FISH 270: Aquatic Ecophysiology

1. Description

This course will teach fundamental aspects of biological form and function with an emphasis on highlighting the profound differences and similarities across taxa. The first half of the course will focus on primary physiological process including energy metabolism, thermal biology, osmoregulation, and immune function. During the second half of the course we will apply the principles to specific case studies that are environment specific as we transition through terrestrial habitat, open ocean, coastal estuaries, polar and tropical ecosystems, and deep ocean. The laboratory section will reinforce principles from each week's lecture content and will consist of live organism experiments, field trips, and computer simulations.

2. Objectives

This class aims to provide you with an understanding of basic physiological process and the ability to apply this knowledge to understand how diverse taxa, ranging from prokaryotes to mammals, live in diverse and changing environments. Specific goals are:

- Describe how essential life processes (growth, reproduction) work and the common and unique challenges organisms face in different environments.
- Discriminate similarities and difference across taxa at the physiological level.
- Develop quantitative reasoning and skills in physiology and in biology in general
- Apply physiological principles to determine how a variety of organisms function in different aquatic environments.
- Synthesize scientific principles by effectively searching primary literature, collating information and presenting knowledge in a succinct fashion.
- Work collaboratively to reach solutions
- Assist the advancement of knowledge by evaluating peer contributions.
- Apply the use of microscopes and lab equipment in investigation in physiological experiments.

3. Course Instructors

Instructors: Steven Roberts, Associate Professor, School of Aquatic and Fishery Sciences. Office: Fisheries Teaching and Research Building - Room 232. Email sr320@uw.edu

Instructor 2: TBD

TAs TBD.

4. Meeting Times
Lectures MWF 50 minutes
Lab M 1:30-4:20

5. Required Textbook
Biological Science – Publisher Benjamin Cummings – Authors: Freeman, Quillin, Allison

6. Online Resources
We have set up a Canvas website that will be used to disseminate resources for the class. To access materials you will need your UW NetID. Lectures notes will be uploaded prior to each lecture. A discussion board on the Canvas site will be used as a primary means of communication.

7. Grading

Exams (3) – 45%
Participation on Discussion Board 5%
Question Sets – 5%
Lab Worksheets - 20%
Lab Species Report – 5%
Final Exam – 20%

Late Policy:
Assignments will not be accepted after due date.

Exams:
Material on the exams will be from information presented in lecture, lab, and from the assigned readings.

The three exams will consist of:
- Multiple choice
- Short answer
- Short essay
- Sketches / drawings

The final exam will be comprehensive

Online question sets (Quizzes) will be done during scheduled lecture and will use the TopHat system.

Participation on Discussion board should be at least 2 posts per week.

Grade Conversion Table

Lower %	Upper %	Letter Grade	Lower Grade	Upper Grade
98	100	A+	4.0	4.0
94	97	A	3.8	3.9
90	93	A-	3.5	3.7
87	89	B+	3.2	3.4
84	86	B	2.9	3.1
80	83	B-	2.5	2.8
77	79	C+	2.1	2.4
74	76	C	1.8	2.0
70	73	C-	1.4	1.7
67	69	D+	1.1	1.3
64	66	D	0.8	1.0
60	63	D-	0.0	0.7

8. Other Policies

Attendance

Students are individually responsible for all information presented in lectures, and readings. No make-up exams will be allowed

Academic Conduct

Passing anyone else's scholarly work (which can include written material, exam answers, graphics or other images, and even ideas) as your own, without proper attribution, is considered academic misconduct. Anyone engaging in academic misconduct will not receive credit for the course.

9. Disability statement

It is crucial that all students in this class have access to the full range of learning experiences. At the University of Washington, it is the policy and practice to create inclusive and accessible learning environments consistent with federal and state law.

Full participation in this course requires the following types of engagement:

Course Component	Requirement(s)
Lecture	The ability to attend tri-weekly lectures of 50 minutes with 150 other students. The ability to complete weekly in-class online quizzes of 3-6 questions
Lab	The ability to attend weekly 80 minute labs with 25 other students. The ability to work with other students, dissect organisms, and go on one field trip that will consist of walking on flat, possibly muddy terrain.

If you anticipate or experience barriers to your learning or full participation in this course based on a physical, learning, or mental health disability, please immediately contact the instructor to discuss possible accommodation(s). A more complete description of the disability policy of the College of the Environment can be found here. If you have, or think you have, a temporary or permanent disability that impacts your participation in any course, please also contact Disability Resources for Students (DRS) at: 206-543-8924 V / 206-543-8925 TDD / uwdss@uw.edu e-mail / http://www.uw.edu/students/drs.

10. Schedule

Week	Topic	Text / Specific	Labs
1	• Intro – Basics Central dogma • Intro - Environmental challenges for living organisms • Intro - Environmental challenges for living organisms	Ch1 58-67, Ch 16 Ch42 842-853 Ch52 1059-1081	Diversity (size and scale)
2	• Bioenergetics • Bioenergetics • Energy acquisition - primary production and oxygen	Ch5 Ch44 882-885 Ch10	Environment (Field trip) -what challenges do organisms have in this environment
3	• Thermal Biology • Osmoregulation • EXAM	Ch56 Ch42 854-859 Ch43 861-870	Energy - red light versus blue light (calculations, quantitative and math, loss of energy to environment take home free energy calculations) or salinity
4	• Digestion and excretion • Sensory systems • Circulation and gas exchange	Ch44 886-897 Ch467 Ch45	Sensory (chemotaxis in prokaryotes, oysters sense and change allocation of energy, anemones, comparative eyes, cuttlefish color change perhaps in a sessile or motile organisms
5	• Defense • Reproduction • Reproduction	Ch51 1037-1054 Ch50	Reproduction - compare on land and sea, asexual reproduction, fertilization and dilution, growth curve asexual and sexual reproduction, macro (plants)
6	Case studies: Land (dessication, waste) Case studies: Land (reproduction) EXAM		Waste excretion (land) - assays on three different samples - what habitat originated from, who excreted this - a CSI forensic lab
7	Case studies: Open Ocean (photosynthesis) Case studies: Open Ocean (nutrients) Case studies: Open Ocean (sensory)		Photosynthesis (open ocean) - energy or oxygen from different wavelengths of light, phytoplankton versus macroalgae
8	Case studies: Coastal Estuaries (anoxia) Case studies: Coastal Estuaries (development) Case studies: Coastal Estuaries (algae grass)		Temperature - polar versus tropical, taxonomically related comparative analysis, Q10, pores in ice, anemones with symbionts, bleaching,
9	Case Studies: Polar and Tropical (temp, salinity) Case Studies: Polar and Tropical (membranes) Case Studies: Polar and Tropical (prokaryote growth)		Nutrient limitation - what do bacteria need to grow
10	Case Studies: Deep Ocean (chemoautotrophs) Case Studies: Deep Ocean (pressure) EXAM		Bioluminescence - organisms responding to the environment