

**Faculty of Science Course Syllabus
Department of Physics and Atmospheric Science**

*PHYC 3010B
Experimental Physics II
Winter 2023*

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.

Instructor: Daniel Labrie Daniel.Labrie@dal.ca

Office hours: *In person:* Any time when I am available to answer any questions related to the lab.

Team's meeting: An invitation will be sent to the student for a meeting at a mutually agreed time.

E-mail: It will be used only to provide one-line answer to questions. I will respond within 24 hours.

Lectures: 2 lectures/week, 1.5 hours per lecture. TR: 14:35 – 15:55, Dunn Room 107

Laboratories: 2 labs/week, 3 hours per lab. MW: 14:35 – 17:25, Dunn Room 107

Course delivery: In-person.

Course Description

Designed to give the students a chance to do non-set experiments and thereby encounter and solve the problems of experimentation. Original approaches by the students are encouraged. As the number of experiments is small (two) students should achieve a real understanding of a few physical phenomena. Lecture topics include data analysis as encountered in the different areas of physics.

Course Prerequisites

PHYC 3000.03 with a minimum grade of B, or permission of the instructor.

Learning Objectives

- To become fluent in the research approach of experimental physics.
- To become familiar with experimental techniques.
- To carry out automated data collection and then full data and error analysis.
- To draw conclusions based on your results and level of confidence of your results.
- To write two formal, detailed, complete scientific reports in the style of the Style Manual of the

AIP (American Institute of Physics).

- To give two formal polished verbal presentations with question periods of the results of the projects carried out experimentally at the level of talks given at international conferences.

Course Content

Time permitting the topics covered during the lectures are:

1. Statistical analysis of data (Error Propagation, Linear and Non-Linear Least Squares Fitting, confidence level in the fitted parameters).
2. Origin of Noise and Shielding.
3. Strategies in increasing the Signal-to-Noise-Ratio (S/N) in your experiment.

Course Materials

Reference text: “Data reduction and error analysis for the physical sciences”, 3rd Edition, by PR Bevington and DK Robinson, McGraw-Hill Higher Education, 2003, ISBN 0-07-247227-8. A copy of the text is in the lab room 107.

PHYC 3010 Lab manual: Electronic version is available on the course page.

Course Assessment

Component Weight

Assignment on data analysis: **5 %**

Project Grade No. 1: **40 %** (breakdown: 2.5 % expt. plan, 97.5 % report/talk[†])

Project Grade No. 2: **55 %** (breakdown: 2.5 % expt. plan, 57.5 % report^{†*}, 40% talk[†])

Total: 100 %

Conversion of numerical grades to Final Letter Grades follows the Dalhousie Common Grade Scale

A+ (90-100) B+ (77-79) C+ (65-69) D (50-54)

A (85-89) B (73-76) C (60-64) F (<50)

A- (80-84) B- (70-72) C- (55-59)

Course Policies

Penalty: - 10 %/calendar day for late assignment (1 min past due date is considered late).

†The report and talk will be marked in terms of the guidelines given in pages 13 - 34 of lab manual.

Expt. validation two weeks after the start of experimentation: Comparison between preliminary data and theory/literature must be presented. Failure to do so will result in a **10% penalty** to the **project grade (p.g.)**.

penalty: - 5 % on the **p.g.** per missing guideline in the report or talk.

penalty: - 10 %/calendar day on the **p.g.** on the due date for late report submission.

penalty: - 5 % on the **p.g.** per missing lab or lecture session.

penalty: Proposed Plan submitted 1 min past the deadline will result in a grade of 0 %.

penalty: - 10 %/calendar day on the **p.g.** will be applied if the expt no. 1 apparatus is not dismantled and equipment put away by February 16.

Penalty: - 10 % on the **p.g.** for not indicating the contribution of each team member for the report and talk components.

Penalty: - 10 % on the **p.g.** for the team member not contributing equally toward the expt, report and talk. The team member at a disadvantage will be compensated by + 10 % on the **p.g.**

If one week, a lab/lecture session is missed and the *Student Declaration of Absence form* is submitted the same week then no penalty on the **p.g.** will be applied.

Note that a total of two (2) *Student Declaration of Absence forms* can only be used throughout the term.

TIMETABLE

January 9: Classes begin, selection of Expt. # 1, and literature search	February 20 - 24: Winter Study Break
January 10: ** Marking of proposed plan # 1 by 3:30 pm	February 27: Start of Expt. # 2
January 10: Start of Expt. # 1 Assignment on data analysis is given.	March 1: Hand in Lab Report # 1 and PPT presentation by 2:00 pm
January 17: Assignment due at 2:35 pm	March 1: Talks on Expt. # 1 starting at 2:35 pm
January 26: Expt. # 1 Validation	March 16: Expt. # 2 Validation
February 7: Selection of Expt. # 2	April 10: Completion of Expt. # 2
February 16 ^{**} : Marking of proposed plan # 2 by 3:30 pm	April 25: Report submissions and Final presentations on Expt. # 2
February 16: Completion of Expt. # 1	

January 9, 2023

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

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

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

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).

Information: 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

Student Resources and Support

Advising

General Advising 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

Black Students Advising Centre: https://www.dal.ca/campus_life/communities/black-student-advising.html

International Centre: 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

Studying for Success: 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

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

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>