

## Term Information

Effective Term Autumn 2016  
*Previous Value* Summer 2012

## Course Change Information

### What change is being proposed? (If more than one, what changes are being proposed?)

Change from 7 to 14 week offering and increase in credit hours from 1.5 to 3.

### What is the rationale for the proposed change(s)?

Dr. Ludsins is requesting to switch his EEOB 5430 (Fish Ecology) course from a half-semester to a full-semester. This course was initially developed in the quarter system (as EEOB 626), with 10 weeks providing the bare minimum of time needed to cover course topics. He has found that he simply cannot sufficiently cover all the basics of this course's topic in a 7-week course, and feels that the students would greatly benefit from a longer course.

### What are the programmatic implications of the proposed change(s)?

(e.g. program requirements to be added or removed, changes to be made in available resources, effect on other programs that use the course)?

The proposed change is not expected to have downstream impacts on the program.

Is approval of the request contingent upon the approval of other course or curricular program request? No

Is this a request to withdraw the course? No

## General Information

Course Bulletin Listing/Subject Area Evol, Ecology & Organismal Bio  
Fiscal Unit/Academic Org Evolution, Ecology & Org Bio - D0390  
College/Academic Group Arts and Sciences  
Level/Career Graduate, Undergraduate  
Course Number/Catalog 5430  
Course Title Fish Ecology  
*Previous Value* Aquatic Ecosystems - Fish Ecology  
Transcript Abbreviation Fish Ecology  
Course Description Lecture emphasis on the behavior, migration, distribution, and evolution of fish; laboratory emphasis on ecological and systematic ichthyology. Lab fee required.  
*Previous Value* Lecture emphasis on the behavior, migration, distribution, and evolution of fish; laboratory emphasis on ecological and systematic ichthyology. Lab fee required. Also available summer session at Stone Lab.  
Semester Credit Hours/Units Fixed: 3  
*Previous Value* Variable: Min 1.5 Max 4

## Offering Information

Length Of Course 14 Week  
*Previous Value* 7 Week, 4 Week (May Session), 12 Week (May + Summer)  
Flexibly Scheduled Course Never  
*Previous Value* Sometimes  
Does any section of this course have a distance education component? No  
Grading Basis Letter Grade  
Repeatable No  
Course Components Field Experience, Laboratory, Lecture

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<b>Grade Roster Component</b>	Lecture
<b>Credit Available by Exam</b>	No
<b>Admission Condition Course</b>	No
<b>Off Campus</b>	Never
<b>Campus of Offering</b>	Columbus

## **Prerequisites and Exclusions**

<b>Prerequisites/Corequisites</b>	Prereq: 3410, or Grad standing, or permission of instructor.
<b>Exclusions</b>	Not open to students with credit for 621 and 626.

## **Cross-Listings**

Cross-Listings

## **Subject/CIP Code**

<b>Subject/CIP Code</b>	26.1301
<b>Subsidy Level</b>	Doctoral Course
<b>Intended Rank</b>	Junior, Senior, Masters, Doctoral

## **Requirement/Elective Designation**

The course is an elective (for this or other units) or is a service course for other units

## **Course Details**

<b>Course goals or learning objectives/outcomes</b>	<ul style="list-style-type: none"><li>• Students will understand the evolutionary and ecological processes that underlie fish behavior, diversity and dynamics</li><li>• Students will acquire an appreciation for the strong inter-dependency between humans and fishes.</li><li>• Students will gain practical skills for conducting ecological research involving fishes.</li></ul>
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### ***Previous Value***

<b>Content Topic List</b>	<ul style="list-style-type: none"><li>• Introduction to individual, population, community, and ecosystem aspects of fish ecology</li><li>• Evolution of Fishes</li><li>• Growth and energy budgets</li><li>• Reproduction in fishes</li><li>• Predation and competition</li><li>• Social behavior of fishes</li><li>• Communities and ecosystems</li><li>• Human impacts on fishes</li><li>• Management and conservation of fishes</li></ul>
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**COURSE CHANGE REQUEST**  
5430 - Status: PENDING

Last Updated: Vankeerbergen, Bernadette  
Chantal  
01/26/2016

**Previous Value**

- [Introduction to individual, population, community, and ecosystem aspects of fish ecology](#)
- [Human influence on fish populations, including their ecology and evolution](#)
- [Methods for ecological research of fisheries](#)
- [Ohio fish families and species](#)

**Attachments**

- EEOB 5430 Syllabus (Spring 2014).pdf: Old syllabus (1.5 credits/7 wks)  
*(Syllabus. Owner: Johnson, Norman F)*
- EEOB 5430 Syllabus (Spring 2014).pdf: New syllabus (3 credits/14 wks)  
*(Syllabus. Owner: Johnson, Norman F)*
- EEOB 5430 Syllabus (August 2016) - Draft Plan.pdf: New syllabus (3 credits/14 weeks)  
*(Syllabus. Owner: Vankeerbergen, Bernadette Chantal)*

**Comments**

- Please ignore syllabus #2. *(by Vankeerbergen, Bernadette Chantal on 01/26/2016 05:18 PM)*
- Attached: syllabus the existing 7 week course and syllabus of proposed 14 week version *(by Johnson, Norman F on 01/15/2016 02:23 PM)*

**Workflow Information**

Status	User(s)	Date/Time	Step
Submitted	Johnson, Norman F	01/15/2016 02:24 PM	Submitted for Approval
Approved	Johnson, Norman F	01/15/2016 02:24 PM	Unit Approval
Approved	Fink, Steven Scott	01/15/2016 04:01 PM	College Approval
Pending Approval	Nolen, Dawn Vankeerbergen, Bernadette Chantal Hanlin, Deborah Kay Jenkins, Mary Ellen Bigler Hogle, Danielle Nicole	01/15/2016 04:01 PM	ASCCAO Approval

**FISH ECOLOGY**  
**Evolution, Ecology & Organismal Biology (EEOB) 5430**  
**Spring 2014**

**INSTRUCTOR:**

Dr. Stuart Ludsin  
Aquatic Ecology Laboratory (AEL)  
1314 Kinnear Road  
222 Research Center  
[ludsin.1@osu.edu](mailto:ludsin.1@osu.edu)  
292-1613

**GRADUATE TEACHING ASSISTANT:**

Reed Brodnik  
AEL, 1314 Kinnear Road  
230 Research Center  
[brodnik.9@osu.edu](mailto:brodnik.9@osu.edu)  
292-2186

**COURSE DESCRIPTION:**

This lecture-, lab-, and discussion-based course will introduce students to the world of fishes, the most diverse vertebrate group on the planet. Freshwater, coastal marine, coral reef, and stream fish ecology at the individual, population, community, and ecosystem level will be the focus of lectures, with some discussion of fish evolution, management, and conservation. Lectures also will include discussions on how humans have been affecting the world's fish fauna. Labs will focus on topics such as overfishing, as well as fish anatomy, identification, feeding, functional morphology, and habitat-use, through hands-on lab exercises, discussions, observation, and field sampling.

