

VMC 991 – Diseases of Marine Organisms

Selective Week 1: April 15 – April 19 2024

Course Coordinator

Tal Ben-Horin, PhD

Assistant Professor of Shellfish Pathology

College of Veterinary Medicine

Center for Marine Sciences and Technology

Office: CMAST 213

tbenhor@ncsu.edu

Course Description

This is a week-long intensive course focusing on diseases affecting marine organisms, with emphasis placed on familiarizing clinicians and veterinary scientists with approaches for observing signs of infection and disease. The coursework includes lectures providing a broad background in pathogens and diseases affecting marine fish and shellfish and labs giving hands-on experience with classic (cytology and histopathology) and modern diagnostic (PCR and next-generation sequencing) tools. Exercises and in-class discussions apply diagnostic tools to interpret signs of infection and disease in coastal North Carolina marine organisms, draw inferences about disease processes in marine ecosystems, and identify key questions for future research. This course divides time between field trips to nearby coastal environments, the NC State University College of Veterinary Medicine, and the Center for Marine Sciences and Technology.

Expected Learning Outcomes

By the end of this course, we aim for you to:

- Become familiar with signs of infection and disease in marine organisms and understand the limitations of applied diagnostic tools;
- Apply principles from pathology and epidemiological theory to infer processes of pathogen transmission and pathogenesis from observed disease signs;
- Identify critical knowledge gaps and key questions for future research in diseases of marine organisms.

Course Expectations

We each enter this classroom community with a unique set of experiences and different backgrounds that will inform our reactions to the subjects we study. Respect for diversity of all kinds is vital to creating a respectful, safe, and stimulating intellectual environment.

You are expected to:

- Be responsible for your own learning. Attending class is a key component of taking responsibility for your learning.
- Think critically about the readings and lectures. This class will be challenging and will demand a lot from you.
- Be engaged in each class: ask questions, answer questions, and offer your point of view.

- Be present, on time, and mindful in all class engagements including lectures, labs, and field excursions. Talk with us ahead of time if you anticipate a problem.
- Be respectful of others.

You can expect us to:

- Do everything we can to engage you during lecture and labs and to assist you in learning the material.
- Respect your contributions and learning styles. Please talk with us if you have suggestions for ways that we can better facilitate your learning.
- Assign all the work that is necessary for you to broadly engage with the material and no more.
- Present material so that it is accessible.

It is our goal to ensure that our learning environment is accessible to everyone. If you have a disability and need special accommodations for note taking or any other aspect of your coursework, please contact Disability Services for Students, 1900 Student Health Center, Campus Box 7509, 919-515-7553. If you have a letter from Disabled Student Services indicating you have a disability that requires academic accommodations, please present the letter to your instructor, Tal Ben-Horin, so we can discuss the accommodations you might need for the class. For more information on NC State's policy on working with students with disabilities, please see the Academic Accommodations for Students with Disabilities Regulation (REG (02.20.01)).

Course Website

All course materials, lab exercises, references, laboratory protocols, and lectures slides are found on my lab web page, available at: <https://shellfishpathology.wordpress.ncsu.edu/dmo/>

Course Schedule

Monday Apr 15

- 9:00-9:30 Lecture: Course expectations and logistics *Room 205 CMAST*
- 9:30-10:30 Lecture: Introduction to diseases of marine organisms *Room 205 CMAST*
- 10:30-12:00 Field trip: Harvest oysters at the farm
- 12:00-1:00 BREAK
- 1:00-3:30 Lab: Oyster gross pathology and RFTM assay *Room 326 CMAST*
- 3:30-5:00 Structured group study: pathology case studies *Rooms 205 & 326 CMAST*

Tuesday Apr 16

- 9:00-11:00 Lab: Oyster DNA extractions *Room 326 CMAST*
- 11:00-12:00 Lecture: Coral diseases *Room 205 CMAST*
- 12:00-1:00 BREAK
- 1:00-2:00 Lecture: Pathogens of bivalves and gastropods *Room 205 CMAST*
- 2:00-5:00 Field trip: Crabbing at CMAST and North River

Readings: Small et al (2012) *J Invert Pathol*; Small et al (2019) *Dis Aquat Org*

Wednesday Apr 17

- 9:00-10:00 Lecture: Crustacean viruses and *Hematodinium* *Room 205 CMAST*
- 10:00-12:00 Lab: Blue crab dissection and cytology *Room 326 CMAST*
- 12:00-1:00 BREAK
- 1:00-5:00 Field trip: Mycobacteria at the MARC

Readings: de Longé et al (2018) *Nat Comm*; Petton et al (2021) *Front Immunol*

Thursday Apr 18

- 9:00-12:00 Lab: Seawater eDNA *Room 328 CMAST*
- 12:00-1:00 BREAK
- 1:00-2:00 Lecture: Finfish pathogens *Room 205 CMAST*
- 2:00-3:00 Lab: PCR follow-up (if necessary) *Room 328 CMAST*
- 3:00-5:00 Lab: Secondary pathogens and sequence analysis *Room 205 CMAST*

Readings: Aquino et al (2021) *Front Microbiol*; McPherson et al (2021) *Comm Biol*

Friday Apr 19

- 9:00-12:00 Lab: read oyster RFTM *Room 328 CMAST*
- 12:00-1:00 BREAK
- 1:00-3:00 Lab: *Perkinsus* and *Mycobacterium* electrophoresis and lab write-up *Room 328 CMAST*
- 3:00-4:00 Lecture: Environmental change and disease *Room 205 CMAST*
- 4:00 Adjourn

Evaluation and Grading

This selective uses credit-only (S/U) grading. Students are expected to complete each of the following components to receive a satisfactory (“S”) grade.

Component	Weight
Case study presentation	35%
Sequence analysis exercise	15%
Group lab exercises	50%

General Standards of Conduct

The CVM Standards of Conduct may be found at: <https://cvm.ncsu.edu/internal/academic-handbook/>. The NC State University Code of Student Conduct may be found at: <https://policies.ncsu.edu/policy/pol-11-35-01>.

Academic Handbook

Students are expected to observe all policies in the CVM Academic Handbook found at: <https://cvm.ncsu.edu/internal/academic-handbook/>.

Copyright

All course materials are for your personal educational use only and are not to be copied or distributed without the express consent of the faculty author. The Copyright Infringement Policy Statement may be found at: <http://policies.ncsu.edu/regulation/reg-01-25-02>.

Computer Use

The CVM Computer Use Policy may be found at: <https://cvm.ncsu.edu/internal/academic-handbook/>.

Weather Policy

The NC State University Weather Policy may be found at: <https://policies.ncsu.edu/regulation/reg-04-20-07>.

NC State University Policies, Regulations, and Rules (PRR)

Students are responsible for reviewing the PRRs which pertain to their course rights and responsibilities. These include: <https://policies.ncsu.edu/policy/pol-04-25-05> (Equal Opportunity and Non-Discrimination Policy Statement), <https://oied.ncsu.edu/oied/policies.php> (Office for Institutional Equity and Diversity), <https://policies.ncsu.edu/policy/pol-11-35-01> (Code of Student Conduct) and [http:// https://policies.ncsu.edu/regulation/reg-02-50-03](http://https://policies.ncsu.edu/regulation/reg-02-50-03) (Grades and Grade Point Average).

Changes to Syllabus

The contents of this syllabus are subject to change. You will receive email notice of any changes.