# 11.10 Ocean Sciences

[www.mun.ca/osc](http://www.mun.ca/osc)

The Department of Ocean Sciences is the newest Department within the Faculty of Science. It was created in 2012, from the transition of the Ocean Sciences Centre, a research unit and facility that was first opened in 1967. The Department's mandate as an interdisciplinary unit is to focus on increasing our understanding of biological and chemical processes within the oceans, and how they relate to aquaculture and other applied marine fields.

The Department offers graduate programs in Marine Biology outlined under [School of Graduate Studies](https://www.mun.ca/university-calendar/school-of-graduate-studies/school-of-graduate-studies/32/16/).

The Department offers the following undergraduate programs:

1. [Honours in Ocean Sciences](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/#d.en.304121)
2. [Joint Major](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/10/1/#d.en.303971) or [Joint Honours](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/10/2/#d.en.303992) in Marine Biology
3. [Major in Ocean Sciences](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/#d.en.304124)
4. [Major in Ocean Sciences (Environmental Systems)](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/#d.en.304124)
5. [Minor in Oceanography](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/#d.en.304126)
6. [Minor in Sustainable Aquaculture and Fisheries Ecology](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/#d.en.304117)

Details of the Joint programs can be found under [Joint Program Regulations](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/10/).

Ocean Sciences course descriptions are found at the end of the Faculty of Science section under [Course Descriptions, Ocean Sciences](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/).

#### [11.10.1 Minor in Oceanography](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/#11.10.1)

Students who take a Minor in Oceanography will complete 24 credit hours as follows:

1. Ocean Sciences [1000](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [2000](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [2100](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [2200](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [2300](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/);
2. Earth Sciences [1000](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/); and
3. Six credit hours that can be selected from:
   1. Biology [3014](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [3709](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [3710](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [3711](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [3712](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [3714](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [3715](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [4122](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [4601](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [4710](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [4750](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [4810](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/);
   2. Chemistry [2100](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [3110](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [4151](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [4156](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/);
   3. Earth Sciences [4302](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [4420](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/);
   4. Geography [3120](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [3510](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [4190](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [4300](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/);
   5. Environmental Science [3072](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [3210](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [3211](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [4230](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/);
   6. Ocean Sciences [2001](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [3000](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [3002](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [3600](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [4000](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [4122](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [4300](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [4601](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/);
   7. Physics and Physical Oceanography [3300](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [3340](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [4300](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [4340](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/); and
   8. Other applicable ocean-related courses, as approved by the Head of the Department (or delegate).

Course prerequisites stipulated In the [Course Descriptions](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/) section shall apply to the Minor in Oceanography.

#### [11.10.2 Minor in Sustainable Aquaculture and Fisheries Ecology](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/#11.10.2)

Students who take a Minor in Sustainable Aquaculture and Fisheries Ecology will complete 24 credit hours as follows:

1. Ocean Sciences [1000](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [2001](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [3000](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [3002](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [4300](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/);
2. six credit hours selected from: Ocean Sciences [2000](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [3600](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [3640](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [4000](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [4122](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [4200](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [4601](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), or other applicable courses at the 3000 level or above, as approved by the Head of the Department or delegate;
3. three credit hours selected from:
   1. Biology [2122](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [3401](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [3640](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [3710](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [3715](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [4251](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [4605](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [4750](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/);
   2. Human Biosciences [3101](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [3207](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [3402](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [4002](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [4101](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [4104](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [4200](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [4201](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/) or the former Biochemistry 3107, 3402, 4002, 4101, 4104, 4105, 4200, 4201;
   3. Geography [4300](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/).

Course prerequisites stipulated in the [Course Descriptions](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/) shall apply to the Minor in Sustainable Aquaculture and Fisheries Ecology.

#### [11.10.3 Major in Ocean Sciences and Major in Ocean Sciences (Environmental Systems)](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/#11.10.3)

1. The Major in Ocean Sciences is an interdisciplinary program that provides a solid foundation in ocean studies, including the basic principles of its main sub-disciplines (physical, chemical, geological, and biological oceanography).
2. The Major in Ocean Sciences (Environmental Systems) is a stream of the major that provides a geological/geographical context to biological and chemical phenomena in ocean sciences, and covers such key ocean-related topics as climate change and natural hazards.
3. Students wishing to take one of these major programs are encouraged to carefully consult the [Degree Regulations](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/4/) for the General Degree of Bachelor of Science.
4. More information, including on how to declare a Major in Ocean Sciences, the recommended courses and time tables, can be found in the [Handbook of Undergraduate Studies in Ocean Sciences](https://www.mun.ca/osc/undergraduates/resources-and-forms).

