

MARINE SCIENCE (PHD IN MARINE SCIENCE)

Batten School Overview
Ph.D. Program Admission Requirements

Students enrolled in the Batten School of Coastal & Marine Sciences are students of William & Mary and must abide by academic and general policies set forth by the University. Students are also eligible for services provided by William & Mary on the main campus in Williamsburg.

The Ph.D. in Marine Science degree program is designed to prepare students for advanced marine science-focused careers in academia, government agencies or other employment sectors. Students complete fundamental and advanced marine science coursework and a dissertation based on original research. The required core curriculum is designed to help students achieve a broad understanding of the essential processes that define oceanic, coastal, and estuarine environments. Advanced courses allow students to explore areas of specialization that align with research and professional interests. There is considerable latitude to design an advanced course of study that ranges from highly disciplinary to highly interdisciplinary.

Ph.D. Program Admission Requirements

Students interested in pursuing marine science as a profession should consult with their academic advisor, or the Batten School Office for Academic Affairs (admissions@vims.edu), early in their college careers to identify an academic program that will prepare them for graduate study in coastal and marine sciences. Applicant reviews are holistic. We look for previous coursework, training, and experience that demonstrate preparedness for a rigorous science and research-focused curriculum, as well as an applicant's interest in pursuing a career path that will benefit from advanced training in coastal and marine sciences. All applicants to the doctoral (Ph.D.) program of the Batten School should have a strong background in basic science with appropriate coursework at the graduate or undergraduate level in chemistry, geology or related geophysical science, physics, meteorology, mathematics or engineering, and a solid quantitative background. Coursework in statistics is highly recommended for all students.

Applicants for the Ph.D. program should identify and contact faculty of interest when applying. Students pursuing the Ph.D. typically receive assistantship (stipend and tuition) support through faculty grants and contacts; offers of admission are therefore connected to a faculty member agreeing to serve as an academic advisor. Review current research topics (<https://www.vims.edu/research/topics/>) to identify your areas of interest and contact faculty (<https://www.vims.edu/about/directory/faculty/>) early in the admissions cycle to determine if space is available.

For matriculation as a regular degree-seeking graduate student, an applicant must have completed the requirements for a master's degree from an accredited college or university, identify their advisor(s) of interest, be recommended for admission by the Batten School Admission Committee and their advisor(s), and be approved for admission by the Batten School Associate Dean for Academic Affairs.

A student without a master's degree enters the M.S. program; however, students wishing to continue directly to the doctoral program may apply

to bypass the M.S. degree, provided they meet the criteria for the bypass (see M.S. Bypass Option). Students entering the M.A. program are not eligible for bypassing directly into the doctoral program.

In unusual circumstances, an applicant judged deficient in preparatory studies or other areas may be admitted as a provisional student. A provisional student may petition for regular student status after successful completion of those requirements stipulated in their notification of admission. Petition for change in status shall be reviewed by the Batten School & VIMS Academic Council, using as criteria overall academic performance and performance standards previously specified on the student's notification of admission. If recommended by the council, the petition must be approved by the associate dean. Graduate credit earned by a provisional student will be applied toward the graduate degree upon successful conversion to regular student status.

For additional Batten School admission information, important dates, and the on-line application, please visit our website (<https://www.vims.edu/academics/graduate/admissions/>).

Other Requirements
Milestones for the Ph.D. Program

Required Coursework

Batten School Core Curriculum for the Ph.D. Degree

Specific objectives of the Batten School core course curriculum are to:

- Educate students in the fundamentals of marine science in a way that fosters interdisciplinary and synthetic understanding of oceanic, coastal and estuarine systems;
- Provide students with an appreciation for the integration of marine science and its application to complex environmental problems;
- Ensure that students have the methodological, quantitative, communication and professional skills needed to pursue successful careers in marine science.

Credit Requirement

At least (42) credit hours of graduate coursework, with a cumulative grade point average of 3.0 or better, are required for the Ph.D. degree. A student must register for dissertation credit (MSCI 699 Dissertation) for at least one semester. At least nine credit hours but no more than twelve credit hours of dissertation may be counted toward the minimum (42) credits required for the degree.

Note: Students must pass all required Batten School core courses with a grade of B- or better by the end of their second year following matriculation.

