal agencies and organizations are required to understand the wildlife-domestic animal-human interface in relation to infectious agents, biosecurity and potential zoonotic diseases. This course provides the framework for undergraduate students from Biology, Environmental Science and Policy, Public Health, Pre-med, Pre-vet, Nursing, Global Health and other majors, to understand the fundamental principles of infectious wildlife diseases and their interactions with conservation of species and ecosystems, impacts to domestic animal health and public health. A basic understanding of these relationships in order to interact knowledgeably with both human and veterinary health professionals will be provided.

The course is not designed as a comprehensive survey of wildlife diseases. We will focus on the epidemiology of viruses, bacteria, fungi, protozoa and parasites that illustrate concepts important to the ecological and evolutionary strategies of the agent and its relationship to its hosts and the environment. Geographic distribution of selected infectious agents will be global but with emphasis on diseases that occur in North America. Affected animal species include amphibians, reptiles, birds, and terrestrial mammals.

Course Objectives and Student Learning Outcomes

During this course, diseases of wildlife will be examined with emphasis on causes and mechanisms, pathobiology, ecology and epidemiology and population significance. We will explore methods of diagnosis, control, prevention and outbreak investigation as they apply to management and conservation of wildlife populations. Also, diseases crossing species barriers will be examined. Students will participate in individual and team assignments to be able to:

8. Identify important infectious diseases of wildlife, including diseases transmissible between humans, domestic animals, and wildlife.
9. Understand the evolution of pathogens and their hosts linked to environmental conditions.
10. Understand the proximate mechanisms of pathogenesis in wildlife diseases.
11. Describe the epidemiological principles and models of disease spread in wildlife populations.
12. Describe primary methods of diagnosis, prevention and control of wildlife diseases.
13. Outline a wildlife disease outbreak investigation
14. Integrate wildlife diseases into principles of wildlife management and conservation.

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Course Expectations

Each session will combine lectures, class exercises, on occasion guest speakers, and student discussion. As with any cross-listed course offering, ***this will not be an easy course***. The successful student **must read assignments, study supporting materials, and prepare assignments outside of class**. Self-directed study skills are important. Students need to organize material logically and communicate well orally and in writing.

Class Preparation

"He who hesitates is lost...." Reading, research, and assignments are detailed on the following class outlines. Any concerns about keeping up with assignments should be discussed with Prof. Aguirre. More students are juggling work, research, internships, shadowing, and families. Please note "Although many students must work to meet living expenses, employment must not take priority over academic responsibilities. Students employed more than 20 hours a week are strongly urged not to attempt a full-time academic load. Students employed more than 40 hours a week should attempt no more than 6 credits per semester. Students who fail to observe these guidelines may expect no special consideration for academic problems arising from the pressures of employment.." (University catalog, section AP.1.2. Academic Load, see: http://catalog.gmu.edu/content.php?catoid=27&navoid=5365#attendance). Please consider your responsibilities and interests and plan accordingly to protect your health and GPA!

Class Participation

Students should come to class ready to participate in all activities (assignments completed prior to class). They should behave in a mature and professional manner and abide by the George Mason University honor code. **Please turn off cell phones or pagers before class begins.**

Absenteeism should be limited to illness or emergencies, or discuss concerns with the instructor. Students should notify the instructor before class if they must miss a class. **Multiple missed classes will affect student grades.** PowerPoint TEXTS will be posted so you have the highlights of each lecture. However, you need to make every effort to attend. Students should contact classmates to obtain lecture notes and assignments, if necessary as quizzes and exams will be based also from readings from the books and other materials.

Students may record the lectures (sound), but may not take photographs or videos. Instead, they should take notes, which will help them study for the exams. If using *electronic devices (such as laptops, notebooks, tablets), please be respectful of your peers and your instructor and do not engage in activities that are unrelated to class. Such disruptions show a lack of professionalism and can affect your grade.* ***All cellular phones should be turned off.***

If you are a student with a disability and you need academic accommodations, please notify the instructor and contact the Office of Disability Services (ODS) at 993-2474. All academic accommodations must be arranged through the ODS.