**COURSE OBJECTIVES:**

- 1) Introduce students to individual, population, community, and ecosystem aspects of fish ecology.
- 2) Illustrate how humans have been influencing the ecology and evolution of fishes.
- 3) Gain knowledge in how to conduct fish ecological research and analyze data.
- 4) Gain hands-on experience in sampling fishes in the field.
- 5) Gain skills in identifying Ohio fish families and species.
- 6) Gain skills in interpreting the scientific literature and communicating ideas through writing.

**COURSE SCHEDULE:**

<b>Lecture:</b>	Monday & Wednesday	10:20 – 11:15	(Jennings 040)	
<b>Lab:</b>	Thursday	1:50 – 4:55	(Jennings 230)	GTA: Brodnik
	Friday	9:35 – 12:30	(Jennings 230)	GTA: Brodnik

**OFFICE HOURS:**

<b>Ludsin</b> (for lecture):	Wednesday	11:30 – 12:30	or by appt.	(474 Aronoff)
<b>Brodnik</b> (for lab or lecture):	Monday	11:30 – 1:00	or by appt.	(456 Aronoff)
	Tuesday	9:00 – 10:30	or by appt.	(230 Research Center)

## **COURSE READINGS:**

No text is required for this course. Instead, we will read papers from the peer-reviewed literature, which will be posted on Carmen. If interested, two supplemental texts exist, from which a lot of lecture material has been drawn. These texts are:

Diana, J.S. 2004. Biology and ecology of fishes, 2<sup>nd</sup> edition. Cooper Publishing Group, Traverse City, MI. 498 pp.

Wootton, R.J. 1998. Ecology of teleost fishes, 2<sup>nd</sup> edition. Kluwer Academic Publishers, AA Dordrecht, The Netherlands, 386 pp.

## **MATERIALS POSTED ON CARMEN:**

Materials for this course will be posted on the EEOB 5430 Carmen site. At this site, you will find this syllabus, as well as other lecture (e.g., lecture notes/handouts, lecture readings, assignment instructions) and lab (e.g., instructions for labs, supplemental lab handouts, readings) materials. Grades also will be posted on this Carmen website. You are welcome to download materials from the Carmen site and print them for your personal use. Please check the Carmen website frequently, as I and your lab instructors will post new information there.

*Also, be sure to check your official OSU email daily; all correspondence will be to this OSU account. We will not respond to non OSU emails, owing to OSU policy rules.*

## **POLICIES AND PROCEDURES**

### **Course Structure**

EEOB 5430 has two 55-min lectures per week. Because I have not found a text that I like very much, your course reading assignments each week will come from the primary literature or selected textbook chapters. I highly recommend that you read all materials **BEFORE** and **AFTER** each lecture. Doing so will help you understand lecture immensely, as well as help you make sense of the readings. Additionally, because a portion of your grade will depend on your participation, having an understanding of the material will help you ask and answer questions in class.

The required lab portion of this course is designed to supplement material covered in lecture and the readings, and also introduce students to some different aspects of fish ecology and biology. The labs will be diverse, consisting of discussion-based learning, fish dissection and identification, behavioral observation, computer simulation modeling, field sampling, data analysis, and writing. Labs are mandatory; each unexcused absence will result in a 5% reduction to your grade. If you cannot make a lab, please let your GTA know ahead of time so that arrangements can be made to attend a different lab (or to make up the assignment).

This course will have three field trips: one to the Columbus Zoo's Discovery Reef, one to a local stream, and one to a local reservoir. Field trip dates may be cancelled or changed at the last minute, owing to adverse weather conditions. Students must attend labs and field trips on their regular lab day, with exception that students from the Friday lab are welcome to attend Thursday lab (as it still has several openings). If you plan to attend a different lab section than the one in which you are enrolled, please let your GTA know ahead of time to ensure this is possible. Remember to dress appropriately for the conditions when in the field. You will **not** need your own waders for the class; however, students who have hip or chest waders can use their own. Students must provide me with a signed waiver form before participating in any field trip.

### **Make-up Exams/Quizzes**

Make-up exams will be given only if the student must miss the regularly scheduled exam due to (1) a university-organized or university-sanctioned event or (2) a medical or family emergency. In the case of a university-organized or-sanctioned event, the student must submit appropriate documentation **no later than 10 days before the examination**, and must schedule the time and place for the make-up exam with Dr. Ludsin prior to the event. In the case of medical emergency, the student must submit documentation from a licensed medical care facility or provider as soon as possible after the exam is given. Make-up examinations will cover the same range of material and will be of comparable

difficulty. Only Dr. Ludsin can approve make-up exams; do not take requests for make-up exams to your lab instructor.

### Late Policy

All assignments are expected to be turned in on their due date. Most assignments will be handed in or turned in electronically via Carmen; quizzes and tests obviously will be in class. **For every day (including weekend days) that a lab assignment is late, you will lose 10% of the maximum attainable score.** Legitimate requests for extensions made at least 2 days prior to a due date will be honored, but Dr. Ludsin and the GTA have ultimate discretion regarding what is “legitimate”.

### Grading

Your final grade for EEOB 5430 will be determined on the basis of 500 points, using the point allocation below. Activities in the lecture and lab portions of the class will account for 79% and 21% of your grade, respectively.

