Course Syllabus

Phys 1081: Foundations of Physics for Engineers

Fall 2024

Classroom component:

Instructors:	Dr. Abdelhaq Hamza	Dr. Dennis Tokaryk
	ahamza@unb.ca	dtokaryk@unb.ca
	Phys 228	Phys 211
Class location:	MacClaggan Hall, room 105	
Class times:	MWF 10h30-11h20	
Tutorial locations:	Tilley 303 (M), Tilley 302 (T), Science Library 107 (W)	

Laboratory component:

Instructors:	Prof. Bruce Benton	Prof. Travis Parkman
	jbenton@unb.ca	travis.parkman@unb.ca
	Phys 305A	Phys 310
Laboratory locations:	Phys 321, Phys 314	

Laboratory/Tutorial times:	M	14h30-17h20 (Section A)
	T	14h30-17h20 (Section B)
	W	14h30-17h20 (Section C)

Physics administrative office:

Executive Assistant:	Rebecca Breen	
	physics@unb.ca	
	506 453 4723	

We recognize and respectfully acknowledge that all UNB course interactions take place on unsurrendered and unceded traditional lands of the Wolastoqiyik.

Office Hours: How to Contact Us

Contacting instructors:
Drs. Hamza and Tokaryk can be reached via email *for classroom inquiries*, and Profs. Benton and Parkman via email *for laboratory inquiries* (addresses are on the first page). While we frequently check our emails, we may need some time to reply, so expect a response within one business day. *For the fastest response, add **Phys 1081** to the Subject line – our software puts these emails in a separate folder which we check first. We don't want your emails lost in the sea of them that we get daily!* We may not be free to respond on weekends or on holidays. Please do not contact us via other services like Teams – we will not be expecting student messages on other platforms and might miss your message.

If you would like to meet us outside of office hours for a more one-on-one meeting, please email us to set up an appointment. Our availability might be limited outside of office hours (we have research, administration and other courses to take care of!) but we will do our best to connect with you.

We welcome your questions and comments, and look forward to discussing physics with you!

About the Course

Course Description:
An introduction to the fundamentals of mechanics. Vector analysis and its application to the analysis of the motion of particles and rigid bodies. Newton's three laws of motion. The kinematics and dynamics of particle motion along straight and curved paths. Work, energy, impulse and momentum of particles and rigid bodies. An introduction to the rotation of a rigid body about a fixed axis, moments of inertia, angular momentum. Simple harmonic motion.

Course Corequisites:
- MATH 1003 (Introduction to Calculus I) or MATH 1053 (Enriched Introduction to Calculus)
- MATH 1503 (Introduction to Linear Algebra), or MATH 2213 (Linear Algebra I), or equivalent.

NOTE: Credit can be obtained in only one of PHYS 1051 and PHYS 1091, or PHYS 1081.

Textbook(s):
Physics for Scientists and Engineers: A Strategic Approach (5th edition) with Mastering Physics, published by Pearson
Author: Randall D. Knight
NOTE: This is an e-text only. Instructions for obtaining the textbook are available on the D2L website for the course. Follow them carefully to avoid purchasing the wrong product.

Classroom, Laboratory and Tutorial Information

Physics 1081 is a **5 credit-hour course**. You are required to participate in the classroom, laboratory and tutorial activities.

In the classroom section you will attend lectures and will be given regular assignments to do on Mastering Physics, web-based platform that comes with your electronic textbook. Assignments will be graded by Mastering Physics, so you will get immediate feedback on your work upon submission. Be sure to have your assignments completed by their due date, since the software will be set to halt submissions once they are past due.

Once a week you will attend a 3-hour session in which you will perform a laboratory exercise and attend a tutorial. On your assigned day,
if your student number is **even**, you will attend laboratory from 14h30-16h00, and tutorial from 16h00-17h30;
If your student number is **odd**, you will attend tutorial from 14h30-16h00, and laboratory from 16h00-17h30.

Rooms for tutorial and lab will be given in class and will be posted on D2L. Further details will be given during the first lab/tutorial session. Labs and tutorials will begin on the first full week, Sept. 09-13.

