

# Aquatic animal health SYLLABUS – Spring 2022

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## Department of Veterinary Medicine, University of Alaska Fairbanks <sup>1</sup>

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### 1. Course Information:

Title: Aquatic animal and Environmental health

Number:

Credit: 2

Prerequisites: Successful completion of relevant undergraduate degree

Location: Virtual

Meeting time: **2 hours per week + assignments (approx. 4 hours); 6hrs total**

### 2. Instructor Contact Information:

Name: Dr. Morag Clinton

Office Location:

Office Hours: By appointment

Office Phone:

Email: mclinton2@alaska.edu

Email to schedule a zoom call, in person or other method of communication are the best way to reach the instructor.

### 3. Course Reading/Materials:

No specific textbooks are required for this class, however open-access/university owned recommended readings including journal articles will be listed prior to or following class sessions via on-line resources. Purchase of student dissection kit is recommended for at-home practice of necropsy skills but not a requirement towards any graded portion of the course.

### 4. Catalogue description:

Infectious and non-infectious concerns to wild aquatic animal stocks and relevant aquaculture-raised species with focus on Alaska. Providing students with the knowledge and problem-solving skills to recognize and address disease (2+0).

### 5. Brief course Description:

Teaching focuses on infectious and non-infectious concerns to wild aquatic animal stocks and relevant aquaculture-raised species, with the goal of providing students with the knowledge and problem-solving skills to recognize and address disease. Course will address key animal health challenges with a focus on Alaska, including how these challenges relate to human and environmental health.

### 5. Course Goals:

Overall Course Objectives:

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<sup>1</sup> Updated 1/29/2021

Through presented lecture material, online workshops, online discussion and further reading, this course will address key elements of aquatic animal health and disease. Teaching will focus on infectious and non-infectious concerns to wild stocks and relevant aquaculture-raised species in the Northern regions of the US as well as globally. Environmental factors play an important role in determining aquatic animal health outcomes and will therefore be a core learning focus of this class.

Although the course will be targeted to Alaskan challenges, a nationwide and global perspective will also be given through case studies and assignments for an overall picture of aquatic animal health. A core concept of this class is the connection of aquatic animal health with environmental and human health. One Health concepts will therefore be an important aspect of this class. Learning material focused on human health and economic consequences of aquatic animal disease will be an important component of this class.

Teaching goals of this class are to provide students with:

- An understanding of the challenges that face aquatic ecosystems generally, provided through an overview of aquatic environmental health and how it relates to both human and aquatic organism health.
- Knowledge of a number of specific diseases, as well as non-infectious causes of stock loss. Infectious pathogens can have devastating consequences to commercially important aquatic organisms, and so students will learn about the variety of disease-causing agents, and how to differentiate them.
- Understanding of biosecurity, and the role preventative medicine has to play in the aquatic environment (particularly in safeguarding the health of cultured stocks).
- Finally, students will gain the practical and analytical skills to investigate aquatic animal disease events, as well as the resources to understand their causes and potentially address them.

#### 6. Student Learning Outcomes:

Academic knowledge:

- Understand the challenges that can arise in the aquatic environment, the predisposing factors of change, and indicators of altered ecosystem health. Describe how alteration in a specific environmental factor or variable might impact animal health.
- Appreciation of the diversity of infectious and non-infectious challenges to aquatic organism health, with the ability to describe the broad categories of disease causing agent, and how they might be differentiated.
- Knowledge of various systems of aquaculture. Basic knowledge of how different aquaculture facilities operate, including routine husbandry, with the ability to comment on their associated benefits to and negative impacts on animal health.

Applied knowledge:

- The skills to independently perform a gross assessment/necropsy in a number of aquatic organism species. Students will acquire the ability to identify key tissues and whether their appearance is within normal ranges through online learning labs and case studies. This, combined with an instructional videos and information in lectures,

- will allow students to practice their sampling skills at home towards competency in necropsy.
- Detailed knowledge of several common and critical diseases in key aquatic organisms, with the ability to generate a 'differential diagnosis' list based on abnormal findings in an animal/population.
  - Identify markers of specific infections, as well as utilize structured decision making in exploring unknown pathologies in aquatic organisms (with a focus on fish). A knowledge of required actions in response to confirmed diagnosis of number of specific infectious and non-infectious diseases.
  - Implement diagnostic sampling (including collection of material correctly) to facilitate further diagnostics. The ability to interpret a number of simple diagnostic tests.
  - Apply concepts presented in the course to prevent or manage disease, and discuss findings to a broad audience.

