

# Environmental Physiology of Fishes

## - FAS 6238

### 1 Course Overview

**Course description:** This course will cover advanced topics on the physiology of fishes, their implications, and applications. We will examine features both common and distinctive, and survey the adaptations of fishes at different levels of biological organization which have allowed them to become by far the most species-rich vertebrate taxa. Maintenance of homeostasis under an array of stressors will be an overarching theme. Through literature review and a final project, students will gain an appreciation for, understanding of, and ability to formulate controlled scientific experiments to generate new knowledge about how fishes function.

- 3 Credits
- Spring 2021
- 100% online, asynchronous with live exam reviews
- <http://elearning.ufl.edu/>

**Course Prerequisites:** Successful completion of FAS 4202/5203: Biology of Fishes (or a similar fish biology/ichthyology course) is a prerequisite for this course. General knowledge in biological systems to the organism level will be beneficial.

**Instructor:** Dr. Joshua Patterson, Assistant Professor

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- Please use the Canvas message/Inbox feature for fastest response.
- Office hours: available by email, phone, or Zoom; office visits available by appointment.

**Textbook(s) and/or readings:** There is no required text for the course. Readings enhancing learning within modules or required for class discussion will be provided by the instructor.

### 2 Learning Outcomes

By the end of this course, each student will be able to:

- *explain how fish physiology applies across disciplines.*
- *critique biological information and ideas in writing.*
- *compare and contrast physiological processes of fish and other animals.*
- *formulate scientific questions and design experiments to answer them.*

## 3 Course Logistics

Students may access lectures, assignments, readings, and supporting materials through the course Canvas site as they become available.

### Technology Requirements:

- A computer or mobile device with high-speed internet connection.
- A webcam, headset and/or microphone, and speakers.
- Latest version of web browser. Canvas supports only the two most recent versions of any given browser. [What browser am I using?](#)
- Installation of proctoring software may be required and will be provided if so.

**Synchronous online sessions may be recorded.** By sharing your video, screen, or audio during any synchronous online class sessions, you are consenting to being recorded for the benefit of students who cannot attend live as well as for class review during the current semester. If you have special circumstances or concerns about privacy, it is your responsibility to discuss it with your instructor.

### 3.1 Description of Assessments & Activities

The course consists of weekly lectures, readings, and student-led class discussion threads

**Discussions:** The number of discussions each student leads will be based the number of students in the course. Students will choose papers to discuss from an instructor-provided list and the timeline for discussions will be established in the first two weeks of the course. All students are expected to make at least three thoughtful posts on each discussion thread across multiple days and the grade given for this section of the course will reflect this expectation. A rubric will be provided.

**Experimental design project:** To be completed in small groups, assigned by the instructor. The written assignment has two phases (idea/abstract and final project) which will both be considered in grading, with the final project receiving more weighting. The assignment is worth 20 out of a total of 100 points in the course. Completion of a peer feedback form for your group members will be included as part of the grade. Students in the same group may receive different grades for the assignment.

**Quizzes/Exams:** Assessments will be based on material provided in lectures and assigned readings. Quizzes will be made available during the weeks they are assigned and must be completed by midnight on Sunday of a given week. Quizzes will be multiple choice and students may access each quiz only once. Mid-term and final exams will also be made available during their respective weeks and must be completed by midnight on Sunday. Exam questions may include multiple choice, matching, fill in the blank, filling in diagrams, short answer, and essay questions.

