

Physics 3900: Introduction and Course Guidelines

Winter 2019

Administrative Information

Instructors

Michael Morrow (Office: C3012, mmorrow@mun.ca)

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TA: To be announced

Please email us if you need consultation outside of the scheduled laboratory times.

Times and locations

Section 1: Mondays and Wednesdays, 14:00-17:00 in C4044 and adjacent labs

Section 2: Tuesdays and Thursdays, 14:00-17:00 in C4044 and adjacent labs

Course information, including a schedule, is posted on D2L. Check D2L frequently for updates.

Calendar Entry

3900 Physics Laboratory I is a selection of experiments based primarily on material covered in the third year courses.

LH: 6

PR: Science 1807; at least two of PHYS 2053, 2820, 2055, and PHYS 2750 (or 2056)

Evaluation Scheme

Lab notebook from first experiment (diffraction grating) 10%

Lab notebook from subsequent experiments (five) 60%

Oral Presentations (2) 20%

Poster 10%

Information about the expectations and format for the Oral Presentations and the poster will be made available on D2L.

Required course materials

Lab notebooks: you will use electronic notebooks with LabArchives

<http://www.labarchives.com/classroomediton/>

A limited number of desktop computers will be available in the labs. You may find it convenient to bring your own internet-enabled device (laptop, tablet, or phone).

Medical notes

Medical notes are not required for missed lab periods. However, you must verbally declare any illness or medical conditions that impedes your ability to participate in labs and/or evaluations.

Academic integrity

You are expected to conduct yourself in all aspects of the course at the highest level of academic integrity. Please consult Memorial University's Code of Student Conduct at <http://www.mun.ca/student/conduct> . Any student who commits academic misconduct will be subject to University regulations: <http://www.mun.ca/regoff/calendar/sectionNo=REGS0748>

Inclusion and Equity

The university experience is enriched by the diversity of viewpoints, values, and backgrounds that each class participant possesses. In order for this course to encourage as much insightful and comprehensive discussion among class participants as possible, there is an expectation that dialogue will be collegial and respectful across disciplinary, cultural, and personal boundaries.

If you require physical or academic accommodations, please speak privately to one of the instructors so that appropriate arrangements can be made to ensure your full participation in the course. All conversations will remain confidential.

Memorial University of Newfoundland is committed to ensuring an environment of understanding and respect for the dignity and worth of each student and also to supporting inclusive education based on the principles of equity, accessibility and collaboration. For more information on Memorial University's commitment to accommodation of students with disabilities, see <http://www.mun.ca/policy/site/policy.php?id=239> .

Student Assistance

Student Affairs and Services offers help and support in a variety of areas, both academic and personal. More information can be found at www.mun.ca/student .

Overview

Physics 3900 (Experimental Physics I) is unlike any other physics course you've taken, and we're proud of that. In this course, you work closely with us on several different special projects of your choice from areas like optics, materials science, spectroscopy, fluids, and modern physics. Not only will you learn some cool physics, but you also develop marketable practical skill in the process. What does this mean for you? By the end of the term, we can help you build a list of resume-appropriate skills to showcase what you've learned. This will help you when you apply for jobs, and it will also help us write more detailed recommendation letters for you.

Experiments

You'll spend 3 lab periods on each experiment, and we expect you to get your labs finished using only these slots. Each experiment has a short set of background notes and instructions posted on D2L. You are required to do the experiments by yourself. You must complete 6 experiments: Diffraction Grating Spectroscopy and five (5) experiments from the list below. It is recommended that you choose at least one experiment from each category but this is not mandatory.

Optics *(to learn precision measurements, model validation, and data analysis strategies)*

- Fraunhofer Diffraction
- Polarization of Light
- Michelson Interferometer

Fluids *(to learn image analysis, coding, and data analysis strategies)*

- Vortex Streets
- Internal Waves
- Angle of Contact

Materials Characterization *(to learn data conversion, instrumentation, and analysis strategies)*

- High Temperature Superconductivity
- Fourier Transform Infrared Spectroscopy
- Nuclear Magnetic Resonance

Modern Physics *(to learn numerical modelling, signal analysis, and data acquisition strategies)*

- Chaos: Period Doubling
- The Speed of Light
- Determination of Debye Temperatures

Everyone will complete the Diffraction Grating Spectroscopy experiment first. A preference sheet for the remaining experiments will be available during the first week of classes. Using this information, we will select and schedule your experiments for the remainder of the semester.

Lab Safety Information

- Wear appropriate clothing to laboratory, including closed-toed footwear (no sandals, slippers, *etc.*). Lab coats and eye protection are available in the lab, and they must be worn when working with hazardous substances, including liquid nitrogen and dry ice (solid carbon dioxide). For work with lasers and other specialized light sources, appropriate eye protection will be provided.
- Eating and drinking are not permitted in the laboratory. Wash your hands before leaving the lab.
- Keep the area around your experiment clean and tidy. If you need to borrow equipment from another location, please return it when you have finished.
- Place coats and bags under the benches or on one of the side benches.
- Always check electrical circuits carefully before you switch on.
- Lab stools must be placed under the bench before you leave.
- Laboratory equipment should be handled with care at all times. Do not modify equipment in any way unless the modification is restricted to changing a lab setup as prescribed by the procedure. NEVER carry out unauthorized experiments. Do not force any of the equipment.
- Use care when loosening and tightening screws and bolts: some of them are plastic and break easily. Report any breakages immediately, no matter how trivial they may seem.
- Broken glass must be placed in the appropriate box not regular garbage.
- Radioactive sources are kept in a locked cabinet. They should not be required for this course and may not be used without supervision.
- A first aid kit is available.
- In case the fire alarm sounds, please go to the nearest safe exit.

Emergency phone numbers

City Emergency Service: 9911

St. John's Campus: 8644100

Campus Enforcement and Patrol: 8648561

Other useful phone numbers

Work Control Facilities-Management: 8647600

Service Desk Computing and Communications: 8644595