## 7. Instructional Methods:

This course includes asynchronous lectures. Lectures are designed to provide a framework of knowledge on which discussion sessions and small projects will build. Monthly optional synchronous Q&A zoom sessions at a variety of times will supplement office hours as optional interactions structured for student engagement. These sessions will be recorded for posterity. **Asynchronous lectures contain the learning and background information designed to present the examinable topics of this class.** Lectures as asynchronous online learning materials (+ required further reading) contain all course content. Synchronous elements are included purely to allow enhance student engagement (similar to and in addition to office hours).

Online learning tools are designed to provide as practical an experience for students as can be achieved through digital learning, including images from real diagnostic cases and disease events. Activities will have students act as aquatic organism health professionals investigating mortality or altered stock health events, with case studies designed to mimic real scenarios they might encounter. All learning is designed to engage students with the topic, providing a basic understanding of the material but mainly the skills and decision-making tools that will assist them in any future aquatic health work. The field of aquatic organism health is relatively new, and continually expanding – each year we learn more about the animals we study and pathogens that impact them. With changing environmental conditions and changing use of organisms through aquaculture, new challenges are constantly emerging. Students are therefore not expected to obtain an encyclopedic knowledge of infectious causes of disease. Rather, this course is designed to prepare them with the tools they need to investigate aquatic organism health events.

Lecturers include UAF faculty members and experts in the fields of relevant topics. Visiting presenters will be selected on the basis of their expertise and ability to communicate relevant specialist topics. These lectures will be exclusively asynchronous due to time differences and work commitments of visiting experts, however we will endeavour to arrange discussion sessions with experts to allow questions to be asked.

**Expected Time Commitment:** Students should expect to spend 1.5-2 hours per week listening to lecture material. Additional time commitment will be expected for outside reading and engagement in set assignments (including online asynchronous written discussion topics through the canvas platform, preparation of graded assignments, and reviewing the materials of fellow students). These assignments are to be performed independently, informed by lecture material, reading assignments, and self-directed study. This will average 2 hours of outside time

commitment for every 1 hour of lecture material. Assessed materials during the course of the term contributes towards a final grade. There is no end of year graded examination.

**8. Course Calendar:**

For details, refer to the section “Tentative Lecture Schedule” at the end of this syllabus.

**9. Course Policies:**

- Attendance:

Students are expected to review all lecture materials during the week in which they are provided barring reasonable and timely requests for exemption. Synchronous lecture participation (available twice a month) is not a requirement of this course, rather, provided to allow student interaction with faculty, provide a forum for more collaborative learning, and allow communication within the cohort.

- Behavior:

Any type of behavior, language or aggressive discussion that is disruptive, distracting, or disrespectful to the instructor or to your fellow students will not be tolerated and will result in dismissal from the classroom or online environment. Repeated incidences of unacceptable behaviour will be reported to the relevant university administrative staff.

- Plagiarism:

“Plagiarism is the overt or covert use of other people’s work or ideas without acknowledgement of the source. This includes using ideas or data from a classmate or colleague without permission and acknowledgement, including sentences from journal articles in your writing without citing the author, or copying parts of a website into your essay. Plagiarism and cheating are serious offenses that violate the student code of conduct which may result in an “F” in the course and/or referral to the university disciplinary committee.”\*

- Student conduct and ethics:

Each assignment will be clear in it’s expectations for collaborative working and whether it should be performed open or closed book. Any students considered to have worked closely together or plagiarized the work of a colleague either with or without permission will be contacted to explain their conduct. If a reasonable explanation for similarity of submitted answers is not provided all students involved may receive a failed grade for that portion of the class. As stated above, plagiarism and cheating are serious offences that violate the student code of conduct, and may result in referral to the university disciplinary committee.