## 3.2 Grades & Grading Scale

| Due Date (11:59pm) | Item  | Percentage |
|--------------------|---|------------|
| Sundays            | Quizzes - due on weeks indicated in course schedule (10 at 2 points each) | 20         |
| Sundays            | Participation in instructor and student-lead discussion threads           | 15         |
| Mar 1 – 6          | Midterm Exam  | 20         |
| Mar 13 and Apr 17  | Experiment idea/abstract (Mar 13) and final project (Apr 17)              | 20         |
| Apr 26 – 30        | Final Exam  | 25         |
|                    | Total   | 100        |

### Grading Scale (%)

A 90-100  
 B+ 85-89.99  
 B 80-84.99  
 C+ 75-79.99  
 C 70-74.99  
 D+ 65-69.99  
 D 60-64.99  
 E < 60

For information on current UF policies for assigning grade points, see

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

## 4 Learning Content

| Week # | Dates                    | Topics                         | Activities                        |
|--------|--------------------------|--------------------------------|-----------------------------------|
| 1      | Jan 11-16                | Introduction and overview      | Intro Discussion                  |
| 2      | Jan 18-23                | Gas exchange and air breathing | Choose discussion papers + Quiz 1 |
| 3      | Jan 25-30                | Osmoregulation                 | Quiz 2<br>Discussion              |
| 4      | Feb 1-6                  | Thermoregulation               | Quiz 3<br>Discussion              |
| 5      | Feb 8-13                 | Reproduction                   | Quiz 4<br>Discussion              |
| 6      | Feb 15-20                | Reproduction                   | Quiz 5<br>Discussion              |
| 7      | Feb 22-27                | Reproduction                   | Quiz 6<br>Discussion              |
| 7      | Week of 22 <sup>nd</sup> | Mid-term Exam Review           | Live Exam Review                  |
| 8      | Mar 1-6                  | Cardiovascular system          | Mid-term Exam                     |
| 9      | Mar 8-13                 | Muscles                        | Experiment idea/abstract due      |
| 10     | Mar 15-20                | Digestion and assimilation     | Quiz 7<br>Discussion              |
| 11     | Mar 22-27                | Growth                         | Quiz 8<br>Discussion              |

|    |                          |                                     |                    |
|----|--------------------------|-------------------------------------|--------------------|
| 12 | Mar 29- Apr 3            | Neuron function and sensory biology | Quiz 9 Discussion  |
| 13 | Apr 5-10                 | Immune function                     | Quiz 10 Discussion |
| 14 | Apr 12-17                | Lipids and homeoviscous adaptation  | Final project due  |
| 15 | Apr 19-21                | Nitrogenous waste                   | Discussion         |
| 15 | Week of 19 <sup>th</sup> | Final Exam Review                   | Live Exam Review   |
| 16 | Apr 26- 30               | Final Exam                          | Final Exam         |

## 4.1 Readings

The instructor will provide paper suggestions to student discussion leaders or students may use a paper of their choice from within the topic area with instructor approval. Discussion leaders for each week and their papers will be finalized by the end of Week 2. A handful of required reading examples (PDFs will be provided) is below:

- Sections I-V of Evans et al. The multifunctional fish gill. *Physiol Rev* 85 (2005): 97-130  
\*note – this reading covers Gas exchange and osmoregulation topics
- Pages 9-22 of Miller and Kendall. Chapter 1: Fish Reproduction *in* Early Life History of Marine Fishes (2009) Miller and Nummela eds
- McBride et al. Energy acquisition and allocation to egg production in relation to fish reproductive strategies. *Fish Fish* 16 (2013): 23-57
- Jensen et al. Evolution of the sinus venosus from fish to human. *J Cardiovasc Dev Dis* 1 (2014): 14-28
- Austreng. Digestibility determination in fish using chromic oxide marking. *Aquaculture* 13 (1978): 265-272

## 5 Policies and Requirements

This course plan and syllabus are subject to change in response to student and instructor needs. Any changes will be clearly communicated in advance through Canvas.

### 5.1 Late Submissions & Make-up Requests

It is the responsibility of the student to access on-line lectures, readings, quizzes, and exams and to maintain satisfactory progress in the course. Requirements for class attendance and make-up exams, assignments and other work are consistent with university policies that can be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

Computer or other hardware failures, except failure of the UF e-Learning system, will not excuse students for missing assignments. Any late submissions due to technical issues MUST be accompanied by the ticket number received from the Helpdesk when the problem was reported to them. The ticket

number will document the time and date of the problem. You MUST e-mail your instructor within 24 hours of the technical difficulty if you wish to request consideration.

