

Faculty of Science and Faculty of Graduate Studies Course Syllabus  
Department of Biology

**MARI 3603.03 — BIOL 3603.03**  
**Practical Aquaculture**  
Winter 2024

*Dalhousie University is located in Mi'kma'ki, the ancestral and unceded territory of the Mi'kmaq.  
We are all Treaty people.*

**Instructor:** Dr. Diego Ibarra | email: [Diego.Ibarra@dal.ca](mailto:Diego.Ibarra@dal.ca) | Office: LSC-5014 (Biology)  
**Questions **MUST** be posted in Brightspace's Discussion boards** (see guidelines below). Only use email for private/personal matters.

**Lectures/labs:** Mon 2:35 - 5:25 pm | *Location:* LSC-BIOL&EARTH B2102

**Course delivery:** In-person, with some sections online.

**TA:** Nan Chen <[nn255237@gmail.com](mailto:nn255237@gmail.com)>

**Time zone:** All times (syllabus, Brightspace, calendar, etc.) are in **Halifax Time (ADT/UTC-3 or AST/UTC-4)**

### Course Description

This course provides students with aquaculture practical experience. The laboratories involve finfish, shellfish and live feed, and help students acquire skills useful for conducting experiments with aquatic animals (e.g. marking, measuring, anaesthesia, etc.). Students collect real data and learn to conduct exploratory graphical and statistical analyses.

### Differences between undergraduate (3603) and graduate (5603) levels

Graduate students taking this course are expected to do about 30% more work than the students taking the course at the undergraduate level. Detailed distinctions between undergraduate (3603) and graduate (5603) students are included throughout this document. Graduate students are marked following a grading scale that is stricter than the undergraduate scale, where a minimum of 70% (B-) is required to pass.

### Course Prerequisites

Undergraduate	Graduate
Corequisite: MARI 3602.03 Prerequisites: STAT 1060.03 and BIOL 2003.03 <b>OR</b> Instructor's approval	Instructor's approval

### Course Objectives/Learning Outcomes

- Identify proper care and use of fish as experimental animal (Lab)
- Demonstrate fish necropsy skills (Lab)
- Demonstrate shellfish handling and necropsy skills
- Generate appropriate tables and graphs to represent data (Lab)
- Demonstrate ability to identify erroneous data and to clean-up experimental database
- Identify patterns in graphs related to basic phytoplankton/zooplankton population growth (Lab)
- Analyse statistically fish growth data collected in a class run experiment (Lab)
- Write laboratory reports (Lab)

### Additional Course Goals and Outcomes for graduate students only

- Demonstrate critical thinking and capacity to solve quantitative problems related to aquaculture
- Demonstrate capacity to write a review paper in a topic related to aquaculture

### Course Materials

#### Textbook (optional):

- Nybakken JW and Bertness MD (2004) Marine Biology: An Ecological Approach. 6<sup>th</sup> Edition. Benjamin Cummings, San Francisco

**Class notes:** Class .PDF notes and labs are posted on Brightspace.

**Announcements:** Electronic announcements and additional material will be posted on Brightspace. Students should check the site frequently.

### Course Assessment

Component	Weight (% of final grade)		Date
	Undergraduate	Graduate	
Phytoplankton lab	11.1	7.5	See table in Course Content below for specific dates
Artemia lab	11.1	7.5	
Bivalves 1 lab (filtration rate)	11.1	7.5	
Bivalves 2 lab (necropsy)	11.1	7.5	
Bivalves 3 lab (spawning)	11.1	7.5	
CCAC (Introduction to the Care and Use of Fish)	11.1	7.5	
Fish 1 lab (necropsy)	11.1	7.5	
Fish 2 lab (fish handling)	11.1	7.5	
Fish 3 lab (data analysis)	11.2	7.5	
Research paper	-	32.5	
Participation in Discussion Boards	2% bonus	2% bonus	Continuously
<b>TOTAL</b>	<b>/100</b>	<b>/100</b>	

### Lab reports

You need to prepare a report after each lab (due at 11:59 pm, one week after the lab delivery date. Please see "Course policies" below for penalties on late reports). Labs will be graded using the following rubric:

