

FISHERIES BIOLOGY

Bachelor of Science degree with a major in Fisheries Biology —

concentrations available in Freshwater Fisheries and Marine Fisheries

Minor in Fisheries Biology

See *Natural Resources* for details on the Master of Science degree.

Department Chair

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Department of Fisheries Biology

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The Program

Students completing this program will have demonstrated the ability to:

- provide a description of how physical and biological factors of aquatic ecosystems determine the distribution and abundance of fish populations and pose testable hypotheses and experiments to identify specific factors that constrain population growth or distribution
- select and implement basic data collection protocols appropriate for characterizing status of fish communities, including assessment of species composition, abundance, and population structure (age, size, genetic)
- convey scientific concepts in written, oral, and visual communication formats, including following basic guidelines for format and structure of scientific reports, papers, or presentations
- describe and explain how fisheries management problems can be expressed as quantitative models, produce useful tabular and graphic summaries of quantitative data, and conduct simple tests of statistical hypotheses
- describe the scientific, legal, political, and social factors that determine goals for fisheries management and conservation, and to identify appropriate management strategies that can be used to achieve these goals
- critically evaluate their own fisheries work as well as fisheries data, information, and conclusions reported in published peer-reviewed literature, unpublished technical reports, and popular media.

The overall goal of the Fisheries Biology Program is to provide students with the knowledge, skills, and motivation required to ensure the conservation of fish and aquatic resources that are faced with increasing societal demands and increasing loss of

habitat. We stress development of a field-based understanding of the relationships between freshwater and marine fishes and the habitats upon which they depend, but our program is broad enough to provide specialized training in fish population dynamics and fishery management, restoration ecology, systematics, marine and freshwater aquaculture, fish health management, water pollution biology, and wastewater utilization. Each of these areas has its own important role to play in the overall conservation of fish resources.

Fisheries Biology students have on-campus facilities for hands-on studies: a recirculating freshwater fish hatchery, rearing ponds, spawning pens, and modern laboratories for study of fish genetics, pathology, taxonomy, ecology, and age and growth. Also on campus is the California Cooperative Fish & Wildlife Research Unit, supported by both state and federal government, and a large fish museum collection.

Off campus, students take classes and carry out research projects at the university's marine laboratory in Trinidad, about 12 miles north of campus. A 90' university-owned ocean-going vessel, docked in Eureka, is available for classes and for faculty and graduate student research in nearshore ocean waters. Numerous small boats and a specialized electrofishing boat are available for instruction and research in local bays, lagoons and estuaries.

Our graduates may qualify for certification by the American Fisheries Society as Associate Fisheries Scientists, and many continue their education after HSU, receiving MS or Ph.D. degrees in fisheries biology or other closely related fields.

Possible careers: aquarium curator, aquatic biologist, biological technician, environmental specialist, fish culturist, fish health manager, fisheries biologist, fisheries consultant, fisheries modeler, fisheries statistician, hydrologist, museum curator, reservoir manager, restoration ecologist, sewage treatment water analyst, water quality advisor.

Preparation

We recommend that high school students interested in fisheries biology take as many challenging biology, chemistry, mathematics, and computer classes as possible, and that they also stress oral and written communications.

REQUIREMENTS FOR THE MAJOR

For a description of degree requirements to be fulfilled in addition to those listed below for the major, please see "The Bachelor's Degree" section of the catalog, pp. 66-81., and "The Master's Degree" pp. 82-84.

The Upper Division Area B General Education requirement is met by the coursework within the Bachelor of Science degree for either concentration in the Fisheries Biology major:

Core Courses

Shared Requirements for Freshwater Fisheries and Marine Fisheries Concentrations

Lower Division

| | | |
|----------|-----|--|
| BIOL 105 | (4) | Principles of Biology |
| CHEM 107 | (4) | Fundamentals of Chemistry |
| CHEM 128 | (3) | Introduction to Organic Chemistry |
| FISH 260 | (3) | Fish Conservation & Mgmt. |
| MATH 105 | (3) | Calculus for the Biological Sciences & Natural Resources |
| STAT 109 | (4) | Introductory Biostatistics |
| ZOOL 110 | (4) | Introductory Zoology |
| FISH 220 | (3) | Water Resources & Conservation [<i>Freshwater Fisheries</i>], or |
| OCN 109 | (3) | General Oceanography and |
| OCN 109L | (1) | General Oceanography Lab [<i>Marine Fisheries</i>] |

Upper Division

| | | |
|----------|-----|--|
| BIOL 330 | (4) | Principles of Ecology |
| FISH 310 | (4) | Ichthyology |
| FISH 314 | (3) | Fishery Science Communication |
| FISH 380 | (3) | Techniques in Fishery Biology |
| FISH 460 | (3) | Adv. Fish Conservation & Management |
| FISH 474 | (4) | Conservation Genetics of Fish and Wildlife |

One quantitative course from:

| | | |
|-------------------|-----|--------------------------------|
| FISH 458/FISH 558 | (4) | Fish Population Dynamics |
| STAT 333 | (4) | Linear Regression Models/ANOVA |
| STAT 404/STAT 504 | (4) | Multivariate Statistics |
| STAT 406 | (4) | Sampling Design & Analysis |

or an approved upper division quantitative course.

Select one concentration and complete requirements.

Freshwater Fisheries Concentration

Core courses plus:

FISH 320/FISH 320L (3/1) Limnology
FISH 370/FISH 370L (3/1) Aquaculture
FISH 434 (4) Ecology of Freshwater Fish
FISH 476 (3) Ecology of Running Waters

Approved Electives* (9 units required; General Education classes may not be used as approved electives). Include **at least two** from the following:

FISH 335 (3) US & World Fisheries
FISH 375 (3) Mariculture
FISH 410/FISH 510 (3) Topics in Advanced Ichthyology
FISH 435 (4) Ecology of Marine Fish
FISH 458/FISH 558 (4) Fish Population Dynamics
FISH 471 (3) Fish Diseases
FISH 571 (3) Advanced Fish Disease & Pathology

One other course approved by your advisor.

Marine Fisheries Concentration

Core courses plus:

FISH 335 (3) US & World Fisheries
FISH 375 (3) Mariculture
FISH 435 (4) Ecology of Marine Fish
ZOO 314 (5) Invertebrate Zoology

Approved Electives* (9 units required; General Education classes may not be used as approved electives). Include **at least two** from the following:

FISH 370 (3) Aquaculture
FISH 410/FISH 510 (3) Topics in Advanced Ichthyology
FISH 434 (4) Ecology of Freshwater Fish
FISH 458/FISH 558 (4) Fish Population Dynamics
FISH 471 (3) Fish Diseases
FISH 571 (3) Advanced Fish Disease & Pathology

One other course approved by your advisor.

REQUIREMENTS FOR THE MINOR

14-15 units:

FISH 310 (4) Ichthyology
FISH 460 (3) Adv. Fish Conservation & Management

Plus one of the following pathways:

FISH 320/320L (3/1) Limnology/
Practicum **or**
FISH 476 (3) Ecology of Running Waters
FISH 434 (4) Ecology of Freshwater Fish

or

OCN 109 (3) General Oceanography **and**
OCN 109L (1) General Oceanography Lab
[*Marine Fisheries*]
FISH 435 (4) Ecology of Marine Fish



* Alternative sets of approved electives may be approved under exceptional circumstances. Discuss with your advisor.
