



Essential Skills for the Modern Scientist

Course Information

Course Number: 1P97

Term/Year/Duration: Winter 2025

Course Title: Essential Skills for the Modern Scientist

Instructor Information

Instructor Name: Prof. Gavin Hester

Email: ghester@brocku.ca

Office Locations: MC E221

Times and Locations

Lectures: Monday, Wednesday 4 pm – 5 pm in MC H313

Thursday, 4 pm – 5 pm in MC A203

Laboratory: (Section 1) Monday, 10 am to 11 am in MC B203

(Section 3) Wednesday, 10 am to 11 am in MC B203

Office Hours: Wednesday, 1 pm – 2 pm in MC E221

Course Calendar Description

Introduction to scientific computation; storing and retrieving data; data visualization. Programming languages used in the physical sciences. Error analysis. Scientific Communication; group project; peer review; ethical norms in science.

Course Assistance

Office Hours: Office hours for the instructor are above and are there to help with the course content. If the listed time does not work, please reach out to request to meet at a different time.

Brock Student Success Center: Brock's Student Success Center offers paid tutoring services. Details on this tutoring are available here: <https://brocku.ca/student-life-success/learning-services/tutoring/>

Required Readings or Texts

On Fact and Fraud: Cautionary Tales from the Front Lines of Science by David Goodstein

The cost of this book can be found [here](#). Note: pricing is subject to change.

Optional Readings or Texts

Introduction to Error Analysis: The Study of Uncertainties in Physical Measurements by John R. Taylor

OpenStax University Physics 2nd Edition – Available for Free at

- <https://openstax.org/details/university-physics-volume-1>

Course Communications

Communications will be primarily sent using Brightspace's announcement feature. Students should contact the instructor via email.

Assessment Components and Due Dates

1P97 Assessment Components

Assessment Component	Grade Weight
Term Paper and Presentation	20%
Class/Laboratory Participation	10%
Laboratory Projects and Quizzes	25%
Homework	25%
Final Exam	20%
Total	100%

Task Descriptions

Term Paper and Presentation: Each student will choose from a list of topics in modern physics to research and write a paper on. These topics will broadly fall under the fields of: Nuclear/Particle Physics, Condensed Matter Physics, Atomic/Molecular/Optical Physics, Soft Matter (Biophysics/Polymer Physics). Students will be required to submit an outline and first draft over the course of the semester. At the end of the semester, students will be required to create a short presentation about their paper for the class.

Class/Laboratory Participation: This class requires heavily on students attending *and* participating in class discussions and assignments. Students are expected to attend all classes and submit all assignments to pass this course. Students can miss one class and one lab during the course. **If students miss more than one class and lab without official academic consideration they will receive a failing grade in the course.** Exceptions will only be made in extreme circumstances.

Participation points are pass/fail and will be awarded in a variety of ways, including but not limited to:

- Attendance checks and participation assessment. Assessing participation is at the sole discretion of the instructor.
- In class assignments that are submitted at the end of class.

Laboratory Projects and Quizzes: Three laboratory projects will be completed outside of class throughout the course of the semester. Students will have approximately four weeks to complete each project. The laboratory time during those four weeks will be aimed at building the skills needed to complete the project.

Three coding quizzes will also be given throughout the course of the semester to test your knowledge of Python. The quizzes must be completed within the laboratory period.

Homework: Homework will be given approximately every week. Most of the homework will focus on error analysis problems. Additional homework problems focused on writing, scientific ethics, and coding may also be assigned.

Final Exam: The final exam will be a two-hour exam and will cover all portions of the class. Heavy focus will be put on error analysis, code analysis, and writing in the exam. More details will be given at the end of the semester.

Late Submission Policy

Class/Laboratory Participation: Participation points cannot be made up without an official academic consideration.

Term Paper and Laboratory Projects: For each calendar day a submission is late, 10% will be deducted from the grade. If the assignment is over 3 calendar days late, it will be given a zero.

Homework: For each calendar day a submission is late, 10% will be deducted from the assignment grade. Homework submitted late is not entitled to comments from the instructor and is only given a numerical grade.

Important dates

First day of classes: January 6

Last day of lectures: April 4

Reading Week: February 17-21

Last day of exams: April 24

Deadline for withdrawal without academic penalty: March 6

Academic Policies

Academic Integrity

Academic misconduct is a serious offence. The principle of academic integrity, particularly of doing one's own work, documenting properly (including use of quotation marks, appropriate paraphrasing and referencing/citation), collaborating appropriately, and avoiding misrepresentation, is a core principle in university study. Students should consult Section VII, "Academic Misconduct", in the "Academic Regulations and University Policies" entry in the [Undergraduate Calendar](#) to view a fuller description of prohibited actions, and the procedures

and penalties. Information on what constitutes academic integrity is available at [Brock University Academic Integrity Website](#).

Use of Large Language Models (ChatGPT, Llama, Gemini, etc.)