#### [11.10.3.1 Admission Requirements for the Major in Ocean Sciences or the Major in Ocean Sciences (Environmental Systems)](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/#11.10.3.1)

Admission to the Ocean Sciences Major Programs is based on academic standing. To be considered for admission, students must normally have completed 30 credit hours with a minimum of 24 credit hours in Science, and an overall average of at least 65%. It is recommended that the following courses be successfully completed before admission:

1. Biology [1001](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/) and [1002](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/);
2. Chemistry [1050](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/) and [1051](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/) (or [1200](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/) and [1001](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/));
3. Earth Sciences [1000](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/);
4. Six credit hours in [Critical Reading and Writing (CRW)](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-humanities-and-social-sciences/6/1/#d.en.307242) courses, including at least 3 credit hours in English courses;
5. Mathematics [1000](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/) (or equivalent);
6. Ocean Sciences [1000](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/) with a minimum grade of 65%; and
7. Physics [1020](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/) or ([1050](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/)) or 3 credit hours in Ocean Sciences courses at the 2000 level.

Students are advised to consult with the Department at the earliest opportunity to prepare adequately for program admission. Each student majoring in Ocean Sciences will be assigned an advisor who should be consulted on academic issues, including course selection.

#### [11.10.3.2 Program Regulations for the Major in Ocean Sciences](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/#11.10.3.2)

Students must successfully complete:

1. the 30 specified credit hours required under [Admission Requirements for the Major in Ocean Sciences or the Major in Ocean Sciences (Environmental Systems)](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/#d.en.304123);
2. Statistics [2550](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/) or any of the courses listed in the credit restrictions of Statistics [2550](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/);
3. Physics [1021](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/) or [1051](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/);
4. a minimum of 30 credit hours in Ocean Sciences, including:
   1. Ocean Sciences [2000](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [2001](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [2100](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/) and at least one of [2500](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/) or [4500](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/) (or Biology [3709](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/) or [4710](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/)). Ocean Sciences [1000](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), successfully completed under [Admission Requirements for the Major in Ocean Sciences or the Major in Ocean Sciences (Environmental Systems)](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/#d.en.304123), will count as 3 of the required 30 credit hours in Ocean Sciences;
   2. at least one of Ocean Sciences [2200](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/) or [2300](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/); and
   3. at least 9 credit hours in Ocean Sciences courses at the 3000 and/or 4000 level.
5. extra Science courses as necessary to fulfil the minimum requirement for 78 credit hours in Science as stipulated under [Electives](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/4/6/) of the [Degree Regulations](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/4/) for the General Degree of Bachelor of Science. The program should include a minimum of 15 credit hours in Science courses at the 3000 and/or 4000 level; and
6. elective courses as necessary to make up the total of 120 credit hours.

#### [11.10.3.3 Program Regulations for the Major in Ocean Sciences (Environmental Systems)](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/#11.10.3.3)

Students must successfully complete:

1. the 30 credit hours required under [Admission Requirements for the Major in Ocean Sciences or the Major in Ocean Sciences (Environmental Systems)](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/#d.en.304123);
2. Statistics [2550](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/) or any of the courses listed in the credit restrictions of Statistics [2550](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/);
3. Physics [1021](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/) or [1051](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/);
4. Geography [1050](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), and at least two of Geography [2102](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [2195](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), or [2425](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/);
5. Earth Sciences [1002](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [2502](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/);
6. at least 9 credit hours at the 3000 and/or 4000 level chosen from:
   1. Geography [3120](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [3140](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [3250](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [3425](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [3510](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [4050](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [4060](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [4190](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [4250](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [4917](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/); and
   2. Earth Sciences [3600](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [4605](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [4903](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/).
7. a minimum of 30 credit hours in Ocean Sciences, including:
   1. Ocean Sciences [2000](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [2001](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [2100](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/) and at least one of [2500](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/) or [4500](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/) (or Biology [3709](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/) or [4710](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/)). Ocean Sciences [1000](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), successfully completed under [Admission Requirements for the Major in Ocean Sciences or the Major in Ocean Sciences (Environmental Systems)](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/#d.en.304123), will count as 3 of the required 30 credit hours in Ocean Sciences;
   2. at least 9 credit hours in Ocean Sciences courses at the 3000 and/or 4000 level.
8. elective courses as necessary to make up the total of 120 credit hours.