E-mail Communications

Prof. Aguirre will send e-mail messages only to your GMU e-mail account. Students must use their Mason email accounts—"MASONLIVE" account—to receive important University information, including messages related to this class. See http://masonlive.gmu.edu for more information. Please be sure you check it often and keep your mailbox from getting "over quota" (filled up so you won't get any)! If you are not getting messages (e.g., masonlive issues), please give an alternate e-mail address.

WHAT THE COURSE CANNOT DO:

A single semester course in infectious diseases of wildlife cannot impart diagnostic skills or research capacity. Work that requires diagnostics or research tools must involve trained diagnosticians/ researchers, for diagnostics usually veterinary pathologists with wildlife experience and consultation from experienced wildlife biologists. This by no means limits wildlife disease work to individuals with diagnostic training. Wildlife diagnostics is only one part of wildlife disease work and may or may not be necessary in all research projects. In fact, the best wildlife disease work is generally done by transdisciplinary teams that include wildlife biologists, population biologists, ecologists, pathologists, toxicologists, microbiologists, parasitologists, modelers, sociologists, anthropologists and others! We hope to emphasize that with examples for discussion.

Course Assignments

Definitions of Terms
Each student is expected to identify 100 common terms in infectious diseases of wildlife and submit them written by hand. This is a way to expose you to common terminology in health and disease ecology hoping that you may remember some of these definitions while writing them.

Written Commentaries
In addition to reading and studying the textbook, other books, and journal papers, you will prepare two written assignments of 400 words not including references drafted as a commentary, comparing, contrasting, or critiquing a technical or popular article recently published (2014) on an infectious disease of wildlife (i.e. West Nile virus infection in alligators, mycoplasmosis in finches, epizootic hemorrhagic disease of deer), in the style of *Letters to Science* *http://www.sciencemag.org/site/collections/online/eletters/guidelines.xhtml*

Identify ***specific*** issues/critiques you have with **an article of your choice from a refereed journal or popular magazine**. This can be something that you found problematic, interesting, ridiculous, missing, etc. and then compare and support your arguments with other sources in the literature. You are **encouraged** to search articles from all sources. Use Web of Science or other journal databases to do additional literature searches.

Make your critiques **explicit and clear**, e.g.: "I find three main critiques in the way this argument was presented." … paragraph 1, 2, 3. Preferable to critique is a piece of **primary** literature, popular magazine or even TV news report, and not a review paper or chapter.

Do not spend too many words describing the intro, methods, conclusions, etc. of the article or report that you are critiquing. Try to give a very **brief** overview of the important points or methods and spend the rest of your paper giving **your own** "two-cents"! A good idea is to end with what you think needs to be done in the future based on your critique. **Don't be repetitive** with your points, you only have up to 400 words, therefore be concise and clear. Make every word count (this may be one of the big challenges of the assignments and will train you for real manuscript writing with editor-imposed word limits).

Proofread: Review your spelling and grammar before handing your work in! Avoid run-on or ambiguous sentences.

Each paper should be neatly prepared and proofread, especially checking for consistency, completeness, and correctness (Help: The Writing Center, OWL/On-line Writing Lab). Many online grammar resources are available now. This book might help when writing:

Ross-Larson, B. 1996. *Edit Yourself: A Manual for Everyone Who Works With Words.* W.W. Norton & Co., New York, NY.

All statements of fact in your paper need to be referenced to some authority. You can of course get access to that material electronically, BUT the use of web sites as a primary source of information is discouraged. You should be using primary literature (e.g. peer reviewed journal articles) and reports for your authority. Limit web citation to no more than about 25% of the total. Full references (all authors names) should be provided in the Literature Cited section of your paper. As for citation style – use *Letters to Science*, but include all authors in the Literature Cited portion of the paper. Footnotes are reserved for limited explanatory material only. In the body of the text use numbers with an alphabetized Literature Cited section.