**10. Evaluation/Grading:**

Lecture engagement (assessed via single lecture-based multiple-choice questions integrated as part of the canvas platform) 20%

Online discussion participation (canvas platform) 20%

Canvas Quiz 1 (timed) 10%

Canvas Quiz 2 (timed) 10%

Canvas Quiz 3 (not timed) 15%

Presentation (online, recorded and uploaded canvas) 15%

Paper report 10%

Expectations for and assessment of graded elements:

- Lecture engagement will be assessed via short single answer questions available on the canvas platform each week. Following watching a lecture, students will complete the associated question to confirm they have reviewed the material.
- Discussion participation must meet the minimum requirement of contribution of one clear, informative discussion point or feedback element to the topic under review, as well as a minimum of two comments or elaborations on points raised by other participants. Discussion will become available each week on canvas and students will be expected to check in multiple times both to post their discussion point, review the discussion points of their peers, and potentially engage in feedback on their own discussion topic.
- The quizzes will be graded according to a marking scheme where marks are given for correctly identifying a causative agents/disease/sampling protocols, but partial or even full credit is available too for well-structured answers that address the key learning outcomes of:
  - Understanding of the challenge or impact on animal health
  - Knowledge of disease-causing agent(s)
  - Understanding of the production system and basic animal husbandry
  - Identification of key changes
  - Structured decision making and proposed solutions
- Student presentations will be graded on the following key elements:
  - Knowledge of the topic (a well-researched presentation)
  - Adherence to the assignment objectives (timing, accessibility of materials generated, citation of materials, engagement with other student's presentation materials)
  - Ability to communicate important learning outcomes well to a broad audience (avoiding use of jargon, clear 'take away' message, readable slides)
- The paper report is designed to assess the student's ability to understand and critically appraise scientific literature. The required report will be graded on:
  - Understanding of the topic (ability to summarize key results, outcomes or discussion points)
  - Critical appraisal of the methods including understanding the techniques used, analysis applied, and any perceived flaws or weaknesses (identified by the authors or student) in the methodology.
  - Writing style (reports should be written in the style and parlance of scientific literature (for example, with no bullet points, any abbreviations fully explained, correctly spelled and in a style in keeping with scientific publishing). Reports should be formatted as having an introduction, results and discussion, however need not contain these specific headings. Avoidance of plagiarism and inclusion of citations.

These expectations will be expanded on more fully when each graded element is set, with a detailed posted description of the expectations of each graded element, as well as an optional Q&A session of the majority of graded assignments.

Grading Scale: Grades will be calculated as follows

Grades will be calculated on  
100-point scale

|    |         |   |
|----|---------|---|
| A+ | 96-100  | % |
| A  | 92-95.9 | % |

|    |         |   |
|----|---------|---|
| A- | 88-91.9 | % |
| B+ | 84-87.9 | % |
| B  | 80-83.9 | % |
| B- | 76-79.9 | % |
| C+ | 72-75.9 | % |
| C  | 68-71.9 | % |
| C- | 64-67.9 | % |
| D  | 60-63.9 | % |
| F  | <60     | % |

Incomplete (I) grades will be given only if a student does not complete the required work because of illness or extenuating circumstances. Prompt communication directly with the course coordinators and/or department is required to document any health problems or other circumstances that may prevent a student from attending class or completing the examinations or homework assignments (see below). Ranks will be assigned according to the final grade score.

**11. Support Services:**

If you require more assistance than can be provided in class, and office hours, you may want to contact Student Support Services (<http://www.uaf.edu/sssp/>) or the Department of Veterinary Medicine for assistance.

**12. Disability Services:**

All students, including those with disabilities, are welcome in this course, and we are committed to providing equal access to this course for all students. If you have a disability (including learning disabilities) please inform us during the first week of class so that we can accommodate your specific needs. If you have not already done so, you will also need to contact UAF's Office of Disabilities Services (474-7043). Everyone should have the opportunity to participate fully in the course and to complete assignments and exams to the best of their ability. If accommodations are needed to enable you to do so, we will gladly work with you to provide them.

