University of Maryland
CENTER FOR ENVIRONMENTAL SCIENCE

Fisheries Science and Management

3 credits

MEES 682
Fall 2018

Course Objectives / Overview

This course will introduce students to central concepts underlying fisheries science and management, including fishery and stock dynamics, surplus production and yield-based management, age-structured assessments, biological reference points, spatial and ecosystem-based fisheries management, effects of overfishing on socioecological systems, management methods and challenges, and institutional structures.

Expected Learning Outcomes

- Literacy in central concepts underlying fisheries science and management.
- Skill in critical reading of scientific publications, including evaluation of agendas, assumptions, interpretations, assertions, and omissions of concern.
- Analytical skills pertinent to fisheries assessment including preparation of indices of abundance, and models of fish growth, stock-recruitment relationships, and mortality.
- Scholarship, scientific reasoning, and synthesis skills required to develop a Fishery Management Plan (FMP) for a regional fishery. Skills include:
  - Individual review of assigned FMP elements. Mastery of expertise needed to evaluate biology, fishery prosecution, and socioecological impacts of fishing. Search and synthesis of primary and grey literature documents pertinent to assigned FMP elements. Demonstrated ability to perform data analysis of basic fishery data (catch, life history, CPUE) necessary to provide basic management advice for a data poor fishery.
  - Team participation and leadership in combining FMP elements into an overall report for the regional fishery. Oral presentation skills through class presentations of quantitative and qualitative portions of the FMP. Compliance with FMP report guidelines

Course Assessment / Grading

Mid-term exam:	25%
Final exam:	25%
Group Pinocchio test exercise:	5%
Individual ecocertification evaluation:	5%
Group FMP exercise:	40%

Exams – Two short answer exams (25% each) will be administered during the 90-minute class period.

INSTRUCTOR DETAILS:
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CLASS MEETING DETAILS:
Dates: Monday/Wednesday
Times: 2:00-3:30 pm
Originating Site: CBL (BFL 1120)
IVN bridge number: 800414
Room phone number: 410-326-7381

COURSE TYPE:
Check all that apply
☐ Foundation
☐ Professional Development
☐ Issue Study Group
☐ Seminar
☒ Elective

Prerequisites
Insert here or state N/A
N/A

Teaching Assistant
N/A

Pinocchio Test – Presentation (5%): Critical reading of high impact fisheries paper and related background literature by groups of students; short in-class presentations. In his Fisheries essay, Univ. Washington Professor R. Hilborn argues that a poorly reviewed literature has emerged in high impact journals such as Science and Nature that represents mission-oriented science. Does this recent high impact literature represent a biased agenda, or does it represent biologists' valid criticisms on the views and science of recalcitrant fishery scientists and managers? What is the quality of this high impact science?

The Pinocchio Test was adopted by the Washington Post and applied to claims of presidential candidates. The scores come from their Fact Checker website. Instructors will identify controversial papers and published responses and distribute them intermittently throughout the course. These papers include arguments on ecosystem level effects of fishing, evolutionary effects of fishing, unsustainable aquaculture, consumption hazards, and the demise of industrial fisheries. Teams of students will be responsible for leading a 20-minute discussion (10 minutes justifying Pinocchio ranking – 3-4 slides; 10 minutes leading a discussion on assumptions, interpretations, assertions, omissions of concern). Instructors will help team identify relevant literature (3-6 papers) in developing their fact-checking responses.

Ecocertification evaluation – Short paper (5%): Individuals will be responsible for reviewing the ecocertification status and published fish guides for one stock and writing a short (3-page max) evaluation. Students will be expected to critically evaluate the information gathered and make their own status recommendation.

Fishery Management Plan – Term Paper and Presentation (40%): Students will work in teams to prepare a draft Fishery Management Plan (FMP) for a species assigned by the instructors. To prepare background information on life history and current fishery and population trends for inclusion in the FMP, a series of short data analysis tasks will be completed throughout the semester by each group and reviewed by the instructors. The FMP report will state goals and objectives for the fishery and summarize all important and relevant biological, ecosystem, socioeconomic, and compliance considerations. Each group will propose a series of alternative management measures for consideration by managers and the public. At the end of the term, each team will provide a 15 to 20-minute presentation overview of their FMP and be prepared to answer questions from the class and instructors.