Use **proper reference structure**, author-year e.g., "AbuBakar *et al* (2011) isolated Nipah virus from pigs" or numbered reference (if you want to save words), e.g. "Nipah virus was isolated from pigs [1]".

References:

1. AbuBakar, S., L.-Y. Chang, A.R.M. Ali, S.H. Sharifah, K. Yusoff, and Z. Zamrod, *Isolation and molecular identification of Nipah virus from pigs.* Emerging Infectious Diseases, 2004. **10**(12): p. 2228-2230.

Please use Word (either .doc or .docx files only) and email your paper to me at the due date.

Research Paper

Each graduate student will be expected to write a research paper on a wildlife disease topic agreed upon by the instructor and student. The paper shall be a minimum of 6 double spaced typed pages containing the history, science, human dimension, and management implications of the topic. Grading of the paper will be judged on content, form, and relevancy to the course subject. Further details of the paper will be covered at the time of assignment. Use the *Journal of Wildlife Diseases* guidelines for length and style of the research papers.

PowerPoint Presentation

All students are required to give a 10 min presentation (+1-2 min Q&A) via PowerPoint slides on a *contemporary* issue/topic relevant to *Infectious Diseases of Wildlife* during the semester. These presentations are worth *15% of your grade*. The issues/topics (*but not the contents*) for the presentations are not limited to those covered in class. Choose your favorite infectious disease of wildlife from a newspaper, magazine article, or scientific journal article. In your presentation, provide a brief background of the problem; describe the impacts of this disease to wildlife, domestic animals, humans and ecosystems and concerns from an economic, cultural, environmental, and/or epidemiological perspective. Management implications may include discussion of mechanisms of control, prevention measures and proactive intervention to reduce impacts of the pathogen.

Presentations will be **10 minutes total** (and 1-2 minutes for questions).

The slide presentation "rule of thumb" is 1 slide per minute so plan accordingly.
Your 1st slide should be a title slide with your name and title of the talk. Next should be an introduction & overview to the infectious disease followed by more specifics. Next you should discuss the implications and management issues related to the ecology of the pathogen-host-environment. Finally, you should provide conclusions in which the main points are highlighted.

Presentations will be graded on the clarity of the presentation, the professionalism of the slides, the content of the material presented, and your ability to answer questions posed by classmates and instructor.

Each topic below will get a score ranging from **1** (poor), **2** (good), **3** (very good) **4** (excellent)

Literature Review- Scope of information gathering

Scientific knowledge- How accurate is the information presented

Management Implications- all presentations should address *at least* 3 of the following areas:

a) Effects of an infectious disease in species and ecosystems from the molecular to the global, including human health
b) Economic perspectives
c) Cultural perspectives
d) Socioeconomic perspectives
e) Environmental policy angle
f) Perspectives from both the development, agriculture and conservation
g) Public health angles
h) Solutions to the problems outlined

Conclusions-Conclusions are sound and supported by data

Slides-Slides are well organized, logical, and easy to read and to interpret

Style-Delivery is clear, audible, with proper elocution and eye contact with audience

Time-Speaker adheres strictly to time limit.

Grading Criteria

The total grade received for this course will be based on the following assignments and assessments:

Activity	Percent Contribution to Total Grade
Definitions of Terms	5%
Extra readings	5%
Two written commentaries	10% (5% each)
Research paper	10%
Four surprise quizzes (5 given)	20% (5% each)
Mid-term Exam	20%
PowerPoint presentation	10%
Final Exam	20%
TOTAL	100%

The final grade will be based on this scale: A= 100–90%, B= 89-80, C = 79–70%, D= 69–60%, F < 59%. **A CURVE WILL NOT BE APPLIED.**

