

## PHYC1310 Physics in and Around You

Fall 2022, Lectures: MWF 12:35 – 13:25, MCCAIN Arts&SS Aud-2

Dalhousie University is located in Mi'kma'ki, the ancestral and unceded territory of the Mi'kmaq. We are all Treaty people. We acknowledge the histories, contributions, and legacies of the African Nova Scotian people and communities who have been here for over 400 years.

### Course Description

**This course is delivered in person.** Videos of lectures from 2013 (when the course content was very similar) are available from the course Brightspace page. We intend to post Panopto recordings of the lectures on the Brightspace class website.

PHYC1310 is an algebra-based (*i.e.* calculus-free) introductory physics course for students in the life, medical and environmental sciences, and the arts. It is a good preparation for students taking the MCAT and students wishing to enter Medicine, Dentistry and Applied Health Sciences. Basic concepts in physics are applied, when possible to realistic biological models, *e.g.* forces and torques related to muscle and joints.

We recommend that all science students take both PHYC 1310 and PHYC 1320. The later course offered in the Winter term completes an introduction to basic concepts in physics, including optics, electricity, atomic and nuclear physics with applications to vision, cellular activity, imaging and radiation treatment.

### Course Prerequisites

High School Physics equivalent to Nova Scotia Grade 12 is **strongly** recommended.

### Knowledge or skills expected of students coming into the course

Students are expected to have a solid understanding of Nova Scotia Grade 12 mathematics (no knowledge of calculus is required).

Students need to be comfortable with the following concepts:

- solve a system of two equations
- analyze and solve trigonometric problems
- solve quadratic equations
- solve problems involving exponential and logarithmic equations
- create and interpret graphs

### Course goals and outcomes

Students who successfully complete PHYC1310 will be able to:

#### General Skills

- develop scientific reasoning skills.
- improve problem solving abilities.
- develop a solid understanding of fundamental physical principles.
- apply those principles to real world problems.

#### Course content

- calculate the motion and mechanical equilibrium of the human body and everyday phenomena by application of Newton's Laws.
- solve mechanical problems through application of conservation laws.
- understand the connection between mechanical work and heat.
- analyze mechanical systems undergoing simple harmonic motion.
- apply concepts of superposition to wave motion.
- solve hydrostatic pressure and buoyancy problems.

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### Instructors

Lecturer: Dr. Ian Folkins  
E-Mail: [ian.folkins@dal.ca](mailto:ian.folkins@dal.ca)  
Office: Dunn Building, Rm 119A  
Office Hours: MWF 2:00 – 3:00 pm

Lab instructor: Dr. Stephen Payne  
E-Mail: [payne@dal.ca](mailto:payne@dal.ca)  
Office: Dunn Building, Rm 206C

CAPA technical help: Tolson Winters  
E-Mail: [tolson@dal.ca](mailto:tolson@dal.ca)  
Office: Dunn Building, Rm 213  
(accessed through Rm 216)

### Important Dates

#### Tutorials

Start Sept. 7<sup>th</sup> during your regular lab day at you regular lab time. The first tutorial is in Dunn 114.

#### Labs Dunn 201

Start week of Sept. 19<sup>th</sup> (for Week A group)  
Pre-lab assignment opens on Sept. 14  
Pre-labs due 5 min before your lab

#### CAPA Assignments

Due every Wednesday at 11:59pm.  
First CAPA due Wed. Sept.14<sup>th</sup>

#### Fall term quizzes

Quiz 1 Fri. Oct. 14<sup>th</sup>, 7:30 - 9:00 pm  
Quiz 2 Fri. Nov. 18<sup>th</sup>, 7:30 - 9:00 pm

#### Fall term exam

TBA (in Exam Period Dec. 9 – Dec. 20)

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## Course Materials

### Response System

We will be using the Top Hat ([www.tophat.com](http://www.tophat.com)) classroom response system in class. You will be able to submit answers to in-class questions using Apple or Android smartphones and tablets, laptops, or through text message. You will be given credit for every question you answer using this system. You may be excused from participation from up to 6 classes without penalty, starting Monday September 12<sup>th</sup>.

