Physics 2750 Modern Physics – Winter 2025
Tuesdays and Thursdays 12:00 – 12:50, Fridays 13:00 – 13:50
Room C2045

Prerequisites: PHYS 1051/1021, and MATH 1001

Course description on department web page:
https://www.mun.ca/physics/undergraduates/syllabus/p2750-modern-physics/

Instructor
Dr. Murray Wilson
Office: C3015
Phone: 864-6724
Email: murray.wilson@mun.ca (Preferred contact method)

Office Hours: 10:00 – 12:00, 14:00 – 16:00 Tuesdays and by appointment.

Course Communication: General information will be communicated via Brightspace. Individual communication with students shall be via email. Response to emails within 24 hours can be expected on weekdays during term time.

Course Delivery:
This course will be delivered as in person lectures unless communicated otherwise. Should health directives relating to COVID-19 or otherwise change, there may be a change to the delivery format.

Laboratory Component:
This course includes a laboratory component. Lab times are either Wednesday 09:00 – 12:00, or Friday 14:00 – 17:00 in C3061, depending on which slot a student has signed up for. Students will complete four laboratory experiments during the term, with four of the remaining sessions taken up by tutorials. These tutorials will be used to go over extra example questions of the sort that will be covered on the assignments / exams. A mark of 1% of final course grade per tutorial session will be assigned for completion of exercises within the tutorial sessions.

A lab report will be submitted after each lab experiment, and graded. Edward Hayden will be primarily running the labs for this course, and scheduling, groups, and marking for the labs will be discussed during the lab intro session for your lab time slot (January 22nd or 24th).

Students will complete laboratory experiments (1) Young's Double Slit Interference, and (2) Atomic Spectra, as well as two experiments selected from the following list, in scheduling consultation with the laboratory instructor.
(3) Electron Diffraction, (4) Franck-Hertz Experiment, (5) Electron e/m ratio, (6) Photoelectric Effect.

Research Project:
Each student will complete an independent literature review research project on a topic related to the course material, but not directly covered in the course. This project will consist of a written report (target 2-3 pages) and a short oral presentation, to take place during the final laboratory session of the course (April 2nd or 4th depending on lab section). This project will be worth 6% of the total course grade, with 4% allocated to the written report, and 2% to the presentation. Students will be able to select from a set of topics suggested by the course instructor, or select their own topic (cleared with course instructor).

Course Text book:
Modern Physics for Scientists and Engineers; Stephen T. Thornton and Andrew Rex
This text is highly recommended to follow along during the course, however assignment questions will be independently provided.

Evaluation Scheme
Assignments (6) - 14% (Approximate due dates: January 17th, January 31st, February 14th, March 7th, March 21st, April 4th)
Research Project – 6% (Oral Presentation April 2nd or 4th depending on lab group, report due April 9th)
Laboratory Reports (4) – 16% (Due dates varying by lab group)
Mid-term examination 1 – 15% (Tuesday February 11th)
Mid-term examination 2 – 15% (Tuesday March 25th)
Final Examination – 30% (Date TBD by registrar)
Tutorial exercises – 4%

Assignments that are submitted late without prior approval will be penalized at a rate of 15% per calendar day late (rounded up to the nearest whole day). Leniency may be provided for reasons of illness or other absence, by communication with course instructor.

During mid term exams (in person at regular class times) students will be permitted to bring a calculator and one handwritten letter-size (8.5 by 11) page of single-sided notes & formulae. During the final exam students will be permitted a calculator and one handwritten letter-size (8.5 by 11) page of doubled-sided notes.

Important Dates
Tuesday January 7th - Lecture period begins
February 24th to February 28th – Winter break, no class
Tuesday February 11th – Midterm Exam 1
Tuesday March 4th – Last day to drop course without academic prejudice
Tuesday March 25th – Midterm Exam 2
Wednesday April 2nd / Friday April 4th - Oral Presentations
Wednesday April 9th – Lecture Period Ends
April 12th to 22nd – Exam period

Outline

This course serves to give a broad overview of a series of important topics in modern physics, studying the development of special relativity, quantum mechanics, and our understanding of atomic and nuclear structures.

Material covered (Chapter references from the course text book):

1. Motivation for the development of modern physics (Ch. 1)
2. Special Theory of Relativity (Ch. 2)
3. Experimental underpinnings of Quantum Theory (Ch. 3-4)
4. Introduction to Quantum Mechanics (Ch. 5-6)
5. Hydrogen atom and Atomic Physics (Ch. 7-8)
6. Atomic Nuclei (Ch. 12)
7. Introduction to Nuclear and Particle Physics (Ch. 13-14)
8. Time permitting, introduction to select topics of solid state physics (Ch. 10-11).

Course Disruptions

In the case of a class disruption or cancellation, and in the case of revisions to evaluation methods, students registered in the course shall be notified via Brightspace. During disruptions that prevent in-person lectures, remote lectures for our class will be recorded for asynchronous delivery, with links posted on Brightspace. Any necessary revisions to the evaluation methods resulting from such disruptions will be made in consultation with the students registered in this course. If a student demonstrates that they would be disadvantaged by the change, then, as per 6.7.4 of the University Calendar, accommodations will be made.

Students are expected to abide by the student code of conduct (https://www.mun.ca/student/media/production/memorial/administrative/student-life/files/supports-services/respect/Student_Code_of_Conduct_May_11_2017.pdf) and academic misconduct guidelines in Section 6.12 of the university regulations (https://www.mun.ca/regoff/calendar/sectionNo=REGS-0748) as set out by Memorial University.

Memorial University of Newfoundland is committed to supporting inclusive education based on the principles of equity, accessibility and collaboration. Accommodations are provided within the scope of the University Policies for the Accommodations for Students with Disabilities (http://www.mun.ca/policy/site/policy.php?id=239). Students who may need an academic accommodation are asked to initiate the request with the Glenn Roy Blundon Centre (http://www.mun.ca/blundon) at the earliest opportunity.

The instructor reserves the right to restrict the use of electronic devices in the classroom if such use, by the discretion of the instructor, is deemed deleterious to the experience of other students.

Original work is expected to be submitted in this course. The use of artificial intelligence tools to generate assignment submissions is not permitted.