Academic Integrity

GMU is an Honor Code university; please see the University Catalog for a full description of the code and the honor committee process. The principle of academic integrity is taken very seriously and violations are treated gravely. What does academic integrity mean in this course? Essentially this: when you are responsible for a

task, you will perform that task. When you rely on someone else's work in an aspect of the performance of that task, you will give full credit in the proper, accepted form. Another aspect of academic integrity is the free play of ideas. Vigorous discussion and debate are encouraged in this course, with the firm expectation that all aspects of the class will be conducted with civility and respect for differing ideas, perspectives, and traditions. When in doubt (of any kind) please ask for guidance and clarification. Students are expected to complete the work on their own or as a team, depending on the assignment.

All exams will be completed by individuals in the classroom or as a team outside the classroom (those registered for the course).

Unless otherwise noted, these assessments will be taken without the use of study aids, memoranda, textbooks, other books, data, or other information available.

It is important to note that materials produced for this course, particularly for the research paper, require creativity in organization and presentation, but that the information presented within the paper or other product must be properly acknowledged as to its source. Statements of a general nature or that synthesize information from several sources need not be attributed to a specific source; however, statements of specific details or direct quotations ("between quotation marks") from books, journals, newspaper or other media articles, Internet web pages, or other authorities must be identified with the name of the author and year in the text and the full citation provided in a literature cited section at the end of the paper. The instructor will provide the format for citations.

Other Useful Campus Resources

WRITING CENTER: A114 Robinson Hall; 703-993-1200; http://writingcenter.gmu.edu

UNIVERSITY LIBRARIES: "Ask a Librarian" http://library.gmu.edu/mudge/IM/IMRef.html

COUNSELING AND PSYCHOLOGICAL SERVICES (CAPS): 703-993-2380;
http://caps.gmu.edu

LEARNING SERVICES: 703-993-2999; http://caps.gmu.edu/learningservices/; offer many good study skills workshops!

ACADEMIC COUNSELING PROGRAM: 703-993-2380:
http://caps.gmu.edu/learningservices/academiccounseling.php

UNIVERSITY POLICIES
The University Catalog, http://catalog.gmu.edu, is the central resource for university policies affecting student, faculty, and staff conduct in university academic affairs. Other policies are available at http://universitypolicy.gmu.edu/. All members of the university community are responsible for knowing and following established policies.

Course Schedule*

*In addition to the chapters for each session, graduate students will read **two** **preselected, refereed papers** listed below that need to be discussed in class.

Week	*Date*	*Topic*
1	01/19	Introduction to the course. General concepts and definitions
		The One Health approach to diseases of wildlife
2	01/26	Spatial & temporal aspects of infectious disease dynamics: pathogens & hosts
		Epidemiological principles: networks, superspreaders & spatial heterogeneity
3	02/2	Transmission, perpetuation and effects of disease in wild populations: decline and extinction or pathogen goes extinct
		Spillover and disease emergence
4	02/9	Mechanical and chemical immobilization
		Stress and capture myopathy
5	02/16	Recording and submitting specimen history data; specimen collection and preservation; specimen shipment
6	02/23	Disease control operations; euthanasia; guidelines for proper care and use of wildlife
		Wildlife disease surveillance
7	03/1	**Midterm Exam**
8	03/8	Spring break
9	03/15	Viral diseases of wildlife including prions
10	03/22	Bacterial diseases of wildlife
11	03/29	Fungal diseases of wildlife
12	04/5	Parasitic diseases of wildlife
13	04/12	Vectorborne diseases of wildlife
14	04/19	Zoonotic diseases: from wildlife to humans
		Anthropozoonoses: from humans to wildlife
15	04/26	Disease management: Host – depopulation, dispersal, vaccination.
		Disease management: Agent- disinfection, vector and reservoir elimination. Environment – Habitat manipulation; public education
16	05/3	**Final Exam**

Required Textbooks (Free on line):