**Rubric: Lab reports**

Component	Comments	Weight (%)
Format	Follow page length and space guidelines. Citations follow the specified standards and are consistent throughout the report	10%
Clarity of text	The report should be concise and written in a clear style	10%
Clarity of figures and tables	Show only the figures that are central to the main results of the report. Make sure to include axis, legends and figure captions. Units are of particular importance, make sure to include them. Tables should also include a caption and units.	10%
Content	<b>Introduction</b> – Be brief (~ 1 page). Explain the aim of the experiment. Utilize relevant scientific literature	10%
	<b>Materials and Methods</b> – Describe concisely (but precisely) the details of the experiment. Include enough details to be able to reproduce the experiment. Include rearing conditions, dates, statistical analysis and any assumption used in your analysis	10%
	<b>Results</b> – Describe your results focusing on the main findings of the experiment. Include tables with results of your statistical analysis. Include some figures showing the main outcomes. Note that some figures you made do not have to be included in the report and are only mentioned in text in one or two sentences	20%
	<b>Discussion</b> – Discuss the main findings. Provide potential explanations for what happened (or did not happen). Explain the limitations of the experiment. Was the level of replication adequate?	20%
	<b>References</b> – While there no minimum number of required references, you do need to demonstrate that you researched the relevant available literature. Are all references used in text listed in the reference section?	10%
TOTAL:		100%

**Participation in Discussion Boards**

You are expected to contribute to the discussion boards (questions **AND ANSWERS**). Please follow the posting guidelines below:

- Before you post your question, **CHECK** if the question has already been asked/answered
- Post only ONE question per post. If you have multiple questions, post them in separate posts
- The post's TITLE should be your question
- If you know the answer to a question, please help by answering the post
- Be respectful and polite

Participation grades will be computed at the end of the course. First, *engagement points* (see below) will be tallied for each student. Then, a curve will be calculated (after removing outliers) to compute the participation bonus points for each student.

Item	Score (units: engagement points)
New question	1
Already posted question	0 for the first 3 events, -1 for additional events
Correct answer	1
Partially correct answer	0.5
Incorrect answer	0 for the first 3 events, -1 for additional events
Useful comment or sharing a link to a useful resource	1
Using offensive tone or language	-1

### Research paper (Graduate students only)

Each graduate student needs to prepare a *Literature Review* “manuscript” following the “Guide to Authors” from the journal *Aquaculture* ([elsevier.com/journals/aquaculture](http://elsevier.com/journals/aquaculture)). The manuscript must provide objective critical evaluation of the subject. It cannot consist solely of a summary of the available literature. Evaluation of the quality of existing data, the status of knowledge, and the research required to advance knowledge of the subject are essential.

Students are encouraged to discuss their interests and propose subject ideas to the instructor. However, the subject of the review will ultimately be appointed by the instructor.

#### Rubric: Research paper

Component		Comments	Weight (%)
Format		Manuscript must follow the formatting guidelines from the “Guide to Authors” from the journal <i>Aquaculture</i>	5%
Clarity		Writing style must be clear and concise. The main content must be divided using headings carefully chosen to assist the reader to understand the content	10%
Critical thinking		The manuscript cannot be a simple summary of literature. Students must demonstrate the ability to evaluate the quality of the available knowledge and to provide suggestions for further advance the subject	10%
Content	Title	Follow instructions in “Guide to Authors” from the journal <i>Aquaculture</i> .	5%
	Abstract		10%
	Table of contents		5%
	Introduction		5%
	Content sections		30%
	Conclusions		10%
	References		10%
<b>TOTAL:</b>			<b>100%</b>

### Conversion of numerical grades to Final Letter Grades

Undergraduate students follows the [Dalhousie Common Grade Scale](#). Graduate students follow a stricter scale, where a minimum of 70% (B-) is required to pass.