Course Topics and Outcomes

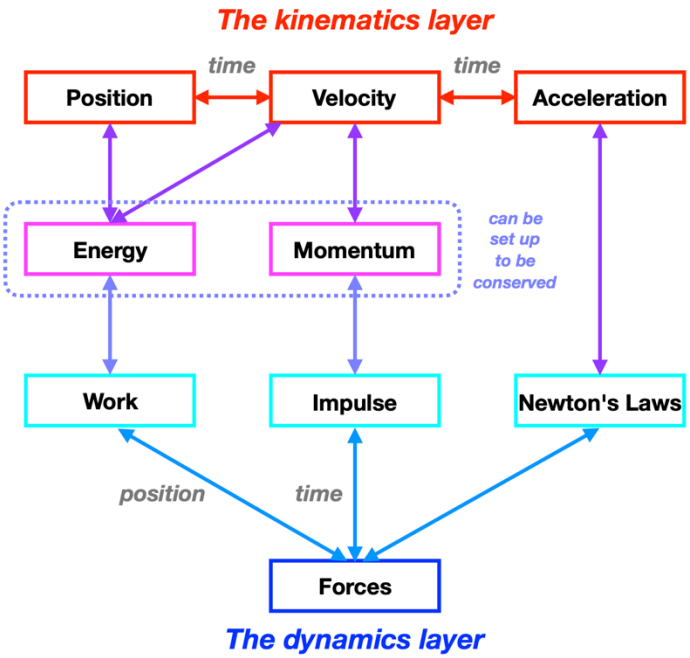
Our aim in this course is to furnish you with the physics tools and understanding that will allow you to go on and become brilliant engineers of all stripes. What you need to start with (from this course) are the *principles of classical mechanics* and a set of *physics skills*, with which you can make use of the principles. To implement the physics skills, we will make use of several technical tools, which are rooted in mathematics and facilitate our calculation of physical quantities.

Classical mechanics is the "grammar" of physics because the concepts and definitions that we develop, like mass, velocity, force, and energy (for example) are carried forward to other branches of physics, like electricity and magnetism, wave physics, thermodynamics, and even quantum mechanics. We will develop a common language used by all disciplines of science by carefully defining these terms in classical mechanics and learning to use them. (As an example, biologists and chemists will use the concept of energy - but its definition is rooted in physics!) We will only study a few, basic physics rules - in fact, physicists try their best to reduce the number of rules they need to a bare minimum - but we can explain a great deal of how the universe works, at scales ranging from galaxies to subatomic particles, using the principles we will develop here.

A detailed list of topics covered is given in the weekly schedule given on subsequent pages. Here we will discuss the objectives we wish for you to meet during the course.

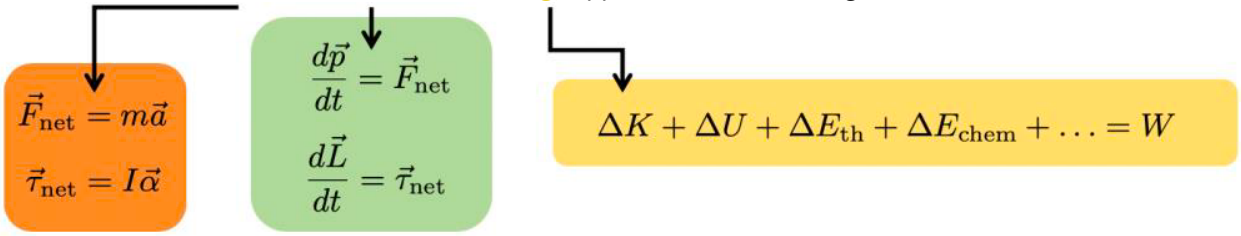
Objectives: the principles of classical mechanics

The graphic below is central to our course and understanding its parts and the connections between them will a major focus.



By the end of this semester:

- You will know the definition of each quantity in the above graphic, as well as its analogue for rotational motion.
- You will be able to connect the ideas shown, both conceptually and mathematically, via the technical tools we will use.
- You will be able to describe positions, velocities, accelerations, forces, and momenta against any arbitrary Cartesian coordinate frame using correct vector notation. This allows you to describe the motion of everything from whales to nanobots, satellites to galaxies.
- You will be able to correctly judge the most appropriate method between a **force**, **momentum**, and **energy** approach when assessing a mechanical situation.



- You will also recognize that more than one approach could lead to a satisfactory answer. You will use more than one approach to think about rocket-powered vehicles, for example, or how wind turbines convert energy.