Component	Assignment	Format	Points
<b>Lecture</b>	Midterm Exam	Closed Book	150
	Final Exam	Closed Book	150
	Quiz (2 @ 10 points each)	Individual	20
	Current Event Summary (1@ 10 pts each)	Individual	10
	Minute Paper Write-ups (3 @ 5 pts each)	Individual	15
	Discussion Write-ups (3 @ 15 pts each)	Individual	45
	Participation/Attendance at Last Discussion	Individual	10
	<b>Lab</b>	Lab Practical	Individual
What’s for dinner? Write-up		Individual	15
Fish Anatomy Write-up		Individual	10
Fish Identification Write-up		Individual	10
Pollution Lab		Individual	15
Columbus Zoo Write-up		Group of 2	10
Stream Sampling Write-up		Individual	10
<b>Total Points Available</b>			<b>500</b>

### Exams (300 points total; 60% of grade)

Two exams (a mid-term and final) will occur in the class. These exams will cover everything covered in lecture, including lectures proper, readings, and discussions. Each exam will be worth 150 points. The final will **not** be comprehensive, focusing on material covered after the mid-term. Exams will be predominantly comprised of questions that require written answers of 1-5 sentences (i.e., mini essays), with some multiple choice, matching, and/or true-false questions.

The second exam will be given during Final Exam week. It is currently scheduled for final exam is on **Thursday, April 24 at 10 AM in our regular lecture room, Jennings 040**. If, for any reason, you cannot take the final exam as scheduled, you must submit a written request to Dr. Ludsin to take this exam at a different time, and must justify this request with a reasonable academic argument. Conflicts with airline reservations or vacation trips do not constitute reasonable academic arguments. **Such requests must be submitted before the end of the 4<sup>th</sup> week of class (by April 10).**

Re-grading Policy. You will be given an opportunity after your graded exams are returned to request that certain questions be re-graded and point deductions reassessed. The procedure for exam re-grading is:

- After you receive your graded exam, consult the posted exam key to determine how/why your answers differed from those we sought;
- For each question you believe should be re-graded, assemble a paragraph describing why you feel your answer deserves more points than were assigned. Your rationale should refer to material from the text and lectures in defense of your view.
- Submit your **TYPED** re-grading request and your exam to Dr. Ludsin or the TA no later than one week after the exam was returned. Handwritten re-grading requests will not be accepted.

#### **Quizzes (20 points total; 4% of grade)**

A quiz will be administered before the first two discussions during lecture. These quizzes will provide an opportunity for students to get a feel for nature of the essay questions that will be on the exams. These quizzes also provide some incentive to read the material before lecture.

#### **Current Event Summary (10 points; 2% of final grade)**

Each of you is required to bring to lecture a fish ecology-related current event story during the quarter on a randomly assigned day. More details, including your assigned date, can be found in the “Current Events Summary” handout in the Assignments section of the EEOB 5430 Carmen site. **These summaries must be handed in at the beginning of class to receive full credit.**

#### **Minute Paper Write-ups (15 points; 3% of final grade)**

Each of you is required to complete three “Minute Papers” during the course of the quarter on a randomly assigned day. These papers will be written during the last few minutes of the lecture period and must be turned into Dr. Ludsin or a GTA before the end of lecture period to receive credit. These papers are designed to help ensure that you are taking home the important points of each lecture, help improve my teaching of lecture material, and also provide some incentive to come to lecture. More details about Minute Papers can be found in the “Minute Paper Write-up” handout in the Assignments section of the EEOB 5430 Carmen site.

#### **Discussion Write-ups (45 points; 9% of final grade)**

Each of you is required to complete a write-up for the three class discussions. These write-ups will help you better understand the discussion papers and resulting discussion points, as well as force you to synthesize your thoughts on each discussion topic in writing. More details about Discussion Paper write-ups can be found in the “Discussion Write-up Instructions” handout in the Assignments section of the EEOB 5430 Carmen site.

#### **Participation/Attendance at Last Discussion (10 points; 2% of final grade)**

To maximize learning and preparedness for class, participation in the lab and lecture group discussions and the class as a whole will be monitored. Because you will have prepared for each Discussion quiz by reading the papers in advance of class, you should be in a very good position to add to the group discussion. **Additionally, you must attend the last lecture period in which we will do course evaluations (and have the third discussion). If you fail to attend this last lecture, all 10 points in this category will be taken away.**

#### **Laboratory practical (30 points; 6% of final grade)**

This practical will focus on fish anatomy and identification, using fishes from Ohio as a basis (emphasizing lake/reservoir game fishes and stream fishes). This quiz will test your ability to identify anatomical features, identify common families, and key out individual species.

### **Laboratory write-ups (70 points total; 14% of final grade)**

Each laboratory topic will require you to complete a write-up, due 1 or 2 weeks following the lab itself. These laboratory write-ups are designed to ensure that paid attention in lab and also to improve your critical thinking, statistical analysis, and writing skill.

### **Earning Final Grades**

The following grading scale will be used to determine the final grade you have earned:

≥93%=A	90-92%=A-	87-89%=B+	83-86%=B	80-82%=B-
77-79%=C+	73-76%=C	70-72%=C-	60-69%=D	≤59%=E

### **FREQUENTLY ASKED QUESTIONS (FAQs):**

*Will lecture attendance be used in the grading scheme?* Frankly, I hope everyone will attend all lectures. Material will be covered in lecture that is not available in the readings or the PowerPoint lecture slides that will be posted on Carmen and that alone should be sufficient for you to attend lecture on a regular basis. However, lecture attendance will not be used explicitly in the grading process, with exception on days which we have group discussions (3 lecture dates). **Attendance is mandatory for these three lecture discussions; any unexcused absence will result in the loss of all points for the associated quiz, discussion write-ups, and participation points.** To help encourage attendance in lectures on other days, a subset of students will be required to complete a Minute Paper at the end of each lecture and two surprise quizzes will be administered. If you were selected to provide a Minute Paper or a quiz was given, and you did not attend class, you will lose points for that assignment.

*What happens if I miss a lab?* **An unexcused laboratory absence will result in the loss of all points associated with that laboratory. Two unexcused laboratory absences will result in course failure.**

*Do I really need to do the class readings?* The goal of this course is to give students a broad and comprehensive introduction to the discipline of fish ecology and biology. The combination of the readings, assignments, and the lectures can achieve this end. Most of the lecture time will be devoted to principles and concepts. Your assigned readings will supply additional examples and explanations to complement what is presented in lecture. For you to actually achieve the goals of this course, you will need to put in the time and effort to master the information and examples presented in both the lecture and the readings. **Neither is sufficient in the absence of the other, and both will be tested on the exams.**

*Does enough detail exist in the lecture PowerPoint slides and readings on Carmen for me to pass the exams without attending lecture?* The PowerPoint lecture slides and any other materials posted on Carmen are designed to make it easier for you to understand course concepts. While the PowerPoint lecture notes posted in Carmen will be complete, they should not be considered a substitute for careful attention and note-taking in lecture. The questions on the exams will often deal with examples and ideas presented in lecture but neither fully explained on the post lecture PowerPoint slides nor presented in your readings. As a result you (as the student) must be a conscientious recorder. Be sure the information you write in your notes is legible, complete, and correct. Just five minutes spent after each lecture reviewing your notes of the day will improve information content tremendously. How many times have you thought to yourself "I know I understood this concept when it was presented in lecture; at the time, it seemed so simple and logical? Why don't my notes make sense now, the night before the exam?" By writing a few more lines in the margins of your notes, expanding on this or that point, you can more easily interpret your notes at exam time...and score higher on exams.



