FISHERIES SCIENCE

DOCTOR OF PHILOSOPHY

Conduct and translate world class fisheries research through quantitative techniques, study design and science communication.
PROGRAM DESCRIPTION

The Doctor of Philosophy in Fisheries Science is offered by the Marine Institute’s School of Fisheries to full time and part-time students. This program is aimed at those who want to participate in the development of new fisheries science knowledge. Fisheries researchers will be equipped with a skill set that focuses on quantitative analysis, science communication and knowledge in the management and practice of North Atlantic fisheries.

For more information and to apply, www.mi.mun.ca/fsphd.

PROGRAM OBJECTIVE

To train world-class researchers that are capable of working at the forefront of fisheries science and advancing the science and practice of fisheries.

Graduates of this program will be able to:

• Conduct original research
• Collect, manage and analyze data
• Display and interpret qualitative information
• Demonstrate adherence to the principles of scientific integrity
• Effectively communicate their research
  - Through peer-reviewed publications in reputable science journals
  - In oral and poster-based presentations at scientific conferences and meetings
  - In formats accessible to stakeholders, including media, industry publications and in other relevant venues
• Explain how their research fits with the broader policy environment of fisheries at local, national and international scales
• Craft impactful research questions that advance their discipline
• Lead the planning and execution of a research program
PROGRAM REQUIREMENTS

The program’s core courses are designed to develop proficiencies in quantitative techniques, study design, and science communication that are necessary to be effective at fisheries research.

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<th>SEMESTER</th>
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<td>Fall</td>
<td>FISH 6000* Science Communication for Fisheries</td>
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<td>FISH 6001 Ecology, Management, and Practice of North Atlantic Fisheries</td>
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<td>FISH 6002* Data Collection, Management, and Display</td>
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<td>FISH 6005† Advanced Statistical Stock Assessment</td>
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<td>Winter</td>
<td>FISH 6003† Statistics and Study Design for Fisheries Science</td>
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<td>FISH 6004† Overview of Statistical Stock Assessment</td>
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*Ph.D. students will normally take these courses unless they are so proficient in the subject matter that their supervisory committee deems taking the course unnecessary.

†Ph.D. students should take at least one quantitative statistics course, unless their supervisory committee determines they are extremely proficient or if they have already taken these course as part of a Master of Science program.

Students must also complete a thesis containing three or more chapters of original research, as approved by their supervisory committee.

Students must meet with their supervisory committee within the first three months of their program and submit a research proposal. They will also complete a written and oral comprehensive examination.

Students will normally complete their thesis within four years (12 semesters) of enrolling in the program.

PROGRAM STRUCTURE

This program recognizes that fisheries science is a broad discipline that is applied in nature and requires proficiency in quantitative and communication skills. Students will gain practical skills through coursework while developing their theoretical understanding through supervised research and through their interactions as an active participant within the scientific community. Students will also be exposed to the depth of the field of fisheries science through lab meetings, reading groups and guest lectures.

ADMISSION

REQUIREMENTS

Admission into the Ph.D. program in Fisheries Science is normally restricted to candidates holding a Master’s degree or its equivalent. In exceptional circumstances, a candidate with a Bachelor of Science degree who has spent not less than 12 months in a Master of Science program may be recommended for transfer into a Ph.D. program. For this transfer to be accepted, the candidate must demonstrate their ability to pursue research at the doctoral level.

Applicants will need to have identified a supervisor, who must be either a research scientist with the Marine Institute’s School of Fisheries, a cross-appointed or adjunct faculty with the School or an actively-publishing researcher within the School that holds a Ph.D. Students will also need a supervisory committee.

HOW TO APPLY

Applications are reviewed three times a year. Applicants should submit their application to Memorial University’s School of Graduate Studies by the following deadlines:

- FALL ADMISSION — MAY 15
- WINTER ADMISSION — SEPTEMBER 15
- SPRING ADMISSION — JANUARY 15

For more information and to apply online, go to [www.mun.ca/become/graduate/apply](http://www.mun.ca/become/graduate/apply).
COURSE DESCRIPTIONS

FISH 6001 - ECOLOGY, MANAGEMENT, AND PRACTICE OF NORTH ATLANTIC FISHERIES
This course will train students in the full spectrum of science communication. The fundamentals of scientific writing, academic publishing, and oral and poster presentations will comprise the first half of the course. The second half will focus on communicating outside the academic environment, and how to responsibly disseminate research across a range of media.