You can visit the Top Hat Overview (<https://success.tophat.com/s/article/Student-Top-Hat-Overview-and-Getting-Started-Guide>) within the Top Hat Success Centre, which outlines how you to register for a Top Hat account, as well as providing a brief overview to get up and running on the system. A Top Hat account costs about \$20 but this should cover all classes for the fall term. My understating is that PHYC 1320 is also using tophat, so it is likely more economical to purchase for the entire year if you are taking PHYC 1320 also.

An email invitation will be sent to you by email but, if you don't receive this email, you can register by visiting the Top Hat course website: Phyc1310 course Join Code is 824885.

Should you require assistance with Top Hat at any time please contact their Support Team directly by way of email ([support@tophat.com](mailto:support@tophat.com)), the in-app support button, or by calling 1-888-663-5491. They require specific user information to troubleshoot issues.

### Course website: Brightspace

#### Textbook:

R. Knight, B. Jones, S. Field, "College Physics: A Strategic Approach", 4<sup>th</sup> Edition (2018)

The ebook can be obtained from the course Brightspace page.

A loose-leaf edition is available via direct order for \$65 with the link:

<https://www.pearson.com/store/p/college-physics-a-strategic-approach/P100000282710/9780134700427>

## Announcements

Announcements pertaining to lectures and laboratory will be made via e-mail; you may be directed to Brightspace. E-mail is an official channel of communication. It is important to check your assigned Dalhousie e-mail account **daily**.

## Course Assessment

Marks will be calculated by two methods and we give you the better of the two grades. Conversion of numerical grades to Final Letter Grades follows the Dalhousie Common Grade Scale, shown below in the table on the right.

	Method 1	Method 2	Grade Conversion	
1 <sup>st</sup> Quiz	17%	best of two quizzes	A+	90-100
2 <sup>nd</sup> Quiz	17%		A	85-89
CAPA Assignments 1 – 11	15%	15%	A-	80-84
Labs 1 – 5	15%	15%	B+	77-79
Tutorials 1 – 6	2 %	2 %	B	73-76
Class participation	2 %	2 %	B-	70-72
Exam	32%	44%	C+	65-69
	100%	100%	C	60-64
			C-	55-59
			D	50-54
			F	< 50

## Laboratory

Location: Rm 201 Dunn

Labs start Monday Sept. 19<sup>th</sup>. Lab manuals must be purchased at the Dalhousie Bookstore; you will be informed when they are available. You are expected to attend labs on the day you have selected, usually in alternate weeks (A, B). The schedule appears in the lab manual and in Brightspace (Laboratory). To find out whether you should attend Week A or Week B, consult your first Pre-Lab assignment, which will state the date and time of your first lab. (See Section "CAPA Assignments" on p. 5 for details about assignments.) The lab schedule given below is just a rough guide. The official schedule is based on both your lab Section and your Week (A or B) and accommodates holidays.

You are expected to come to the laboratory prepared for that day's experiment. All labs have a CAPA pre-lab assignment, which is due on your designated day 5 minutes before your session. To print your assignment, e-mail your pre-lab

sheets to yourself by logging into [www.learning.physics.dal.ca](http://www.learning.physics.dal.ca) and clicking on the corresponding link. Your first pre-lab for Lab X1 will be available on Wed. Sept. 14.

Laboratory policies and procedures are set out in the Introduction to the manual.

### Lab Rescheduling

If you must miss a lab session, for good reason, log onto [www.learning.physics.dal.ca](http://www.learning.physics.dal.ca), select "Lab Rescheduling" and follow the instructions. Do this as far in advance as possible. Note that your pre-lab assignment is still due on your regular lab day.