This course will make use of large language models (LLM) like ChatGPT for educational purposes. Students are not permitted to use LLM for work in this course without explicitly being told to in the assignment. If an LLM is used, students must explain how it was used in their work.

The instructor reserves the right to discuss submissions with students and if it is clear that you do not understand what you submitted you will receive a zero for the assignment.

Plagiarism software:

This course will use Turnitin.com, phrase-matching software. If you object to uploading your assignments to Turnitin.com for any reason, please notify the instructor to discuss alternative submissions.

Penalties for Academic Misconduct in the Faculty of Mathematics and Science

The following are standard penalties imposed in academic misconduct cases in FMS. Please be aware that the Associate Dean, Undergraduate Programs, may assign different penalties than those listed here, depending on the details of individual cases. ***Requests for special academic consideration, such as exceptions to academic regulations, will not be considered while academic integrity cases are ongoing.***

Penalties for misconduct in course work, including mid-term tests

First offence: Zero grade on assignment, additional penalty of 100% of the weight of the assignment to be subtracted from the final grade, mandatory completion of the AZLS Academic Integrity workshop

Second offence: Zero grade on assignment, additional penalty of 100% of the weight of the assignment to be subtracted from the final grade, 4-month suspension

Third offence: Zero grade in course, 1-year suspension, permanent removal from major program.

Fourth offence: Permanent suspension / debarment.

Penalties for misconduct in final exams:

First offence: Zero grade in course

Second offence: Zero grade in course, 4-month suspension

Third offence: Zero grade in course, 1-year suspension, permanent removal from major program,

Fourth offence: Permanent suspension / debarment.

Intellectual Property Notice

All slides, presentations, handouts, tests, exams, and other course materials created by the instructor of this course are the intellectual property of the instructor. **You may NOT share intellectual property that is not your own!** A student who publicly posts or sells an instructor's work, without the instructor's express consent, may be charged with misconduct under Brock's Academic Integrity Policy and/or Code of Conduct. You may also face adverse legal consequences for infringement of intellectual property rights.

Accommodations for Medical Reasons or Bereavements

a. Brief absence (up to 72 hours)

In the case of a short-term medical circumstance, if a student wishes to seek an academic consideration, please use the [Medical Self-Declaration Form](#). The request is to be made in good faith by the student requesting the academic consideration due to a short-term condition that impacts their academic activities (e.g., participation in academic classes, delay in assignments, etc.).

The period of this short-term medical condition for academic consideration must fall within a 72-hour (3 day) period. The form must be submitted to the instructor either during your brief absence or if you are too unwell, within 24 hours of the end of your 3 day brief absence. This form cannot be used for final exam deferrals.

b. Extended absence (longer than 72 hours)

In cases where a student requests academic consideration due to a medical circumstance that exceeds 72 hours (three days) that will impact their academic activities (e.g., participation in academic classes, delay in assignments, etc.), or in the case of a final exam deferral, the [Medical Verification Form](#) must be signed by the student and the health professional as per process set out in the [Faculty Handbook III:9.4.1.](#)

c. Students may request deferred due dates or examinations on medical or compassionate grounds, such as the death of a close family member. Requests should be submitted whenever possible. Appropriate documentation is required. Retroactive requests for deferment after an examination cannot be completed. If you are not well enough to write an exam, notify your instructor before the exam begins.

Other Accommodations

The University is committed to fostering an inclusive and supportive environment for all students and will adhere to the Human Rights principles that ensure respect for dignity, individualized accommodation, inclusion and full participation. The University provides a wide range of resources to assist students, as follows:

- a) If you require academic accommodation because of a disability or an ongoing health or mental health condition, please contact Student Accessibility Services at askSAS@brocku.ca or 905 688 5550 ext. 3240.
- b) If you are experiencing mental health concerns, contact the Student Wellness and Accessibility Centre. *Good2Talk* is a service specifically for post-secondary students, available 24/7, 365 days a year, and provides anonymous assistance: [Good 2 Talk](#) or call **1-866-925-5454**. For information on wellness, coping and resiliency, visit: [Brock University \(Mental Health\)](#)
- c) If you require academic accommodation on religious grounds, you should make a formal, written request to your instructor(s) for alternative dates and/or means of satisfying requirements. Such requests should be made during the first two weeks of any given academic term, or as soon as possible after a need for accommodation is known to exist.
- d) If you have been affected by sexual violence, the Human Rights & Equity Office offers support, information, reasonable accommodations, and resources through the Sexual Violence Support & Education Coordinator. For information on sexual violence, visit [Brock's Sexual Assault and Harassment Policy](#) or contact the Sexual Violence Support & Response Coordinator at humanrights@brocku.ca or 905 688 5550 ext. 4387.
- e) If you have experienced discrimination or harassment on any of the above grounds, including racial, gender or other forms of discrimination, contact the Human Rights and Equity Office at humanrights@brocku.ca.