OCSC 7200 **Winter 2023**

Adaptations to the Marine Environment **Course Syllabus**

Course co-coordinator contacts [offices at the Ocean Sciences Centre (OSC)]:

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Contact information for additional course instructors (offices at the OSC):

Name	Office	Phone	Email
Dr. Ian Fleming	AX 4022A	864-3586	ifleming@mun.ca
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Course format: One session per week: OSC Challenger Room, Wednesday 1:00-4:00 pm

Course description:

Covering more than 70% of the planet, the oceans are a huge and dynamic environment that contain a diversity of distinct habitats which can be defined by specific conditions/regimes of salinity, temperature, pH, light, pressure, oxygen levels, current, nutrient sources, pollutants, etc. Marine organisms have developed a number of mechanisms (e.g. at the behavioural, organismal, cellular, and molecular levels) that allow them to become uniquely adapted to more delimited niches, or to tolerate a wide range of environmental conditions. For example, in the intertidal zone, marine organisms must withstand wave action, and periodic exposure to the sun and air; in the deep sea, they face crushing pressures and constant darkness; in estuaries, they experience significant daily and seasonal variations in salinity, temperature, oxygen levels and other factors.

Using a combination of lectures, student presentations and discussions, this course will provide an overview of the fascinating adaptations displayed by marine organisms, as well as opportunities for more in-depth assessments of particular functions or processes. Marine habitats (e.g. deep sea, polar environments, intertidal) will be used to highlight specific molecular, physiological and ecological responses (e.g. photoadaptation, symbiosis, host-pathogen interactions, life-history strategies, signaling/communication, chemosynthesis, metabolic restructuring). Students will also explore adaptations specific to particular taxa, the cellular and molecular mechanisms underlying a variety of adaptations, and the influence of anthropogenic disturbances on marine organisms.

Evaluation

Short student presentations: Each student will be required to make three short oral presentations and associated written assignments (one for each Module) based on papers they select. Each oral presentation will be 12-15 min in length with 5 minutes for discussion facilitated by the speaker. The oral presentation should describe the major findings of the study, the experimental approaches, and how the results contribute to our further understanding of the information under discussion in the specific module of the course. A general marking scheme for oral presentations will be posted on Brightspace. Additional details on the written assignments will be provided by the instructors of each Module. The written assignments will be associated with the student-selected papers.

The paper will be selected from the recent primary literature by the student and must be in the general topic area under discussion. The paper must be approved by one of the module instructors. A pdf of the front page of the paper including the abstract should be sent to mrise@mun.ca 2 days before class, and this will be posted on Brightspace. All students should read at least the abstracts in order to be better informed for discussion.

Discussion/participation: It is anticipated that each student will make a significant contribution to the discussions and question periods throughout the entire course.

Major student presentation: Each student will be required to deliver a major oral presentation of approximately 20 min (and facilitate a subsequent discussion of 5-10 min) on a topic of their choosing. The topic, including a preliminary list of references, must be approved by one of the course instructors and the course coordinators no later than **Feb. 27**. The material covered should be fairly comprehensive in nature and give consideration to information from biochemical/molecular through physiological to ecological levels. The objective will be a presentation that integrates the material into a comprehensive story that ties in levels of biological organization.

In addition, to the oral presentation students are required to submit a slide-by-slide script of their presentation (with references) which will be evaluated on content including aspects such as synthesis and comprehensiveness of the selected topic, and the quality of writing (e.g. grammar, organization, sentence structure, length). The script allows the presenter to organize their thoughts and what they want to say about each slide. The idea is to practice the presentation with the script a few times so that the presentation can be given in a natural manner without having to read the script. The script document (with a reference section formatted in the style of a recognized journal) should be sent to mrise@mun.ca 2 days before class. The Powerpoint presentation and script doc files will be posted on Brightspace (with the students' permission). All students should read these in order to be better informed for discussion.

The speaker order for the major presentations will be based on volunteers first and thereafter on a lottery system. This will be determined in class on March 15.

Examples of topics are as follows:

Adaptations in Antarctic animals to life at constant sub-zero temperatures.
Evolutionary adaptation of marine plankton to global change.
Adaptive strategies employed by ‘diving' animals.
Adaptations to life in wave-swept environments.
Adaptations of seaweeds to herbivory.
Adaptations of marine organisms to the estuarine environment.
Adaptations of marine invertebrates (e.g. mussels, lobster, nematodes) to salinity stress.
Marine microbe responses/adaptations to environmental changes.
Early and later life stage responses/adaptations of echinoderms to ocean acidification.
Adaptations of reef-building coral to elevated temperature or ocean acidification.

Marking scheme:

Three short oral presentations	3 x 10% =	30%
Three short assignments	3 x 10% =	30%
Final major presentation (oral Powerpoint)		20%
Final major presentation (written script)		10%
Class participation		10%
	TOTAL:	100%

Course schedule:

1. (Jan. 11) Introduction to the course
   Nature of course and evaluation method - Dr. Matt Rise
   Overview presentation – Introduction to Sea Water - Dr. Chris Parrish
   Each instructor to speak briefly about their interests and how their module fits into the course.
   All students will introduce themselves.

Module 1. Life History and Reproductive Adaptations to the Marine Environment
Instructors - Dr. Ian Fleming and Dr. Annie Mercier

2. (Jan. 18) Instructor presentations/discussions (~ 1 to 1.5 hours each)
Each instructor will provide a recent paper from the primary literature for discussion purposes. These papers will be posted on Brightspace a few days before the lecture.