Fall Term 2022				
	Lectures	Reading Assignment	Labs	Tutorials
Sep-07 Sep-9	1. Introduction 2. Displacement and velocity	Sect 1.1 – 1.7 Sect. 2.1 - 2.3		T1. Vectors T1. Vectors
Sep-12 Sep-14 Sep-16	3. Acceleration 4. Constant acceleration and free fall 5. Motion in 2-D and vector review	Sect. 2.4 - 2.5 Sect. 2.6 - 2.7 Sect. 3.1 - 3.3		T1. Vectors T2 Graphs T2. Graphs
Sep-19 Sep-21 Sep-23	6. Projectile motion 7. Projectile motion and circular motion 8. Forces and Newton's 2nd Law	Sect. 3.5 - 3.6 Sect. 3.7 Sect. 4.1 - 4.5	L1: Measurement L1: Measurement L1: Measurement	T2. Graphs T2. Graphs T2. Graphs
Sep-26 Sep-28 Sep-30	9. Free body diagrams and gravity 10. Newton's 3rd Law Day of Reconciliation	Sect. 4.6 Sect. 4.7	L1: Measurement L1: Measurement	T2. Graphs T3 Forces
Oct-03 Oct-05 Oct-07	11. Normal Force 12. Friction, ropes and pulleys 13. Rotational motion	Sect. 5.1-5.4 Sect. 5.5, 5.7 - 5.8 Sect. 6.1 - 6.4	<b>** T3. Forces **</b> L2: Newton's Laws L2: Newton's Laws	T3. Forces T3. Forces T3. Forces
Oct-10 Oct-12 Oct-14	Thanksgiving 14. Torque 15. Centre of mass	Sect. 7.1, 7.3 Sect. 7.4	L2: Newton's Laws L2: Newton's Laws	T4. Torque T4. Torque
Oct-17 Oct-19 Oct-21	16. Stability and balance 17. Hooke's Law and properties of materials and tissues 18. Biomechanics	Sect. 8.1 - 8.2 Sect. 8.3 - 8.4 Sect. 8.5	L3: Oscillations L3: Oscillations L3: Oscillations	T4. Torque T4. Torque T4. Torque
Oct-24 Oct-26 Oct-28	19. Impulse and momentum 20. Conservation Laws, Work and Energy 21. Gravitational potential energy	Sect. 9.1 - 9.4 Sect. 10.1 - 10.3 (partial) Sect. 10.4	L3: Oscillations L3: Oscillations L3: Oscillations	T4. Torque T5. Energy T5. Energy
Oct-31 Nov-02 Nov-04	22. Elastic potential energy 23. Thermal energy 24. Power and Metabolism	Sect. 10.4,10.6 – 10.7 Sect. 10.5 & 10.10 Sect. 11.1 - 11.3	L4: Centre of mass L4: Centre of mass L4: Centre of mass	T5. Energy T5. Energy T5. Energy
Study Break: Nov. 7 - Nov. 11				
Nov-14 Nov-16 Nov-18	25. Energy in collisions 26. Periodic motion, simple harmonic motion, circular motion 27. SHM and vertical springs	Sect. 9.5 and 10.9 Sect. 14.1 - 14.3 Sect. 14.4	L4: Centre of mass L4: Centre of mass L4: Centre of mass	T5. Energy
Nov-21 Nov-23	28. Pendula, Forced and Damped Oscillations 29. Waves	Sect. 14.5 – 14.7 Sect. 15.1 - 15.2, 15.3 (partial)	L5: Waves L5: Waves	T6. Waves T6. Waves

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Nov-25	30. Superposition, standing waves, normal modes	Sect. 16.1 - 16.2	L5: Waves	T6. Waves
Nov-28	31. Standing waves on a string	Sect. 16.3	L5: Waves	T6. Waves
Nov-30	32. Standing waves in a tube and the human voice	Sect. 16.4 - 16.5	L5: Waves	T6. Waves
Dec-02	33. Wave intensity and pressure	Sect. 15.5	L5: Waves	T6. Waves
Dec-05	34. Pressure in a liquid, Pascal's principle	Sect. 15.5	L2: Newton's Laws	
Dec-07	35. Pressure and Archimedes principle	Sect. 13.1 - 13.3	L2: Newton's Laws	