**Tentative Lecture Schedule**

| Date   | TOPIC  | LECTURER   | COMMENTS  |
|--------|--|------------|---|
| Week 1 | Introduction & Course Overview<br><br>+<br><br>Aquatic ecosystems health | M. Clinton | Informal introduction session with student participation (zoom) |

|        |  |            |   |
|--------|--|------------|---|
|        |  |            | Background of ecosystem organization and how it might impact aquatic organism health (recorded video)   |
| Week 2 | Diversity and biology of aquatic organisms<br><br>+<br>Anatomy of aquatic organisms: Fish                | M. Clinton | <p>The lifecycle and biology of aquatic organisms greatly impact what diseases or pathologies they might encounter, as well as how they are impacted by environmental changes. Understanding this is key to predicting how different challenges might impact them.</p> <p>A good understanding of anatomy is key to appropriate sampling. Indicators of disease can be specific to certain conditions, but they can also be shared across many pathologies. In this instance, further work is often required if a condition is to be diagnosed. This lecture presents some options in diagnostic techniques, when they might best be applied, and resources for further workups</p> |
| Week 3 | Anatomy of aquatic organisms: Invertebrates<br><br>+<br>Introduction to aquaculture of aquatic organisms | M. Clinton |   |

|        |  |            |   |
|--------|--|------------|---|
| Week 4 | Aquaculture of aquatic organisms: Fish<br><br>+<br><br>Aquaculture of aquatic organisms:<br>Invertebrates  | M. Clinton | Many aquatic organisms of commercial importance are part of finite wild fisheries resources, but as demand increases for seafood and freshwater products, much of this must be met with increased aquaculture production. Aquaculture is considered a dirty word by many, but is it necessary in some parts of the world? |
| Week 5 | Aquatic environmental health   | M Clinton  | The close association of aquatic animals with their environment (including reliance on parameters like temperature and oxygen for survival) means environmental health is closely linked to aquatic animal health.  |
| Week 6 | Live handling and clinical assessment<br><br>Introduction to diagnostic testing in aquatic animals   | M Clinton  |   |
| Week 7 | Aquatic animal disease I: Infectious diseases of fish<br><br>+<br><br>Aquatic animal disease II: Infectious diseases of mollusks and crustaceans | M. Clinton | Infectious and non-infectious diseases can have devastating impacts on aquatic organisms: These lectures provide an introduction to the topic, and present some key indicators of important pathologies.  |

|         |   |   |  |
|---------|---|---|--|
| Week 8  | Aquatic animal disease<br>III: Non-infectious<br>causes of pathology  | M Clinton                               |  |
| Week 9  | Specialist guest lectures<br>in aquatic animal health   | Multiple (TBD)                          | Experts in various fields of aquatic<br>organism health will present for 15-<br>30mins each on niche topics in aquatic<br>organism health and production.  |
| Break   |   |   |  |
| Week 10 | Diagnostics in aquatic<br>animal health:<br>Performing a necropsy<br><br>Diagnostics in aquatic<br>animal health:<br>Appropriate sample<br>collection | M Clinton                               | Appropriate sampling technique is<br>key to obtaining good quality<br>material, either for presumptive<br>diagnosis, or further testing.   |
| Week 11 | Interpreting diagnostic<br>testing<br><br>Introduction to<br>epidemiology and<br>disease surveillance   | M Clinton                               | Although many of the diagnostic<br>tests in aquatic animal health must<br>be performed in a laboratory, a<br>working knowledge of their<br>performance and interpretation is<br>key to understanding results.  |
| Week 12 | Notifiable diseases in<br>aquatic organisms<br><br>Approaching an aquatic<br>disease outbreak   | M Clinton                               | With a foundation of knowledge in<br>aquatic animal health, including<br>what might be considered<br>abnormal, we can approach an<br>animal health outbreak to achieve<br>our goals in:<br>1) Diagnosis<br>2) Limitation of harm<br>3) Prevention (in some contexts) |
| Week 13 | Biosecurity<br><br>Student presentation<br>review   | M Clinton +<br>classmate<br>presenters. | Biosecurity is a complex concept in<br>the aquatic animal environment,<br>closely aligned with the goal of<br>prevention of disease.   |