Canadian Cooperative Wildlife Health Centre. 2010. Wildlife Disease Investigation Manual 3rd ed. http://www.sccp.ca/sites/default/files/specieshabitat/documents/wildlife%20disease%20investigation%20manual%203%20ed%202010%20%20ccwhc.pdf

Friend, M. 2006. Disease Emergence and Resurgence: The Wildlife-Human Connection: Reston, Va., U.S. Geological Survey, Circular 1285, 400 p., Reston, Virginia
http://www.nwhc.usgs.gov/publications/disease_emergence/

Friend, M. and J-C Franson (eds). 1999. Field Manual of Wildlife Diseases: General Field Procedure and Diseases of Birds. US Geological Survey and U.S. Fish and Wildlife Service.
http://www.nwhc.usgs.gov/publications/field_manual/

Leighton, F.A. 2010. The Training Manual on Wildlife Diseases and Surveillance: Workshop for OIE National Focus Points for Wildlife. World Organisation for Animal Health (OIE), Paris, France.
http://www.oie.int/fileadmin/Home/eng/Internationa_Standard_Setting/docs/pdf/WGWildlife/A_Training_Manual_Wildlife.pdf

Required Readings:

Week 1:

Buttke, D.E., D.J. Decker, and M.A. Wild. 2015. The role of one health in wildlife conservation: a challenge and opportunity. Journal of Wildlife Diseases 51:1-8.

Stephen C. 2014. Toward a modernized definition of wildlife health. Journal of Wildlife Diseases 50:427-430.

Tompikns, D.M., A.M. Dunn, M.J. Smith and S. Telfer. 2011. Wildlife diseases: from individuals to ecosystems. Journal of Animal Ecology 80:19-38.

Week 2:

Sections I to VI from Leighton 2010

Aguirre, A.A., and E.E. Starkey. 1994. Wildlife disease in U.S. National Parks: historical and coevolutionary perspectives. Conservation Biology 8(3):654-661.

Keesing, F., L.K. Belden, P. Daszak, A. Dobson, C. Drew Harvell, R.D. Hold, P. Hudson, A. Jolles, K.E. Jones, C.E. Mitchell, S.S. Myers, T. Bogich, and R.S. Ostfeld. 2010. Impacts of biodiversity on the emergence and transmission of infectious diseases. Nature 468:647-652. doi:10.1038.nature09575

Viana, M., R. Mancy, R. Biek, S. Cleaveland, P.C. Cross, J.O. Lloyd-Smith, and D.T. Haydon. 2014. Assembling evidence for identifying reservoirs of infection. Trends in Ecology & Evolution 29(5):270–279.

Week 3:

Ch 3 from Friend 2006

Daszak, P., A.A. Cunningham, and A.D. Hyatt, 2000. Emerging infectious diseases of wildlife–threats to biodiversity and human health. Science 287: 443-449.

Tompikns, D.M., S. Carver, M.E. Jones, M. Krkošek, and L.F. Skerrat. 2015. Emerging infectious diseases of wildlife: a critical perspective. Trends in Parasitology 31:149-159.

MacPhee, R.D.E., and A.D. Greenwood. 2013. Infectious disease, endangerment, and extinction. Int. J. Evol. Biol. doi.org/10.1155/2013/571939

Pedersen, A.B., K.E. Jones, C.L. Nunn, and S. Altizer. 2007. Infectious diseases and extinction risk in wild mammals. Conservation Biology 21(5):1269–1279.

Smith, K. F., D. F. Sax and K. D. Lafferty. 2006. Evidence for the role of infectious disease in species extinction and endangerment. Conservation Biology 20:1349-1357.

Week 4:

Michigan Department of Natural Resources. 2000. Managing white-tailed deer in Michigan: Capture and translocation as a means of population control. Lansing.

Cunningham, A.A. 1996. Disease risks of wildlife translocations. Conservation Biology 10: 349-353.

Blumstein, D.T. et al. 2015. The evolution of capture myopathy in hooved mammals: a model for human stress cardiomyopathy? Evolution, Medicine and Public Health pp. 195-203.

