# Course Approval Form

**Action Requested:**
- [X] Create new course
- [ ] Modify existing course

**Course Level:**
- [X] Undergraduate
- [ ] Graduate

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**College/School:**
College of Science

**Department:**
Biology

**Submitted by:**
Alonso Aguirre

**Ext:**
7069

**Email:**
aaguir3@gmu.edu

**Subject Code:**
BIOL

**Number:**
560

**Effective Term:**
- [X] Fall
- [ ] Spring
- [ ] Summer

**Year:**
2016

**Title:**
- [ ] Current Banner (30 characters max including spaces)
- [X] New

Infectious Diseases of Wildlife

**Credits:**
3

**Repeat Status:**
- [X] Not Repeatable (NR)
- [ ] Repeatable within degree (RD)
- [ ] Repeatable within term (RT)

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

**Schedule Type:**
- [X] Lecture (LEC)
- [ ] Lab (LAB)
- [ ] Recitation (RCT)
- [ ] Internship (INT)

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

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

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

<table>
<thead>
<tr>
<th>Description</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
<td>List additional information for the course</td>
</tr>
</tbody>
</table>

**Indicate number of contact hours:**

<table>
<thead>
<tr>
<th>When Offered</th>
<th>Hours of Lecture or Seminar per week</th>
<th>Hours of Lab or Studio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>3</td>
<td></td>
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<tr>
<td>Summer</td>
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<tr>
<td>[X] Spring</td>
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</tbody>
</table>

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**For Graduate Courses Only**

Graduate Council Member

Provost Office

Graduate Council Approval Date

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For Registrar Office’s Use Only: Banner ________________________ Catalog ____________________

**revised 11/8/11**
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.

**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.
13. Outline a wildlife disease outbreak investigation

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.

Absenteism 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—“MASTONLIVE” 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:


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:**


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:

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

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*

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

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

**Required Textbooks (Free on line):**

http://www.nwhc.usgs.gov/publications/disease_emergence/


**Required Readings:**

**Week 1:**


**Week 2:**

Sections I to VI from Leighton 2010


**Week 3:**

Ch 3 from Friend 2006


**Week 4:**


**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:**

Chapter 22 from Friend and Franson 1999


**Week 10:**

Chapters 7 and 10 from Friend and Franson 1999


**Week 11:**

Chapter 13 from Friend and Franson 1999


**Week 12:**

Chapters 25 and 30 from Friend and Franson 1999


**Week 13:**

Week 14:

Chapter 2 from Friend 2006


Week 15

Sections VII to X from Leighton 2010


Selected References on Wildlife Diseases


Websites

http://wildlifedisease.nbia.gov/index.jsp
http://www.nwhc.usgs.gov/
http://www.cdc.gov/
http://www.wildlifedisease.org/
http://www.library.tufts.edu/vet/signature/exotwild.html