Students are required to choose courses as follows:

Code	Title	Hours
Fundamental Core Courses		
Select four of the following:		8
MSCI 501A	Fundamentals-Phys Oceanog	
MSCI 501B	Fundamentals-Chem Oceanog	
MSCI 501C	Fundamentals-Marine Geology	
MSCI 501D	Fundamentals Biological Ocean	
MSCI 501E	Fundamentals of Aquatic Health	
MSCI 501F	Fundamentals-Mar Fisheries Sci	

Quantitative Core Course

Select at least one of the following: 3

MSCI 504	Stats Methods/Data Analysis
MSCI 554	Principles Numerical Computing
MSCI 556	Foundations of Stats & Data Sc

Interdisciplinary Core Course

MSCI 503 Interdis Res Estua/Coastal Sys 2

Science Communication Core Courses

MSCI 505 Fundamentals of Science Comm 1

Select at least one of the following: 1-2

MSCI 506	Scientific Communication Skill
MSCI 508	College Science Teaching
MSCI 509	Comm Sci to Diverse Aud
MSCI 548	Spec Topics in Marine Science (Scientific Illustration)

Electives

Fulfill remaining credit hours with elective coursework (any Batten School graduate course applies, except courses used to fulfill the Ph.D. core curriculum requirement) 14-18

Research

MSCI 699 Dissertation ((9) credit hours minimum or up to (12) credit hours maximum) 9-12

Note: With the permission of the academic advisor and Batten School Associate Dean for Academic Affairs, up to (9) credit hours of relevant, non-Batten School graduate-level coursework, including courses on the Williamsburg campus or through cross-registration agreements with other institutions (e.g., Old Dominion University), may be counted as electives towards the degree. In addition, excess credit hours from a Batten School M.S. degree can also be applied with Ph.D. committee approval.

Other Requirements

Credit Requirements

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Residency and Enrollment Requirements

To fulfill the full-time academic residency requirement a student must successfully complete the Batten School core curriculum requirements and be a full-time student in academic standing for two consecutive semesters.

Registration

Full-time degree-seeking students in the Ph.D. program who have not been granted leave must enroll for at least nine credit hours of approved coursework for both the fall and spring semesters, and three credit hours each summer. Students must maintain continuous enrollment during the summer and also be registered in the term of graduation. Students holding assistantships must register full-time during the summer. Additional coursework that is not being used to meet Marine Science degree program requirements and overload coursework are not covered by an assistantship award unless you have the permission of the Batten School Associate Dean for Academic Affairs. Part-time students not

supported by an assistantship register for one credit hour during the summer.

Research Graduate Status | Registration Requirements

Upon the recommendation of the student's academic advisor and approval by the Batten School Associate Dean for Academic Affairs, a full-time graduate student in the Ph.D. program who is engaged primarily in dissertation research and has achieved candidacy may apply for Research Graduate (RG) student status. For doctoral students, RG status will commence in the first full semester (e.g., fall or spring semester) following admission to candidacy and will continue through a student's normative graduation date (i.e., graduation milestone) as determined by the Batten School faculty.

Awarding of RG status is contingent on the availability of funds. In addition, the following conditions must be met:

- The student has completed all Batten School required coursework other than the dissertation.
- The student has passed the qualifying examination and the prospectus has been approved.
- The student has passed the comprehensive examination.
- The student is not employed significantly in any activity other than research and writing in fulfillment of degree requirements.
- The student is present on campus or is engaged in approved fieldwork related to their dissertation.

While classified as RG status, a student should register during the fall or spring semester for nine credit hours of MSCI 699 Dissertation, for which there will be three billable credit hours at the part-time rate. The student may elect to use up to two of the three paid credit hours for formal coursework and may register for additional coursework only if they or their advisor pay the additional part-time tuition. During the summer term, a student should register full-time for three credit hours, for which there will be one billable credit hour at the part-time rate.

A student with RG status is not eligible for services (e.g., student health and athletic events) unless those required fees are paid.

Part-Time Student Status | Registration Requirements

Students in the Ph.D. program who have achieved candidacy, and completed coursework and on-campus research, are allowed to finish the degree program in a special part-time registration status. These off-site degree-seeking students are not eligible for Batten School & VIMS assistantships, fellowships, or workshop funding and are not making use of on-site campus resources of the Batten School & VIMS or William & Mary. Depending on domicile, a part-time student pays for one credit hour at the out-of-state rate or three credit hours at the in-state rate during fall and spring semesters. During the summer, part-time students are required to register for one credit hour to maintain continuous enrollment.

Milestones for the Ph.D. Program

In addition to completing degree requirements, students in the Ph.D. program are expected to adhere to the following timeline for completion of milestones in the degree program.

