

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

**BIOL 3872.03**  
**Biologist's Toolkit**  
Winter 2022

**Instructor:** Dr. Diego Ibarra | email: [Diego.Ibarra@dal.ca](mailto:Diego.Ibarra@dal.ca) | Office: LSC-3625 (Oceanography)  
**Questions **MUST** be posted in Brightspace's Discussion boards** (see guidelines below). Only use email for private/personal matters.

**Lectures/labs:** Wednesdays 2:35 pm-5:25 pm | *Location:* MCCAIN ARTS&SS 2104

**Course delivery:** In-person or online

**TA:** Javier Augusto Locsin | email: [JavierLocsin@dal.ca](mailto:JavierLocsin@dal.ca)

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

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### Course Description

Best practices for scientific computing and data handling, theory of visualisation, and scripting, teaching students how to create, store, and manipulate data using the object-oriented programming language R. Examples and projects will be drawn from a wide variety of biological areas, covering typical problems encountered with computer use.

### Course format

This course will start delivered online, mainly using Brightspace and zoom. However, we hope to switch to a face-to-face format if (and when) the COVID19 pandemic allows us to do so.

- **Labs and lab reports (required)** are delivered online (via Brightspace) under an asynchronous format, so that students can access course elements at their convenience. Labs are released weekly. Lab reports are due on Wednesdays at 11:30 pm (Halifax time).
- **Zoom synchronous conversations (not required)**. There are weekly conversations (Wednesdays @ 2:35 pm Halifax time) where the class can meet (via zoom, link in Brightspace) to ask questions, spark discussion and interact with each other. Students are encouraged, **but not required**, to attend to these sessions. **These synchronous events will NOT be recorded**. During these video-calls, please follow the etiquette below:
  - You are expected to have your **CAMERA ALWAYS ON** when in the zoom room, therefore:
    - Be mindful of your clothing and appearance
    - Be mindful of your background (virtual backgrounds are ok)
    - Silence your cellphone and other electronic devices
    - Advise your roommates about your video-call so they are also mindful too
  - Keep you **MICROPHONE ALWAYS MUTED**, unless you need to speak

### Course Prerequisites, Cross-listings and Restrictions

- **Prerequisites:** BIOL 2030.03 or BIOL 2040.03 or BIOL 2060.03

### Course Objectives/Learning Outcomes

- Students will be able to store, import, and manipulate data in R, as well as execute basic concepts in data and research reproducibility, webpage data scraping, and graphical representation.

### Course Materials

- No textbooks
- Use of a personal laptop is encouraged
- Class notes: Class notes 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
Lab Report 1: Introduction to RStudio and R	9.09	See schedule below
Lab Report 2: Project management and version control	9.09	See schedule below
Lab Report 3: R basics	9.09	See schedule below
Lab Report 4: Data wrangling and basic plotting	9.09	See schedule below
Lab Report 5: Advanced data manipulation and analysis with tidyverse	9.09	See schedule below
Lab Report 6: Data visualization and advanced plotting with ggplot2	9.09	See schedule below
Lab Report 7: SQL databases and R	9.09	See schedule below
Lab Report 8: Flow control and Functions explained	9.09	See schedule below
Lab Report 9: Temporal data and string manipulation	9.09	See schedule below
Lab Report 10: Mapping and geospatial analysis	9.09	See schedule below
Lab Report 11: Producing reports with knitr	9.09	See schedule below
Participation in Discussion Boards	2% bonus	Continuously
<b>TOTAL</b>	<b>/100</b>	

### Lab Reports

Each week, the lab manual for the week will be posted on Brightspace (usually on Wednesdays before 11:30 pm). You will have one week to go to the material, do the required work and answer questions. The reports are due on the following Wednesday at 11:30 pm. You are highly encouraged to try to finish your lab before our zoom meeting of the week (i.e., Wednesday) so that you have a chance to ask, via zoom, any question that you may have regarding the lab. At any time, you can also ask questions in the respective Discussion board. However, note that questions directly related to your own lab answers (e.g. “why I got question 37 wrong?”) will not be answered until after all reports have been submitted.

If you missed the deadline to submit a report:

- Email **both**, the TA and the Instructor, briefly explaining your circumstance and dates.

- Fill in a [Student Declaration of Absence \(SDA\) form](#) and upload it to the Brightspace Dropbox designated for SDAs.
- Students with an Accessibility or Accommodation Plan in place do not need to submit SDA form.
- For prolonged absences (e.g. prolonged illness, etc.) contact the instructor to develop a mitigation plan.
- For non-extenuating circumstances (e.g. work on another class, timing miscalculations, etc.), a 10% grade reduction will be applied for every day a report is late.

### 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

### Conversion of numerical grades to Final Letter Grades

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

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

## Course Policies

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

### Missing or late academic requirements:

- Email **both**, the TA and the Instructor, briefly explaining your circumstance and dates.
- Fill in a [Student Declaration of Absence \(SDA\) form](#) and upload it to the Brightspace Dropbox designated for SDAs.
- Students with an Accessibility or Accommodation Plan in place **do not** need to submit SDA form.
- For extenuating circumstances (e.g. prolonged illness, family matters, etc.) contact the instructor to develop a mitigation plan.

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

**Late assignments:** A 10% reduction in grade will be applied for every day an assignment is late.

## Course Content

### Detailed Schedule

All dates and times are in **Halifax Time** (ADT/UTC-3 or AST/UTC-4). Note that due dates are shown in **red** and synchronous (not required) events are shown in **blue**.