Spraker, T. 1993. Stress and capture myopathy in artiodactyls *In* M.E. Fowler (ed.), Zoo & Wildlife Medicine: Current Therapy 3, pp. 481-488. W.B. Saunders Company, Philadelphia, Pennsylvania.

Week 5:

Pages 4-27 from the CCWHC manual 2007

Chapters 1-3 from Friend and Franson 1999

Ryser-Degiorgis, M.-P. 2013. Wildlife health investigations: needs, challenges and recommendations. BMC Veterinary Research 9:223.

Week 6:

Pages 28-47 from the CCWHC manual 2007

Chapters 4-6 from Friend and Franson 1999

Grogan, L.F., L. Berger, K. Rose, V. Grillo, S.D. Cashins, and L.F. Skerratt. 2014. Surveillance for emerging biodiversity diseases of wildlife. PLoS Pathog 10(5): e1004015. doi:10.1371/journal.ppat.1004015

Stallknecht, D.E. 2007. Impediments to wildlife disease surveillance, research, and diagnostics. CTMI 315:445-461.

Week 7: MIDTERM EXAM

Week 8: SPRING BREAK

Week 9:

Chapter 22 from Friend and Franson 1999

Aguirre, A.A. and P.L. Lutz. 2004. Marine turtles as sentinels of ecosystem health: is fibropapillomatosis an indicator? EcoHealth 1:275-283.

Clayton, B.A., L.F. Wang, and G.A. Marsh. 2012. Henipaviruses: an updated review focusing on the Pteropid reservoir and features of transmission. Zoonoses and Public Health 60:69-83.

Marra, P. et al. 2004. West Nile virus and wildlife. BioScience 54:393-402.

Wallace RM, Gilbert A, Slate D, Chipman R, Singh A, et al. (2014) Right place, wrong species: A 20-year review of rabies virus cross species transmission among terrestrial mammals in the United States. PLoS ONE 9(10): e107539. doi:10.1371/journal.pone.0107539

Williams, E.S. and M.W. Miller. 2002. Chronic wasting disease in deer and elk in North America. Rev sci tech Off int Epiz 21:305-316.

Week 10:

Chapters 7 and 10 from Friend and Franson 1999

LoBue, P.A., D.A. Enarson, and C.O. Thoen. 2010. Tuberculosis in humans and animals: an overview. Int J Tuberc Lung Dis 14:1075-1078.

Week 11:

Chapter 13 from Friend and Franson 1999

Burco, J.D., K.A. Etienne, J.G. Massey, M.H .Ziccardi, and S.A. Balajee. 2012. Molecular sub-typing suggests that the environment of rehabilitation centers may be a potential source of *Aspergillus fumigatus* infecting rehabilitating seabirds. Medical Mycology 50:91-98.

Fisher, M.C., D.A. Henk, C.J. Briggs, J.S. Brownstein, L.C. Madoff, S.L. McCraw, and S.J. Gurr. 2012. Emerging fungal threats to animal, plant and ecosystem health. Nature 484:186-194.

Olsen, D.H., D.M. Aanensen, K.L. Ronnenberg, C.I. Powell, S.F. Walker, J. Bielby, T.W.J. Garner, G. Weaver, The *Bd* Mapping Group, and M.C. Fisher. 2013. Mapping the global emergence of *Batrachochytrium dendrobatidis*, the amphibian chytrid fungus. PLoS ONE 8(2):e56802.

Week 12:

Chapters 25 and 30 from Friend and Franson 1999

Chomel, B.B. 2008. Control and prevention of emerging parasitic zoonoses. Int J Parasitol 38:1211-1217.

Dubey, J.P. and J.L. Jones. 2008. Toxoplasma gondii infection in humans and animals in the United States. International Journal for Parasitology 38:1257-1278.

