

Fish Health
FRSHWTR 567, BIOSCI 567

This course is designed to give graduate students and advanced undergraduate students an 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 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: Tuesdays 8:30- 11:10am

Location: We will have classes and hands-on activities at School of Freshwater Sciences Room 1084, 600 E Greenfield Ave., Milwaukee, WI, 53204

Instructor:

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Office hours: Mondays 10:00AM – 12:00PM, Tuesdays, and Wednesdays 1:00PM-3:00PM, via Microsoft Teams.

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 presentation and discussion 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. Additionally, we will have hands-on activities, as listed in green in the schedule below.

Lecture Schedule

Date	Topic
Lecture Block 1	
24-Jan	Anatomy and Physiology of fish
31-Jan	stress and immune mechanisms
7-Feb	Disease transmission and recognition
14-Feb	Necropsy techniques Quiz 1
Lecture Block 2	
21-Feb	Bacterial and Viral pathogens
28-Feb	Protozoans, epizootics, and Parasites
7-Mar	Other diseases in fish
14-Mar	Necropsy practice 2 Quiz 2
21-Mar	Spring Break
Lecture Block 3	
28-Mar	Water quality and physical conditions
4-Apr	Nutrition and disease (Dong Fang Deng)
11-Apr	Necropsy practice 3
18-Apr	Shipping and receiving fish Quiz 3
Lecture Block 4	
25-Apr	Biosecurity and prophylaxis
2-May	Treatments and interventions
9-May	Graduate presentations, wrap-up
16-May	Final Comprehensive exam

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. Final grades will be assigned following the scale below

	A 93-100%	A- 90-92%
B+ 87-89%	B 83-86%	B- 80-82%
C+ 77-79%	C 73-76%	C- 70-72%
D+ 67-69%	D 63-66%	D- 60-62%
F 0 - 59%		

Attendance policy: Since your grades will depend on the exams, it is essential that you try not to incur any absences. Two or more unexcused absences will result in failing the class. The instructors will 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 Canvas (canvas.uwm.edu). Students continue to be responsible to cover that week's material/activities. There are additional policies for attendance as explained in the COVID-19 Policies section at the end of this syllabus, please make sure to read thoroughly and ask if you have any questions.

	Graduate	Undergraduate
Quiz 1	15%	25%
Quiz 2	15%	25%
Quiz 3	15%	25%
Final	20%	25%
Presentation	15%	N/A
Semester project	20%	N/A

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 16, 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 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. Additionally, graduate students will be responsible for sustaining participation in online discussion of the relevant journals using the Canvas class forum. This participation will improve the preparation in leading student presentations, and will also facilitate introducing the journal content to the undergraduate students. Undergraduate students will be encouraged to participate in the online discussion forums, but no grade will be assigned to their participation.

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)

The Use of Live Animals in Teaching and Observational Field Studies: The care and

use of animals in teaching, research and field studies are regulated by the Animal Welfare Act, the Public Health Service (PHS) Policy and a PHS publication called the "Guide for the Care and Use of Laboratory Animals". These regulations require that the use of live vertebrate animals for teaching or research first be approved by a Committee called the IACUC (Institutional Animal Care and Use Committee). Teaching and research proposals are submitted to the IACUC and reviewed.

In deciding whether to approve a protocol, the IACUC assesses whether alternatives to animal use exist for the proposed teaching or research proposals, whether the proposal using animals will be carried out in as humane a manner as possible, and whether unavoidable pain, distress and discomfort will be minimized by the use of specific analgesics, anesthetics or sedatives. Conduct of field studies will be in accordance with all applicable guidelines for field research.

The regulations require that the IACUC include at least one Veterinarian, a scientist and a member representing community interests. The IACUC is responsible for reviewing the animal care program and all animal facilities and associated labs at least once every 6 months. Individuals reporting concerns about animal use are protected by law from repercussions, and the IACUC investigates all concerns over animals use that are reported. Basic animal husbandry requirements are also specified by the regulations, ensuring that an animal's food, water and shelter are provided for in an optimal manner.

The regulations further require that all personnel using animals be trained in appropriate handling techniques and experimental procedures and that persons coming in contact with animals are given information regarding the methods to minimize the risks involved in using animals. The Animal Care Program has an informative web page at: www.safety.uwm.edu which has information on minimizing the risks involved in using animals including lab animal allergy information.

The Animal Care Program at UWM is staffed and administered by a Veterinarian and a Lab Manager. These dedicated staff oversee the legal and humane treatment of animals and management of the animal facilities.

Course Policies:

Other 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>. This includes information, and participation by students with disabilities, accommodation for religious observances, complaint procedures, grade appeal procedures, and other standing policies.