***Is the final exam comprehensive?*** No. The exam given during exam week covers the last lectures (including discussions) of the course (not covered on the previous exam) and will be similar in length, depth, breadth, and structure.

***What should I do if I feel I need some accommodation to allow me to succeed in this course?*** Any student who feels s/he may need an accommodation based on the impact of a disability should contact Dr. Ludsin privately to discuss your specific needs. Anyone who feels they may need an accommodation based on a special need should contact Dr. Ludsin to arrange an appointment as soon as possible after the beginning of the quarter. At that time we can discuss the course format, anticipate your needs, and explore potential adaptations to meet your needs. We rely on the Office for Disability Services for assistance in verifying the need for accommodations and developing accommodation strategies. If you have not previously contacted the Office for Disability Services, please do so at 614-292-3307 in room 150 Pomerene Hall to coordinate reasonable accommodations. Note: The syllabus, lecture manual, and exams can be made available in alternative media, given advanced notice and documentation from ODS.

***What should I do if I'm having difficulty with the amount and/or type of writing that's required in this course?*** I recommend you make use of the OSU Writing Center. The OSU Writing Center is a place where students, faculty, staff, and alumni can receive free, individual consultations on any piece of writing. The Writing Center can help with traditional writing assignments like research reports and essays, but you can also work on lab reports, personal statements, resumes, job letters, and even screenplays. Graduate Associates from a variety of disciplines staff OSU's Writing Center. The Writing Center works on an appointment basis. Appointments last about 50 minutes and start on the half hour (e.g., 8:30, 9:30, etc.). Call 688-4291 or stop by room 485 Mendenhall Lab to schedule an appointment.

***What is the course policy on Academic Misconduct?*** You are responsible for completing your academic exams and assignments on your own, unless otherwise noted. Examples of plagiarism and other forms of academic misconduct are given in the code of student conduct, and it is the responsibility of all OSU students to understand what actions might be construed as academic misconduct. Any and all suspected incidents of academic misconduct in EEOB 5430 will be forward to the OSU Committee on Academic Misconduct for adjudication. There will be no exceptions. **DON'T CHEAT!**

***What is the course policy concerning diversity?*** The instructors of this course are committed to promoting a welcoming climate for all students. For more information on diversity, see the EEOB (<http://www.biosci.ohio-state.edu/~eeob/diversity/>) or OSU (<http://www.osu.edu/diversity/>) websites. The instructors welcome suggestions, questions, and comments. Any exchange of ideas will be conducted with confidentiality, safety, and respect as guiding principles.

### TENTATIVE LECTURE SCHEDULE

Lecture	Date	Topic	Readings ( <b>read before class</b> )	Assignments
1	2/26	Fish Evolution & Diversity	Kitano et al 2008	
2	3/3	Foraging 1	de Robertis et al. 2003; Werner 1974	
3	3/5	Foraging 2 / Growth 1	Schurmann & Steffensen 1997	
	3/10	Spring Break (No class)		
	3/12	Spring Break (No class)		
4	3/17	Growth 2	Conover et al. 1997	
5	3/19	<b>Discussion 1: Climate Change (Quiz)</b>	See <b>Discussion 1</b> Assignment for Readings <b>(Attendance is mandatory)</b>	
6	3/24	Populations 1	Doherty & Fowler 1994; Holbrook & Schmitt 2002	<b>Due: Discussion 1 write-up</b>
7	3/26	Populations 2	Schindler et al 2009; Reichert et al. 2010	
8	3/31	Life-History	Winemiller 2005	
<b>Exam 1</b>	4/2	<b>Mid-term Exam (thru Lectures 1-7)</b>		
9	4/7	Communities	Jackson et al. 2001; Ludsin et al. 2001	
10	4/9	<b>Discussion 2: Ethics of Recreational Fishing (Quiz)</b>	Cooke & Sneddon 2007; <b>Discussion 2</b> Assignment <b>(Attendance is mandatory)</b>	
11	4/14	Fish in Ecosystems	Schindler et al. 2003; Vanni et al. 2005	<b>Due: Discussion 2 write-up</b>
12	4/16	Human Impacts on Fisheries	Carlson et al 2007; Conover et al. 2009	
13	4/21	Course Evaluations & <b>Discussion 3: Fisheries Management &amp; Conservation</b>	See <b>Discussion 3</b> Assignment for Readings <b>(Attendance is mandatory)</b>	<b>Due: Discussion 3 write-up</b>
<b>Exam 2</b>	4/24	<b>Final Exam 10-11:45 AM (Lectures 8-13)</b>		

### TENTATIVE LABORATORY SCHEDULE

Lab	Dates	Lab Topics	Readings ( <b>Read Before Class</b> )	Assignments
1	2/27 – 2/28	Introduction to Course  <i>End of the Line</i> Film ( <a href="http://endoftheline.com/">http://endoftheline.com/</a> )  What's for dinner? Environmentally Conscious Seafood Choices Case study	Course syllabus  Lab 1 Seafood Choices Assignment; Brownstein et al. 2003	
2	3/6 – 3/7	What's for Dinner? Discussion  Fish Anatomy	Webb 1984; Handout	<b>Due:</b> What's for dinner? Write-up
	3/13 – 3/14	<b>NO LABS – SPRING BREAK</b>		
3	3/20 – 3/21	Fish Taxonomy & Identification	Handout	<b>Due:</b> Fish Anatomy Write-up
4	3/27 – 3/28	<b>Fish Anatomy/Identification Practical</b>  Pollution Modeling	<b>Download software from SimBio &amp; read exercise</b>	<b>Due:</b> Fish Identification Write-up  <b>Due:</b> Purchase Eutrophication Module; <i>Field Trip Waiver Form (Zoo/Stream/Reservoir)</i>
5	4/3 – 4/4	Columbus Zoo Field Trip (Discovery Reef)	Webb 1984; Handout	<b>Due:</b> Pollution Modeling Write-up
6	4/10 – 4/11	Stream Sampling Field Trip	Aadland 1993; Handout	<b>Due:</b> Columbus Zoo Write-up
7	4/17 – 4/18	Reservoir Sampling Field Trip	Vanni et al. 2005; Handout	<b>Due:</b> Stream Sampling Write-up

