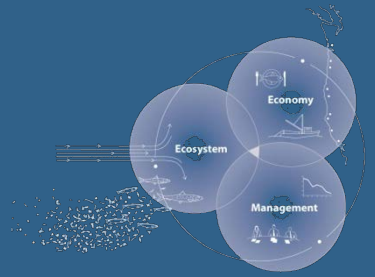


FISH 110

FISH AND FISHERIES IN A CHANGING WORLD

FALL 2015



“Good farmers, who take seriously their duties as stewards of Creation and of their land's inheritors, contribute to the welfare of society in more ways than society usually acknowledges, or even knows. These farmers produce valuable goods, of course; but they also conserve soil, they conserve water, they conserve wildlife, they conserve open space, they conserve scenery.”

--Wendell Berry

FACILITATOR

Peter Westley, Assistant Professor

233 O'Neill Building (down hall and to left)

Email: pwestley@alaska.edu

Peter's Office Hours

Tuesday & Thursday 11:30am -12:30pm

MEETING TIMES & LOGISTICS

O'Neill 201

Tuesday & Thursday

9:45am – 11:15am

Class website: Blackboard (login at: <http://classes.uaf.edu>)

Course credits: 3

Prerequisites: None save for a curiosity of the natural world

CLASS DESCRIPTION

This course is an exploration of the patterns of fish diversity, the ecological and evolutionary processes that give rise to that diversity, and the resilience and sustainability that result. The topics that we will cover are intended to act as foundational principles that fisheries resource professionals will use throughout their careers. Together we will examine the complexity of what constitutes a 'fishery' and better understand the factors that have led some fisheries to collapse and others to persist. In addition to lectures, students will read, discuss, and write extensively and by doing so, can expect to gain better understanding of the “science of sustainability” with regards to 21st century fisheries in Alaska and beyond.

COURSE OBJECTIVES

This course has the following objectives for student learning:

- To develop a thorough understanding of the complexity of natural resource issues;
- To critically read and synthesize diverse opinions on issues;
- To foster each student's own informed views of complex natural resource issues;
- To clearly express those views in writing and in discussion with peers.

COURSE EXPECTATIONS

Together we can be most effective and are most likely to achieve the courses' objectives if we are clear about what we can expect from one another. As a result, the following expectations will guide our work together.

MY EXPECTATIONS OF STUDENTS

- Come to class on time, engage in the course content for the full class time, and refrain from any activities that distract us from doing our best jobs of teaching or detract from a positive learning environment for all involved;
- Come to class prepared to participate, having completed assigned reading, writing, and research in advance;
- Participate in class activities in ways that support course goals and demonstrate respect and civility toward all other students and teachers;
- Take an active role in obtaining information and resources for completion of tasks and assignments in the course and, ultimately, in promoting your own learning;
- Monitor your own learning and contribute feedback to support the Facilitator in achieving course goals.

STUDENTS' EXPECTATIONS OF THE FACILITATOR

- Begin and end class on time;
- Come to class prepared to do the best job of supporting your learning;
- Provide information and resources to support your learning in the course;
- Make the best possible use of class time to support your learning in the course;
- Answer questions and emails promptly and sufficiently;
- Be available to provide additional assistance when needed;
- Provide clear and consistent criteria that can be used fairly in evaluating your learning;
- Welcome input on ways to support you in your achievement of course goals.

LEARNING OUTCOMES

By the completion of the course, you should be able to:

- Understand the primary role of natural selection in driving adaptation in fish;
- Apply concepts of population growth and density-dependence to explain patterns in abundance;
- Clearly articulate the logic behind how Alaska salmon fisheries are managed (e.g. what's 'fixed escapement?');
- Articulate some of the frequently used definitions of 'sustainability' and 'resilience', and clearly explain what these terms mean to you;
- Understand what is meant by 'global climate change' and explain some of the challenges it poses for fisheries management. Explain how climate is different than weather;
- See connections between different topics and ideas and apply these connections to new scenarios;
- Have increased confidence speaking in front of peers and articulating your thoughts in writing;

