Fish Health
FRSHWTR 565

This course is designed to give graduate students and advanced undergraduate students a comprehensive overview of current and emerging fish diseases and treatment strategies. We will use textbooks, lecture discussion, laboratory activities, and peer presentations to become acquainted with diagnosing and identifying pathogens and disease in cultured fishes, and to determine appropriate treatments and procedures to mitigate spread of disease. Graduate students will additionally increase their understanding of current topics in aquaculture health topics by preparing semester projects for site operations, focused on disease prevention, disease surveillance, and detection, consistent with the responsibility level of a site supervisor or manager.

Credits: 3

Class hours: Wednesdays 9:00-11:40AM
Location: School of Freshwater Sciences, 600 E Greenfield Ave., Milwaukee, WI, 53204

Instructors:
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Lecture Schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
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<tbody>
<tr>
<td>Lecture Block 1</td>
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<tr>
<td>25-Jan</td>
<td>Anatomy and Physiology of fish/ Units 1-3 UW Online fish health course</td>
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<tr>
<td>1-Feb</td>
<td>stress and immune mechanisms/ Units 4-6 UW Online fish health course</td>
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<td>8-Feb</td>
<td>Disease transmission and recognition</td>
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<td>15-Feb</td>
<td>Fish Health assessment/ Necropsy (SFS)/ Quiz 1</td>
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<td>Lecture Block 2</td>
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<tr>
<td>22-Feb</td>
<td>Bacterial and Viral pathogens</td>
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<td>1-Mar</td>
<td>Protozoans, epizootics, and Parasites</td>
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<tr>
<td>8-Mar</td>
<td>Practical cases – Infectious diseases (SFS)</td>
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<tr>
<td>15-Mar</td>
<td>Fish health troubleshooting Quiz 2</td>
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22-Mar  Spring Break
Lecture Block 3
29-Mar  Water quality and physical conditions (Root River Hatchery)
  5-Apr   Nutrition and disease
  13-Apr  Practical cases – non-infectious diseases/ Toxics and metabolites
  19-Apr  Quarantine process/ Fish as research subjects (SFS)/ Quiz 3
Lecture Block 4
26-Apr  Practical cases – Regulatory and epidemiology
  3-May   Available treatments/ Biosecurity audits (Commercial farm)
  10-May  Graduate presentations, wrap-up
  17-May  Final Comprehensive exam

Text:  We will use the book “Fish Disease: Diagnosis and Treatment” by Edward J. Noga
(Wiley-Blackwell, ISBN: 978-0813806976), and the Blue Book, American Fisheries
Society (available online at: http://www.afs-fhs.org/blue-book.php). Use of both texts
is optional, but useful and recommended.

Additional material: Graduate students will provide the class with relevant and current
journal articles of their selected topics for discussion. Additionally, graduate students
will create a semester project, which will describe the normal operations of a
hypothetical aquaculture operation, focusing on disease prevention, disease
surveillance, and detection, including a flowchart of critical control points in
preventing disease. See the evaluation section for more detail.

Lecture sessions: classes will be split into a general lecture session where we will discuss
the principal coursework and material from the textbook, and a laboratory and
presentation session, where graduate students will lead with recent peer-reviewed
literature that is relevant to the topics discussed in the lecture session. A short break
(less than 5 minutes) will be provided between the sessions.

Course Goals and Objectives

The course is designed such that students will:

☐ Develop an understanding of the general concepts of fish physiology and immunity.
☐ Become aware of the different types of pathogens that affect cultured fish species in
  North America.
☐ Become proficient in the identification and matching of pathogens and available
treatments.
☐ (Graduate Students) Obtain additional information and context of the infectious and
disease cycle, through the use and analysis of current literature, and apply that
additional knowledge to inform their undergraduate peers and instructors through presentation in laboratory. A practical outcome of this course will be to prepare the graduate students with additional knowledge necessary to perform as a site supervisor in a large-scale aquaculture operation.