|         |   |           |   |
|---------|---|-----------|---|
| Week 14 | Emerging disease in a changing climate<br><br>+<br><br>Aquatic environment and animals as they relate to human health | M Clinton | A changing environment will drive many alterations to the aquatic environment and the animals that call it home. This lecture and discussion will highlight some areas where change may occur, and in some cases, is already seen.<br><br>Aquatic organisms are important to human health and communities not just as a food source, but also for their cultural significance, economic importance and complex importance to environmental health. They can also be vectors of disease and cause harm to humans. Awareness of their many positive and negative influences is a crucial takeaway from this course. |
| Week 15 |   |           |   |

**COVID-19 statement:** Students should keep up-to-date on the university's policies, practices, and mandates related to COVID-19 by regularly checking this website:

<https://sites.google.com/alaska.edu/coronavirus/uaf?authuser=0>

Further, students are expected to adhere to the university's policies, practices, and mandates and are subject to disciplinary actions if they do not comply.

**Student protections statement:** UAF embraces and grows a culture of respect, diversity, inclusion, and caring. Students at this university are protected against sexual harassment and discrimination (Title IX). Faculty members are designated as responsible employees which means they are required to report sexual misconduct. Graduate teaching assistants do not share the same reporting obligations. For more information on your rights as a student and the resources available to you to resolve problems, please go to the following site:

<https://catalog.uaf.edu/academics-regulations/students-rights-responsibilities/>.

**Disability services statement:** I will work with the Office of Disability Services to provide reasonable accommodation to students with disabilities.

**Student Academic Support:**

- Speaking Center (907-474-5470, [uaf-speakingcenter@alaska.edu](mailto:uaf-speakingcenter@alaska.edu), Gruening 507)
- Writing Center (907-474-5314, [uaf-writing-center@alaska.edu](mailto:uaf-writing-center@alaska.edu), Gruening 8th floor)
- UAF Math Services, [uafmathstatlab@gmail.com](mailto:uafmathstatlab@gmail.com), Chapman Building (for math fee paying students only)
- Developmental Math Lab, Gruening 406
- The Debbie Moses Learning Center at CTC (907-455-2860, 604 Barnette St, Room 120, <https://www.ctc.uaf.edu/student-services/student-success-center/>)
- For more information and resources, please see the Academic Advising Resource List ([https://www.uaf.edu/advising/lr/SKM\\_364e19011717281.pdf](https://www.uaf.edu/advising/lr/SKM_364e19011717281.pdf))

**Student Resources:**

- Disability Services (907-474-5655, [uaf-disability-services@alaska.edu](mailto:uaf-disability-services@alaska.edu), Whitaker 208)
- Student Health & Counseling [**6 free counseling sessions**] (907-474-7043, <https://www.uaf.edu/chc/appointments.php>, Whitaker 203)
- Center for Student Rights and Responsibilities (907-474-7317, [uaf-studentrights@alaska.edu](mailto:uaf-studentrights@alaska.edu), Eielson 110)
- Associated Students of the University of Alaska Fairbanks (ASUAF) or ASUAF Student Government (907-474-7355, [asuaf.office@alaska.edu](mailto:asuaf.office@alaska.edu), Wood Center 119)

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UAF Department of Equity and Compliance

1692 Tok Lane, 3rd floor, Constitution Hall, Fairbanks, AK 99775

907-474-7300

[uaf-deo@alaska.edu](mailto:uaf-deo@alaska.edu)

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3. There are supportive measures available to individuals that may have experienced discrimination.
4. University of Alaska's Board of Regents' Policy & University Regulations (UA BoR P&R) 01.02.020 Nondiscrimination and 01.04 Sex and Gender-Based Discrimination Under Title IX, go to: <http://alaska.edu/bor/policy-regulations/>.

5. UA BoR P&R apply at all university owned or operated sites, university sanctioned events, clinical sites and during all academic or research related travel that are university sponsored.

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\* This plagiarism statement is used, verbatim, from the existing course outline document by Dr A. Reynolds, course DVM 777.