#### [11.10.4 Honours in Ocean Sciences](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/#11.10.4)

1. The Honours in Ocean Sciences is an interdisciplinary program that provides a solid foundation in ocean studies, including the basic principles of its main sub-disciplines (physical, chemical, geological, and biological oceanography). Possession of this degree will be of great advantage to students planning advanced work or graduate studies in a marine science field.
2. The Honours in Ocean Sciences requires a minimum of 45 credit hours in Ocean Sciences as outlined below. The program includes a prescribed number of courses at the 3000/4000 level as well as mandatory successfully completion of Ocean Sciences [499A/B](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), which consist of supervised research leading to the submission and oral defence of a dissertation.
3. The Honours program may comprise a broad base of courses following the model of the generic [Major in Ocean Sciences](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/#d.en.304119) or be more specifically focused, in line with the stream in [Environmental Systems](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/#d.en.304120). Upon admission, the student’s Honours program will be defined in consultation with the student's supervisor, and approved by the Head of the Department (or delegate) in accordance with the [Degree Regulations](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/4/) for the Honours Degree of Bachelor of Science.
4. Students considering this program are strongly encouraged to carefully consult the [Degree Regulations](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/4/) for the General Degree of Bachelor of Science.
5. In addition to the information below, further information, including the admission process, program requirements, the recommended courses, and time tables, can be found in the [Handbook of Undergraduate Studies in Ocean Sciences](https://www.mun.ca/osc/undergraduates/resources-and-forms/).

#### [11.10.4.1 Admission Requirements for the Honours in Ocean Sciences](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/#11.10.4.1)

1. Admission to the Ocean Sciences Honours Program is based on academic standing. Students should be enrolled in one of the [Major](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/#d.en.304124) programs offered by the Department of Ocean Sciences before applying to the Honours, normally upon completing the third year of their program. For admission to the Honours program, students shall, at a minimum, have completed all admission requirements for their Major program.
2. Students should plan well in advance to ensure they have completed all the appropriate prerequisites. Entry to required courses may be limited and determined by academic performance. Students are advised to consult with the Department at the earliest opportunity to prepare adequately for program admission. Each student registered in the Honours will be assigned an advisor who should be consulted on academic issues, including course selection.

#### [11.10.4.2 Program Regulations for the Honours in Ocean Sciences](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/#11.10.4.2)

Students must successfully complete:

1. the 30 credit hours required under [Admission Requirements for the Major in Ocean Sciences or the Major in Ocean Sciences (Environmental Systems)](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/#d.en.304123);
2. Chemistry [2400](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/) (or equivalent). Chemistry [2440](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/) will be accepted as a substitute for Chemistry [2400](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/). However, a number of advanced Science courses may require Chemistry [2400](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/) and [2401](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/). Students are therefore strongly encouraged to successfully complete the Chemistry [2400](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/)/[2401](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/) sequence or otherwise carefully plan their options;
3. Physics [1021](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/) or [1051](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/);
4. Statistics [2550](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/) or any of the courses listed in the credit restrictions of Statistics [2550](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/);
5. a minimum of 12 credit hours chosen from:
   1. Biology [2060](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [2122](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [2250](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [2600](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [2900](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/);
   2. Human Biosciences [2001](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [2003](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [2004](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [3004](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [3207](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), or the former Biochemistry 2100, 2101 or 2201, 3106 or 3206, 3107 or 3207, 3108;
6. a minimum of 45 credit hours in Ocean Sciences, including:
   1. Ocean Sciences [2000](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [2001](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [2100](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [2200](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), [2300](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/) and at least one of [2500](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/) or [4500](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/) (or Biology [3709](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/) or [4710](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/)). Ocean Sciences [1000](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), successfully completed under [Admission Requirements for the Major in Ocean Sciences or the Major in Ocean Sciences (Environmental Systems)](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/#d.en.304123), will count as 3 of the required 45 credit hours in Ocean Sciences;
   2. at least 18 credit hours in Ocean Sciences courses at the 3000 and/or 4000 level.
   3. Ocean Sciences [499A/B](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/); and
7. elective courses as necessary to make up the total of 120 credit hours including a minimum of 15 credit hours at the 3000 and/or 4000 level in any of Biology, Chemistry, Earth Sciences, Environmental Science, Geography, Human Biosciences, Ocean Sciences or Physics (these 15 credit hours can include courses completed as part of the requirements in 5.b. but not those required as part of 6. above).

