**Fishery Science**
11:628:309
Fall even years – 3cr
Fridays 10:20 – 1:30
In Person

Alampi Room

**Instructor**:           Dr. Thomas Grothues – grothues@marine.rutgers.edu

**Physical Address:**
Rutgers University Marine Field Station (RUMFS)
800 c/o 132 Great bay Blvd.
Tuckerton, NJ 08087
Cell: 609 618-6549

**Pre-requisites**: Requires some familiarity with algebra and a willingness to engage in basic mathematical modeling and coding.  General biology highly recommended and a course in ecology preferred.

**Summary**:  This course provides an introduction to the interdisciplinary study of wild capture fisheries.  We will cover marine and freshwater fisheries and commercial and recreational fisheries.  As complex social-ecological systems, fisheries can only be understood through the combined use of theories and techniques from biology, ecology, oceanography, mathematics, statistics, economics and other social sciences. We will examine the behavior of fish populations, fishers, and management institutions as well as the emergent properties of the entire system.

**Course Objectives:**

* Introduce students to the interdisciplinary study of fisheries as social-ecological systems with ecological, physical, and social dimensions.
* Develop basic skills in mathematical modeling of biological processes including growth and population dynamics.

**Learning Outcomes:**

At the end of this class, students will be able to

* explain fisheries terms (i.e. length limits, ITQs, and catch shares)
* describe the link between fish population dynamics and their physical environment
* develop and apply length-weight relations
* estimate abundance from mark-recapture data
* estimate growth from length-at-age data and fit stock-recruitment curves
* model the dynamics of a harvested fish population
* understand trade-offs inherent in fisheries management
* explore the conflicts with offshore wind power development
* understand the different motivations for fishing and how they interact with fishery governance

**Format**: In person meetings. There are two 80 minute meetings per week, both on Friday (10:20 - 11:40, & 12:10 - 1:30). This reflects that my office is not on or near campus. Class time will be a mix of lecture, discussion, and guided programming.  A weekend field trip is possible for enrichment, but is not required and material solely explored during a field trip will not be tested. A recommended evening workshop on the r programming language will be remote.

**Evaluation**: homework (20%), exams (20%), in class discussions (20%), final project (30%), quizzes on assigned reading (10%)

**Readings**: Required textbook – Jennings, Kaiser, and Reynolds. 2001. Marine Fisheries Ecology. Available on Kindle. Additional required readings to be posted on Canvas.

**Ichthyology (11:628:321)**

**Syllabus, Fall Semester 2023**

**Instructor:**

Dr. Thomas M. Grothues

Rutgers University Marine Field Station

Department of Marine and Coastal Sciences

800 (c/o 132) Great Bay Blvd., Tuckerton, NJ  08087

Phone: (609) 249-8802                       Fax: (609) 296-1024Email: grothues@marine.rutgers.edu             Website:  [http://marine.rutgers.edu/rumfs/Links to an external site.](http://marine.rutgers.edu/rumfs/)

**Meeting Places: \*Check the Schedule Section Below. It changes!!!**

Marine Field Station in Tuckerton (lab and lectures first half of semester),

Foran Hall 138B (lecture, second half of semester)

Foran Hall 193 (lab, second half of semester)

**Office Hours:**

Immediately after lecture and laboratory, otherwise seldom possible to meet because professor’s office is off-campus. Will do Zoom by appointment!

 **Pre-requisites**: General biology is required and a course in ecology preferred.

**Summary**:  This course provides an introduction to the study of fishes, including evolution, anatomy and physiology, systematics and taxonomy, life history, ecology/habitat, and the methods used to study them. The laboratory section will include collection of wild fish in freshwater of the pinelands, estuary, and coastal ocean through field experiences in the first half of the semester. In the second half of the semester, the labaroatory section will include dissections and a survey of diversity focused on local species but inclusive of and representative of species worldwide.

**Course Objectives:**

* Introduce students to the study of fishes as basal vertebrates.
* Develop basic skills in identifying fishes by inspection of internal and external characters using a dichotomous key.
* Develop basic skills in the collection of fishes for scientific purposes.
* Become familiar with the concepts of evolutionary selective pressures in the aqueous and marine world that lead to niche specialization and species diversity among fishes

**Learning Outcomes:**

At the end of this class, students will be able to

* read and understand relevant primary literature
* be able to identify and explain the function of external and internal anatomy
* describe the link between fish anatomy, life history, and physical environment
* understand the benefits and drawbacks of various fish collection methods
* be able to identify live and preserved specimens

**Format**:

In person meetings in the field, laboratory, and classroom. For the first several weeks, students will need to be prepared to get wet and muddy for a combined lecture/field session. A change of clothes and towels and a bag for wet clothes is suggested Changing spaces and hoses for wash down are available..

**Schedule:**

Classes are held all-day Friday. As a result, it will be impossible to take another class on Friday. The first and the following five classes, will start at the Marine Field Station in Tuckerton. On these dates, the class will depart ON YOUR OWN or in SELF-Organized Carpool from New Brunswick at 8:30 am to start at RMUFS at 10:00 AM and return at approximately 5:00 pm. From mid-October onward, class will be held in New Brunswick from 10-3 (lecture room: Alampi, laboratory in FOR-193).

**Evaluation**: homework (10%), quizzes, exams, and practicum (40%), in class discussions (20%), final project (30%)

**Required texts:**

Helfman, G., B. Collette and D. Facey.  2009.  The Diversity of Fishes.  Second Edition.  Wiley-Blackwell, West Sussex, UK.  ISBN: 978-1405124942

 Caillet, G.M., M.S. Love and A.W. Ebeling.  1996.  Fishes:  A Field and Laboratory Manual on Their Structure, Identification and Natural History.  Waveland Press, Prospect Heights, Ill.  ISBN 978-0881339086

**Suggested field guide:**

Ray, C., Robins, C.R. and Peterson, R. T.  1999.  A Field Guide to Atlantic Coast Fishes of North America.  Peterson Field Guide Series.  Hougton Mifflin Co., Boston. ISBN: 978-0395975152

 Page, L. R., B. M. Burr, E. C. Beckham, J. Sipiorski et al. 2011. Peterson Field Guide to Freshwater Fishes, Second Edition (Peterson Field Guides)

**Suggested reference texts:**

Able, K. W. and M. P. Fahay. 2010.  Ecology of Estuarine Fishes: Temperate Waters of the Western North Atlantic. Johns Hopkins University Press, Baltimore, MD. 566 p. ISBN: 978-0801894718

Nelson, J. F., T. C. Grande, and M. V. H. Wilson. 2016. Fishes of the World 5th Edition. http://sites.google.com/site/fotw5th/

Borro, D. J. 1988. Dictionary of Word Roots and Combining Forms. Mayfield Publishing Company

**Required supplies**:

Safety glasses or goggles and a dissecting kit – you will need forceps, scissors, scalpel and a probe.  Simple kits can be found online.  I usually buy these: [https://www.amazon.com/Advanced-Biology-Anatomy-Dissecting-Dissection/dp/B017XY1FQS/ref=sr\_1\_3?crid=16006KZABKY3V&keywords=dissection+kit&qid=1565113390&s=gateway&sprefix=dissect%2Cstripbooks%2C159&sr=8-3Links to an external site.](https://www.amazon.com/Advanced-Biology-Anatomy-Dissecting-Dissection/dp/B017XY1FQS/ref%3Dsr_1_3?crid=16006KZABKY3V&keywords=dissection+kit&qid=1565113390&s=gateway&sprefix=dissect%2Cstripbooks%2C159&sr=8-3)