At the completion of this course, students should be able to:

1) Discuss the general concepts in fish health, and current diseases of cultured fishes.
2) Properly understand and discuss the current literature, and relevant topics in fish health.
3) Identify disease status in fish, and suggest possible treatment strategies.

**Evaluation**

Final course grade will be a result of your performance in the quizzes and exams, participation in laboratory activities, and in presentation and discussions for graduate students. No makeup assignments are anticipated.

**Attendance policy:** Since your grades will depend on the quizzes, it is essential that you do not incur any absences. Two or more unexcused absences will result in failing the class. The instructors will only consider MAJOR events and disruptions when an absence occurs, on a case-by-case basis. In cases where lecture is not possible (e.g., instructor out of town, inclement weather, etc.), the week’s activities and materials will be available in D2L (d2l.uwm.edu). Students continue to be responsible to cover that week’s material/activities.

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<thead>
<tr>
<th></th>
<th>Graduate</th>
<th>Undergraduate</th>
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<tbody>
<tr>
<td>Quiz 1</td>
<td>15%</td>
<td>25%</td>
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<tr>
<td>Quiz 2</td>
<td>15%</td>
<td>25%</td>
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<tr>
<td>Quiz 3</td>
<td>15%</td>
<td>25%</td>
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<tr>
<td>Final</td>
<td>20%</td>
<td>25%</td>
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<tr>
<td>Presentation</td>
<td>15%</td>
<td>N/A</td>
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<tr>
<td>Semester project</td>
<td>20%</td>
<td>N/A</td>
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Tests: In an effort to allow for appropriate understanding of the coursework, we will have three discrete quizzes, and a final comprehensive exam. Each quiz will cover the material for each lecture block, and will also cover any material discussed by graduate students during that lecture block. In lieu of a fourth discrete quiz for the lecture block, we will have the comprehensive final exam on May 12, which will cover all material presented in lecture and by graduate student discussion.
Graduate Students: Graduate students will additionally be required to select one lecture topic, prepare an expanded presentation, and to lead discussion on a recent and relevant journal article that relates to the selected topic (e.g., If a student selects the parasites lecture topic, the discussion should be based on a recent paper on a subject relevant to parasites). Graduate students will make the journal article available (by providing paper copies, PDF files or direct links to the article from library/journal websites) to all other students and instructors at least a week prior to the day of the presentation. Failure to do so will impair the ability to fully discuss the topic and will result in a grade reduction for that activity.

Graduate semester project: A comprehensive semester project will be assigned to graduate students; a technical description and operating procedures for health maintenance and disease control in a hypothetical intensive, recirculating, or other medium- and large-scale aquaculture facility. This report will focus on disease prevention, disease surveillance, and detection, including a flowchart of critical control points in preventing disease, for the selected target species and facility type. It is expected that this semester project will be sufficiently detailed and thorough that it would be a usable reference at a hypothetical production facility.

Assignment submission policy: Since it is essential that all students participate in the class and use all available resources (readings, journal articles, etc.) there is a need for timely submission of assignments. Thus, any late submission will incur a 20% grade reduction per week of delay for the first two weeks after the assignment is due. After the second week of delay, the tardy assignment will no longer be accepted.

Statement of time investment by the average student: On average, students should spend 48 hours per credit per semester on in-class activities and activities outside of the classroom (i.e., approx. 144 hours for a 3-credit course, 226 at the graduate level).

Total Hours: 3 credits x 48 hours = 144 hours (226 hours graduate level)
In Class/ Lab: 160 minutes x 15 weeks = 40 hours
Reading/Viewing Course Materials: 2x class time = 75 hours (120 hours graduate level)
Taking Quizzes: 30 minutes x 4 periods = 2 hours
Working on Presentations/Assignments = 27 hours (64 hours graduate level)

Course Policies: General campus policies that apply to this course are listed on the Secretary of the University’s web site: http://www.uwm.edu/Dept/SecU/SyllabusLinks.pdf