NOTE to prospective students: This syllabus is intended to provide students who are considering taking this course an idea of what they will be learning. A more detailed syllabus will be available on the course site for enrolled students and may be more current than this sample syllabus. Summer term courses may be accelerated – please check the Ecampus Schedule of Classes for more information.

FW 315
ICHTHYOLOGY

COURSE CREDITS:
(3) This course combines approximately 90 hours of instruction, online activities, and assignments for 3 credits.

PREREQUISITES, CO-REQUISITES AND ENFORCED PREREQUISITES:
PREREQS: One year introductory biology.

COURSE DESCRIPTION FROM CATALOG
FW 315. ICHTHYOLOGY (3).

A survey of the diversity of biological adaptations of fishes. Topics include physiological and zoogeographical adaptations, reproduction, evolution, cladogenesis, morphology, behavior, and genetics. PREREQS: One year introductory biology.

CONTACT INFORMATION:

Instructor: Thaddaeus Buser
thaddaeus.buser@oregonstate.edu

Course Designer: Brian Sidlauskas, Ph.D.
Webpage: http://people.oregonstate.edu/~sidlausb/
Sample syllabi may not have the most up-to-date information. For accuracy, please check the ECampus Schedule of Classes to see the most current instructor information. You can search for contact information by name from the OSU Home Page.

LEARNING RESOURCES:

Required Textbooks:

Bond's Biology of Fishes, 3rd Edition
Michael Barton, 2007

Recommended Textbook:

Writing Papers in the Biological Sciences, 5th edition
Victoria E. McMillan, 2011

This contains lots of advice on how to format and prepare scientific writing!

NOTE: For textbook accuracy, please always check the textbook list at the OSU Bookstore website. Sample syllabi may not have the most up-to-date information.

Students can also click the ‘OSU Beaver Store’ link associated with the course information in the ECampus schedule of classes for course textbook information and ordering.

COURSE SPECIFIC MEASURABLE STUDENT LEARNING OUTCOMES:

We will study the anatomy, physiology, life history, diversity, evolution, behavior, biogeography and ecology of the fishes, the most diverse of all vertebrate groups and the dominant group of vertebrates in aquatic habitats. During this course you will learn to:

1) identify the major anatomical features of the most important groups of fishes and describe their evolutionary origins and physiological functions
2) synthesize information on the anatomical, functional, ecological, behavioral and physiological attributes of fishes to explain how those attributes adapt them to life in an aquatic environment
3) describe the wide diversity of life history and reproductive strategies among fishes, and illustrate how that variation adapts them for life in aquatic habitats ranging from isolated lakes and swift rivers to the oceanic abyss.

4) explain and provide examples of how fishes interact with each other and their environment through communication, predation and ecosystem connections.

5) combine information on geography, morphology and genetics to describe the diversity of fishes worldwide and reconstruct how scientists and managers use such data to recognize threatened species and conserve biodiversity, and

6) summarize major new findings from scientific papers, relate those findings to topics covered in this course, and explain their importance to scientifically-literate people who have not taken a course in ichthyology.

Your progress towards meeting these course objectives will be evaluated with contributions to discussion boards, a multi-part writing assignment, and a series of tests using multiple choice, true/false, multiple answer, fill-in-the-blank, and short answer questions. Aside from serving as a comprehensive introduction to the science of ichthyology, the course will provide a solid foundation in anatomy, physiology, evolution, life history, and ecology and will prepare you well for careers in fisheries science, ichthyology, aquaculture, oceanography or vertebrate biology.

**COURSE CONTENT AND POLICIES:**

<table>
<thead>
<tr>
<th>Week</th>
<th>Lectures</th>
<th>Readings</th>
</tr>
</thead>
</table>
| 1    | Course Introduction  
An Introduction to Fishes  
Understanding Phylogenies  
Interpreting and Using Phylogenies Fins and Form | Chapter 1: 13-17  
Chapter 2: All  
Chapter 4: 80-88  
Heimberg et al. (2010) and related commentary by Janvier (2010)  
Interactive Online Phylogeny Chapter 3: 31-44 |
| 2    | Locomotion  
Skin and Scales  
Muscle and Bone  
Fish Skulls | Chapter 3: 44-67  
Chapter 18: 283-291  
Chapter 19: All  
Chapter 23: 426-430  
Tapanila et al. (2013) |
|      | Choose a Paper for the Writing Assignment | |
|      | Skull Function  
Respiration | Mehta and Wainwright (2007) and commentary by Westneat (2007) |
<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Chapters</th>
</tr>
</thead>
</table>
| 3    | Buoyancy | Chapter 23: 411-420  
Chapter 24: All |
| 4    | Homeostasis 1  
Homeostasis 2  
Nervous System | Chapter 25: All  
Chapter 26: 493-500  
Chapter 30: 639-646 |
| 5    | Vision  
Mechanoreception  
Electroreception  
Chemoreception & Magnetoreception | Chapter 20: All  
Chapter 21: All  
Chapter 22: All |
| 6    | RECOMMEND EXAM 1 (through Skull Function) |  |
| 7    | Reproductive Anatomy  
Reproduction Theory  
Reproduction Case Studies | Chapter 27: 517-534  
Chapter 37: 778-783 |
| 8    | Larval Development and Morphology  
Larval Habitat and Transport  
Age and Growth  
Aging Methods | Chapter 27: 534-544  
Johnson et al. (2009) paper  
Chapter 23: 407-411 |
| 9    | Migration  
Diadromy  
Stocks, Populations and Species  
Predation  
Defense | Chapter 36: All  
McDowell (2001) paper  
Chapter 30: 647-657  
Chapter 37: All  
Christie et al. (2011) paper |
| 10   | EXAM 3 (Reproductive Anatomy through Stocks, Populations, and Species) |  |