**FISH ECOLOGY**  
**Evolution, Ecology & Organismal Biology (EEOB) 5430**  
**Autumn 2016**

**INSTRUCTOR:**

Dr. Stuart Ludsin  
Aquatic Ecology Laboratory (AEL)  
1314 Kinnear Road  
222 Research Center  
[ludsin.1@osu.edu](mailto:ludsin.1@osu.edu)  
292-1613

**GRADUATE TEACHING ASSISTANT:**

TBD  
AEL, 1314 Kinnear Road  
230 Research Center

**COURSE DESCRIPTION:**

This 3-credit hour course will introduce students to the world of fishes, the most diverse vertebrate group on the planet. Freshwater, coastal marine, coral reef, and stream fish ecology at the individual, population, community, and ecosystem level will be the focus of lectures, with some discussion of fish evolution, management, and conservation. Lectures also will include discussions on how humans have been affecting the world's fish fauna. Labs will focus on topics such as overfishing, as well as fish anatomy, identification, feeding, functional morphology, and habitat-use, through hands-on lab exercises, discussions, observation, and field sampling.

**LEARNING OBJECTIVES:**

- 1) Better understand the evolutionary and ecological processes that underlie fish behavior, diversity, and dynamics.
  - i) Understand major steps in teleost fish evolution.
  - ii) Understand the ecology of the individual organism.
  - iii) Understand what factors and processes affect fish population demographics.
  - iv) Understand what factors and processes affect fish community structure and function.
- 2) Gain an appreciation for the strong inter-dependency between humans and fishes.
  - i) Understand how human-induced stressors affect fish populations and communities.
  - ii) Understand the various roles that fish play in regulating ecosystems.
  - iii) Gain an appreciation for the importance of fish to society.
- 3) Learn practical skills for conducting ecological research involving fishes.
  - i) Gain skills in fish identification, anatomy, and functional morphology.
  - ii) Learn methods important to ecological research with fishes.
  - iii) Learn how to analyze and interpret data from field observations and modeling.
  - iv) Learn how to more effectively communicate science.

**COURSE SCHEDULE:**

<b>Lecture:</b>	Tuesday & Thursday	11:30 AM – 12:25 PM (Jennings 040)
<b>Lab sections:</b>	Tuesday	12:45 AM – 3:50 PM (Jennings 230)

Thursday

12:45 AM – 3:50 PM (Jennings 230)

**OFFICE HOURS:**

<b>Ludsin</b> (for lecture):	Wednesday	11:30 – 12:30	or by appt.	(474 Aronoff)
<b>TBD</b> (for lab or lecture):	Monday	11:30 – 1:00	or by appt.	(456 Aronoff)
	Tuesday	9:00 – 10:30	or by appt.	(230 Research Center)

**COURSE READINGS:**

No text is required for this course. Instead, we will read papers from the peer-reviewed literature, which will be posted on Carmen. If interested, two supplemental texts exist, from which a lot of lecture material has been drawn. These texts are:

Diana, J.S. 2004. Biology and ecology of fishes, 2<sup>nd</sup> edition. Cooper Publishing Group, Traverse City, MI. 498 pp.

Wootton, R.J. 1998. Ecology of teleost fishes, 2<sup>nd</sup> edition. Kluwer Academic Publishers, AA Dordrecht, The Netherlands, 386 pp.

**INSTRUCTIONS FOR REGISTERING YOUR SMART OR CELL PHONE WITH TOP HAT:**

In this course, you will use Top Hat, an electronic polling system, to record your attendance at lecture and also allow you to respond for points to in-class questions. TA ([email TBD](#)) will be the TA helping to facilitate the use of Top Hat during class lectures (see syllabus for more details). Top Hat requires only the use of a phone, smart or otherwise, for participation in class. To participate in class and be counted for attendance, you **must be registered with Top Hat on the first day** as I will be testing the system out in lecture that day.

Below you will find the instructions for creating your Top Hat account:

1. Navigate to the page: <https://resourcecenter.odde.osu.edu/top-hat/using-top-hat-students>.
2. Read the instructions and follow them to create your account.
3. Once you have created your account, please note the following:
  - a. The password that you chose will be used to sign into the mobile app on your phone.
  - b. When signing into Top Hat online, you will be directed through OSU's Single Sign On (SSO), the same page you see when logging into Carmen or Student Center.
4. If you have a smart phone, download the Top Hat app from the Apple or Google Play store. You will log in using the username and password that you created when originally signing up online.
5. Once your account is created, either online or on the app, you should see EEOB 5430 (xxxxx) in your courses. This is because I will have added you by syncing Top Hat with the Carmen roster. If you were not yet enrolled by the time that I completed this step, you will not see Ecology listed and you must join the class manually.
  - a. To join manually, click on the Top Hat icon in the upper left of your screen. This takes you to the course lobby (basically, your "home page")
  - b. Next, choose "Add a Course" (the big blue button)
  - c. Type the Join Code into the search box. Our code is 190150.
  - d. Click Enroll

For those of you who do not have a smart phone, you may respond to any Top Hat poll by texting (SMS). Texts to Top Hat are considered local to the USA and are not charged a premium, so they should be free. However, depending on your plan, they may not be, so if you are unsure as to whether or not this will cost you, please consult your phone service provider.

Instructions for responding via SMS are found here: <https://support.tophat.com/hc/en-us/articles/200019054-How-do-I-submit-answers-using-texting-SMS->. Please remember that the phone number you will send the SMS to will not change throughout the semester, so add it to your contacts list to save yourself from entering the number each time. Please also remember that the 4-digit ID does change for each question, so make sure you have the correct ID!

A video tutorial also available at the link listed above.

If you have any issues signing up, please do not hesitate to contact the TA (email TBD). A wealth of information can also be found through <https://support.tophat.com>. A technical support phone number is also available at [1 \(888\) 663 5491](tel:18886635491).