## Tutorials

All lab sections have a first tutorial in the first week, **Wed. Sep. 7<sup>th</sup> - Tue. Sep. 13<sup>th</sup>**, in the assigned lab period. That is, students in section **B03** have Tutorial 1 on Wed. 7<sup>th</sup>. (2:35 pm start); students in **B06** on Thu. 8<sup>th</sup>. (10:05 am); students in **B04** on Thu. 8<sup>th</sup>. (4:30 pm start); students in **B05** on Fri. 9<sup>th</sup>. (2:35 pm); students in **B01** on Mon. 12<sup>th</sup> (2:35 pm); students in **B02** on Tue. 13<sup>th</sup>. (2:35 pm).

Subsequent tutorials take place during your regular lab time, but in those weeks that you do **not** have a lab session. Consult the schedules in Brightspace folders or the lab manual, carefully, to find which weeks you have a tutorial.

**Locations:** The first tutorial is split across Dunn 114 and additional rooms (below); report outside Dunn 114.

All subsequent tutorials occur in the following rooms:

Lab sections **B01, B02, B03** - Dunn 302

Lab section **B04** - Dunn 301 B

Lab section **B05** - Dunn 221 C

Lab section **B06** - Dunn 301 A

## Quizzes and Exams

Only non-programmable calculators without graphing capabilities are permitted in the quizzes and exams. All other electronic devices—with or without wireless capabilities—are not permitted. This includes cell phones or any other telecommunication device.

Quiz 1: Friday Oct. 14, 7:30 – 9:00 pm

Quiz 2: Friday Nov. 18, 7:30 – 9:00 pm

If you miss either quiz - for **any** reason - your mark will be calculated using method 2 as outlined in the grading scheme. If you are unable to attend a quiz for good reason, you must inform the lecturer **one week in advance and provide appropriate documentation**. If you miss a quiz due to illness, **within one week of the quiz** you must provide a *Student Declaration of Absence* which can be obtained here: [https://www.dal.ca/campus\\_life/safety-respect/student-rights-and-responsibilities/academic-policies/student-absence.html](https://www.dal.ca/campus_life/safety-respect/student-rights-and-responsibilities/academic-policies/student-absence.html) No make-up is offered for a missed quiz.

## Exam

The term exam will take place during the regular examination period (Dec. 9 - 20, 2022). The exam is 3-hours in duration and covers the work of the entire term. Students are required to write during the scheduled time, except under **exceptional** circumstances. If you miss the exam due to illness or distress, **within one week of the exam** you must provide a medical certificate signed by a physician that clearly states that you were not fit to write the exam. Instructors reserve the right to reject unsatisfactory certificates. A *Student Declaration of Absence* is **NOT** acceptable for an exam.

## Lectures

The lectures notes and slides will be made available on Brightspace the night before lecture. Live lectures recordings from 2013 are also posted on Brightspace. These may help you catch-up if you miss a class, but are not meant as a substitute for attending lectures. There are small changes made to the course from year to year. You should therefore ensure that you have the new material that is included in the slides and lecture notes, to properly prepare for quizzes and exams.

## CAPA Assignments

The computer-assisted personalized approach – known as CAPA – is a system of personalized assignments for each student in the class, created by the instructors from a variety of conceptual and quantitative problems. You have 11 CAPA assignments over the course of the term, one due every Wednesday, the first due Sept. 14. These assignments are for you to learn and practise your problem-solving skills. You are encouraged to collaborate by discussing concepts with your classmates. However, it is most important for **you** to work through **your** assignment to ensure **you** understand the

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concepts fully. If you just use methods provided by others without understanding the material, you will **not** succeed in this course!

- NOTE:
- We do **not** drop your lowest CAPA assignment mark.
  - An additional CAPA 12 is given as practice for the final exam; it is **not** for credit.