Thompson, R.C.A. 2013. Parasite zoonoses and wildlife: one health, spillover and human activity. International Journal for Parasitology 43:1079-1088.

Week 13:

Aguirre, A. A. 2009. Wild caninds as sentinels of ecological health: a conservation medicine perspective. Parasites & Vectors 2(Suppl 1):S7

Duscher, G.G., M. Leschnik, H.-P. Fuehrer, and A. Joachim. 2015. Wildlife reservoirs for vector-borne canine, feline, and zoonotic infections in Austria. International Journal for Parasitology: Parasites and Wildlife 4:88-96.

Magori, K. and J.M. Drake. 2013. The population dynamics of vector-borne diseases. Nature Education Knowledge 4(4):14 http://www.nature.com/scitable/knowledge/library/the-population-dynamics-of-vector-borne-diseases-102042523

Week 14:

Chapter 2 from Friend 2006

Childs, J.E. 2004. Zoonotic viruses of wildlife: hither from you. Arch Virol [Suppl]18:1-11.

Gortazar C., L.A. Reperant, T. Kuiken, J. de la Fuente, M. Boadella, B. Martínez-Lopez, F. Ruiz-Fons, A. Estrada-Peña, C. Drosten, G. Medley, R. Ostfeld, T. Peterson, K. C. VerCauteren, C. Menge, M. Artois, C. Schultsz, R. Delahay, J. Serra-Cobo, R. Poulin, F. Keck, A.A. Aguirre, H. Henttonen, A.P. Dobson, S. Kutz , J. Lubroth and A. Mysterud. 2014. Crossing the interspecies barrier: opening the door to zoonotic pathogens. PLoS Pathogens 10(6): e1004129. doi:10.1371/journal.ppat.1004129.

Messenger, A.M., A.N. Barnes, and G.C. Gray. 2014. Reverse zoonotic disease transmission (zooanthroponosis): A systematic review of seldom-documented human biological threats to animals. PLoS ONE 9(2): e89055.doi:10.1371/journal.pone.0089055

Wood, C.L., K.D. Lafferty, G. DeLeo, H.S. Young, P.J. Hudson, and A.M. Kuris. 2014. Does biodiversity protect humans against infectious disease? Ecology 95(4):817-832.

Week 15

Sections VII to X from Leighton 2010

Bienen, L., and G. Tabor. 2006. Applying an ecosystem approach to brucellosis control: can an old conflict between wildlife and agriculture be successfully managed? Front Ecol Env 4(6):319–327.

Chauvenet, A.L.M., S.M. Durant, R. Hilborn, and N. Pettorelli. 2011. Unintended consequences of conservation actions: managing disease in complex ecosystems. PLoS ONE 6(12): e28671. doi:10.1371/journal.pone.0028671

Travis, D.A., D.W. Chapman et al. 2014. One health: lessons learned from East Africa. Microbiology Spectrum 2(1):OH-0017-2012. doi:10.1128/microbiolspec.OH-0017-2012.

Selected References on Wildlife Diseases

Aguirre, A.A., R.S. Ostfeld and P. Daszak (eds.). 2012. New Directions in Conservation Medicine: Applied Cases of Ecological Health, Oxford University Press, New York, 639 pp.

Aguirre, A.A., R.S. Ostfeld, G.M. Tabor, C.A. House and M.C. Pearl (eds.). 2002. Conservation Medicine: Ecological Health in Practice. Oxford University Press, New York.

Atkinson, C.T., N.J. Thomas, and D.B. Hunter (eds.). 2008. Parasitic Diseases of Wild Birds. Wiley-Blackwell. Ames, Iowa, 595 pp.

Botzler, R.G. and R.N. Brown. 2014. Foundations of Wildlife Diseases, University of California Press.

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.

Chowdhury, N. and A. A. Aguirre (eds.). 2001. Helminths of Wildlife. Science Publishers, Inc., Enfield, New Hampshire, 514 pp.