Course Schedule

Lecture Instructor	Topic  = Pinocchio Test presentation/discussion  =data analysis task for FMP
1: Aug 27 **Nesslage**	**Introduction to fisheries science and management.** *What are fisheries and why do we need management? History and terminology.*
2: Aug 29 **Nesslage**	**Global fisheries overview.** *Issues, patterns and trends in global fisheries.*
	Labor day
3: Sept 5 **Nesslage**	**National/regional fisheries overview.** *Issues, patterns and trends in US/Mid-Atlantic and Chesapeake Bay fisheries.*
4: Sept 10 Nesslage	**Data collection for fisheries science and management.** *Data types and collection methods, general uses, and applications.* 
5: Sept 12 Nesslage/ Guests	**Ecocertification/labeling**. +Guest panel: Erik Williams, Paul Nitchke, Churchill Grimes (NOAA Fisheries)
6: Sept 17 **Nesslage**	**Abundance indices.** *What are they and why are they so important? Developing indices of abundance and their implications for science and management.* 
7: Sept 19 **Nesslage**	**Overfishing.** *Overfishing/overfished concepts. Growth, recruitment, ecosystem overfishing. Selectivity and growth/maturity responses to fishing.* 
8: Sept 24 Wilberg	**FSM goals and framework.** *Role of stock assessment in fisheries science and management, methods of estimating abundance.*
9: Sept 26 Wilberg	**Fisheries production**. *Aquatic food chains, primary and secondary production, principal aquatic ecosystems, climate.*
10: Oct 1 **Nesslage**	**Fisheries Interactions.** *Habitat alterations, bycatch mortality, discards, MPAs, ghost fishing* ****Ecocertification reports due****
11: Oct 3 **Guest/ Nesslage**	**Local fisheries management**. *Guest lecture from Lynn Fegley, MD DNR Fisheries Service Deputy Director*
12: Oct 8 Wilberg	**Mortality.** *Total, fishing, and natural mortality, annual and instantaneous rates, methods for estimation.* 
Oct 10 **Wilberg**	**Mid Term Exam**
13: Oct 15 **Wilberg**	**Age, growth, and reproduction in Stock Assessment**. *How is growth and reproduction measured and modeled?* 
14: Oct 17 **Wilberg**	**Stock-recruitment estimation.** *Estimation of S-R parameters, iteroparous vs. semelparous species considerations.*  ****First FMP task due!****
15: Oct 22 Wilberg	**Aggregated Assessment Models**. *Surplus production models, catch-survey, and delay difference models, "time-series" model fitting.*
16: Oct 24 Wilberg	**Age-structured Stock Assessment**. *Virtual population analysis and statistical catch-at-age, retrospective pattern.*
17: Oct 29 Wilberg	**MSY and Biological Reference Points**. *Definition of MSY, estimation and uses of MSY, current uses in U.S. fisheries.*
18: Oct 31 Wilberg	**Adaptive Management & Decision Analysis**. *How to make decisions in the face of uncertainty.* ****Second FMP task due!****
19: Nov 5 **Wilberg**	**Management Strategy Evaluations**. 
20: Nov 7 **Guest/ Wilberg**	**State and Inter-Jurisdictional Management**. *Guest lecture from Kirby Rootes-Murdy, Senior FMP Coordinator, ASMFC*

Lecture Instructor	Topic  = Pinocchio Test presentation/discussion  =data analysis task for FMP
21: Nov 12 **Nesslage**	**Ecosystem-based fisheries management (EBFM).** *Definitions, approaches, and challenges.* 
22: Nov 14 Guest	**Fisheries law enforcement.** *Guest lecture from Colonel Kyle Overturf, CT DEEP State Environmental Conservation Police*
23: Nov 19 **Guests/ Nesslage**	**Federal and inter-jurisdictional management**. *Guest lecture from Jessica Coakley and Brandon Muffley, Fishery Management Specialists with the MAFMC. Federal/Council management and FMPs.* ****Draft FMP report due!****
Nov 22	**Thanksgiving**
24: Nov 26 **Guest/ Nesslage**	**Ecocertification presentations & discussions -** *Kohma, Jake, Jerelle, Nicki*
24: Nov 28 **Guest/ Nesslage**	**Ecocertification presentations & discussions -** *Tom, Ben, Matt, Caroline*
Dec 3	**Student FMP presentations** 
Dec 5	**Student FMP presentations** 
Dec 7	**Final FMP reports due**
25: Dec 10 Nesslage	**Future of fisheries science and management**
Dec 12	**Final exam (during normal class period)**

Required textbooks, reading and/or software or computer needs

Required textbook: Marine Fisheries Ecology by Simon Jennings, Michel Kaiser, and John D. Reynolds. Blackwell Science 2001. ~$37-$87 used/new. Please purchase this book in advance of first class. Other required and ancillary reading will be made available through the class website (below).

Students should have access to a computer with MS Office 2013 or 2016.

Course Communication

Course readings, lecture notes, assignments, communications, and assessments will be made available through the web-based program Moodle (moodle.cbl.umces.edu). Feel free to contact the instructor via email or phone to schedule an appointment.

Campus Policies

The University of Maryland Center for Environmental Science has drafted and approved of various academic and research-related policies by which all students and faculty must abide. Please visit http://www.umces.edu/consolidated-usm-and-umces-policies-and-procedures for a full list of campus-wide academic policies.