ASSUMPTIONS ABOUT LEARNING

These assumptions will guide our path in the course:

- Students learn in unique ways (for example, when asked what you did yesterday, do you see pictures or words?);
- Writing, reading, and thinking are inextricably linked;

- Students learn best from either themselves or from peers;
- The best *discussions* come from good *listening*;
- Transformative learning occurs best when preconceived notions are challenged;

REQUIRED READINGS

These books are available at the UAF Bookstore, online at amazon.com, local bookstores (e.g. Barnes & Noble) and several copies (including E-versions) are available at the Rasmuson Library. It is your responsibility to obtain these books, or have a plan for accessing the readings, by the first week of class!

Four Fish by Paul Greenberg

Overfishing by Hilborn & Hilborn

ADDITIONAL READINGS

Posted on Blackboard. It is *essential* that you are comfortable in this environment. Through the Blackboard system, I will provide details on assignments, important changes to dates on the syllabus, class outlines and notes, class recordings, and supplemental reading material and content.

CORE ACTIVITIES & IMPORTANT DATES

ASSIGNMENTS & PARTICIPATION IN FISH TANK THURSDAYS (FTT)

On most Thursdays, HALF of our class time will be devoted to FTT in which we will: 1) revisit concepts and ideas that were not as clear as they should have been from previous classes, and 2) have a discussion based on the assigned readings for the week.

Your role in FTT has three parts and your combined performance counts toward one third of your course grade.

First, each student will contribute one question or comment on something that they were confused about based on lecture (See GRADING POLICY & EXPECTATIONS FOR EXAMPLES)

These **questions/comments are due on Blackboard by 11:59 pm on the Tuesday before FTT.** Comments will be put into a fish tank (yes, a real fish tank), selected at random during FTT, and discussed.

Second, students are to prepare a ½ page (2 paragraphs) reflection on the readings assigned for the week and we will use these reflections as points for discussion. **Reflections are also due at 11:59 pm on the Tuesday before FTT via Blackboard.** Participation in FTT through comments/questions/reflection will count heavily toward your participation grade.

Third, students are to directly contribute to discussions with substantive and well thought out points. Very specifically, students are expected to speak at each FTT; however, full points for this criterion of the participation score can be achieved through speaking during at least 9 FTT discussions (there are 11 FTT during the term). Trivial statements will receive zero or partial credit. See the section on *Grading Philosophy & Expectations* for more clarification.

EXAMS & QUIZZES

There will be an in-class mid-term exam (**October 21**) and a cumulative final-exam (i.e. material covers the entire course, **December 11**), which will consist of definitions, short-answer, and essay-type questions. Note: things discussed during FTT will be prime targets for exam questions! To prepare for the exam and to practice the type of questions that will be asked, we will have two short (15 min) in class quizzes.

The final will have twice the weight as the mid-term, and combined the exams will count towards one third of your grade in the course.

EXPERT PANELS

Students will be assigned to expert panels to explore ‘hot’ current topics (e.g. the use of Marine Protected Areas as a fisheries management tool). Each student will take a specific role (e.g. the expert economist, the hydrologist, the ecologist) and research the assigned topic. The group, as a whole, will be provided with key documents to aid in their research and is responsible for providing the class an ‘executive’ summary of their key findings **prior** to giving an in-class presentation of the issue. Based on the briefing and presentation, the class will then ask questions of the panel. How well do you know the issue? Be prepared for tough questions! The remaining third of your grade will be based on your participation and performance on the panel.