Those courses in which a grade "B" or an average of 75% or higher are required to graduate with an Honours degree as per clause 1. of [Academic Standing](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/4/8/#d.en.304721) in the [Degree Regulations](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/4/) for the Honours Degree of Bachelor of Science, are the Ocean Sciences courses at the 2000, 3000 and/or 4000 level, and 15 credit hours in courses at the 3000 and/or 4000 level in any of Biology, Chemistry, Earth Sciences, Environmental Science, Geography, Human Biosciences, or Physics.

Students should be aware of a number of credit restrictions and refer to the [Course Descriptions](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/) section for information.

#### [11.10.4.3 Honours Dissertation](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/#11.10.4.3)

The dissertation is a crucial part of the program. It involves an original piece of research undertaken under the supervision of a faculty member of the Department of Ocean Sciences (or someone holding cross-appointment or adjunct status in the Department), as approved by the Head of the Department. This segment of the program is Ocean Sciences [499A/B](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/), a two-semester, 6 credit hour linked course, where a grade of PAS in 499A is required in the first semester in order to proceed to 499B.

Work conducted during Ocean Sciences [499A/B](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/11/10/) includes directed reading relevant to the dissertation topic, preparation of a dissertation outline, supervised research, data analysis and interpretation, a written dissertation and an oral defence. Electronic copies of the dissertation, complete with figures and tables, are to be submitted to the student’s supervisor and to the Head of the Department not less than two weeks before the end of lectures in the semester in which the student is registered for Ocean Sciences 499B.

The student will be examined orally on the contents of the dissertation, normally before the last day for examinations in the semester. The examining committee shall consist of the Head of the Department (or delegate), the student's supervisor, and an examiner appointed by the Head of the Department in consultation with the student's supervisor.

Ocean Sciences courses are designated by OCSC.

##### [OCSC 1000 Exploration of the World Ocean](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/#d.en.304656)

is an introductory course covering the major ocean sciences (biology, chemistry, geology, physics) at a level sufficient for science majors but accessible to non-science majors. It explores phenomena occurring from the shoreline to the abyss and from equatorial to polar regions. It also examines principles of marine ecology as well as how the marine environment affects humans and vice versa. The course is offered either in a blended format (combining face-to-face lectures and online interactive activities in the form of virtual oceanographic expeditions) or exclusively online.

LC: a maximum of 1.5 hours per week

OR: a maximum of 3 hours per week of online interactive activities

##### [OCSC 2000 Introductory Biological Oceanography](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/#d.en.304642)

provides a general understanding of the biological processes that occur in coastal and oceanic environments. It introduces students to the major groups of bacteria, phytoplankton, invertebrates and fish, emphasizing the biotic and abiotic factors controlling primary production and marine biomass. It shows how the physical, chemical, and geological environments interact with biology to define processes and patterns affecting nutrients and life in marine ecosystems.

PR: OCSC [1000](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/) and another 1000-level course in one of Biology, Chemistry, Earth Sciences or Physics (or BIOL [1001](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/) and [1002](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/))

##### [OCSC 2001 Introduction to Sustainable Fisheries and Aquaculture](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/#d.en.304646)

introduces students to the breadth of aquaculture and fisheries science and the variety of animal species cultured and harvested. Basic aspects of aquaculture and fisheries and the links between the two are covered, including production systems, capture fisheries, environmental interactions, and the physiology, ecology and reproduction of finfish and shellfish in the context of their culture and harvest.

PR: OCSC [1000](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/) or Biology [1002](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/)

##### [OCSC 2100 Introductory Chemical Oceanography](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/#d.en.304651)

provides an introduction to the fundamental chemical properties of seawater and the processes governing the concentrations of elements and compounds in the oceans. It is an introduction to the sources, distribution, and transformations of chemical constituents of the ocean, and their relation to biological, chemical, geological, and physical processes. Topics include: controls on average concentration of chemicals in the ocean; vertical and horizontal distributions of ocean constituents; air-sea interactions; production, export, and remineralization of organic matter; the ocean carbon cycle; human-induced changes; stable isotopes; and trace elements.