Milestone	Number of Months for Completion
Advisor Selection	8
Committee/Research Topic	9
Pre-Qualifying Interview	18

Comprehensive Exam	21
Qualifying Exam/Prospectus Defense	30
Admission to Candidacy	34
Seminar Presentation/Dissertation Defense	1-3 months prior to degree completion
Completion of Degree Requirements	60-72 (see below)

Advisor Selection

The student selects a Batten School faculty member as an academic advisor. The advisor, co-advisor (when applicable), and advisory committee direct the student's program. When appropriate, the student may select a co-advisor who is a Batten School faculty member or a Research Scientist. Research Scientists must hold a Ph.D. and be approved as a co-advisor by the Academic Council and the Batten School Associate Dean for Academic Affairs. Should a student's advisor retire or leave the Batten School & VIMS before the student completes the degree, the student is required to select an appropriate on-campus advisor or co-advisor from the current Batten School faculty.

Advisory Committee

The advisory committee, chosen by the student in consultation with the advisor, consists of five members and must be approved by the Batten School Associate Dean for Academic Affairs. A majority of the committee members must be from the Batten School faculty. The committee must include at least one Batten School faculty member who is within a different discipline from the student's research discipline. At least one committee member with appropriate qualifications must be from outside of the Batten School & VIMS and William & Mary faculty. The committee must be approved by the Batten School Associate Dean before the comprehensive and qualifying exams are scheduled.

Note: A student in the M.S. program who plans to petition to bypass the M.S. must constitute a committee in accordance with the requirements for a Ph.D. program advisory committee. This should be done prior to the scheduling of the comprehensive exam. Refer to M.S. Bypass Option for more details.

Pre-Qualifying Interview

The student is expected to schedule a meeting early in the program to discuss academic preparation and research ideas with the advisory committee. Doctoral students should have their pre-qualifying interview before the end of the second fall semester (for students matriculating in Fall).

Comprehensive Exam (M.S. Bypass and Ph.D.)

A written exam is administered by the student's advisory committee and must be passed before the qualifying exam. The comprehensive exam allows a student to demonstrate comprehension and integration of material from the disciplines of marine science that are relevant to the student's specialization. The objective of the written exam is to ensure that the student has an appropriate general understanding of the field as well as the specific knowledge needed to undertake their research project. Successful completion of a rigorous comprehensive exam signals that a student is ready to pursue advanced training and original scientific research. The comprehensive examination milestone is (21) months. The exam must be passed within six months, i.e. before (27) months. After the initial exam, Ph.D. students are allowed one exam retake for any sections that were not passed. At a minimum, a student must pass all but one of their exam sections to be allowed to proceed in the Ph.D. program to the qualifying exam. Students who fail more than one section will be given an option to enroll in the M.S. degree program. A

student who seeks to bypass the M.S. degree has one opportunity to take the comprehensive exam. If they pass all but one section, they may apply to bypass to the Ph.D. program. *There is no appeal of this policy.*

The exam will be created, administered, and graded by the student's advisory committee. For a student pursuing the bypass, the examination committee must satisfy the requirements for a Ph.D. advisory committee. The student's advisor will notify the Batten School Associate Dean for Academic Affairs of the outcome of the pass/fail exam and if any remedial action is needed. Following the exam, a copy of the questions, as well as the graded exam with the questions and student responses will be submitted to the Batten School Registrar. The questions will be maintained electronically in the Office for Academic Affairs. The graded exam will be maintained in the student's file.

Qualifying Exam and Prospectus Defense

The qualifying examination must be passed, and a prospectus must be accepted by the student's committee. The qualifying examination and prospectus defense gauge a student's progress early in the research program. The qualifying examination milestone is (30) months for a Ph.D. track student and the exam must be completed within twelve months of the milestone deadline.

The qualifying examination is an oral exam designed to test a student's scientific competence and ability to pursue the research project. The exam consists of two components:

1. questions that address knowledge specific to the proposed research project and
2. questions concerning the general knowledge in the student's field of study.

The qualifying examination will be administered by the student's advisory committee and chaired by a moderator who is not a member of the student's advisory committee. The moderator must be identified at least three weeks prior to the examination. It is expected that the committee members will attend in person. Should a committee member participate remotely, the advisor should alert the moderator and confirm the availability of adequate means of communications, both at the Batten School and at the remote location. Students must file appropriate paperwork for the scheduling and announcement of the qualifying examination with Academic Affairs. The approval of the Batten School Associate Dean for Academic Affairs is required if more than one committee member needs to participate remotely. Consistent with Batten School procedures, the examination will be advertised and open to all faculty members. The examination allows a student's advisory committee to identify any deficiencies in a student's preparation to successfully conduct and complete the degree program. The minimum elapsed time between successful completion of the qualifying examination and the final defense must be no less than one year. Batten School policy prohibits audio or video recording of exams, although exceptions may be made for students with documented disabilities, in consultation with W&M's Student Accessibility Services.