Throughout the semester, Scott will serve as the contact person for any and all issues regarding Top Hat responses. **If you are unable to respond to Top Hat questions in class due to technical difficulties, raise your hand immediately.** You then can write down your answer on a piece of paper with your name and date and hand it to your TA before the response to the question is shown on the screen. When you submit your response via paper, make sure your name and your TA's names are both on the paper.

### **MATERIALS POSTED ON CARMEN:**

Materials for this course will be posted on the EEOB 5430 Carmen site. At this site, you will find this syllabus, as well as other lecture (e.g., lecture notes/handouts, lecture readings, assignment instructions) and lab (e.g., instructions for labs, supplemental lab handouts, readings) materials. Grades also will be posted on this Carmen website. You are welcome to download materials from the Carmen site and print them for your personal use. Please check the Carmen website frequently, as I and your lab instructors will post new information there.

*Also, be sure to check your official OSU email daily; all correspondence will be to this OSU account.* I will not respond to non OSU emails, owing to OSU policy rules.

### **POLICIES AND PROCEDURES:**

#### **Course Structure**

EEOB 5430 has two 55-min lectures and one 165-min lab meeting per week. Because I have not found a text that I like very much, your course reading assignments each week will come from the primary literature or selected textbook chapters. I highly recommend that you read all materials **BEFORE** and **AFTER** each lecture. Doing so will help you understand lecture immensely, as well as help you make sense of the readings.

**Attendance and participation in lecture is mandatory.** Lecture sessions will be used in a number of ways, but a simple recounting of material from the assigned reading is not one of them. Most lectures will elaborate on and present a broader perspective on the readings and laboratories, require student involvement, including synthesizing new information, interpreting data, and/or presenting ecological news items, among other activities. Points will be lost (n = 5 per lecture), if you do not attend lecture so be prepared to attend and participate in it.

The required lab portion of this course is designed to supplement material covered in lecture and the readings, and also introduce students to some different aspects of fish ecology and biology. The labs will be diverse, consisting of discussion-based learning, fish dissection and identification, behavioral observation, computer simulation modeling, field sampling, data analysis, and writing. Like the lectures, **labs are mandatory; each unexcused absence will result in a 10% reduction to your grade, with three missed labs resulting in an E for the entire course.** If you cannot make a lab, please let your TA know ahead of time so that arrangements can be made to attend a different lab (or to make up the assignment).

This course will have numerous field trips: one to Lake Erie over a weekend, two a local stream, one to a local reservoir, one to a local pond, and one to the Columbus Zoo's Discovery Reef. Field trip dates may be

cancelled or changed at the last minute, owing to adverse weather conditions. Students must attend labs and field trips on their regular lab day. If you plan to attend a different lab section than the one in which you are enrolled, please let your TA know ahead of time to ensure this is possible. Remember to dress appropriately for the conditions when in the field. You will **not** need your own waders for the class; however, students who have hip or chest waders can use their own. Students must provide me with a signed waiver form before participating in any field trip.

### **Grading**

Your final grade for EEOB 5430 will be determined on the basis of 500 points, using the point allocation below. Activities in the lecture and lab portions of the class will account for 79% and 21% of your grade, respectively.

<b>Component</b>	<b>Assignment</b>	<b>Format</b>	<b>Points</b>	
<b>Lecture</b>	Midterm Exam	Closed Book	125	
	Midterm Exam	Closed Book	125	
	Final Exam	Closed Book	125	
	Top Hat Lecture Questioning (22 lectures @ 5 pts each)	Closed Book	110	
	Discussion Quizzes (7 @ 5 points each)	Individual	35	
	Current Event Summary (2 @ 5 pts each)	Individual	10	
	Minute Paper Write-ups (5 @ 5 pts each)	Individual	25	
	<b>Lab</b>	Fish Anatomy Write-up	Individual	15
Fish Taxonomy Write-up		Individual	15	
Discovery Reef Write-up		Group of 2	15	
Reservoir Sampling Write-up		Individual	30	
Stream Sampling Write-up		Individual	30	
Fish Bioenergetics Modeling Write-up		Group of 2	25	
Pollution Modeling Lab		Individual	15	
End-of-Line Video & What's for dinner? Write-up		Individual	20	
<b>Paper</b>		Research Paper Topic & Literature Search	Individual	15
		Research Paper: 1st Draft	Individual	40
	Research Paper: Final Draft	Individual	100	
	Peer Review of Research Paper	Individual	25	
	<b>Total Points Available</b>		<b>900</b>	

### **Exams (375 points total; ~42% of grade)**

Three exams (two mid-terms and a final) will occur in the class. These exams will cover everything covered in lecture, including lectures proper, readings, and discussions. Each exam will be worth 125 points. The final will **not** be comprehensive, focusing on material covered after the mid-term. Exams will be predominantly comprised of questions that require written answers of 1-5 sentences (i.e., mini essays), with some multiple choice, matching, and/or true-false questions.

The third exam will be given during Final Exam week. It is currently scheduled for final exam is on **TBD**. If, for any reason, you cannot take the final exam as scheduled, you must submit a written request to Dr. Ludsin to take this exam at a different time, and must justify this request with a reasonable academic argument. Conflicts with airline reservations or vacation trips do not constitute reasonable academic arguments. **Such requests must be submitted before the end of the 4<sup>th</sup> week of class (by TBD).**

Re-grading Policy. You will be given an opportunity after your exams are returned to request that certain questions be re-graded and point deductions reassessed. The procedure for exam re-grading is:

- After you receive your graded exam, consult the posted exam key to determine how/why your answers differed from those I sought;
- For each question you believe should be re-graded, assemble a paragraph describing why you feel your answer deserves more points than were assigned. Your rationale should refer to material from the text and lectures in defense of your view.
- Submit your **TYPED** re-grading request and your exam to Dr. Ludsin or the TA no later than one week after the exam was returned. Handwritten re-grading requests will not be accepted.

**Research Paper (180 points; 20% of grade)**

You will complete a review paper on an instructor-approved topic that involves the relationship between humans and fish. This assignment is designed to help you: 1) become an expert on a topic with which you are likely unfamiliar; 2) hone your research and writing skills; and 3) apply concepts and frameworks developed in the class to real-world situations. To ensure that you do not wait until the last minute to write your paper, you will be required to turn in a Research Topic, First Draft (that is close to final, with all required components and polished writing; i.e., not an outline or rough draft), and Final Draft on different days of the semester. More details can be found in a separate document (EEOB 5430 Research Paper) in the Assignments section of the EEOB 5430 Carmen site. In addition to writing your own research paper, you will be asked to provide constructive criticism on a classmate's research paper. This will be done through use of an anonymous peer-review process. The reasons for conducting a peer-review are several: 1) to give constructive criticisms that will help the author produce the best paper possible; 2) to help you identify ways in which you can more effectively communicate ideas in your own research paper; and 3) ensure that the research is described in accordance with my required format.