EQ: Chemistry [2610](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/)

PR: the former CHEM 1011 or [1051](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/) or [1001](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/) which may be taken concurrently

##### [OCSC 2200 Introductory Geological Oceanography](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/#d.en.304661)

is a study of the formation and evolution of oceans, including plate tectonics, mid-ocean ridges (birth place of oceans), subduction zones (where oceans are consumed), sedimentary environments such as estuaries, deltas, beaches and barrier islands, continental shelves, slopes and deep abyssal plains and special topics, including anoxic events, evolution of tides, atmosphere-ocean interactions, formation of banded iron formations, snowball Earth, black and white smokers, and how Earth modulates its climate through atmosphere, hydrosphere, biosphere and lithosphere interactions.

EQ: Earth Sciences [2919](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/)

PR: Earth Sciences [1000](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/) with a grade of at least 55%

##### [OCSC 2300 Introductory Physical Oceanography](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/#d.en.304648)

provides an introduction to general oceanography with a primary focus on physical oceanography. Topics include how oceans form and evolve on a planetary scale. Ocean characteristics studied include: the properties of seawater; elementary dynamics of fluids on the rotating Earth; ocean circulation; wind-forcing in the ocean; tides and waves. Contemporary methods used in oceanographic study are covered including satellite oceanography. Interactions that occur between physical and chemical processes and biological activity are reviewed.

CR: Environmental Science [2371](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/)

EQ: Physics [2300](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/)

PR: 6 credit hours in any first-year courses in Physics

##### [OCSC 2500 Introduction to Practical Ocean Sciences](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/#d.en.304657)

explores the instruments, techniques and analytical methods commonly used to study marine life and processes, chiefly focusing on the interaction between living organisms and their chemical, physical and geological environment. The course combines ship-based or shore-based sampling and data collection with laboratory investigation in an intensive 2-week long format. It is primarily intended for mid-level undergraduate students majoring in Ocean Sciences or Marine Biology. This course will either be offered during a special session following the Winter semester, or in the Spring semester.

AR: attendance is required. Failure to attend may result in a failing grade or withdrawal from the course.

PR: Science [1807](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/) and Science [1808](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/); OCSC [1000](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/), and at least three of OCSC [2000](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/) (or Biology [3710](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/)), [2001](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/), [2100](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/), [2200](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/), [2300](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/)

##### [OCSC 3000 Aquaculture Principles and Practices](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/#d.en.304647)

emphasizes the techniques and methods used to culture finfish and shellfish, with a primary focus on Canadian aquaculture species. Basic aspects of aquaculture will be covered, including the design and maintenance of production systems, culture techniques, and the nutrition, health, physiology and reproduction of finfish and shellfish. The laboratory portion of this course will provide students with practical experience in the maintenance of land-based aquaculture production systems and in the husbandry/culture of aquatic organisms.

LH: 3

PR: OCSC 2001, or OCSC [1000](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/) and Biology [1002](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/)

##### [OCSC 3002 Aquaculture and Fisheries Biotechnology](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/#d.en.304643)

is an introduction to biotechnology and genetics as they are applied to aquaculture and fisheries. Topics covered include genetic variation; genetic structure of fish and shellfish populations; the genetic basis of aquaculture traits; finfish and shellfish genomic research; marker-assisted selection in aquaculture; manipulation of ploidy; genetic engineering in aquaculture; and techniques used to study the responses of aquatic animals to external stressors such as hypoxia, temperature stress, acidification, and pathogens.

PR: Biology [2250](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/) or Human Biosciences [2004](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/) or the former Biochemistry 2100 or 2200

##### [OCSC 3600 Marine Microbiology](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/#d.en.304650)

provides an overview of microbial activity in the ocean, both in natural and applied settings. The focus is on interactions between microorganisms and other biota, ranging from deep-sea vent invertebrates to commercially cultured fish species. Prospective topics include effluent discharge, water quality, bacterial metabolism and nutrient cycles, bacteria-virus and bacteria-host interactions (including symbioses and pathogenesis), and marine microbial biotechnology.