Grading, Marks, and Course Policies

Grading Scale

Percentage	Letter Grade	Grade Points
90.0-100.0	A+	4.3
85.0-89.9	A	4.0 (Excellent)
80.0-84.9	A-	3.7
75.0-79.9	B+	3.3
70.0-74.9	B	3.0 (Good)
65.0-69.9	B-	2.7
60.0-64.9	C+	2.3
55.0-59.9	C	2.0 (Satisfactory)
50.0-54.9	D	1.0
Below 50.0 or Incomplete	F	0.0

The grading scheme for this course is summarized above. There will be no rescaling of the grade distribution in this course. Grades may be shifted up if a particular course topic proves to be unfairly difficult. Grades will NEVER be shifted down. Also, note that a D is officially a passing grade, but it is not sufficient to use this course as a prerequisite for other physics courses, or to use this course if it is required for your degree.

Course Marking Scheme

Item	Value	Description
Readings	-----	Scheduled e-text **readings will be posted on Mastering Physics**. Readings are not graded, but we highly recommend them to keep up with the course material.
Assignments	12%	Homework assignments will be **assigned once per week on Mastering Physics**.
Tutorials	12%	During weekly tutorial sessions, you will be assigned a group to work collectively on an assignment. **Only one submission per group is necessary.**
Term Tests	3 x 10% = 30%	There will be three term tests throughout the semester during class time.
Final Exam	30%	The final exam will cover **all the material in the course** and will take place during the final exam period.
Classroom	84%	
Laboratory	16%	
Total	**100%**	

Course Policies

1. *You are expected to participate in all classes and tutorials.* ***Attendance in tutorials is mandatory****, as group assignments will be administered there. Attendance in classes is expected.* ***Your presence is mandatory for completing term tests and the final exam****. For further information regarding attendance, see UNB's policy.*
2. *Homework assignments will be done in the Mastering Physics platform. Respect the deadlines for completing the assignments, and start them well in advance to ensure your success.*
3. *Tutorial assignments will be completed in your assigned tutorial and submitted on Crowdmark. Only group members who are present for the tutorial will be given credit for the work.*
4. *There are a total of 3 term tests during the term.*
5. *One make-up test will be administered at the end of the semester for those students who missed a test due to extenuating circumstances (e.g. if you are incapacitated due to illness). Contact the instructors to request a make-up test. Supporting documentation may be required to corroborate your reason. Requests will be granted at the discretion of the instructors.*
6. *There will be* ***no material assigned for extra credit*** *under any conditions.*

Weekly Schedule

The *approximate* weekly course schedule is given below. It is subject to change during the semester. Consult the D2L course homepage for the most up-to-date schedule and Mastering Physics for the suggested readings.

Week	Dates	Topics	Tests
01	Sept. 04-06	Ch. 1 – Concepts of motion	
02	Sept. 09-13	Ch. 2 – 1D kinematics	
03	Sept. 16-20	Ch. 3 – Vectors and coordinate frames Ch. 4 – 2D kinematics	
04	Sept. 23-27	Ch. 5 – Forces Ch. 6 – Dynamics I	
05	Sept. 30-Oct. 04 (no class Sept. 30)	Ch. 6 – Dynamics I	Test 01 (Oct. 04)
06	Oct. 07-11	Ch. 7 – Newton's 3rd law Ch. 8 – Dynamics II	
07	Oct. 14-18 (no class Oct. 14)	Ch. 8 – Dynamics II	
08	Oct. 21-25	Ch. 9 – Work and Energy	
09	Oct. 28-Nov. 01	Ch. 10 – Potential Energy	Test 02 (Oct. 25)
10	Nov. 04-08	Ch. 11 – Impulse and Momentum Ch. 12 – Rotation	
11	Nov. 11-15 (no classes)		
12	Nov. 18-25	Ch. 12 – Rotation	Test 03 (Nov. 20)
13	Nov. 25-29	Ch. 12 – Rotation Ch. 15 – Oscillations	
14	Dec. 02-06	Ch. 15 – Oscillations Wrap-up	

D2L Information

Always available (Self-directed Asynchronous Activities)
Online course materials can be found in D2L Brightspace, UNB's online Learning Management System. You can access it through the MyUNB portal for single login to all UNB services (https://my.unb.ca/Pages/default.aspx) or directly at https://lms.unb.ca/.