### To get paper copies of assignments

for printing log-in to [www.learning.physics.dal.ca](http://www.learning.physics.dal.ca), then beside the "Assignments" button click [get the PDF file].

### Submitting assignments

Complete your assignments with pencil and paper. Keep good, clear records of all your working and step-by-step solutions in a binder. This is important for studying for quizzes and exams. Teaching Assistants in the Resource Centre will ask to see *your written solution attempt* before they help you with a given problem.

After you complete each question, you submit it on-line at [www.learning.physics.dal.ca](http://www.learning.physics.dal.ca). Your web browser needs to have *Cookies* and *JavaScript* enabled. CAPA will tell you whether your answer is correct or not. Normally, you have 15 tries to get each question correct. Assignments are due every Wednesday by 11:59 pm. If you are unable to complete an assignment for good reason, you must inform Tolson Winters before the due date. A limited number of extensions are granted but only in exceptional circumstances and for a valid reason.

Instructions for log-in and entering answers are printed on the back of the first assignment. See also the *How To* pages at [www.learning.physics.dal.ca](http://www.learning.physics.dal.ca)

## Where to get help

Students are welcome to come see the instructor (Ian Folkins) at any time in Room 119A (main floor of Dunn Physics Building, south end). However, it is advisable to come during office hours, or email beforehand to make an appointment.

- Discussions with **classmates** can be very useful. It is worthwhile to get to know some of your classmates; some students find it helpful to form small study groups. There is a discussion group for PHYC1310 on Brightspace ([dal.brightspace.com](http://dal.brightspace.com)).
- For technical problems with the CAPA system, contact **Tolson Winters** (Dunn 213), [tolson@dal.ca](mailto:tolson@dal.ca). Keep in mind that problems are well tested and that CAPA is very seldom wrong.
- **Teaching Assistants** (TAs) provide help on-line through the CAPA **Discussion Forum** on Brightspace and in person in the **Resource Centre** (Dunn 108) on Tuesdays and Wednesdays. (Hours to be announced. There will be limits to student occupancy in 108.)
- There will be Discussion forums for lecture content, laboratory and tutorials on Brightspace, where you can post questions to instructors and chat with classmates ([dal.brightspace.com](http://dal.brightspace.com)).
- If you are struggling with the mathematics, an excellent resource is **Khan Academy** <https://www.khanacademy.org>. This site provides tutorial videos and quizzes to ensure you understand a given concept. In particular, you should be comfortable with concepts covered in Khan's 'Algebra I', 'Geometry', 'Trigonometry' and 'Algebra II' units. To find these units, once you have logged-in to the site, go to the home page and select the "Subjects" menu at the top and choose "Math".

## Accommodation policy for students

Students may request accommodation as a result of barriers related to disability, religious obligation, or any characteristic protected under Canadian Human Rights legislation. The full text of Dalhousie's Student Accommodation Policy can be accessed here: [http://www.dal.ca/dept/university\\_secretariat/policies/academic/student-accommodation-policy-wef-sep--1--2014.html](http://www.dal.ca/dept/university_secretariat/policies/academic/student-accommodation-policy-wef-sep--1--2014.html). Students who require accommodation for classroom participation or the writing of tests and exams should make their request to the **Advising and Access Services Centre (AASC)** prior to or at the outset of the regular academic year. More information and the **Request for Accommodation** forms are available at [www.dal.ca/access](http://www.dal.ca/access).

## Intellectual honesty

We encourage you to discuss concepts and methods with your classmates, TAs or instructors. However, the answers and calculations must be your own work. We consider it an academic offence when a student:

- copies answers or reports from another student
- obtains answers, or programs that calculate answers, from other students or from the internet
- provides other students with reports, answers or programs that calculate answers

Instructors are obligated to report any academic offences to the Senate Disciplinary Committee. Please consult the Academic Integrity section below.

## 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/academic-advising.html>

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**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>