CO: Biology [2250](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/) or Human Biosciences [2004](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/) or the former Biochemistry 2100 or 2200

##### [OCSC 3640 Environmental Physiology of Animals](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/#d.en.304655)

covers physiological adaptations of animals facilitating their survival in natural environments with emphasis on physiological and biochemical responses of animals to extreme environments. Starting with the fundamental basis of physiological mechanisms, the course explores various aspects and the integration of major physiological processes (metabolism, respiration, osmoregulation) and how these relate to ecological niche.

CR: the former Biology 3403 or the former Biology 4455

EQ: Biology [3640](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/)

PR: Biology [2060](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/); Human Biosciences [2003](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/) or the former Biochemistry 3106 or 3206

UL: may not be used to fulfill the physiology course requirement for a Biology major, honours or joint honours program

##### [OCSC 3710 Laboratory Methods in Biological Oceanography](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/#d.en.320377)

uses a practical laboratory-based approach to investigate interactions between marine life and their ocean environment and is intended for students of biology and ocean science. Both experimental and computer-based modelling labs will cover topics such as historical and modern approaches for investigating planktonic life, life in and near the seafloor, and life in the sea surface microlayer.

EQ: Biology [3710](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/)

PR: Science [1807](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/) and Science [1808](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/); Ocean Sciences [2000](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/)

##### [OCSC 3711 Principles of Marine Biology](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/#d.en.320312)

is an introductory course in biology of the oceans. Introduces students to marine habitats and the organisms that inhabit them, emphasizing functional morphology, physiology, biodiversity, phylogeny, and ecology. Also includes introduction to marine biogeography, conservation, fisheries and pollution.

EQ: Biology [3711](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/)

LC: either three hours of lecture and three hours of laboratory per week or a two-week field course that embodies equivalent instructional time

LH: either three hours of lecture and three hours of laboratory per week or a two-week field course that embodies equivalent instructional time

PR: Science [1807](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/) and Science [1808](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/); Biology [2122](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/), Biology [2600](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/)

##### [OCSC 3714 Estuarine Fish Ecology Field Course](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/#d.en.320313)

examines community structure, function and distribution of northern coastal fishes in fjords and estuarine environments. Emphasis on sampling, field techniques, taxonomy, quantitative characterization, adaptations and habitat relationships. A comparative approach will contrast fish communities from other areas. To be held as a two week field course.

EQ: Biology [3714](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/)

PR: Science [1807](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/) and Science [1808](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/); Biology [2600](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/)

##### [OCSC 3715 Ecology and Evolution of Fishes](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/#d.en.320314)

examines the evolutionary history and ecology of the world’s fishes, with particular emphasis on those of ecological, economical and cultural importance to Eastern Canada. Topics will include taxonomy, life histories, behaviour, zoogeography, evolutionary ecology, population biology, contemporary evolution, and conservation biology.

EQ: Biology [3715](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/)

LH: 3

PR: Science [1807](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/) and Science [1808](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/); Biology [2600](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/) and [2900](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/)

##### [OCSC 4000 Scientific Diving Methods](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/#d.en.312490)

is an in-depth study and application of methods routinely employed for data collection in underwater scientific research. Aspects covered include habitat mapping; installation and use of instrumentation; still and video camera techniques; planning and execution of surveys and experiments in major subtidal habitats; as well as data analysis and interpretation. Participants are trained in accordance with Memorial University of Newfoundland’s Guide for Diving Safety and the Canadian Association for Underwater Science (CAUS) standards to meet the criteria for Scientific Diver I rating. This course is normally offered at the Ocean Sciences Centre in a special 2-week session at the beginning or end of the Spring semester.

OR: The following documentation must be provided to the course instructor at least four months before the first day of the course. It must be in effect until at least the last day of the course. Submission of this documentation does not guarantee acceptance into the course. Aside from course prerequisites, acceptance will be based on successful completion, before the course begins, of a diving fitness and skills evaluation in a pool environment and demonstration of understanding of the MUN Diving Safety Manual, physics and physiology of diving, and use of recreational dive tables. Nationally recognized scuba diver certification with diver rescue and accident management techniques; diver medical examination by a licensed physician knowledgeable in diving medicine; First Aid (basic), CPR (basic), and DAN oxygen first aid for scuba diving injuries administration cards; DAN membership and insurance or medical insurance covering hyperbaric treatment; diver’s log book with at least 12 dives in the last 12 months including one dive in the last six months and four dives in cold (<10°C) water; cold-water scuba diving equipment complete with proper hydrostatic/VIP service tags on diving cylinders and overhaul/service receipts on regulators and buoyancy compensator devices.