Collinge, S.K. and C. Ray. 2006. Disease Ecology: Community Structure and Pathogen Dynamics. Oxford University Press: New York.

Conover, M.R. and R. M. Vail. 2015. Human Diseases from Wildlife. Taylor & Francis Group, CRC Press.

Davidson, W.R. (ed.). 1981. Diseases and Parasites of White-tailed Deer. Tall Timbers Research Station, Misc. Publ No. 7 Tallahassee, Florida. 458 pp.

Davidson, W.R. and V.F. Nettles. 1997. Field Manual of Wildlife Diseases in the Southeastern United States, 2nd ed. Southern Cooperative Wildlife Disease Study, Athens, Georgia. 417 pp.

Fairbrother, A., L.N. Locke, and G.L. Hoff. 1996. Noninfectious Diseases of Wildlife, 2nd ed. Iowa State University Press, Ames. 219 pp.

Fowler, M.E. and Z.S. Cubas (eds.). 2001. Biology, Medicine, and Surgery of South American Wild Animals. Iowa State University Press, Ames, 536 pp.

Grenfell, BT et al (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.

Miller R.E. and M.E. Fowler (eds.). 2015. Fowler's Zoo and Wildlife Medicine Vol 8. Elsevier Saunders, St. Louis, Missouri. 773 pp.

Monath, T.P. (ed.). 1988.The Arboviruses: Epidemiology and Ecology. IV vols. CRC Press, Inc. Boca Raton, Florida.

Morand, S. and B.R. Krasnov (eds). 2010. The Biogeography of Host-Parasite Interactions. Oxford University Press: New York.

Nunn, C.L. and S. Altizer. 2006. Infectious Diseases in Primates: Behavior, Ecology and Evolution. Oxford University Press: New York.

Ostfeld, R.S., et al. 2008. Infectious Disease Ecology: The effects of ecosystems on disease and disease on ecosystems. Princeton University Press: Princeton, New Jersey.

Poulin, R. and S. Morand. 2004. Parasite Biodiversity. Smithsonian Books: Washington DC.

Romich, J.A. 2008. Understanding Zoonotic Diseases. Thomson Delmar Learning: New York.

Samuel, W.M., M.J. Pybus, and A.A. Kocan (eds.). 2001. Parasitic diseases of Wild Mammals 2nd ed. Iowa State University Press, Ames, 559 pp.

Schmid-Hempel, P. 2011. Evolutionary Parasitology. Oxford University Press: New York.

Scott, M.E. and G. Smith. 1994. Parasitic and Infectious Diseases Epidemiology and Ecology. Academic Press: New York.

Stearns, S.C. (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, New York.

Thomas, N.J., D.B. Hunter, and C.T. Atkinson (eds.). 2007. Infectious diseases of Wild Birds. Blackwell Publishing, Ames, Iowa, 484 pp.

Thorne, E. T., N. Kingston, W.R. Jolley, and R. C. Bergstrom (eds.). 1982. Diseases of Wildlife in Wyoming. Wyoming Game and Fish Department, Cheyenne, Wyoming. 353 pp.

Williams, E.S. and I.K. Barker. 2001. Infectious Diseases of Wild Mammals 3rded. Iowa State University Press, Ames, 558 pp.

Wobeser, G. A. 2007. Disease in Wild Animals: Investigation and Management 2nd ed. Springer, Heidelberg, Germany, 387 pp.

Wobeser, G.A. 2006. Essentials of Disease in Wild Animals. Blackwell Publishing.

Wobeser, G. A. 1998. Diseases of Wild Waterfowl, 2nd ed. Plenum Press, New York, 324 pp.

Websites

http://wildlifedisease.nbii.gov/index.jsp
http://www.nwhc.usgs.gov/
http://www.aphis.usda.gov/ws/nwrc/research/disease_research.html
http://www.cdc.gov/
http://www.wildlifedisease.org/
http://www.library.tufts.edu/vet/signature/exotwild.html