

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

**MARI 3603.03 — BIOL 3603.03**  
**Practical Aquaculture**  
Winter 2023

*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 | 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

**TA:** Nan Chen <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	
CCAC	10	7	See table in Course Content below for specific dates
Fish lab 1	10	7	
Bivalves lab 1	10	7	
Phytoplankton lab	10	7	
Artemia lab	10	7	
Bivalves lab 2	10	7	
Bivalves lab 3	10	7	
Fish necropsy lab	10	7	
Fish lab 2	20	14	
Research paper	-	30	
Participation in Discussion Boards	2% bonus	2% bonus	
<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). 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%
TOTAL:			100%

### 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	A+	4.30	Exceptional	A+	4.30	Exceptional
85-89	A	4.00	Excellent	A	4.00	Excellent
80-84	A-	3.70	Very Good	A-	3.70	Very Good
77-79	B+	3.30		B+	3.30	
73-76	B	3.00	Good	B	3.00	Good
70-72	B-	2.70		B-	2.70	
65-69	C+	2.30	Satisfactory	F	0.00	Failure
60-64	C	2.00		F		
55-59	C-	1.70		F		
50-54	D	1.00	Marginal Pass	F		
<50	F	0.00	Failure	F		

## 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.

**Late assignments:** There is a late penalty schedule in place for late assignments

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

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

## Course Content

### Detailed Schedule

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

Week	Date	Content
1	Jan 9	Introduction
2	Jan 16	CCAC 1 (Introduction to the Care and Use of Fish 1)
3	Jan 23	CCAC 1 (Introduction to the Care and Use of Fish 2)
4	Jan 30	Aquatron Tour   Husbandry lab
5	Feb 6	Fish 1 lab (Fish growth experiment, first measures)
6	Feb 13	Bivalves 1 lab (spawning)
7	Feb 20-24	Winter study break
8	Feb 27	Phytoplankton lab
9	Mar 6	Artemia lab
10	Mar 13	Bivalves 2 lab (filtration rate)
11	Mar 20	Bivalves 3 lab (necropsy)
12	Mar 27	Fish necropsy lab
13	Apr 3	Fish 2 lab (Fish growth experiment, last measures)
14	Apr 10	Wrap up, help with final fish growth 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

**This course is governed by the academic rules and regulations set forth in the University Calendar and by Senate**

### Academic Integrity

At Dalhousie University, we are guided in all of our work by the values of academic integrity: honesty, trust, fairness, responsibility and respect (The Center for Academic Integrity, Duke University, 1999). As a student, you are required to demonstrate these values in all of 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.

**Information:** [https://www.dal.ca/dept/university\\_secretariat/academic-integrity.html](https://www.dal.ca/dept/university_secretariat/academic-integrity.html)

### Accessibility

The Advising and Access Services Centre is Dalhousie's centre of expertise for student accessibility and accommodation. The advising team works with students who request accommodation as a result of a disability, religious obligation, or any barrier related to any other characteristic protected under Human Rights legislation (Canada and Nova Scotia).

**Information:** [https://www.dal.ca/campus\\_life/academic-support/accessibility.html](https://www.dal.ca/campus_life/academic-support/accessibility.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.

**Code:** [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)

### 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

**Statement:** <http://www.dal.ca/cultureofrespect.html>

### 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 (1321 Edward St) ([elders@dal.ca](mailto:elders@dal.ca)).

**Information:** [https://www.dal.ca/campus\\_life/communities/indigenous.html](https://www.dal.ca/campus_life/communities/indigenous.html)

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

<https://academiccalendar.dal.ca/Catalog/ViewCatalog.aspx?pageid=viewcatalog&catalogid=117&chapterid=-1&topicgroupid=31821&loadusercredits=False>

### University Grading Practices

[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)

## Student Resources and Support

### Advising

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

**Science Program Advisors:** <https://www.dal.ca/faculty/science/current-students/undergrad-students/degree-planning.html>

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

**Black Students 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/current-students.html](https://www.dal.ca/campus_life/international-centre/current-students.html)

### Academic supports

**Library:** <https://libraries.dal.ca/>

**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)

**Studying for Success:** [https://www.dal.ca/campus\\_life/academic-support/study-skills-and-tutoring.html](https://www.dal.ca/campus_life/academic-support/study-skills-and-tutoring.html)

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

**Fair Dealing Guidelines** <https://libraries.dal.ca/services/copyright-office/fair-dealing.html>

### Other supports and services

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

**Student Advocacy:** <https://dsu.ca/dsas>

**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)

### Safety

**Biosafety:** <https://www.dal.ca/dept/safety/programs-services/biosafety.html>

**Chemical Safety:** <https://www.dal.ca/dept/safety/programs-services/chemical-safety.html>

**Radiation Safety:** <https://www.dal.ca/dept/safety/programs-services/radiation-safety.html>

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

**Dalhousie COVID-19 information and updates:** <https://www.dal.ca/covid-19-information-and-updates.html>