Online components in D2L Brightspace may include:

- Syllabus
- e-books
- Videos
- Articles as PDFs and online
- PowerPoint files
- Excel spreadsheets
- Assignments
- Quizzes
- Discussions
- Group workspace

D2L Brightspace Support for Students:
https://unbcloud.sharepoint.com/sites/adm/SitePages/D2L-Resources-for-Students.aspx

For D2L technical support, contact: d2l@unb.ca

General Technical Support

For general technical support, please contact Information Technology Services (ITS) Help Desk by phone, 457-2222 (Fredericton Campus) 657-2222 (Saint John Campus) or email, itservicedesk@unb.ca.

Key Technologies

During the semester, there are a variety of technologies that students will be expected to use. Students can contact their course instructor or Information Technology Services (ITS) Help Desk (itservicedesk@unb.ca). If you are using any external learning tools, or software packages you would list the information here.
There are resources available online to help guide students through some of these key technologies:

Microsoft 365 free for students
Every student is entitled to install the Microsoft 365 suite of tools that has lots of tools and apps to help you do well in your courses. Teams can be used for group projects, sharing content, and office hours, but there is OneNote, Sway for creating class presentations, OneDrive for sharing files for working and studying in groups, and Stream for sharing videos.

MS 365 is free through your UNB login account, and you can access it through your MyUNB portal (my.unb.ca).

More information on this is available here:
https://unbcloud.sharepoint.com/sites/UNBO365/SitePages/Studying-Remotely.aspx
(Note: your UNB log-in will be required.)

D2L
UNB's learning management system is D2L Brightspace. Information about using D2L is available here:
https://unbcloud.sharepoint.com/sites/adm/SitePages/D2L-Resources-for-Students.aspx

PollEverywhere
This is a classroom polling software that your course instructor may be using. Information about using Poll Everywhere is available here:
https://www.unbtls.ca/itl/pdfs/Poll_Everywhere_Student_Guide.pdf

CrowdMark
This is an online grading software that your course instructor may be using for submission of assignments, tests, or exams. Information about using CrowdMark is available here:
https://www.unbtls.ca/itl/pdfs/Crowdmark_Student_QuickStart_Guide.pdf

Getting organized academic success

Your Academic Work is Your Full-Time Job
Treat your studies at UNB as a full-time job, if you are enrolled full-time. Every lecture hour of a course takes on average 3 hours of work outside of that, preparing, reviewing, studying, and working on assignments. Set aside about 40 hours of time per week for your academic work, and use this rule-of-thumb as a guide to setting expectations for the others with whom you share your living space, which will most likely also be your learning and study space. If you have a job while studying at UNB, try to keep it to no more than 15 hours per week.

Manage Your Time
Since your academic work is your full-time job, likely to take 40 hours per week, you need to set an academic work schedule on a weekly basis. To get set up to do this, look at the key academic dates for the entire term and note the important ones:

https://www.unb.ca/secretariat/students/undergraduatedatesmain.html

For example, note the last day for adding courses, the last day for withdrawing from courses without academic penalty and reading week for the fall term.

Start with the big picture
Create a Term-at-a-Glance table or matrix so you can visualize how the academic dates unfold over the 15-week period (13 for classes, 2 for exams).

Then create schedules week-by-week
Before you start your first week of classes, and then at the end of each week, create a weekly schedule in a tabular form. Start by referring to your Term-at-a-Glance, then checking the syllabus and communications from professors about upcoming course work.

Include class preparation and study time, as well as your other life commitments, such as work or household chores. And, schedule "health and wellness" time to take care of yourself, such as exercise, favourite pastimes, hanging out with friends and other social activities, even if they're done virtually.

Make a plan each day
Use an electronic or paper day planner or agenda, or whatever other tool you're used to or want to try, to create a list of tasks with times associated with them for each day. Start with your weekly schedule. These items are your goals for the day to keep you on track and motivated.
[Instructors may wish to provide personal and/or faculty/departmental policies regarding:]

1. Expectations for participation and attendance (note the UNB attendance policy: http://go.unb.ca/tls1viWva)
2. Deadlines for assignment submissions
3. Submission methods (e.g. in person or electronically)
4. Extensions or penalties for late work, missed exams, late for test/exam
5. Email response time
6. Use of electronic devices in class
7. Classroom, lab, clinical and field work safety and decorum (note the UNB policy: http://go.unb.ca/tlsmWzKLL)
8. Policy on extra credit, or statement that there is no extra credit

Library information

www.lib.unb.ca

UNB Libraries supports your learning and academic success. Librarians will help you navigate academic resources and guide you through your research and information needs. Examples of this support include finding reliable sources for your assignments, searching the scholarly databases, and offering advice on the quality of your research. A vast collection of resources is available to you online and in print at lib.unb.ca. Research help is available by phone, e-mail, chat, and in-person.