The prospectus is a formal written presentation of the proposed research. Its purpose is to present the rationale for selection of the hypotheses, objectives and methodology to be used in the research. It must include a problem statement, review of current literature in the area of study, and a detailed plan of study, as well as a summary of preliminary research conducted by the student. The prospectus must also provide a detailed rationale for the proposed work, clearly stated objectives, and testable hypothesis(es) when appropriate, consistent with the problem statement, and a description of research design, field and laboratory

studies, methods and data analysis intended to test the hypothesis. The prospectus must be formally approved by the advisory committee.

A student who fails to meet the qualifying examination and prospectus defense milestones within the timeframe specified will be placed on academic probation. A student on academic probation will have one calendar year to satisfy any outstanding deficiencies. Failure to do so will result in automatic dismissal from the student's degree program.

Admission to Candidacy

A student may apply for candidacy when they have completed Batten School required coursework other than dissertation, passed the comprehensive and qualifying exams, and have an approved prospectus. The student must also have achieved a grade point average of B (3.0) or better, averaged over all courses taken for credit at the time of application for admission to candidacy. The student will be admitted to candidacy upon a favorable recommendation of their advisory committee and approval of the Batten School Associate Dean for Academic Affairs.

Seminar and Defense

The dissertation defense consists of two parts. All students are required to present a seminar to the marine science faculty, staff and students on their dissertation research. The seminar will be advertised and open to any interested individuals. Immediately following the seminar, the student will undergo an oral examination, the defense of the dissertation, by the student's advisory committee. The defense is chaired and administered by a moderator (<https://www.vims.edu/academics/graduate/moderators/>) who is not a member of the student's committee. It is expected that committee members will attend in person. Should a committee member participate remotely, the advisor should alert the moderator and confirm the availability of adequate means of communications, both at the Batten School and at the remote location. The approval of the Batten School Associate Dean for Academic Affairs is required if more than one committee member participates remotely. Any interested W&M faculty members are invited to attend. Batten School policy prohibits audio or video recording of exams and defenses, although exceptions may be made for students with documented disabilities, in consultation with W&M's Student Accessibility Services.

At the conclusion of the defense, the student's advisory committee will vote on a pass/fail decision, and indicate this on the *Defense Acceptance* form. Unanimous committee approval is necessary for satisfactory completion of both the dissertation defense and the final version of the dissertation. Following the student's defense, the Batten School Registrar will initiate the *Dissertation Final Acceptance* form and send it electronically to the committee in the routing order established by the moderator at the student's defense. Once final edits following the defense have been incorporated, the advisor and student will also sign this form.

Submission of Dissertation

All students are required to submit an electronic-only dissertation to the William & Mary Institutional Repository via the ProQuest ETD Administrator website no later than 11:59 p.m. on the deadline date listed on the academic calendar. Bound print copies of dissertations are no longer submitted to the Swem and Hargis libraries. Refer to the Batten School Graduate Student Handbook (https://www.vims.edu/academics/graduate/student_handbook/handbook_milestones/ms_phd_milestones/thesis_dissertation/) for additional guidelines.

Completion of Degree Requirements

The requirements for the degree, including submission of the approved dissertation must be completed within specified timelines as follows:

- 60 months - students pursuing a Ph.D. who enter the program with a M.S. degree or equivalent from another institution
- 72 months - students pursuing a Ph.D. who bypass completion of a Batten School M.S. degree

Note: *Batten School students generally are bound by the requirements stated in the catalog for the academic year stated in their Notification of Admission letter. A student's advisory committee may prescribe additional requirements for the student.*

Sub-concentration in Shellfish Aquaculture

Sub-concentration in Marine Policy

The sub-concentration, offered in collaboration with the College of Arts & Sciences Public Policy Program and the William & Mary Law School, exposes students to the tools and ideas that shape contemporary dialogue of coastal and marine policy. Through required coursework, students will first develop an understanding of policy structures and processes before exploring constructs, models, and methods commonly used to discuss and analyze coastal and marine policy. Completion of the sub-concentration also requires observation and reflection on coastal and marine public policy in practice. Students may need to take additional coursework over that required for the degree in order to fulfill the sub-concentration requirements. The requirements for the sub-concentration are as follows:

Requirements:

Students will select courses from thematic areas (one area must be public policy; courses are subject to the availability of seats). In addition, a "capstone" course will provide the opportunity to observe and reflect on marine public policy in practice. Students must accrue at least 10 credit hours in total.