%	Undergraduate			Graduate		
	Letter Grade	Grade Point Value	Definition	Letter Grade	Grade Point Value	Definition
90 - 100	<b>A+</b>	4.30	Exceptional	<b>A+</b>	4.30	Exceptional
85-89	<b>A</b>	4.00	Excellent	<b>A</b>	4.00	Excellent
80-84	<b>A-</b>	3.70	Very Good	<b>A-</b>	3.70	Very Good
77-79	<b>B+</b>	3.30		<b>B+</b>	3.30	
73-76	<b>B</b>	3.00	Good	<b>B</b>	3.00	Good
70-72	<b>B-</b>	2.70		<b>B-</b>	2.70	
65-69	<b>C+</b>	2.30	Satisfactory	<b>F</b>	<b>0.00</b>	<b>Failure</b>
60-64	<b>C</b>	2.00		<b>F</b>		
55-59	<b>C-</b>	1.70		<b>F</b>		
50-54	<b>D</b>	1.00		<b>F</b>		
<50	<b>F</b>	<b>0.00</b>	<b>Failure</b>	<b>F</b>		

## Course Policies

**Questions.** All questions MUST be posted in Brightspace's Discussion boards (see posting guidelines above). Only use email for private/personal matters.

**Brightspace** will be used to post lectures, updates and announcements.

**Lab report submission:** Assignments should be submitted via Brightspace as .pdf file by 11:59 pm on the due date.

**Late reports:** The table below shows the late penalty schedule in place for late assignments. Note that the TA marks the reports, thus **email the TA (and Cc the instructor)** to advice of a late submission.

Number of days late	Penalty (% deduction)
1	10%
2	20%
3	30%
4	50%
5	70%
6 or more	100%

## Course Content

### Detailed Schedule

Lab reports are due at 11:59 pm, **one week after** the lab delivery date.

Week	Date	Content
1	Jan 8	Introduction
2	Jan 15	Phytoplankton lab
3	Jan 22	Artemia lab
4	Jan 29	Bivalves 1 lab (filtration rate)
5	Feb 5	Bivalves 2 lab (necropsy)
6	Feb 12	CCAC (Introduction to the Care and Use of Fish)
7	Feb 19-23	Winter study break (no report is due on this week)
8	Feb 26	Aquatron Tour   Husbandry lab
9	Mar 4	Bivalves 3 lab (spawning)
10	Mar 11	Fish 1 lab (necropsy)
11	Mar 18	Fish 2 lab (fish handling, anesthesia, measurements)
12	Mar 25	Fish 3 lab (data analysis)
13	Apr 1	Wrap up, help with Fish 3 report, buffer in case of a snow day

*NOTE: Dates and topics may change depending on course pace and weather-related class cancellations.*

## University Policies and Statements

### Recognition of Mi'kmaq Territory

Dalhousie University would like to acknowledge that the University is on Traditional Mi'kmaq Territory. The Elders in Residence program provides students with access to First Nations elders for guidance, counsel, and support. Visit or e-mail the Indigenous Student Centre at 1321 Edward St or [elders@dal.ca](mailto:elders@dal.ca). Additional information regarding the Indigenous Student Centre can be found at: [https://www.dal.ca/campus\\_life/communities/indigenous.html](https://www.dal.ca/campus_life/communities/indigenous.html)

### Internationalization

At Dalhousie, 'thinking and acting globally' enhances the quality and impact of education, supporting learning that is "interdisciplinary, cross-cultural, global in reach, and orientated toward solving problems that extend across national borders." Additional internationalization information can be found at: <https://www.dal.ca/about-dal/internationalization.html>

### Academic Integrity

At Dalhousie University, we are guided in all our work by the values of academic integrity: honesty, trust, fairness, responsibility, and respect. As a student, you are required to demonstrate these values in all the work you do. The University provides policies and procedures that every member of the university community is required to follow to ensure academic integrity. Additional academic integrity information can be found at: [https://www.dal.ca/dept/university\\_secretariat/academic-integrity.html](https://www.dal.ca/dept/university_secretariat/academic-integrity.html)

### Accessibility

The Student Accessibility Centre is Dalhousie's centre of expertise for matters related to student accessibility and accommodation. If there are aspects of the design, instruction, and/or experiences within this course (online or in-person) that result in barriers to your inclusion, please contact the Student Accessibility Centre ([https://www.dal.ca/campus\\_life/academic-support/accessibility.html](https://www.dal.ca/campus_life/academic-support/accessibility.html)) for all courses offered by Dalhousie with the exception of Truro. For courses offered by the Faculty of Agriculture, please contact the Student Success Centre in Truro (<https://www.dal.ca/about-dal/agricultural-campus/student-success-centre.html>)