3. (Jan. 25) Student presentations [see p. 2 of Syllabus (Short Student Presentation) for details]

Briefly, each student will present an oral summary (12 – 15 min. in length) of a paper. The presentation should relate the major findings of the paper, the experimental approaches, and how the results contribute to our further understanding **of the information under discussion in the specific module of the course**. The paper will be selected by the student and must be approved by an instructor. A copy of the cover page of the paper, including the abstract, should be sent to one of the Module Instructors 2 days before class for posting on Brightspace. **Module 1 written assignment related to the student's selected article also due. Details on the written assignment will be provided by the Instructors.**

4. (Feb. 1) Student presentations continued. If time permits, we will invite a Department of Ocean Sciences graduate student or postdoc to discuss their research related to this Module.

Module 2. Physiological and Biochemical Adaptations to Environmental Stressors.
Instructors - Dr. Chris Parrish and Dr. Iain McGaw

5. (Feb. 8) Instructor presentations/discussions (~ 1 to 1.5 hours each)
Each instructor will provide a recent paper from the primary literature for discussion purposes. These papers will be posted on Brightspace a few days before the lecture.

6. (Feb. 15) Student presentations [see p. 2 of Syllabus (Short Student Presentation) for details]

As stated above, each student will present an oral summary (12 – 15 min. in length) of a paper. The presentation should relate the major findings of the paper, the experimental approaches, and how the results contribute to our further understanding **of the information under discussion in the specific module of the course**. The paper will be selected by the student and must be approved by an instructor. A copy of the cover page of the paper, including the abstract, should be sent to one of the Module Instructors 2 days before class for posting on Brightspace. **Module 2 written assignment related to the student's selected article also due. Details on the written assignment will be provided by the Instructors.**

Feb. 22 – Winter semester break - No class.

Module 3. Molecular Aspects of Adaptation of Marine Organisms to Environmental Changes
Instructors - Dr. Javier Santander and Dr. Matt Rise

7. (March 1) Instructor presentations/discussions (~ 1 to 1.5 hours each)
Each instructor will provide a recent paper from the primary literature for examination purposes. These papers will be posted on Brightspace a few days before the lecture.

8. (Mar. 8) Student presentations [see p. 2 of Syllabus (Short Student Presentation) for details]

As previously stated, each student will present an oral summary (12 – 15 min. in length) of a paper. The presentation should relate the major findings of the paper, the experimental approaches, and how the results contribute to our further understanding **of the information under discussion in the specific module of the course**. The paper will be selected by the student and must be approved by an instructor. A copy of the cover page of the paper, including the abstract, should be sent to one of the Module Instructors 2 days before class for posting on Brightspace. **Module 3 written assignment related to the student's selected article also due. Details on the written assignment will be provided by the Instructors.**

9. (Mar. 15) Student short presentations continued (and guest lecture if time permits)

10. (Mar. 22) Student major presentations [see page 2 of Syllabus (Major Student Presentation)]

11. (Mar. 29) Student major presentations continued.

12. (Apr. 5) Student major presentations continued (and guest lecture if time permits).

- Should courses be disrupted due to COVID-19 or other causes, we will aim to transition to remote delivery.

- In the case of a class disruption or cancellation, and in the case of revisions to evaluation methods, the Instructors will notify all students registered in the course via the course shell in Brightspace. Any necessary revisions to the evaluation methods will be made in consultation with the students registered in this course.

- This course does not have a required text book. We will use the primary literature and other sources for course content. Resources will be accessible via Brightspace.

- Memorial University of Newfoundland is committed to fostering equitable and accessible learning environments for all students. Accommodations for students with disabilities are provided in accordance with Accommodations for Students with Disabilities Policy (www.mun.ca/policy/site/policy.php?id=239) and its related procedures. Students who feel that they may require formal academic accommodations to address barriers or challenges they are experiencing related to their learning are encouraged to contact Accessibility Services (the Blundon Centre) at the earliest opportunity to ensure any required academic accommodations are provided in a timely manner. You can contact Accessibility Services (Blundon Centre) by emailing blundon@mun.ca

- Students are expected to adhere to those principles which constitute proper academic conduct. A student has the responsibility to know which actions, as described under Academic Offences in the University Regulations, could be construed as dishonest or improper. Students found guilty of an academic offence may be subject to a number of penalties commensurate with the offence including reprimand, reduction of grade, probation, suspension or expulsion from the University. For more information regarding this policy, students should refer to the University Regulations for Academic Misconduct (Section 6.12) in the University Calendar.

- Academic supports at MUN include, but are not limited to: Memorial University Libraries, The Commons (QEII Library), The Glenn Roy Blundon Centre, The Writing Centre, Center for Innovation in Teaching and Learning Support Centre, Information Technology Services, Academic Advising, and specific departmental help centres.

- Student life supports at MUN include, but are not limited to: Student Wellness and Counselling Centre, Student Support and Crisis Management, MUN Chaplaincy, Sexual Harassment Office, The Circle: First Nations, Inuit & Métis Students Resource Centre, Disability Information Support Centre, International Students Resource Centre, Sexuality and Gender Advocacy, Student Parent Assistance & Resource Centre, Students Older Than Average, Intersections – A Resource Centre for Marginalized Genders, and specific departmental societies.