

2016

# Master of Science in Biological Sciences Program Overview

Nova Southeastern University

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## NSUWorks Citation

Nova Southeastern University, "Master of Science in Biological Sciences Program Overview" (2016). *Halmos College of Natural Sciences and Oceanography Course Catalogs*. 16.  
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# Biological Sciences 2016

## Description of Program

The M.S.B.Sc. will provide both a traditional biological curricula and innovative approaches to instruction. You will take core and required courses spanning a wide range of disciplines, from molecular, through organismal, to ecosystem-level biology. This rigorous curriculum will provide a practical foundation that can be applied as an entry point or a terminal degree professional careers in biomedicine, biotechnology and environmental biology.

You will specialize in one of two broad areas: **Molecular Biology** or **Organismal Biology**

The M.S.B.Sc. is not a lock-step program and offers both thesis and capstone (non-thesis) tracks. The capstone (non-theses) track is the default option and will require 45 credit hours (24 hours of core/required courses, 15 hours of electives, and 6 hours of capstone). The theses track will require 39 credit hours for completion (24 hours of core/required courses, 9 hours of electives, and 6 hours of theses) and also the approval of an OC faculty member to advise and support a specific research project.

One of the most innovative aspects of the curricula, is the possibility of working as an intern for course credit with one of our off- campus partners for expanded experience in various biological disciplines. These include the following:

- [Ocean Ridge Biosciences in Jupiter FL](#)
- [Ocean Genome Legacy , in Massachusetts](#)
- Broward Sheriff's DNA Laboratory
- Center for Food Safety & Applied Nutrition, US Food and Drug Administration, College Park MD
- [Dobzhansky center for Genome Bioinformatics - St Petersburg State University, Russia](#)

In the near future, the M.S.B.Sc. program plans to add greater focus on the growing field of genomics and molecular computational biological sciences. For example the Ocean Center have recently launched a "[Global Invertebrate Genomics Alliance \(GIGA\)](#)" consortium.

Moreover, a new 4 course certificate in "[computational molecular biology](#)" has now been launched through the OC. The certificate intends to give students a practical background in DNA sequence analysis and bioinformatics. The training can make them more competitive in industry job searches for this growing field. The certificate will involve 2 genomics related courses from the OC, and 2 computer science courses from the [College of Engineering and Computing](#).

Relevant courses in computer sciences (some taught by the NSU Graduate school of Computer and Information Sciences) and state of the art practical courses in bioinformatics will be added. These will enable students to gain basic training and practice that can likely translate to employment in the growing bioinformatics and genomics fields.

## Learning Outcomes

Expected learning outcomes are:

- Effective communication skills,
- A full understanding of the scientific method,
- A generalized knowledge in ecological, geological, chemical and biological concepts as they relate to the environment.
- A generalized knowledge of the natural and human-driven problems currently, and anticipated to, impact the marine environment.
- In-depth knowledge of a specific aspect of their major.

## Delivery System

On campus graduate classes typically meet one evening per week in a three hour session. Exceptions are field courses which may entail several days of intensive study. On-line courses meet periodically at the convenience of faculty and students

## Degree Tracts

There are two tracts for completing an M.S. degree.

### Capstone

**All entering M.S. students are accepted in the Capstone (also called Capstone track).** Students take a minimum 13 regular courses in their selected degree for 39 credits. Students must take Capstone Review Paper courses totaling a minimum of 6 credits (which involve submitting and defending a capstone review paper. This is typically done at or near the completion of formal coursework. The Capstone review paper is a scholarly review, based upon a comprehensive literature search, review, and synthesis of the chosen topic. Carrying out a Capstone review paper takes place with guidance from a major professor. Typically, Capstone students find a major professor by approaching faculty in the student's area of interest. Students will be assigned a Capstone advisor if they have difficulty in identifying a major professor. Prior to beginning a Capstone review paper and registering for Capstone Review Paper credits, the student must write a proposal which must be approved by the student's major professor, committee (define how committee is formed), and the Associate Dean of Academic Programs, and be submitted to the Director of Academic Support and Administration in the Program Office.

