This is a hybrid course, in which some traditional face-to-face "seat time" has been replaced by online learning activities. The purpose of a hybrid course is to take advantage of the best features of both face-to-face and online learning.

In this course you will learn fundamental aspects of biological form and function with an emphasis on highlighting the profound differences and similarities across taxa. We will focus on primary physiological process including energy metabolism, thermal biology, osmoregulation, reproduction, and immune function. 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.

Science communication is part of a scientist's everyday life. Scientists must give talks, write papers and proposals, communicate with a variety of audiences, and educate others. In this course we will implement both in-person and digital communication skills.

To create an environment that appeals to a variety of learners, the scientific material in this course will be presented in a variety of formats, a range of teaching method shown through educational research to be effective for student learning will be included, and these include various active learning methods, group learning, guided and inquiry-based laboratory investigations.

Despite our efforts, our teaching methods will not necessarily apply to all learners. If you find you are struggling with the material and/or with these different approaches, you are encouraged to discuss your difficulties with any member of the teaching team. WE WANT EVERYONE TO SUCCEED.

Objectives

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

Specific goals are:

- Describe how essential life processes work and the common and unique challenges organisms face in different environments.
- Categorize similarities and differences in physiological process across taxa.
Predict how environmental change (natural and anthropogenic) can impact aquatic organism physiology.

- Being able to work in teams and communicate effectively.

**Course Instructors:**

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

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**Summary Sheets**

To help develop an integrative approach to learning physiology, students will create weekly a Summary Sheet that synthesizes and integrates their understanding of the week's material in a pictorial format. The summary sheet will be turned in person at the beginning of the Friday's in class meeting. The Summary Sheets will be graded as

- 0 points = Not turned or missing important information
- 1 point = Incomplete or missing connections
- 2 points = Complete
Friday's in-class meeting

We will meet on Fridays in FSH107 8.30-9.20 am. The purpose of Friday’s in-class meeting is to 1) review in a comprehensive manner the content for the week, 2) provide space and time to ask in-depth questions and explore points of confusion or interest, and 3) interact with the week’s content using an active learning activity. In order to use our in-class time effectively, it is expected that in a 50-min class we use the first 20 min for points 1 and 2, and the rest of the time (30 min) for point 3.

The objective of these activities is to engage students in thinking critically or creatively, speaking with a partner, in a small group, or with the entire class, and giving and receiving feedback. For this, we will use three different types of active learning activities:

**Scaffold Questions.** Students are expected to work in groups of 4-5, and address a sequence of 4-5 questions provided by the instructor. After each question is posed in class, students will first work individually using a small white board. After a couple of minutes working individually, students will discuss the answer for the question with their own group. Finally, the group’s leader (the leader will be different for each question) will make public the group’s answer on a large white board.

**Random Discussion Leader.** Students are expected to work individually or in groups, and prepare to lead a discussion. The Monday before the activity, a research paper will be posted on canvas. Students are
expected to read, understand and be prepared to lead a discussion on that paper – this can be done individually or in groups organized by students. The day before the activity, each student will submit an individual informal guide with their points and perspectives on the paper (i.e., a document that will be used in case they have to lead the discussion the next day) via canvas. The day of the activity, a leader for the discussion will be randomly chosen. The discussion leader is expected to kick around ideas, create questions and structure the session. Here some advice on How to Lead a Discussion: https://teachingcommons.stanford.edu/resources/teaching/small-groups-and-discussions/how-lead-discussion

**Case Study with Research.** Students are expected to work in groups and address a case study. After a case study is posted in class, students will work in groups of 4-5, to come up with an elaborate answer or solution. This process will require doing some research and information gathering, so students must be able to bring and use their own laptops, smartphones, surfaces, etc.

**Resources**

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

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. A discussion board on the Canvas site will be used as a primary means of communication.

**Weekly workflow**

Each week will comprise two blocks:
If you have a question...