FISH 6002 - DATA COLLECTION, MANAGEMENT AND DISPLAY
Modern fisheries scientists work in a complex data environment. This course will introduce students to the basics of R statistical software including programming best practices, optimizing workflows and producing tidy data. A focus on data display and visualization will be present throughout this course, reflecting the importance of good graphing habits in science.

FISH 6003 - STATISTICS AND STUDY DESIGN FOR FISHERIES SCIENCE
This course will provide an overview of modern statistical techniques used in fisheries research. A broad range of approaches will be covered and students will learn the advantages and disadvantages of each, how they relate to one another, when they are applicable, and how to implement them in R. Special focus will be placed on designing powerful experiments.

FISH 6004 - OVERVIEW OF STATISTICAL STOCK ASSESSMENT
Students will get an overview of concepts in fish stock assessment including survey sampling theory, basic population dynamics, optimal harvest strategies and stock assessment models. Students will learn how to fit basic growth, reproduction and stock assessment models using R software. This will include training in statistical estimation and inference using the maximum likelihood method.

FISH 6005 - ADVANCED STATISTICAL STOCK ASSESSMENT
This course will address cutting-edge topics in stock assessment. Students will gain a robust understanding of advanced stock assessment models and will demonstrate this understanding by applying the course material to a current problem in this field. Students will be trained in state-of-the-art state-space stock assessment models that integrate multiple types of data. Students will receive training in advanced statistical theory (marginal/profile/restricted maximum likelihood, bootstrap).

PROGRAM DELIVERY AND SUPPORT
Program courses will be delivered at the Marine Institute Ridge Road campus. Ph.D. students should complete their program courses in the first year of the program.

Internships may be a part of any student’s research program, provided the supervisor and supervisory committee are supportive. The Marine Institute’s Office of Career Integrated Learning is a resource that could be available to students or they can seek internships themselves with the support of their mentorship team.

ABOUT THE MARINE INSTITUTE
As a campus of Memorial University of Newfoundland, the Fisheries and Marine Institute is Canada’s most comprehensive centre for education, training, applied research and industrial support for the ocean industries.

Located on the edge of the Atlantic Ocean, we are one of the most respected centres of marine learning and applied research in the world.

The Marine Institute provides more than 20 industry-driven programs ranging from technical certificates to doctorate degrees. In addition to undergraduate and graduate degrees, the Institute offers advanced diplomas, diplomas of technology and technical certificates.

Students enjoy a learning environment where small class sizes are the rule, hands on instruction is a way of life and competitive tuition rates put an internationally-recognized education well within reach.

The Institute also runs a variety of short courses and industrial response programs. All programs and courses are designed to provide students with knowledge and skills required for success in the workforce.

The Institute has three Schools — the School of Fisheries, the School of Maritime Studies and the School of Ocean Technology — and within these Schools a number of specialized centres and units.

Our School of Fisheries reflects the diversity of fisheries science as a whole. Scientists in the Centre for Fisheries and Ecosystems Research primarily study ecosystem dynamics that inform the management of fisheries. Researchers at the Centre for Sustainable Aquatic Resources develop and assess techniques for conducting fisheries sustainably. Research on fish processing is the mandate of the Centre for Aquaculture and Seafood Development. Our researchers collaborate with engineers, social scientists, policy experts, economists, and members of many other disciplines in pursuit of their research objectives.
CONTACT INFORMATION

GRADUATE STUDENT RECRUITMENT OFFICER
Student Affairs
Fisheries and Marine Institute of
Memorial University of Newfoundland

Telephone: 709.778.0395
Toll-free: 1.800.563.5799, ext. 0395

recruitment@mi.mun.ca
www.mi.mun.ca/fsphd
www.mun.ca/become/graduate

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