EVALUATION/GRADING:

Grade scale: 92-100 A; 90-92 A-; 88-90 B+; 80-88 B; 78-80 B-; 65-78 C; 50-65 D; below 50 F. If the class average falls below 75%, this scale will be adjusted accordingly. Point and percentage values for each of the three evaluation components (shown below in **BOLD**) are as follows:

| TOPIC | POINTS POSSIBLE | % TOTAL OF 900 POINTS |
|--|------------------------|------------------------------|
| FTT ASSIGNMENTS & PARTICIPATION | 300 | 33.3 |
| Questions/ comments for FTT | 50 | |
| Two paragraph reflections | 200 | |
| Participation in discussions | 50 | |
| EXAMS & QUIZZES | 300 | 33.3 |
| Mid-Term | 85 | |
| Final Exam | 170 | |
| Two quizzes | 45 | |
| EXPERT PANELS | 300 | 33.3 |
| Executive summary | 100 | |
| Personal presentation | 100 | |
| Group presentation/response to questions | 100 | |

COURSE OUTLINE (SUBJECT TO CHANGE)

| <u>DATE</u> | <u>TOPIC</u> | <u>READINGS AND ASSIGNMENTS</u> |
|--------------------|--|--|
| September 4 | WELCOME TO FISH 110 CLASS OBJECTIVE (CO): To set the stage for the rest of the course, introductions, clarifying expectations. To provide evidence of the benefits of student-centered learning | Obtain books by Greenberg and Hilborn & Hilborn Blackboard Intro ASSIGNMENT DUE 9/7/14 at 11:59 pm |
| September 9 | PATTERNS OF FISH HABITAT (CO): To expose students to the diversity and complexity of fish habitat. And...what defines fish habitat anyway? | Greenberg: Introduction (pp. 1-14) FTT ASSIGNMENT #1 DUE at 11:59 pm on Blackboard |
| September 11 | PATTERNS OF FISH DIVERSITY (CO): To expose students to the diversity of fishes that uses a template of habitat diversity. Develop the ground rules for FTT discussions FISH TANK THURSDAY (FTT) | Greenberg: Salmon (pp. 15-38) |
| September 16 | FISH ECOLOGY PART I (CO): To introduce and understand exponential and logistic population growth | Greenberg: Salmon (pp. 38-79) FTT ASSIGNMENT #2 DUE at 11:59 pm on Blackboard |
| September 18 | FISH ECOLOGY PART II (CO): To introduce and understand the concept of food webs and interactions among species FTT | Greenberg: Sea Bass (pp. 82-108) |
| September 23 | NATURAL SELECTION & ADAPTATION IN FISHES PART I (CO): To understand how natural selection leads to adaptation in fishes | Greenberg: Sea Bass (pp. 108-125) FTT ASSIGNMENT #3 DUE at 11:59 pm on Blackboard |
| September 25 | NATURAL SELECTION & ADAPTATION IN FISHES PART II (CO): To understand how natural selection and adaptation explain <i>why</i> we see certain fish in certain habitats FTT INTRODUCTION TO EXPERT PANELS | Greenberg: Cod (pp. 127-168) QUIZ 1 |
| September 30 | FISHERIES MANAGEMENT PART I (CO): to clarify, what is a fishery? To articulate what is a <i>sustainable</i> fishery? To understand the concept of density-dependence, surplus production, and maximum sustainable yield | Hilborn & Hilborn (pp. 3-10) Greenberg: Cod (pp. 168-188) FTT ASSIGNMENT #4 DUE at 11:59 pm on Blackboard |
| October 2 | FISHERIES MANAGEMENT PART II GUEST LECTURER: RAY HILBORN, SAFS/UW SEATTLE (CO): To review the status of the world's fisheries and to articulate prominent opposing views of single-species management FTT | Worm & Myers 2003 Hilborn 2006 |
| October 7 | CASE STUDY: NORTHERN COD I (MAKE AND BREAK HARBOUR) (CO): An overview of the Newfoundland cod fishery from its discovery to collapse Understand the 'Tragedy | Greenberg: Tuna (pp. 189-220) FTT ASSIGNMENT #5 DUE at |