### Conduct in the Classroom – Culture of Respect

Substantial and constructive dialogue on challenging issues is an important part of academic inquiry and exchange. It requires willingness to listen and tolerance of opposing points of view. Consideration of individual differences and alternative viewpoints is required of all class members, towards each other, towards instructors, and towards guest speakers. While expressions of differing perspectives are welcome and encouraged, the words and language used should remain within acceptable bounds of civility and respect.

### **Diversity and Inclusion – Culture of Respect**

Every person at Dalhousie has a right to be respected and safe. We believe inclusiveness is fundamental to education. We stand for equality. Dalhousie is strengthened in our diversity. We are a respectful and inclusive community. We are committed to being a place where everyone feels welcome and supported, which is why our Strategic Direction prioritizes fostering a culture of diversity and inclusiveness (Strategic Priority 5.2). Additional diversity and inclusion information can be found at: <http://www.dal.ca/cultureofrespect.html>

### **Student Code of Conduct**

Everyone at Dalhousie is expected to treat others with dignity and respect. The Code of Student Conduct allows Dalhousie to take disciplinary action if students don't follow this community expectation. When appropriate, violations of the code can be resolved in a reasonable and informal manner - perhaps through a restorative justice process. If an informal resolution can't be reached, or would be inappropriate, procedures exist for formal dispute resolution. The full Code of Student Conduct can be found at: [https://www.dal.ca/dept/university\\_secretariat/policies/student-life/code-of-student-conduct.html](https://www.dal.ca/dept/university_secretariat/policies/student-life/code-of-student-conduct.html)

### **Fair Dealing Policy**

The Dalhousie University Fair Dealing Policy provides guidance for the limited use of copyright protected material without the risk of infringement and without having to seek the permission of copyright owners. It is intended to provide a balance between the rights of creators and the rights of users at Dalhousie. Additional information regarding the Fair Dealing Policy can be found at: [https://www.dal.ca/dept/university\\_secretariat/policies/academic/fair-dealing-policy-.html](https://www.dal.ca/dept/university_secretariat/policies/academic/fair-dealing-policy-.html)

### **Originality Checking Software**

The course instructor may use Dalhousie's approved originality checking software and Google to check the originality of any work submitted for credit, in accordance with the Student Submission of Assignments and Use of Originality Checking Software Policy. Students are free, without penalty of grade, to choose an alternative method of attesting to the authenticity of their work and must inform the instructor no later than the last day to add/drop classes of their intent to choose an alternate method. Additional information regarding Originality Checking Software can be found at: [https://www.dal.ca/dept/university\\_secretariat/policies/academic/student-submission-of-assignments-and-use-of-originality-checking-software-policy-.html](https://www.dal.ca/dept/university_secretariat/policies/academic/student-submission-of-assignments-and-use-of-originality-checking-software-policy-.html)

### **Student Use of Course Materials**

Course materials are designed for use as part of this course at Dalhousie University and are the property of the instructor unless otherwise stated. Third party copyrighted materials (such as books, journal articles, music, videos, etc.) have either been licensed for use in this course or fall under an exception or limitation in Canadian Copyright law. Copying this course material for distribution (e.g. uploading to a commercial third-party website) may lead to a violation of Copyright law.

# Student Resources and Support

## University Policies and Programs

Important Dates in the Academic Year (including add/drop dates):

[http://www.dal.ca/academics/important\\_dates.html](http://www.dal.ca/academics/important_dates.html)

Classroom Recording Protocol:

[https://www.dal.ca/dept/university\\_secretariat/policies/academic/classroom-recording-protocol.html](https://www.dal.ca/dept/university_secretariat/policies/academic/classroom-recording-protocol.html)

Dalhousie Grading Practices Policies:

[https://www.dal.ca/dept/university\\_secretariat/policies/academic/grading-practices-policy.html](https://www.dal.ca/dept/university_secretariat/policies/academic/grading-practices-policy.html)