Students with Disabilities:

If you have a documented disability and need special accommodations in order to meet course requirements please contact the instructor. You will need to provide your VISA form which you can obtain at the Student Accessibility Center (Mitchell 112: 2229---6287; <http://www4.uwm.edu/sac/>)

This course will adhere to UWM's policy regarding academic misconduct. UWM does not

tolerate cheating, plagiarism and any student caught will be given a zero for that exam or quiz and risk removal from the course. More information can be found at http://www4.uwm.edu/Dept/Acad_Aff/policy/academicmisconduct.cfm. Students are responsible for taking their own exams and exams without assistance from any other person either in or out of the course and unless specifically stated they are not allowed to use notes.

UWM AND COVID-19 POLICIES FOR THIS COURSE

Panther Community Health and Safety Standards

UWM has implemented reasonable health and safety protocols, taking into account recommendations by local, state and national public health authorities, in response to the COVID-19 pandemic. As a member of our campus community you are expected to abide by the [Panther Community Health and Safety Standards](#) and the [Interim COVID Related Health & Safety Rules \(SAAP 10-12\)](#), which were developed in accordance with public health guidelines. These standards apply to anyone who is physically present on campus, UWM grounds, or participating in a UWM-sponsored activity.

With respect to instructional spaces (classrooms, labs, performance spaces, etc.):

- Six-foot social distancing must always be maintained.
- Masks are always required on campus, with limited exceptions—environments where hazards exist that create a greater risk by wearing a mask (for example, when operating equipment in a lab with the risk of a mask strap getting caught in machinery, or when flammable materials are being used).
- A student who comes to class without wearing a mask will be asked to put on a mask or to leave to get one at a mask handout station. Failure to do so could result in student conduct processes.
- You should check daily for COVID symptoms by completing the self-check at <https://uwm.edu/coronavirus/symptom-monitor/>. Symptoms may appear 2-14 days after exposure to the virus and include fever, cough, or shortness of breath or difficulty breathing. See the [CDC's Website](#) for more information about COVID-19 symptoms.

Students who test positive for or who are diagnosed based on symptoms with COVID-19 should complete this Dean of Students form:

https://cm.maxient.com/reportingform.php?UnivofWisconsinMilwaukee&layout_id=4.

By doing so, students will get information on resources, help UWM identify individuals they may have come into contact with on campus so that UWM can work with the local health department, and allow UWM to clean campus areas you visited as appropriate.

Attendance Policy

Do not attend your in-person class if you have COVID-19, if you are experiencing symptoms consistent with COVID-19, if you have been in close contact with others who have symptoms, if you need to care for an individual with COVID-19, or have other health concerns related to COVID-19. Students who miss class due to the above conditions will not be penalized for their absence and will not be asked to provide formal documentation from a healthcare provider.

If you are unable to attend class, take the following steps.

- Notify me in advance of the absence or inability to participate, if possible.
- Participate in class activities online and submit assignments electronically, to the extent possible.
- Reach out to me if illness will require late submission or other modifications to deadlines.
- If remaining in a class and fulfilling the necessary requirements becomes impossible due to illness or other COVID-related circumstances, contact me to discuss other options.

As your instructor, I will trust your word when you say you are ill, and in turn, I expect that you will report the reason for your absences truthfully.

Class Content

Our class sessions will be audio-visually recorded for students who are unable to attend at the scheduled time. Students who participate with their camera engaged or who utilize a profile image are agreeing to have their audio/video or image recorded. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded.

Potential for Reversion to Fully Online Instruction

Changing public health circumstances for COVID-19 may cause UWM to move to fully online instruction at some point during the semester. UWM will communicate with students about moving to fully online instruction if the situation develops.

Navigate Student Success Platform and Mobile App

Students are encouraged to use a tool called Navigate. This tool can help you learn about academic resources, set up study groups in your courses, make appointments with your academic advisor, get reminders on important dates, and much more. In addition, Navigate allows instructors to send Progress Reports to students throughout the term, allowing for updates on your academic progress in a course in addition to your grade. You can log into the platform

here: <https://uwmilwaukee.campus.eab.com/> or by finding the Navigate link under the Current Students tab on the [UWM home page](#). More information on how you can use Navigate and the app, including tutorials, can be found on UWM's [Navigate website](#).

Other

- To enable safe entry/exit from classrooms, all in-person instruction will end 15 minutes early, with additional course content to be covered online.
- All individual student meetings with faculty and teaching assistants will happen online.

Additional Resources: There are many resources to help you at UWM, including the general resource: www4.uwm.edu/letsai/services/
Student Success Center: uwm.edu/studentsuccess/
Writing Center: <http://www4.uwm.edu/writingcenter/>
Tutoring and Academic Resource Center: <http://www4.uwm.edu/pass/>