| | | |
|-------------|---|--|
| | of the Commons' | 11:59 pm on Blackboard |
| October 9 | CASE STUDY: NORTHERN COD II (CO): An overview of the economic fallout of the Newfoundland cod fishery collapse and some ideas of why it has failed to recover. FTT | Walters & Kitchell 2001 (cultivation/depensation hypothesis) |
| October 14 | CASE STUDY: BRISTOL BAY SOCKEYE SALMON (CO): To introduce the concept of biocomplexity, portfolio dynamics, and to contrast Bristol Bay sockeye with Newfoundland cod | Greenberg: Tuna (pp. 189-241) Hilborn et al 2003 (PNAS Biocomplexity) FTT ASSIGNMENT #6 DUE at 11:59 pm on Blackboard |
| October 16 | CASE STUDY: PEBBLE MINE AND THE FUTURE OF BRISTOL BAY SOCKEYE FTT | Woody et al. 2010 |
| October 21 | MIDTERM EXAM (CO): To gauge your understanding and ability to synthesize material taught to this point in the semester | MIDTERM EXAM No FTT ASSIGNMENT |
| October 23 | HABITAT ALTERATION AND LOSS PART I (CO): To review the primary sources of habitat change in oceans and freshwaters FTT: EXPERT PANEL WORKING SESSION | Hilborn & Hilborn (pp. 47-67) |
| October 28 | HABITAT ALTERATION AND LOSS PART II (CO):To examine the consequences of habitat change for communities, species, and populations | Hilborn & Hilborn (pp. 69-90) FTT ASSIGNMENT #7 DUE at 11:59 pm on Blackboard |
| October 30 | CASE STUDY: ELWHA DAM REMOVAL (CO): To learn about the largest ecosystem restoration project in the US FTT | Hilborn & Hilborn (pp. 91-120) |
| November 4 | INVASIVE SPECIES (CO): To understand the difference between native and non-native, invasive and non-invasive. | Hilborn & Hilborn (pp. 91-129) FTT ASSIGNMENT #8 DUE at 11:59 pm on Blackboard |
| November 6 | CASE STUDY: RAINBOW TROUT- AN ENTIRELY SYNTHETIC FISH? (CO): To learn about an invasive fish we all love FTT | Halverson (pp 76-113) QUIZ 2 |
| November 11 | THE OF RISE OF AQUACULTURE (CO): To learn about the global trend and status of shellfish and finfish aquaculture and to explore some of the costs and benefits | Bostock et al. 2010 FTT ASSIGNMENT #9 DUE at 11:59 pm on Blackboard |
| November 13 | CASE STUDY: GENETICALLY-MODIFIED SALMON (CO): To learn about GM salmon, how they are produced, and potential environmental risks FTT | Sundstrom et al. 2004 |
| November 18 | GLOBAL CLIMATE CHANGE (CO): To understand the difference between weather and climate, climate change vs. global warming. | Hansen et al. 2012 FTT ASSIGNMENT #10 DUE at 11:59 pm on Blackboard |

| | | |
|-------------|--|---------------------------------|
| November 20 | CASE STUDY: FISH IN A WARMING WORLD (CO): To explore the potential biological responses to warming oceans and freshwaters FTT | Cheung et al. 2013 |
| November 25 | HUMAN POPULATION GROWTH & FOOD SECURITY (CO): To explore the true costs of our decisions of what we eat, how we use water and power. To think about what challenges we face on Earth with 6 billion other people LAST 30 MIN OF CLASS FOR EXPERT PANEL WORK | Ehrlich and Ehrlich 2013 |
| November 27 | NO CLASS, THANKSGIVING HOLIDAY | |
| December 2 | EXPERT PANEL PRESENTATIONS & DISCUSSION | Briefings and Presentations Due |
| December 4 | EXPERT PANEL PRESENTATIONS & DISCUSSION | Briefings and Presentations Due |
| December 11 | LAST DAY OF CLASS; FINAL EXPERT PANEL PRESENTATIONS & DISCUSSION | Briefings and Presentations Due |
| December 15 | CUMULATIVE FINAL EXAM (CO): To gauge your understanding and ability to synthesize material taught throughout the semester | FINAL EXAM |

GRADING POLICY & EXPECTATIONS

In this section I have provided examples of *writing reflections*, *questions for FTT*, and *discussion comments* that would earn full credit, in contrast to examples that would earn little or no credit. More extensive details concerning expectations for the *expert panels* will be discussed in class.