**OPTIONAL (10 bonus points): Final day to submit proof outside feedback on your writing project (e.g. from the Online Writing Center)**
<table>
<thead>
<tr>
<th>9</th>
<th>Communication Interaction Communities and Ecosystems Special Habitats</th>
<th>Chapter 31: All Chapter 32: All Chapter 35: All</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FINAL PAPER DUE</strong></td>
<td></td>
<td></td>
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<tr>
<td>Finals</td>
<td>FINAL EXAM (Comprehensive)</td>
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</tbody>
</table>

**Assessment Methods:**

<table>
<thead>
<tr>
<th>Assessment Method</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intro Questionnaire</td>
<td>10 points (bonus)</td>
</tr>
<tr>
<td>Discussion Boards</td>
<td>20 points per unit, 200 points total</td>
</tr>
<tr>
<td>Writing Assignment</td>
<td>140 points (+10 bonus)</td>
</tr>
<tr>
<td>Midterm 1</td>
<td>100 points</td>
</tr>
<tr>
<td>Midterm 2</td>
<td>150 points</td>
</tr>
<tr>
<td>Midterm 3</td>
<td>150 points</td>
</tr>
<tr>
<td>Final Exam</td>
<td>260 points</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>1000 points (+20 bonus)</strong></td>
</tr>
</tbody>
</table>

**Intro Questionnaire:**

On the Canvas site you will find a short questionnaire that will help you practice the online testing procedure. The questions appear in formats similar to what you’ll see on the exams, but these are designed to let us get to know you a little better rather than to test your comprehension. You may leave answers blank on the intro questionnaire if you choose, but please at least sign in and submit the questionnaire so that we can be certain that you won’t have any technical problems taking the actual exams.

**Discussion Boards**

Each unit, you will find a set of discussion boards that will pose some open-ended questions for you think about and debate with your classmates, or will present information-gathering tasks that ask you to go find examples to share with the class. **We ask that you make at least two substantive posts to these boards in total each during each module, and that you post at**
least one of these posts before or on Wednesday of each week, and the other by the close of the module on Sunday night. You may either start a new thread or continue an extant thread with your comments, but please note that we are looking for well-thought-out and reasoned postings. Each post should fall between a few sentences to a full paragraph in length and should show some degree of mastery of the subject or a thoughtful consideration of the significance, ramifications, limitations, or implications of someone else’s answer. You are welcome to ask other questions if they relate to the topic at hand and the goals of this course. Simply posting “I agree,” “Go Beavers!” or “Fishes are Awesome!” is not sufficient! You will earn up to 20 points each unit for your contributions here, according to the following rubric.

18 to 20 points: Contributions exceed expectations. Student contributes comments of outstanding quality and/or contributes high-quality comments more frequently than the minimum requirement.
15 to 17 points: Contributions meet expectations of quality, frequency and timeliness.
14 points and below: Comments posted, but do not meet expectations of quality, frequency and/or timeliness.

In general, assume that 12 points are awarded for intellectual quality, 4 for frequency, and 4 for clarity, style and correctness of expression.

There are mostly no right or wrong answers on the discussion boards. These questions are designed to help you understand and really think about the material presented in the course. Think of the discussion board as a collaboration with your fellow students to generate ideas, synthesize information on fishes, bring in facts and examples from the course materials and outside sources, consider new perspectives, and improve everyone’s overall understanding of fish biology, ecology, and evolution.

PLEASE NOTE that there are more than two questions posed in each unit. You do not necessarily need to respond to all the questions posed, but you are responsible for reading and learning from all the boards. Concepts from the discussion boards are fair game for exams!

