



# Course Approval Form

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

registrar.gmu.edu/facultystaff/curriculum

## Action Requested:

☒ 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

☐ Graduate

College/School: College of Science Department: Biology

Submitted by: Alonso Aguirre Ext: 7069 Email: aaguirr3@gmu.edu

Subject Code: BIOL Number: 460 Effective Term: ☐ Fall ☒ Spring Year: 2016 ☐ Summer

(Do not list multiple codes or numbers. Each course proposal must have a separate form.)

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) ☒ Not Repeatable (NR) ☐ Repeatable within degree (RD) ☐ Repeatable within term (RT) Maximum credits allowed: 3

Grade Mode: (check one) ☒ Regular (A, B, C, etc.) ☐ Satisfactory/No Credit ☐ Special (A, B, C, etc. +IP)

Schedule Type: (check one) ☒ Lecture (LEC) ☐ Lab (LAB) ☐ Recitation (RCT) ☐ Internship (INT)

☐ Independent Study (IND) ☐ Seminar (SEM) ☐ Studio (STU)

## Prerequisite(s):

60 credits and BIOL 308, or permission of the instructor

## Corequisite(s):

N/A

## Instructional Mode:

☒ 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)?

☒ Yes ☐ No

If yes, please list EVPP460

## 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) <input type="checkbox"/> Fall <input type="checkbox"/> Summer <input checked="" type="checkbox"/> 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 460 Infectious Diseases of Wildlife

**Course Prerequisites:** 60 credits BIOL 308, or permission of the instructor

**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.

### **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 460-00X (CRN\_\_\_\_)**

**BIOL 460-00X (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](mailto:aaguirr3@gmu.edu)  
**Prerequisite(s):** BIOL308 and 60 credit hours; 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.

## 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 Assignment***

In addition to reading and studying the textbook, other books, and journal papers, you will prepare one written assignment 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.

### 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 1<sup>st</sup> 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	10%
One written commentary	10%
Four surprise quizzes (5 given)	20% (5% each)
Mid-term Exam	30%
Final Exam	30%
TOTAL	100%

The final grade will be based on this scale: A = 100–93%, A- = 92-90%, B+ = 89-86%, B=85-83, B- = 82-80%, C = 79–70%, D = 69–60%, F < 59%. **A CURVE WILL NOT BE APPLIED.**

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### **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

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

**Required**

### Textbooks (Free on line):

Canadian Cooperative Wildlife Health Centre. 2010. Wildlife Disease Investigation Manual 3<sup>rd</sup> 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/](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/](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/International\\_Standard\\_Setting/docs/pdf/WGWildlife/A\\_Training\\_Manual\\_Wildlife.pdf](http://www.oie.int/fileadmin/Home/eng/International_Standard_Setting/docs/pdf/WGWildlife/A_Training_Manual_Wildlife.pdf)

## **Required Readings:**

### ***Week 1:***

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

### ***Week 2:***

Sections I to VI from Leighton 2010

### ***Week 3:***

Chapter 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.

### ***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.

### ***Week 5:***

Pages 4-27 from the CCWHC manual 2007

Chapters 1-3 from Friend and Franson 1999

### ***Week 6:***

Pages 28-47 from the CCWHC manual 2007

Chapters 4-6 from Friend and Franson 1999

### ***Week 7: MIDTERM EXAM***

### ***Week 8: SPRING BREAK***

### ***Week 9:***

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

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

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.

***Week 12:***

Chapters 25 and 30 from Friend and Franson 1999

***Week 13:***

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

***Week 14:***

Chapter 2 from Friend 2006

***Week 15***

Sections VII to X from Leighton 2010