PR: OCSC [2000](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/) (or Biology [2122](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/) and [2600](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/); or Biology [3709](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/); or Biology [3710](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/); or Biology [3711](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/); or Environmental Science [2371](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/)), Statistics [2550](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/) or equivalent

##### [OCSC 4605 Statistics in the Biological and Environmental Sciences](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/#d.en.320302)

is quantitative reasoning using verbal, graphical and statistical models of scaled quantities (units and dimensions). Exploratory and confirmatory analysis of field and laboratory data. Hypothesis testing, randomization tests, and likelihood ratios. Topics include the general linear model (t-tests, ancova etc), correlation, multivariate methods, mixed models, Poisson and logistic regression.

EQ: Biology [4605](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/)

LH: 3

PR: Statistics [2550](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/) or any of the courses listed in the credit restrictions of Statistics [2550](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/) or permission of the instructor

##### [OCSC 4122 Advanced Studies in Marine Animal Diversity](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/#d.en.304659)

provides an in-depth examination of cellular, physiological, behavioural and ecological adaptations in marine animals. Lectures will be combined with discussions of relevant papers from the primary literature on topics of current interest which may relate morphology, ecology, evolution, natural history, species interactions and practical applications. Students will also gain hands-on experience by designing and conducting research projects involving live or preserved animals.

EQ: Biology [4122](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/)

LC: either three hours of lecture and three hours of laboratory per week or a two-week intensive course that embodies equivalent instructional time

LH: either three hours of lecture and three hours of laboratory per week or a two-week intensive course that embodies equivalent instructional time

PR: Science [1807](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/) and Science [1808](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/); OCSC [2000](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/) and [2500](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/) (or Biology [2122](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/)), and Biology [2600](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/)

##### [OCSC 4200 Marine Omics](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/#d.en.304645)

provides an overview of marine genomics, transcriptomics, proteomics, glycomics, metabolomics, and lipidomics. Omics-based studies of a variety of marine organisms (e.g. fungi, algae, animals), as well as several industrial applications (e.g. biofuel, nutrigenomics, pharmacogenomics, aquaculture and fisheries), will be considered.

PR: OCSC [1000](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/) and Biology [2250](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/) (or Human Biosciences [2004](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/) or the former Biochemistry 2100 or 2200), or OCSC [3002](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/)

##### [OCSC 4300 Climate Change and Global Marine Fisheries Dynamics](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/#d.en.304653)

explores the effects of ocean-atmosphere dynamics on large scale marine ecosystem domains, with a special focus on assessing the impact of anticipated climate change on global fisheries production. The course uses a blend of lectures and computer simulation laboratories to familiarize students with current research on fisheries and climate change.

LH: 3

PR: OCSC [1000](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/), [2000](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/) (or Biology [3710](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/)) and [2001](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/)

##### [OCSC 4400 Deep-Sea Ecology](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/#d.en.304660)

provides an overview of the physical and chemical environment of the deep sea, including hydrothermal vents and seeps, to explore adaptations in deep-sea organisms and biodiversity in this key oceanic system. The course combines lectures, seminars, discussions and computer-based laboratory tools, such as dive logs from remotely operated vehicles and data from underwater cabled observatories. It introduces students to emerging research, cutting-edge technologies, as well as natural and human impacts in the deep sea.

LH: 3

PR: OCSC [2500](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/) and at least one course in Ocean Sciences at the 3000 or 4000 level

##### [OCSC 4500 Experimental Marine Ecology](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/#d.en.304640)

is a two-week intensive course that examines the ecology of cold oceans, focussing on energy flux through Newfoundland waters, and how the dynamics of this environment influence linkages among organisms in different habitats. The course is field and lab intensive, with lectures and a strong hands-on component. Students will collect field samples, identify local organisms from the plankton or the benthos, plan and conduct an experiment, and learn to interpret and present the gathered results. This course is offered during two weeks of the Spring or Fall semesters.

EQ: Biology [4710](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/)

PR: Science [1807](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/) and Science [1808](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/); Biology [2600](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/) or at least three of OCSC [2000](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/) (or Biology [3710](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/)), [2001](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/), [2100](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/), [2200](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/), [2300](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/)

##### [OCSC 4600 Crustacean Biology](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/#d.en.320571)

is designed to give students exposure to all aspects of crustacean biology including, but not limited to classification, anatomy and morphology, physiology, behaviour, fisheries and aquaculture. The lectures are combined with interactive activities where students can look at representative specimens, learn through dissection and simple behavioural experiments.