**Discussion Quizzes (35 points total; 4% of grade)**

A quiz will be administered before each of the seven lecture discussions. These quizzes will provide an opportunity for students to get a feel for nature of the essay questions that will be on the exams. These quizzes also provide some incentive to read the material before lecture.

**Current Event Summary (10 points; 2% of final grade)**

Each of you is required to bring to lecture a fish ecology-related current event story during the quarter on a randomly assigned day. More details, including your assigned date, can be found in the "Current Events Summary" handout in the Assignments section of the EEOB 5430 Carmen site. **These summaries must be handed in at the beginning of class to receive full credit.**

**Minute Paper Write-ups (25 points; 3% of final grade)**

Each of you is required to complete five "Minute Papers" during the course of the quarter on a randomly assigned day. These papers will be written during the last few minutes of the lecture period and must be turned into Dr. Ludsin or a TA before the end of lecture period to receive credit. These papers are designed to help ensure that you are taking home the important points of each lecture, help improve my teaching of lecture material, and also provide some incentive to come to lecture. More details about Minute Papers can be found in the "Minute Paper Write-up" handout in the Assignments section of the EEOB 5430 Carmen site.

**Laboratory write-ups (165 points total; 18% of final grade)**

Each laboratory topic will require you to complete a write-up, due 1 or 2 weeks following the lab itself. These laboratory write-ups are designed to ensure that paid attention in lab and also to improve your critical thinking, statistical analysis, and writing skill.

**Earning Final Grades**

The following grading scale will be used to determine the final grade you have earned:

≥93%=A	90-92%=A-	87-89%=B+	83-86%=B	80-82%=B-
77-79%=C+	73-76%=C	70-72%=C-	60-69%=D	≤59%=E



### Make-up Exams/Quizzes

Make-up exams will be given only if the student must miss the regularly scheduled exam due to (1) a university-organized or university-sanctioned event or (2) a medical or family emergency. In the case of a university-organized or-sanctioned event, the student must submit appropriate documentation **no later than 10 days before the examination**, and must schedule the time and place for the make-up exam with Dr. Ludsin prior to the event. In the case of medical emergency, the student must submit documentation from a licensed medical care facility or provider as soon as possible after the exam is given. Make-up examinations will cover the same range of material and will be of comparable difficulty. Only Dr. Ludsin can approve make-up exams; do not take requests for make-up exams to your lab instructor.

### Late Policy

All assignments are expected to be turned in on their due date. Most assignments will be handed in or turned in electronically via Carmen; quizzes and tests obviously will be in class. **For every day (including weekend days) that a lab assignment is late, you will lose 25% of the maximum attainable score.** Legitimate requests for extensions made at least 2 days prior to a due date will be honored, but Dr. Ludsin and the TA have ultimate discretion regarding what is “legitimate”.

### **FREQUENTLY ASKED QUESTIONS (FAQs):**

***Will lecture attendance be used in the grading scheme?*** **Yes, for each class you miss, you will lose points if you do not attend.** While I will not take attendance during lecture, I have designed the course so that during each lecture period, some activity will occur that will involve your participation. This might include answering questions through Top Hat, taking a quiz before discussions, completing a minute paper at the end of class, or presenting a current event article. I am requiring that you to attend class primarily because I want you to succeed. I expect our exams to be difficult. Thus, attending class would 1) help you do better on exams because material will be covered in lecture that will not be available in the Carmen handout or papers that you read and 2) allow you to earn relatively “easy” points to offset potential deficits incurred elsewhere in the course. Make it a habit to attend class on a regular basis!!

***What happens if I miss a lab?*** **An unexcused laboratory absence will result in the loss of all points associated with that laboratory. Three unexcused laboratory absences will result in course failure.**

***Do I really need to do the class readings?*** The goal of this course is to give students a broad and comprehensive introduction to the discipline of fish ecology. The combination of the readings, assignments, and the lectures can achieve this end. Most of the lecture time will be devoted to principles and concepts. Your assigned readings will supply additional examples and explanations to complement what is presented in lecture. For you to actually achieve the goals of this course, you will need to put in the time and effort to master the information and examples presented in both the lecture and the readings. **Neither is sufficient in the absence of the other, and both will be tested on the exams.**

***Does enough detail exist in the lecture PowerPoint slides and readings on Carmen for me to pass the exams without attending lecture?*** The PowerPoint lecture slides and any other materials posted on Carmen are designed to make it easier for you to understand course concepts. While the PowerPoint lecture notes posted in Carmen will be complete, they should not be considered a substitute for careful attention and note-taking in lecture. The questions on the exams will often deal with examples and ideas presented in lecture but neither fully explained on the post lecture PowerPoint slides nor presented in your readings. As a result you (as the student) must be a conscientious recorder. Be sure the information you write in your notes is legible, complete, and correct. Just five minutes spent after each lecture reviewing your notes of the day will improve information content tremendously. How many times have you thought to yourself "I know I

understood this concept when it was presented in lecture; at the time, it seemed so simple and logical? Why don't my notes make sense now, the night before the exam?" By writing a few more lines in the margins of your notes, expanding on this or that point, you can more easily interpret your notes at exam time...and score higher on exams.

*Is the final exam comprehensive?* No. The exam given during exam week covers the last lectures (including discussions) of the course (not covered on the previous exam) and will be similar in length, depth, breadth, and structure.

*Am I allowed to use laptops and phones in lectures?* **No, laptops and smartphones\* are NOT allowed to be used during class.** You should bring writing materials (notebook, pens, etc.) and printed lecture handouts to take notes during class. Many studies have shown that this leads to a "brain on" situation where you listen to and assimilate the information being presented much better. Lecture handouts may at times be made available on Carmen prior to a given lecture; in these cases, you should plan to bring a printed copy of the handout with you in order to make notes on it; at other times, handouts of the lecture material will not be posted to Carmen until after the lecture.