If you have questions regarding general course logistics or the course material, please post your question to the Open Forum that we’ve set up to handle such inquiries. This will allow us to respond where the whole class can benefit from the answer. Personal concerns, extension requests, etc. can of course come through email or the Canvas inbox (top right of Canvas).

**Midterm Exams**

Each of the three midterms will consist of multiple choice, multiple answer, true or false, fill-in-the-blank and short answer questions. Each midterm stands alone: material from the first section of the course will not be tested on the second midterm (though you can’t forget basic concepts from the first section, such as how to interpret the phylogeny of fishes). The midterms are open book, but you’ll have only a limited about of time to respond to all the questions, so you’ll still need to study up before taking them!
Before the test begins, there will be a timer option. If you want to see the timer during the test, that is where you’ll activate it. **You are responsible for submitting your exam within the allowed time limit.** If you take longer than allotted, Canvas will not automatically kick you out of the test, but we will be able to see how long it took you to finish. You will begin to lose substantial points if you go over the time limit. Check a clock before you start if you are worried.

If you accidentally close the browser window while you are taking the test, you can log back into the exam with no problems, but note that the timer will continue to countdown. You cannot pause the test once you begin.

Also note that you can have more than one tab open at a time, so you can have the exam open in one tab and another part of the course website open in another. That said, remember that you cannot simply cut and paste answers from the course or a website into the exam! This is plagiarism (see section on academic dishonesty below). **In all cases you need to write out answers in your own words.**

**Final:**

The open-book final will last two hours and will consist of multiple choice, multiple answer, true-or-false, fill-in-the blank and short answer questions, **as well as a single longer essay. The final is comprehensive.**

**Writing Assignment: Understanding and Explaining Recent Developments in Ichthyology**

Ichthyology is a dynamic field, with new discoveries reported all the time. Your writing task for this course is to compose a five-page paper summarizing, contextualizing and explaining the importance of a recent (2000 or later) scientific publication in ichthyology that reports new results (e.g., not a commentary, opinion, perspective or review article). You may select from a list of articles that we provide, or pick your own if you first secure the instructor’s permission to work on a specific different article. No matter which article you pick, it should be something that you think is interesting and exciting, and part of your grade will depend on how well you explain why the paper is important. You’ll be assigned a peer review partner, and will complete the assignment in several steps.

1) Choose a paper to write about and explain briefly why you picked it (10 points)
2) Submit a draft of your assignment to your partner (10 points)
3) Critique a draft written by your partner (20 points)
4) OPTIONAL: Submit a draft for critique to the Online Writing Center or Net Tutor (10 bonus point)
5) Submit your final assignment (100 points)

**(A separate handout with more detail on the writing assignment will be posted)**
Grading:

Earning at least the total number of points specified below will earn you the corresponding grade.

<table>
<thead>
<tr>
<th>Points</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>930</td>
<td>A</td>
</tr>
<tr>
<td>900</td>
<td>A-</td>
</tr>
<tr>
<td>870</td>
<td>B+</td>
</tr>
<tr>
<td>830</td>
<td>B</td>
</tr>
<tr>
<td>800</td>
<td>B-</td>
</tr>
<tr>
<td>770</td>
<td>C+</td>
</tr>
<tr>
<td>730</td>
<td>C</td>
</tr>
<tr>
<td>700</td>
<td>C-</td>
</tr>
<tr>
<td>670</td>
<td>D+</td>
</tr>
<tr>
<td>630</td>
<td>D</td>
</tr>
<tr>
<td>600</td>
<td>D-</td>
</tr>
</tbody>
</table>

We may curve grades upwards if a given assessment ends up being too hard, but we will never curve grades downwards. You are not in competition with one another.

Make Ups:

Make-up midterms will be given only in cases of excused absences (e.g. health-related absences or family emergencies) that are arranged in advance. Excused absences will not be given for airline reservations or routine illnesses. Excused absences will not be granted after the absence has occurred.

Regrades:

Regrades of exams will be performed when there is an error and the student requests a regrade. All requests for regrading must be made within one week of the day the exam is returned. After that period of time, grades will be fixed and will not be changed.

Incompletes:

Incompletes will be granted on a case-by-case basis and only in extreme circumstances in which there is a documented legitimate (e.g., health-related or family emergency) excuse for not being able to take the final exam. You must have completed at least 70% of the course in order to request an incomplete. If you think that you will need to request an incomplete, please contact us with the details of your case as soon as possible. No incompletes will be granted post-hoc after the final exam has occurred.