EQ: Biology [4600](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/)

LH: 3

PR: OCSC [2000](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/); Biology [2122](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/) and [2600](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/)

##### [OCSC 4601 Functional Biology of Fish](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/#d.en.304641)

is an introduction to anatomical, physiological and cellular processes in the life cycle of fishes.

EQ: Biology [4601](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/)

PR: Biology [2060](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/), [2210](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/); Biology [3401](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/) or [3640](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/) is recommended

##### [OCSC 4602 Reproductive Strategies of Marine Animals](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/#d.en.320572)

explores the principles and tactics of reproduction in an evolutionary ecology context, with an emphasis on adaptations to the marine environment. It focuses on the behavioural, ecological and life-history means by which marine animals maximize their lifetime reproductive success. The course covers such topics as sex determination, hermaphroditism, sex ratio, reproductive allocation, mating systems, sexual selection, sexual dimorphism, and parental investment. Various reproductive strategies are exemplified in the major groups of marine animals.

LH: 3

PR: OCSC [1000](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/), Biology [2600](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/) and [2900](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/)

##### [OCSC 4603 Immunobiology of Aquatic Organisms](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/#d.en.320574)

provides an overview of immunology of aquatic organisms. The focus is on comparative immunology, immune response to infections and environmental stressors (e.g. temperature, pollutants), and vaccinology of commercially cultured fish species. This course also covers topics related to the origin of adaptive immunity, antigen recognition and antibody diversity, memory immune response, and vaccine development. Lab visits and mini-labs are part of this course.

CO: Biology [2060](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/)

LH: 3

PR: Biology [2250](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/) or Biochemistry [2100](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/) or Biochemistry [2200](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/)

##### [OCSC 4700 Hot Topics in Oceanography](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/#d.en.320570)

focuses on areas of study of heightened current interest to both oceanographers and the public. Examples include changes in ocean conditions under global warming and degradation of the marine environment by polluting plastics. This course provides students with current information on a Hot Topic and prepares them for public speaking. Students are encouraged to think about relevant issues from both a scientific and societal perspective.

LH: 3

PR: OCSC [1000](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/) and a minimum of 3 credit hours at the 3000 level in any Science course

##### [OCSC 4910-4919 Special Topics in Ocean Biogeochemistry](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/#d.en.304652)

are advanced courses for senior undergraduate students that cover one or several subjects related to environmental changes and the flow of major elements in marine systems.

PR: to be determined at the time of offer

##### [OCSC 4920-4929 Special Topics in Marine Ecology](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/#d.en.304649)

are advanced courses for senior undergraduate students that cover one or several subjects related to evolutionary and ecological principles at the organisimal and ecosystem levels in marine systems.

PR: to be determined at the time of offer

##### [OCSC 4930-4939 Special Topics in Experimental Marine Biology](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/#d.en.304658)

are advanced courses for senior undergraduate students that cover one or several subjects related to research in marine biology, such as field and laboratory experimental design, data analysis and modeling.

PR: to be determined at the time of offer

##### [OCSC 4940-4949 Special Topics in Applied Ocean Sciences](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/#d.en.304639)

are advanced courses for senior undergraduate students that cover one or several subjects of special interest in applied fields of ocean sciences, such as fisheries, conservation, aquaculture, and biotechnology.

PR: to be determined at the time of offer

##### [OCSC 499A/B Honours Dissertation](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/#d.en.304644)

is a two-semester linked course based on independent research conducted under the supervision of an academic supervisor, who is normally a faculty member of the Department of Ocean Sciences. This dissertation is mandatory for students pursuing the Honours in Ocean Sciences. It can also be used towards the requirements of the Joint Honours in Marine Biology. A grade of PAS in 499A is required to proceed to 499B. The final written dissertation is normally submitted before the end of the tenth week of the second semester and an oral presentation of the completed research is delivered before the end of the semester.

CH: 6

PR: Honours students in their final year or permission of the Head of the Department; Science [1807](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/) and Science [1808](https://www.mun.ca/university-calendar/st-johns-campus/faculty-of-science/13/10/)