Grade Appeal Process: [https://www.dal.ca/campus\\_life/academic-support/grades-and-student-records/appealing-a-grade.html](https://www.dal.ca/campus_life/academic-support/grades-and-student-records/appealing-a-grade.html)

Sexualized Violence Policy: [https://www.dal.ca/dept/university\\_secretariat/policies/health-and-safety/sexualized-violence-policy.html](https://www.dal.ca/dept/university_secretariat/policies/health-and-safety/sexualized-violence-policy.html)

Scent-Free Program: <https://www.dal.ca/dept/safety/programs-services/occupational-safety/scent-free.html>

## Learning and Support Resources

General Academic Support – Advising (Halifax): [https://www.dal.ca/campus\\_life/academic-support/advising.html](https://www.dal.ca/campus_life/academic-support/advising.html)

General Academic Support – Advising (Truro): <https://www.dal.ca/about-dal/agricultural-campus/ssc/academic-support/advising.html>

Student Health & Wellness Centre: [https://www.dal.ca/campus\\_life/health-and-wellness.html](https://www.dal.ca/campus_life/health-and-wellness.html)

On Track (helps you transition into university, and supports you through your first year at Dalhousie and beyond): [https://www.dal.ca/campus\\_life/academic-support/On-track.html](https://www.dal.ca/campus_life/academic-support/On-track.html)

Indigenous Student Centre: [https://www.dal.ca/campus\\_life/communities/indigenous.html](https://www.dal.ca/campus_life/communities/indigenous.html)

Indigenous Connection: <https://www.dal.ca/about-dal/indigenous-connection.html>

Elders-in-Residence (The Elders in Residence program provides students with access to First Nations elders for guidance, counsel, and support. Visit the office in the Indigenous Student Centre or contact the program at [elders@dal.ca](mailto:elders@dal.ca) or 902-494-6803:

<https://cdn.dal.ca/content/dam/dalhousie/pdf/academics/UG/indigenous-studies/Elder-Protocol-July2018.pdf>

Black Student Advising Centre: [https://www.dal.ca/campus\\_life/communities/black-student-advising.html](https://www.dal.ca/campus_life/communities/black-student-advising.html)

International Centre: [https://www.dal.ca/campus\\_life/international-centre.html](https://www.dal.ca/campus_life/international-centre.html)

South House Sexual and Gender Resource Centre: <https://southhousehalifax.ca/about/>

LGBTQ2SIA+ Collaborative: <https://www.dal.ca/dept/vpei/edia/education/community-specific-spaces/LGBTQ2SIA-collaborative.html>

Dalhousie Libraries: <http://libraries.dal.ca/>

Copyright Office: <https://libraries.dal.ca/services/copyright-office.html>





Dalhousie Student Advocacy Services: <https://www.dsu.ca/dsas?rq=student%20advocacy>  
Dalhousie Ombudsperson: [https://www.dal.ca/campus\\_life/safety-respect/student-rights-and-responsibilities/where-to-get-help/ombudsperson.html](https://www.dal.ca/campus_life/safety-respect/student-rights-and-responsibilities/where-to-get-help/ombudsperson.html)  
Human Rights and Equity Services: <https://www.dal.ca/dept/hres.html>  
Writing Centre: [https://www.dal.ca/campus\\_life/academic-support/writing-and-study-skills.html](https://www.dal.ca/campus_life/academic-support/writing-and-study-skills.html)  
Study Skills/Tutoring: [http://www.dal.ca/campus\\_life/academic-support/study-skills-and-tutoring.html](http://www.dal.ca/campus_life/academic-support/study-skills-and-tutoring.html)  
Faculty of Science Advising Support: <https://www.dal.ca/faculty/science/current-students/undergrad-students/degree-planning.html>

## **Safety**

Biosafety: <http://www.dal.ca/dept/safety/programs-services/biosafety.html>  
Chemical Safety: <https://www.dal.ca/dept/safety/programs-services/chemical-safety.html>  
Radiation Safety: <http://www.dal.ca/dept/safety/programs-services/radiation-safety.html>  
Laser Safety: <https://www.dal.ca/dept/safety/programs-services/radiation-safety/laser-safety.html>