WRITING REFLECTION EXAMPLE

SNIPPET OF LANGUAGE FOR FULL CREDIT: In this week's reading of *Four Fish*, the author describes the key attributes of species that make them easily domesticated for human purposes. Among these traits are the ability to live in high densities in fish tanks, have large hearty eggs that are tough to the environment, and the tendency to accept handling by people. I admit I had never thought about why certain species were used by humans while others remain entirely wild. Could these sorts of traits explain why chickens and cows are domesticated, but zebras and hippos are not?

SNIPPET OF LANGUAGE FOR PARTIAL/ZERO CREDIT: I like this week's reading, it was really clear and made a lot of sense. But I didn't understand what 'domesticated' meant.

FTT QUESTION EXAMPLE

SNIPPET OF LANGUAGE FOR FULL CREDIT: In the lecture where we talked about natural selection, I understood that traits that give an individual a better ability to survive or reproduce should increase in frequency in future generations (assuming there is a genetic link for the trait), but then you gave an example of the brightly colored guppy who is preyed upon at higher rates than the duller colored fish. How is that an exception to natural selection? What am I missing?

SNIPPET OF LANGUAGE FOR PARTIAL/ZERO CREDIT: What date is the mid-term again?

DISCUSSION COMMENT EXAMPLE

COMMENT FOR FULL CREDIT: “That’s a really good point Jack, but it seems to me that if we are serious about reducing the problem of overfishing that the primary goal has got to be to stop killing so many fish!”

COMMENT FOR ZERO CREDIT: “One time at band camp I laughed so hard milk came out my nose!”

POLICIES

LATE WORK & ATTENDANCE

As a reminder, we are all in this course *together* and so I expect that students will take a proactive attitude toward the work in Fish 194. I expect you to turn in assignments on-time, and if a rare legitimate reason gets in the way that you will let me know before the assignment is due! Also, I expect that you will attend all class sessions. As stated above, your participation in discussions counts for a large part of your grade. But more importantly, if you are not in class you cannot contribute and everyone has something unique to contribute! Simply put, not coming to class and not participating detrimentally impacts the learning of others. In the event that an emergency will keep you from attending class or completing an assignment on time, I expect an email or in-person conversation IN ADVANCE to discuss. Emails should be respectfully written, with a clear subject heading and concise message. If I do not hear from you and your work is not in on time the grade will be a **Zero**.

ACADEMIC DISHONESTY

I, and the University of Alaska Fairbanks as a whole, consider academic dishonesty and plagiarism as a violation of trust and an offense that has major ramifications (e.g. potential expulsion from UAF). This course is about developing your personal thinking with regards to issues of natural resource use and sustainability and I expect your work to be your own. This is different than saying you must work in isolation! I want your thoughts to be shaped through conversation with your peers, through what you read, and what you watch. But the work you turn in needs to be in your own voice, express personal conclusions, and where appropriate acknowledge the contribution of others (through citation). Simply put, I will not tolerate dishonesty (in any form) in Fish 110.

SUPPORT SERVICES AND DISABILITIES

This class involves writing assignments. You may find it useful to visit the UAF writing center. For more information, go to www.uaf.edu/english/writingcenter/about.htm. Make sure that your tutor understands the premise and audience for your writing assignments. For students new to Fairbanks and college life, consider using the services provided by Rural Student Services <http://www.uaf.edu/ruralss/>.

If you need special accommodations because of a disability, please contact me as soon as possible and we will work together with the Office of Disabilities Services (203 WHIT, 474-7043) to make the necessary arrangements in order to maximize your learning. To the extent possible I will work to provide reasonable accommodation to students with disabilities.