For computer, software compatibility, or access problems call the HELP DESK phone number—352-392-HELP = 352- 392-4357 (option 2).

## 5.2 Communication Courtesy and Professionalism

Just as in any professional environment, meaningful and constructive dialogue is expected in this class and requires a degree of mutual respect, willingness to listen, and tolerance of opposing points of view.

**Respect for individual differences and alternative viewpoints will be maintained in this class at all times.** All members of the class are expected to follow rules of common courtesy, decency, and civility in all interactions. Failure to do so will not be tolerated and may result in loss of participation points and/or referral to the Dean of Students' Office.

## 5.3 Semester Evaluation Process

Student assessment of instruction is an important part of efforts to improve teaching and learning.

**At approximately the mid-point of the semester**, the School of Forest Resources & Conservation will request anonymous feedback on student satisfaction on various aspects of this course. These surveys will be sent out through Canvas and are not required but encouraged. This is not the UF Faculty Evaluation!

**At the end of the semester**, students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

## 5.4 Academic Honesty Policy

As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: *"We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity."*

You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit at the University of Florida, the following pledge is either required or implied: *"On my honor, I have neither given nor received unauthorized aid in doing this assignment."*

It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers, quizzes, exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct or appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated.

Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see: <http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code>.

## 5.5 Inclusive Learning Environment

This course embraces the University of Florida's Non-Discrimination Policy, which reads,

*The University shall actively promote equal opportunity policies and practices conforming to laws against discrimination. The University is committed to non-discrimination with respect to race, creed, color, religion, age, disability, sex, sexual orientation, gender identity and expression, marital status, national origin, political opinions or affiliations, genetic information and veteran status as protected under the Vietnam Era Veterans' Readjustment Assistance Act.*

If you have questions or concerns about your rights and responsibilities for inclusive learning environment, please see the instructor or refer to the Office of Multicultural & Diversity Affairs website: <http://multicultural.ufl.edu>.

## 5.6 Services for Students with Disabilities:

The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues. Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation. 0001 Reid Hall, 352-392-8565, [www.dso.ufl.edu/drc/](http://www.dso.ufl.edu/drc/)

## 5.7 Software Use

All faculty, staff and students of the university are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate.

# 6 Campus Helping Resources

For issues with technical difficulties for e-learning in Canvas, please post your question to the Technical Help Discussion in your course, or contact the UF Help Desk at:

- [Learning-support@ufl.edu](mailto:Learning-support@ufl.edu) | (352) 392-HELP - select option 2 | <http://elearning.ufl.edu>
- Library Help Desk support <http://cms.uflib.ufl.edu/ask>
- SFRC Academic Hub <https://ufl.instructure.com/courses/303721>

## 6.1 Student Life, Wellness, and Counseling Help

Students experiencing crises or personal problems that interfere with their general well-being are encouraged to utilize the university's counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students. Resources are available on

campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance.

- Counseling and Wellness resources <http://www.counseling.ufl.edu/cwc/>
- U Matter, We Care <http://www.umatter.ufl.edu/>
- Career Connections Center <http://career.ufl.edu/>
- Other resources are available at <http://www.distance.ufl.edu/getting-help> for online students.

## 6.2 Student Complaint Process

The School of Forest Resources & Conservation cares about your experience and we will make every effort to address course concerns. We request that all of our online students complete a course satisfaction survey each semester, which is a time for you to voice your thoughts on how your course is being delivered.

If you have a more urgent concern, your first point of contact should be the SFRC Academic Coordinator or the Graduate/Undergraduate Coordinator for the program offering the course. You may also submit a complaint directly to UF administration:

- Students in online courses: <http://www.distance.ufl.edu/student-complaint-process>
- Students in face-to-face courses: <https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>