Pre-requisites for Public Policy courses (except MSCI 689 Pub Pol for Sci & Professions and PUBP 627 Law, Policy & Environment)

- Quantitative course - MSCI 504 Stats Methods/Data Analysis will fulfill requirement.
- Economics course - MSCI 557 Economies of the Coast will fulfill requirement.

Required - One Public Policy course:

- MSCI 689 Pub Pol for Sci & Professions

Required - Two additional courses from one or more of the following thematic areas:

The following course list is subject to availability of seats.

Economics

- MSCI 557 Economies of the Coast
- MSCI 687 Environmental Policy
- PUBP 604 Microeconomics Public Policy
- PUBP 605 Macroeconomics for Public Pol
- PUBP 606 Benefit-Cost Analysis

Law

- LAW 339 Natural Resources Law
- LAW 441 Admiralty Law
- MSCI 693 Environmental Law (cross-listed with LAW 424 Environmental Law)
- MSCI 694 Land Use (cross-listed with LAW 425 Land Use Control)
- MSCI 695 Administrative Law (cross-listed with LAW 453 Administrative Law)
- MSCI 698 Topics in Marine Science (cross-listed with LAW 679 Climate Change)

Other Courses

- OEAS 690 Topics in Marine Environmental Policy (offered by Old Dominion University through a cooperative agreement)

As additional courses become available at William & Mary, including the Batten School, or through an existing agreement with Old Dominion University or other future agreements with other universities, students may petition the Batten School Associate Dean for Academic Affairs to have a course included to fulfill the thematic area requirement. Courses from other thematic areas might include social sciences (e.g., anthropology, sociology), education, maritime or marine-related business or other disciplines.

Notes: (1) Instructor or School permission may be required to enroll in courses that do not have the MSCI prefix and is subject to the availability of seats. Procedures for cross-school registration are available from the Batten School Registrar; (2) Seminar courses offered by the W&M Law School may be more appropriate than lecture courses for Batten School students; (3) Courses in the above list with the prefix LAW and PUBP are taught on the Williamsburg campus as are MSCI 687, 689, 693, 694, 695, 698: Climate Change.

Required - At least one credit of reflective practice

Taken as the last course in the marine policy subconcentration sequence, selected from:

- MSCI 688 Marine Policy & Mgmt Seminar (1-2 credits)
- MSCI 698 Topics in Marine Science (1-3 credits; course must be approved by the Batten School Associate Dean for Academic Affairs)

Supervised by a faculty member, students may self-identify opportunities to observe the coastal or marine public policy process in practice (e.g., public meetings of government commissions, agencies, or other decision-making bodies, at the local, regional, state, national or international level; policy shadowing experiences; internship; etc), and draft a 2-5 page synthesis paper, reflecting upon their observations of the policy process, integrating concepts from their prior course work, and discussing how the policy experience may relate to their science and research.

Subconcentration in Shellfish Aquaculture

The sub-concentration increases students' understanding and knowledge of the opportunities and challenges across the spectrum of shellfish aquaculture. Through required coursework, students will improve their comprehension of the types of shellfish aquaculture practiced locally and around the world. Students may need to take additional coursework over that required for the degree to fulfill the sub-concentration requirements. The requirements for the sub-concentration are as follows:

Requirements:

Students must accrue at least 10 credit hours in total.

Required - One Fundamentals course, from the following menu:

- MSCI 501E Fundamentals of Aquatic Health
- MSCI 501F Fundamentals-Mar Fisheries Sci

Required - All three modules of MSCI 560: Bivalve Shellfish Aquaculture

- MSCI 560A Shellfish Aquaculture:Bio&Prod
- MSCI 560B Shellfish Aquaculture: Env Int
- MSCI 560C Shellfish Aqua:Socioecon & Pol

Required - Five additional credit hours, from the following menu:

- MSCI 523 Human Dimensions of Marine Sci
- MSCI 534 Disease in Marine Systems
- MSCI 551 Directed Readings Shellfish Aq
- MSCI 552A Shellfish Aqua Practice: Ches
- MSCI 552B Shellfish Aqua Prac: New Persp
- MSCI 697 Advance Problem Marine Science; three course options, by arrangement:
 - Applied Breeding/Research Methods (2 credits)
 - Applied Farm Operations (2 credits)
 - Applied Hatchery & Nursery Operations (2 credits)

The above course list is subject to availability of seats. As additional courses become available at William & Mary, including the Batten School, or through an existing agreement with Old Dominion University or other future agreements with other universities, students may petition the Batten School Associate Dean for Academic Affairs to have additional courses included.