Weekly Topics

W 3 Jan (in class): Introduction to course and Learning objectives

F 5 Jan (pre-class reading): Biology and tree of Life (Ch. 1, Ch. 4, Ch. 16)
F 5 Jan: Scaffold Questions
*Lab: No lab this week

M 8 Jan: Function and Homeostasis (Ch. 42.1- 42.4)

Week 2

W 10 Jan: Sensory Physiology (Ch. 47)
F 12 Jan (in class): Scaffold Questions
*Lab: Metabolic Diversity in Prokaryotes I: Winogradsky Column

M 15 Jan: Animal nutrition (Ch. 29.3 [only Metabolic diversity], Ch. 44)

W 17 Jan: Photosynthesis (Ch. 10)

F 19 Jan (in class): Scaffold Questions

*Lab: Primary production in Freshwater Systems I

M 22 Jan: Osmoregulation (Ch. 43)

W 24 Jan: Circulation and Gas exchange (Ch. 45.1-45.3)

F 26 Jan (in class): Random Discussion Leader (Oxygen Limitation Theory: Pauly and Cheung, 2017 vs. Lefevre et al., 2017)

*Lab: Primary production in Freshwater Systems II

M 29 Jan: Innate immune (Ch. 51.1)

W 31 Jan: EXAM 1

F 2 Feb (in class): Scaffold Questions

*Lab: Salinity and Water Regulation

M 5 Feb: Adaptive immune (51.2-51.4)

W 7 Feb: Endocrinology (Ch. 49.1, 49.2)

F 9 Feb (in class): Scaffold Questions

*Lab: The Effect(s) of Drugs on Daphnia

M 12 Feb: Reproduction I (Ch. 50.1, 50.2)

W 14 Feb: Reproduction II (50.4 and paper Mylonas et al., 2010)

F 16 Feb (in class): Case study (Arapaimas gigas)

*Lab: Discussion Paper

M 19 Feb: Thyroid hormone I (ch. 49.3-49.4)

W 21 Feb: Thyroid hormone II and Stress

F 23 Feb (in class): Random Discussion Leader

*Lab: Metabolic Diversity in Prokaryotes II: Prokaryotes Isolation
M 26 Feb: Current research – Application of knowledge

W 28 Feb: EXAM 2

F 2 Mar (in class): Scaffold Questions

*Lab: Metabolic Diversity in Prokaryotes III: Prokaryotes Identification

M 5 Mar Aquatic Ecophysiology Scientific Papers

Week 10

W 7 Mar (in class): Paper Discussion

F 9 Mar: (in class): Paper Discussion

*Lab: TBD

Grading

Exams (2) – 30%

Quizzes - 10% (2 / week: online)

Weekly Summary sheets – 10% (Weekly)

Lab Worksheets - 25% (Weekly)

Special Project (Week 10 Paper Discussion / Leading and Participating) – 5%

Final Exam – 20%

Late Policy: Assignments will not be accepted after the due dates.

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

• Multiple choice
• Short answer
• Short essay
• Sketches / drawings
The final exam will be comprehensive

Use of Technologies

We encourage the use of technologies in this course. Some of the assignments will require the use of one or several digital platforms. However, we also acknowledge that not everyone may have access to these resources. If you are experiencing any difficulty in this regard: please, contact the teaching team.

Here is a list of resources that you will use.

> Canvas. We will use for include instructions and course material.

The Discussion Board will be the primary means for class communication.

Here are other technologies that we plan to use as it suits our learning goals.

> Poll everywhere. Use for quizzes and etc.

> Slack. Quick and informal channel of communication among students, and between students and instructors.

> Google Doc. Will be used to reflect on that week’s classes: what you learned, found interesting and what you struggled with. This will be not graded but will help us to improve the class as we go. This an important vehicle of communication.

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.

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 accommodations. A more complete description of the disability policy of the College of the Environment can be found [here](https://environment.uw.edu/intranet/academics/teaching/disability-accommodation/). 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 / [http://www.uw.edu/students/drs](http://www.uw.edu/students/drs).

We also facilitate readable files (pdf, word) -> Check digital content accessibility checklist

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**Course Summary:**

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