UNB Saint John's library is located in the Hans W. Klohn Commons. The Harriet Irving Library (HIL) is the main library on UNB's Fredericton campus and is located directly across from the Student Union Building (SUB).

The libraries offer quiet and group study space. Book a Group Study Room online at http://www.lib.unb.ca/services/group_study.php

Here are some examples of profiles for librarians who can help with various subjects. An overview of subjects and links to their library resources can be found here: https://guides.lib.unb.ca/

KEEP TEXT FOR THE RELEVANT SUBJECT LIBRARIAN AND DELETE FOR THE OTHERS

Alex Goudreau is the librarian for all Sciences, Engineering, Nursing, and Health. Alex is available to meet one-on-one, online or in person. Contact information and research guides by subject: https://guides.lib.unb.ca/profile/u83a9

Phil Taber is the librarian for Business, Economics, English, Philosophy, and Languages. Phil is available to meet one-on-one, online or in person. You'll find his contact information and research guides at https://guides.lib.unb.ca/profile/x75a8.

David Ross is the librarian for Classics, Communication Studies, Education, History, Political Science, and Sociology. David is available to meet one-on-one, online or in-person. You'll find his contact information and subject guides at https://guides.lib.unb.ca/profile/drross

Equity, Diversity, and Inclusion

UNB embraces the idea of an intellectual community enriched by diversity along a number of dimensions, including gender, gender identity, sexual orientation, age, culture, ability, race, ethnicity, language, religion, and nationality. It is my intent that all students be well served by this course, that students' learning needs be addressed both in and out of class, and that the diversity students bring to this class be viewed as a resource, strength and benefit. I intend to provide materials and activities that are respectful of diversity. Your suggestions are encouraged and appreciated. In addition, if any of our class meetings conflict with your religious holidays, please let me know so that we can make arrangements for you.

Location of gender-neutral washrooms on campus (scroll down):
https://www.unb.ca/humanrights/resources/index.html

Office of Human Rights and Positive Environment:
https://www.unb.ca/humanrights/index.html

Services for Students with Disabilities

FREDERICTON
If you are a student with a disability of any type (physical, mental, learning, medical, chronic health, sensory; visible or invisible) you are strongly encouraged to register with the UNBF Student Accessibility Centre (SAC) (https://www.unb.ca/fredericton/studentservices/academic-success/accessibility-centre/) so that you may receive appropriate services and accommodations. Once you are registered with SAC, you'll receive an accommodation letter you can share with instructors. If you would like to discuss your needs with the instructor, please book a time for a confidential appointment.

SAINT JOHN
Academic accommodations for students with disabilities are provided by the Student Accessibility Centre. If you are a student with a disability and would like to discuss potential accommodations, you are encouraged to contact Ken Craft, Student Accessibility Centre Coordinator. Ken can be reached at kcraft@unb.ca or 648-5690.

Your wellbeing is important.

It is normal for university students to experience mental and physical health challenges. If you or a friend encounter difficulties and need assistance, it's important to reach out. Consider discussing the situation with a mentor or academic advisor. Learn about resources that assist with wellness and academic success at the University of New Brunswick by visiting:

- https://www.unb.ca/fredericton/studentservices/be-healthy-at-unb.html (Fredericton) or
- www.unb.ca/saintjohn/studentservices/ (Saint-John)

If you are in immediate crisis, please contact CHIMO helpline at 1-800-667-5005.

Class Recording and Copyright

Anyone who wishes to video or audio record lecture presentations or distribute course notes or other similar materials provided by instructors must obtain the instructor's written consent beforehand. Otherwise, all such reproduction is an infringement of copyright and is absolutely prohibited and subject to academic penalties (see Academic Offences below). In the case of private use by students with documented disabilities, the instructor's consent will not be unreasonably withheld.