Late Assignments:
Late writing assignments will be marked down by 5% for every day (24 hour period or portion thereof) that they are late. Short extensions can be granted without penalty in some circumstances. Extensions must be requested at least three days in advance of the existing deadline to be considered, though we reserve the right to bend this rule in the case of true catastrophe. **No late contributions to the discussion boards will be accepted under any circumstances.**

**Communications:**

- Remember that online discussions are public messages, and all writings in this area will be viewable by the entire class. If you prefer that only the instructor sees your communication, send it by email, and be sure to identify yourself and the class.
- Posting of personal contact information is discouraged (e.g. telephone numbers, address, personal website address).
- All your online communications need to be composed with fairness, honesty and tact. Spelling and grammar are very important in an online course. What you put into an online course reflects on your level of professionalism.
- Please check the Announcements area and the course syllabus before you ask general course "housekeeping" questions (i.e. how do I submit assignment 3?). If you don't see your answer there, then please contact the instructor.
- We will try to respond to all course related emails sent during the work week within 48 hours. Response times may be longer over the weekend; believe it or not, we don't always work on Saturday! If more than 48 hours elapses and you have not received a response, please feel free to send us a gentle reminder.
- We aim to have all work graded within one week of submission, with the exception of the final writing assignment, which may take two weeks to grade and return.

**EVALUATION OF STUDENT PERFORMANCE:**

See policy under section above entitled "grades" for minimum point values needed to earn each letter grade.

**COURSE SITE LOGIN INFORMATION**

Information on how to login to your course site can be found [HERE](#).

**STATEMENT REGARDING STUDENTS WITH DISABILITIES**

Oregon State University is committed to student success; however, we do not require students to use accommodations nor will we provide them unless they are requested by the student. The student, as a legal adult, is responsible to request appropriate accommodations. The student must take the lead in applying to Disability Access Services (DAS) and submit requests for accommodations each term through DAS
Online. OSU students apply to DAS and request accommodations at our Getting Started with DAS page.

Accommodations are collaborative efforts between students, faculty and Disability Access Services (DAS). Students with accommodations approved through DAS are responsible for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through DAS should contact DAS immediately at 541-737-4098.

ACADEMIC INTEGRITY AND STUDENT CONDUCT (OSU POLICY)

Students are expected to be honest and ethical in their academic work. Intentional acts of academic dishonesty such as cheating or plagiarism may be penalized by imposing an “F” grade in the course.

Student conduct is governed by the universities policies, as explained in the Office of the Dean of Student Life: Student Conduct and Community Standards. In an academic community, students and faculty, and staff each have responsibility for maintaining an appropriate learning environment, whether online or in the classroom. Students, faculty, and staff have the responsibility to treat each other with understanding, dignity, and respect.

Students are expected to conduct themselves in the course (e.g. on discussion boards, email postings, etc.) in compliance with the university's regulations regarding civility. Students will be expected to treat all others with the same respect as they would want afforded to themselves. Disrespectful behavior (such as harassing behavior, personal insults, inappropriate language) or disruptive behaviors are unacceptable and can result in sanctions as defined by Student Conduct and Community Standards.

For more info on these topics please see:
- Statement of Expectations for Student Conduct
- Student Conduct and Community Standards - Offenses
- Policy On Disruptive Behavior

PLAGIARISM

You are expected to submit your own work in all your assignments, postings to the discussion board, and other communications, and to clearly give credit to the work of others when you use it. Academic dishonesty will result in a grade of “F.”
- Statement of Expectations for Student Conduct
- Avoiding Academic Dishonesty
TECHNICAL ASSISTANCE
If you experience computer difficulties, need help downloading a browser or plug-in, assistance logging into the course, or if you experience any errors or problems while in your online course, contact the OSU Help Desk for assistance. You can call (541) 737-3474, email osuhelpdesk@oregonstate.edu or visit the OSU Computer Helpdesk online.

- COURSE DEMO
- GETTING STARTED

TUTORING
For information about possible tutoring for this course, please visit our Ecampus NetTutor page. Other resources include:

- Writing Center
- Online Writing Lab

STUDENT EVALUATION OF TEACHING
The online Student Evaluation of Teaching form will be available in week 9 and close at the end of finals week. Students will be sent instructions via ONID by the Office of Academic Programs, Assessment, and Accreditation. Students will log in to “Student Online Services” to respond to the online questionnaire. The results on the form are anonymous and are not tabulated until after grades are posted. Course evaluation results are very important and are used to help improve courses and the learning experience of future students. Results from questions are tabulated anonymously and go directly to instructors and unit heads/supervisors. Unless a comment is “signed,” which will associate a name with a comment, student comments on the open-ended questions are anonymous and forwarded to each instructor. “Signed” comments are forwarded to the unit head/supervisor.

REFUND POLICY INFORMATION
Please see the Ecampus website for policy information on refunds and late fees.