(\*The Top Hat polling system (used in lieu of clickers) requires the use of either a cellular phone (answering via text message, SMS) or a smartphone (using the Top Hat app). Aside from this, however, TAs and instructors will be checking continuously to make sure that the no-laptop, no-phone use policy is enforced).

*What happens if I have issues participating in Top Hat polling?* Top Hat points will be posted within 48 hours of class so that you have time to check your grade and make sure your answers were properly submitted. If you submitted your answers but find that there is a problem (i.e., missing points on Carmen), **it will be your responsibility to notify the course TA (TBD), the TA in charge of Top Hat, within 24 hours of the Top Hat points being posted on Carmen. Thus, check your grades on Carmen regularly so that you can catch any issues early.** You will not receive any points or credit, if Scott is not notified of polling devices failing to work properly within 24 hours of scores being posted to Carmen. As a final note, **if you have a technology issue during lecture and are unable to submit answers, let your TA know, and you may write your answer on a piece of paper with your name and your date and submit it to your TA by the end of polling.**

*What should I do if I feel I need some accommodation to allow me to succeed in this course?* If you feel that you may need an accommodation based on a special need, you should contact me to arrange an appointment as soon as possible after the beginning of the semester. At that time, I can discuss the course format, anticipate your needs, and explore potential adaptations to meet your needs.

I rely on two University units to assist students in need:

If you have (or suspect that you have) a learning or physical disability that required special accommodation, the Office for Disability Services (ODS; <http://ods.osu.edu/>) can provide assistance. If you have not previously contacted the Office for Disability Services, you can do so by calling 614-292-3307 or visiting 150 Pomerene Hall. Note: The syllabus and lab materials can be made available in alternative media, given advanced notice and documentation from ODS.

If you have other issues that are hampering your ability to succeed inside or outside of the classroom, you should contact the Student Advocacy Center (SAC; <http://advocacy.osu.edu/>). The SAC is committed to helping students navigate Ohio State's structure and to resolving issues that they encounter at the university. Their purpose is to empower students to overcome obstacles to their growth both inside and outside the classroom. The SAC can be reached by calling 614-292-1111 or by visiting 1120 Lincoln Tower, 1800 Cannon Drive.

***What should I do if I'm having difficulty with the amount and/or type of writing that's required in this course?*** I recommend you make use of the OSU Writing Center. The OSU Writing Center is a place where students, faculty, staff, and alumni can receive free, individual consultations on any piece of writing. The Writing Center can help with traditional writing assignments like research reports and essays, but you can also work on lab reports, personal statements, resumes, job letters, and even screenplays. Graduate Associates from a variety of disciplines staff OSU's Writing Center. The Writing Center works on an appointment basis. Appointments last about 50 minutes and start on the half hour (e.g., 8:30, 9:30, etc.). Call 688-4291 or stop by room 485 Mendenhall Lab to schedule an appointment.

***What is the course policy on Academic Misconduct?*** You are responsible for completing your assignments on your own, unless otherwise noted. Examples of plagiarism and other forms of academic misconduct are given in the OSU Code of Student Conduct (<http://studentaffairs.osu.edu/csc/>), and it is the responsibility of all OSU students to understand what actions might be construed as academic misconduct. See <http://oaa.osu.edu/coamfaqs.html> for frequently asked question on academic misconduct. Any and all suspected incidents of academic misconduct will be forwarded to the OSU Committee on Academic Misconduct for adjudication.

***What is the course policy concerning diversity?*** I am committed to promoting a welcoming climate for all students. For more information on diversity, see the EEOB (<http://www.biosci.ohio-state.edu/~eeob/diversity/>) or OSU (<http://www.osu.edu/diversity/>) websites. I welcome suggestions, questions, and comments. Any exchange of ideas will be conducted with confidentiality, safety, and respect as guiding principles.

**TENTATIVE SCHEDULE:**

<b>Week</b>	<b>Week of</b>	<b>Class Type</b>	<b>Topics &amp; Activities</b>
1	Aug 23	Lecture	Course Introduction; Introduction to Fish
		Lecture	Evolution of Fishes
		Lab	<b>NO LABS</b>
2	Aug 30	Lecture	Foraging
		Discussion	Discussion 1: African Rift Lakes Case Study
		Lab	Lab 1: Reservoir 1 Field Trip
3	Sep 06	Lecture	Growth & Energy Budgets 1
		Lecture	Growth & Energy Budgets 2
		Lab	Lab 2: Stream 1 Field Trip
4	Sep 13	Lecture	Reproduction
		Discussion	Discussion 2: Personality in Fishes
		Lab	Lab 3: Fish Anatomy
5	Sep 20	Lecture	Predation
		Lecture	Competition
		Lab	Lab 4: Reservoir 2 Field Trip
6	Sep 27	Lecture	<b>Exam 1</b>
		Lecture	Social Behavior
		Lab	Lab 5: Stream 2 Field Trip
7	Oct 04	Discussion	Discussion 3: Ethics of Recreational Fishing
		Lecture	Life History 1
		Lab	Lab 6: Discovery Reef Field Trip
8	Oct 11	Lecture	Life History 2
		Lecture	Populations 1
		Lab	<b>NO LABS - OSU BREAK</b>
9	Oct 18	Lecture	Populations 2
		Discussion	Discussion 4: Lake Erie Yellow Perch Case Study
		Lab	Lab 7: Fish Taxonomy
10	Oct 25	Lecture	Communities 1
		Lecture	Communities 2
		Lab	Lab 8: Reservoir Data Processing & Analysis
11	Nov 01	Lecture	<b>Exam 2</b>
		Lecture	Ecosystems 1
		Lab	Lab 9: Stream Data Processing & Analysis
12	Nov 08	Lecture	Ecosystems 2
		Discussion	Discussion 5: Cascading Interactions Case Study
		Lab	Lab 10: Population Growth Modeling
13	Nov 15	Lecture	Human Impacts 1
		Lecture	Human Impacts 2
		Lab	Lab 11: Lake Pollution Modeling
14	Nov 22	Discussion	Discussion 6: Fisheries-Induced Evolution
		Lecture	Human Impacts 3
		Lab	<b>NO LABS - THANSGIVING BREAK</b>
15	Nov 29	Lecture	Management & Conservation 1
		Lecture	Management & Conservation 2
		Lab	Lab 12: End of Line Video & What's for Dinner?
16	Dec 06	Discussion	Discussion 7: The Future of Fisheries
Finals	TBD		<b>Exam 3</b>