Plagiarism and Academic Offences

"The purpose of education is to acquire knowledge, develop skills, and to grow as an individual. In order to achieve these goals one needs to approach one's courses in an honest manner. This requires individuals to submit work that is their own creation. Students often wonder why documenting their sources and maintaining a high level of academic integrity is so important, and why failure to do so is taken so seriously. Work undertaken at university is part of a centuries-long conversation. All work builds on that of your predecessors. Documenting your sources recognizes the efforts of others and places your contribution within the conversation. Therefore, your documentation/integrity shows courtesy for your sources and for your reader."

Ken Craft

The university has carefully defined what it considers plagiarism, and these regulations are found in the UNB calendar section B.19 IX Academic Offences:

Plagiarism includes:

1. quoting verbatim or almost verbatim from any source, regardless of format, without acknowledgement;
2. adopting someone else's line of thought, argument, arrangement, or supporting evidence (such as, statistics, bibliographies, etc.) without indicating such dependence;
3. submitting someone else's work, in whatever form (essay, film, workbook, artwork, computer materials, etc.) without acknowledgement;
4. knowingly representing as one's own work any idea of another.

NOTE: In courses which include group work, a penalty may be imposed on all members of the group unless an act of plagiarism is identified clearly with an individual student or students.

Please note that plagiarism is not difficult to spot; web sources can be quickly traced through a variety of specialty search engines. Professors are required to follow the disciplinary procedures outlined in the calendar (B.17. IX. A. 1-2).

OTHER ACADEMIC OFFENCES you need to be aware of include:

1. Cheating on examination, tests, assignments or reports, including but not limited to:
   Impersonating a candidate at an examination or test or in connection with any assignment in a course or availing oneself of the results of impersonation.
   Obtaining, through theft, bribery, collusion, purchase, or other improper manner,
   1. an examination or test paper prior to the date and time for writing the examination or test;
   2. academic materials belonging to another person, e.g. laboratory reports, assignments, papers, computer materials, datasets.
2. Falsifying or knowingly submitting false assignments or credentials, records, transcripts, or other academic documents.
3. Submitting a false health or other certificate.
4. Submitting identical or substantially similar work for one course or program of study, which has been or is being submitted for another course or program of study, without the prior express knowledge and approval of the instructors.
5. Interfering with the right of other students to pursue their studies.
6. Knowingly aiding or abetting any of the above offences.
7. Tampering with, or altering, in any deceptive way, work subsequently presented for a review of the grade awarded.

Penalties for plagiarism and other academic offences range from a minimum of F (zero) in the assignment, exam or test to a maximum of suspension or expulsion from the University, plus a notation of the academic offence on the student's transcript.

For more information, please see the Undergraduate Calendar, University Wide Academic Regulations, Regulation VIII.A, or visit: http://go.unb.ca/tlsPb0XX5 . It is the student's responsibility to know the regulations.

Tutorial Attendance
Attendance is **mandatory**. Attendance will be recorded and a grade assigned. Inappropriate behaviour (e.g., being disrespectful of tutorial leaders, arriving late, or sleeping during the tutorial) will result in a loss of some or the entire attendance grade for that particular tutorial.

Laboratory Reports
Lab reports will be submitted by students during the course (lab dates are marked on the lecture schedule). For some of the labs, students will work in groups and submit one report per group. Details on lab report format will be discussed in class.

Lab Safety Procedures and Conduct
[if there is information beyond what is mentioned in Course Policies item #7 above]

Student Services Writing and Study Skills Support
The UNB Writing and Study Skills Centre provides many coaching and mentoring services to assist with writing papers, effective study methods, and other skills development related to student success: http://www.unb.ca/fredericton/studentservices/academics/writing-centre/index.html

Student Services Learning Strategist Support
Any UNB student wanting to improve their academic skills may book appointments with the Learning Strategist. The Strategist offers instruction on topics such as: "learning how to learn" strategies, memory techniques, time management skills, test preparation and test taking methods, note-taking, and other learning and study skills.
https://www.unb.ca/fredericton/studentservices/academic-success/accessibility-centre/services-and-support.html

Math Skills Support
UNB's Math Learning Centre offers math help drop-in times and opportunity to book appointments: http://www.math.unb.ca/~mathhelp/

Technical Support
Information Technology Services (ITS) Help Desk can be reached by phone 457-2222 (Fredericton Campus) 657-2222 (Saint John Campus), email - itservicedesk@unb.ca, or visited in person at the Harriet Irving Library Learning Commons. http://www.unb.ca/its/get-it-help.html