Week	Date	Content
<b>Course introduction</b>		
1	Wed, Jan 5 @ 2:35 pm	<a href="#">Zoom meeting (questions, discussion, chat). See link in Brightspace.</a>
<b>LAB 1. Introduction to RStudio and R</b>		
2	Wed, Jan 12 @ 2:35 pm	<a href="#">Zoom meeting (questions, discussion, chat). See link in Brightspace.</a>
	<b>Wed, Jan 12 @ 11:30 pm</b>	<b>Submit: Lab Report 1</b>
	Wed, Jan 12 by 11:30 pm	New content is uploaded. Make sure to review it before Wednesday's zoom, so you can ask questions before the lab report is due
<b>LAB 2. Project management and version control</b>		
3	Wed, Jan 19 @ 2:35 pm	<a href="#">Zoom meeting (questions, discussion, chat). See link in Brightspace.</a>
	<b>Wed, Jan 19 @ 11:30 pm</b>	<b>Submit: Lab Report 2</b>
	Wed, Jan 19 by 11:30 pm	New content is uploaded. Make sure to review it before Wednesday's zoom, so you can ask questions before the lab report is due
<b>LAB 3. R basics (variables, functions, data types, data structures and indexing)</b>		
4	Wed, Jan 26 @ 2:35 pm	<a href="#">Zoom or Lab meeting (questions, discussion, chat). See link in Brightspace.</a>
	<b>Wed, Jan 26 @ 11:30 pm</b>	<b>Submit: Lab Report 3</b>
	Wed, Jan 26 by 11:30 pm	New content is uploaded. Make sure to review it before Wednesday's zoom, so you can ask questions before the lab report is due
<b>LAB 4. Data wrangling and basic plotting</b>		
5	Wed, Feb 2 @ 2:35 pm	<a href="#">Zoom or Lab meeting (questions, discussion, chat). See link in Brightspace.</a>
	<b>Wed, Feb 2 @ 11:30 pm</b>	<b>Submit: Lab Report 4</b>
	Wed, Feb 2 by 11:30 pm	New content is uploaded. Make sure to review it before Wednesday's zoom, so you can ask questions before the lab report is due
<b>LAB 5. Advanced data manipulation and analysis with tidyverse</b>		
6	Wed, Feb 9 @ 2:35 pm	<a href="#">Zoom or Lab meeting (questions, discussion, chat). See link in Brightspace.</a>
	<b>Wed, Feb 9 @ 11:30 pm</b>	<b>Submit: Lab Report 5</b>

	Wed, Feb 9 by 11:30 pm	New content is uploaded. Make sure to review it before Wednesday's zoom, so you can ask questions before the lab report is due
<b>LAB 6. Data visualization and advanced plotting with ggplot2</b>		
7	Wed, Feb 16 @ 2:35 pm	<a href="#">Zoom or Lab meeting (questions, discussion, chat). See link in Brightspace.</a>
	<b>Wed, Feb 16 @ 11:30 pm</b>	<b>Submit: Lab Report 6</b>
	Wed, Feb 16 by 11:30 pm	New content is uploaded. Make sure to review it before Wednesday's zoom, so you can ask questions before the lab report is due
8	Mon, Feb 21... ...Fri, Feb 25	Reading week Reading week
<b>LAB 7. SQL databases and R</b>		
9	Wed, Mar 2 @ 2:35 pm	<a href="#">Zoom or Lab meeting (questions, discussion, chat). See link in Brightspace.</a>
	<b>Wed, Mar 2 @ 11:30 pm</b>	<b>Submit: Lab Report 7</b>
	Wed, Mar 2 by 11:30 pm	New content is uploaded. Make sure to review it before Wednesday's zoom, so you can ask questions before the quiz
<b>LAB 8. Flow control and Functions explained</b>		
10	Wed, Mar 9 @ 2:35 pm	<a href="#">Zoom or Lab meeting (questions, discussion, chat). See link in Brightspace.</a>
	<b>Wed, Mar 9 @ 11:30 pm</b>	<b>Submit: Lab Report 8</b>
	Wed, Mar 9 by 11:30 pm	New content is uploaded. Make sure to review it before Wednesday's zoom, so you can ask questions before the lab report is due
<b>LAB 9. Temporal data and string manipulation</b>		
11	Wed, Mar 16 @ 2:35 pm	<a href="#">Zoom or Lab meeting (questions, discussion, chat). See link in Brightspace.</a>
	<b>Wed, Mar 16 @ 11:30 pm</b>	<b>Submit: Lab Report 9</b>
	Wed, Mar 16 by 11:30 pm	New content is uploaded. Make sure to review it before Wednesday's zoom, so you can ask questions before the lab report is due
<b>LAB 10. Mapping and geospatial analysis</b>		
12	Wed, Mar 23 @ 2:35 pm	<a href="#">Zoom or Lab meeting (questions, discussion, chat). See link in Brightspace.</a>
	<b>Wed, Mar 23 @ 11:30 pm</b>	<b>Submit: Lab Report 10</b>
	Wed, Mar 23 by 11:30 pm	New content is uploaded. Make sure to review it before Wednesday's zoom, so you can ask questions before the lab report is due
<b>LAB 11. Producing reports with knitr</b>		
13	Wed, Mar 30 @ 2:35 pm	<a href="#">Zoom or Lab meeting (questions, discussion, chat). See link in Brightspace.</a>
	<b>Wed, Mar 30 @ 11:30 pm</b>	<b>Submit: Lab Report 11</b>
	Wed, Mar 30 by 11:30 pm	<b>Please do your SRI (Student Rating of Instruction)</b>
14	Wed, Apr 6	<a href="#">No class</a>

*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://www.dal.ca/academics/important\\_dates.html](https://www.dal.ca/academics/important_dates.html)

### 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/academic-advising.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/services-support/student-health-and-wellness.html](https://www.dal.ca/campus_life/health-and-wellness/services-support/student-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>