### Thesis Optional Track

Some students desire the thesis track. The thesis track requires an extra step. A thesis is an original contribution to knowledge resulting from the systematic study of a significant problem or issue. A thesis track requires a minimum of 10 regular courses for 30 credits. In addition, a minimum of 9 Thesis credits is required. To be allowed entry into the Thesis track the student must secure agreement from a faculty member to be the student's major professor. There must be adequate funding to carry out the proposed research. Students are not provided with a thesis advisor. Prior to beginning thesis research and registering for thesis credits, the student must write a proposal which must be approved by the student's major professor, committee, and the the Associate Dean of Academic Programs, and be submitted to the Director of Academic Support and Administration in the Program Office. The Thesis option is typically a longer duration track and number of credit hours than the Capstone track.

For further details, students are referred to section 3.8 of this catalog and to the online guidelines for the capstone or thesis track found on the [Halmos College of Natural Sciences and Oceanography Student Information](#) page

## **M.S. Credit Hour Requirements**

The default Capstone track requires a minimum of 45 credits. This includes five 3-credit core classes, eight 3-credit specialty courses and a minimum of two 3-credit Capstone Review Paper courses (consisting of an extended literature review of an approved subject). Once a student starts registering for capstone course credits, they cannot stop registering for credits until the capstone is completed and defended. It is expected the Capstone review paper can be completed within two terms or less. The completed Capstone review paper is presented in an open defense that includes the student's advisory committee.

The Thesis option track requires a minimum of 39 credits. This includes five 3-credit core classes, five 3-credit specialty courses, and at least nine credits of master's thesis research. The number of thesis research credits above the minimum is dependent upon the length of time needed to complete the thesis research, which may be more than the typical minimum three terms. The final thesis is formally defended in an open defense that includes the student's advisory committee.

## **Elective Courses**

Students in a single degree are allowed to take up to two elective courses outside their degree orientation and have them count towards their final credit count.

For both the Capstone Review Paper and the Thesis degree tracks, once the proposal has been accepted, enrollment in the chosen track must continue until completion of the degree.

## **Joint M.S. Degrees**

Also offered are Joint M.S. Degrees

- M.S. in Marine Biology/Coastal Zone Management
- M.S. in Marine Biology/Marine Environmental Sciences
- M.S. in Coastal Zone Management/Marine Environmental Sciences

The joint specialization M.S. degrees require a minimum of 57 course credits (19 courses) or 51 course credits (17 courses) (for Capstone review or Thesis respectively) including nine credits minimum thesis research or the six credits minimum for the capstone review paper. For the joint programs, students take approximately equal numbers of courses within each of the two specialties. The final thesis is formally defended in an open defense that includes the student's committee.

## **Curriculum**

### **Core Courses - 15 Credit Hours**

- [BCOR 5565](#) Scientific Communication and Grant Writing
- [BCOR 5560](#) Marine Biodiversity

- BCOR 5570 Biostatistics
- [BCOR 5585](#) Marine Genomics
- [BCOR 5580](#) Scientific Method and Experimental Design

**Biological Science Electives - 24 Credit Hours (Capstone Track) or 15 Credit Hours (Thesis Track)**

- [BMME 6770](#) Bacterial Evolutionary Genetics
- [BMME 8040](#) Corals from the Inside Out: Comparative Histopathology
- [BMME 5701](#) Ecosystems Applications
- [BMME 4001](#) Geospatial Field Methods
- [BMME 6000](#) GIS and Environmental Remote Sensing
- [BMME 6760](#) Histology of Marine Organisms
- [BMME 8058](#) Ichthyology
- BMME 8053 Introduction to Bioinformatics
- [BMME 6001](#) Laboratory q-PCR and Culture Techniques
- [BMME 8020](#) Marine Physiology
- [BMME 8059](#) Professional Development
- BMME 8050 Programming Data Structure/Algorithm
- [BMME 7080](#) Ultrastructure of Marine Organisms