Physics 4910G
Special Topics: Advanced Physics Projects
Course Information – Winter 2021

Calendar Description
Physics 4910G student will work on a research project in advanced experimental, theoretical or computational physics under faculty supervision. It is intended to provide students with more experience in the design and construction of physics experiments, measurement techniques, programming, and data analysis.

Prerequisites: Physics 2910G.

Requirements: Average of 72% in Physics 2101A, 2110B and 2910G/F or by special permission.

Note*:* this project should be distinctly different from the Physics 4999E Honour Research Projects. It is also required that project is supervised by one of the core Faculty members in Physics or Astronomy.

6 hours, 0.5 course.

Instructor: Dr. Lyudmila Goncharova

email: lgonchar@uwo.ca
Office hours: Zoom, by appointment lgonchar@uwo.ca

Course website: OWL site for this course: https://owl.uwo.ca/portal

Class times: First meeting, Zoom, January 11, 2021, 2:30-5:30pm
Next: by arrangements with the research advisor

Introduction
The main goals of this course are to:

- develop your experimental skills beyond the level of Phys 2910F/G
- provide advanced training in computerized data acquisition and analysis
- improve your skills in preparing and presenting research reports in a variety of formats

Expectations. The minimum requirements for this course are:
1) 4-6 hours/week throughout the 13 weeks in the term working on your research project under the direction of your assigned supervisor. Please note that the week after the Reading Week (February 22, 2021) marks the end of your training period. This is to allow enough time to do your independent project and to write methodology section. One page project proposal should be submitted by email by January 18, 2021 to be approved jointly by the research supervisor and Dr. Goncharova.

2) Attendance of P4910G events listed below. Participation in each is required for course credit.

Initiation meeting: January 11, 2021, 2:30pm Zoom.
If you have a conflict with other courses during these hours, please contact me immediately and we can try to work out an alternative schedule.
Poster presentations at PhUNC event (ZOOM). Date: March 11, 2021

Evaluation
Your final grade in this course will be calculated according to:

Lab notebook	10%
Mid-term evaluation by supervisor	10%
Methodology section (written report, submitted **by March 24, 2021**	25%
Project implementation (Research performance grade by supervisor)	30%
Final project presentation (15%) and PhUNC poster presentation (10%)	25%

Lab notebook:
All students are required to keep a record of their work in laboratory notebooks, it can be electronic or hard copy. The purpose of the laboratory record is to have a sufficiently detailed record of your experiments that someone else could reconstruct exactly what you did. This is essential in case you – or someone else– have to check or repeat your measurements in the future. In a research laboratory, whether academic or industrial, laboratory notebooks are legal documents that can be important for establishing priority, obtaining patents, etc.

Lab notebooks will be checked and signed by the supervisor (at least monthly) and will be periodically checked by your course instructor during the term to ensure that they are being properly kept.

Project design and implementation (Evaluation by supervisor): One-page project proposal should be submitted by email to lgonchar@uwo.ca and research supervisor by **January 27, 2021** to be approved jointly by the supervisor and Dr. Goncharova. A large fraction of your mark for this course will be based on an experimental or computational project that you will design, build, and carry out in the second half of the term. If you work on computation project, it will be a new code or a new module that goes to the existing code that you will develop on your own. The only major constraint is time: you need to finish your project by the end of term.
A large part of your grade will be based on our observations of your research skills and effectiveness in the lab settings. It will be done by your supervisor and will consists of the midterm evaluation (10%) and project implementation evaluation (30%). It is expected that you will be working in a research group settings and get training in the relevant research skills during the first 6 weeks. By the end of reading week (February 22, 2021), your training period will be mostly completed and you start working on the design and implementation of your project.

Methodology section:
Methodology session will be evaluated by your course coordinator. Please submit it by March 24, 2021; more instructions and examples from previous years are provided on OWL.

PhUNC poster presentation (10%): your project progress will be presented on March 2021 as a poster presentation during virtual PhUNC 2021. Posters will be uploaded on OWL and presented to other class members, faculty members, interested reviewers, course instructors and TAs.

Final Presentation (15%): In addition to your written reports, you will be required to make a final oral presentation describing your project. Students will prepare their presentations as usual, but instead of presenting them in class, they submit an electronic copy on OWL. In addition to providing a series of slides, students are asked to provide a recorded voice narration, or a separate audio file complementary to the slides. You will need to explain your research project to the instructor and Physics 3900G and staff members, and other faculty members recruited as judges.

Safety and Security

Some of the experiments may involve lasers, radioactive materials or chemical. If you do not have a recent WHMIS certification from Western, you will also need to complete this via OWL. In addition, your supervisor will provide group-specific safety training. Please hand your signed Certificate of Completions to your supervisor. No food or drink is permitted in the experimental laboratory under any circumstances. Never remove equipment from the lab or allow anyone else to do so without permission from the faculty.

Accommodation and Accessibility

If you are unable to meet a course requirement due to illness or other serious circumstances, you must seek approval for the absence as soon as possible. Approval can be granted either through a self-reporting of absence or via the Dean's Office/Academic Counselling unit of your Home Faculty. If you are a Science student, the Academic Counselling Office of the Faculty of Science is located in NCB 280, and can be contacted at scibmsac@uwo.ca.
For further information, please consult the university's policy on academic consideration for student absences: https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Consideration_for_absences.pdf.

Cheating

University policy states that cheating is a scholastic offence. The commission of a scholastic offence is attended by academic penalty, which may include expulsion from the program. If you are caught cheating, there will be no second warning. Cheating includes having available any other electronic devices than a watch and a calculator during a test or exam. You may not have a cell phone accessible, even to use it as a calculator or watch. Complete information on the University policy on academic offenses can be found at
http://www.uwo.ca/univsec/handbook/appeals/scholastic_discipline_undergrad.pdf

Plagiarism

Students must write their lab reports, tests and final exam in their own words. Whenever students take an idea, or a passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. Plagiarism is a major academic offence (see Scholastic Offence Policy in the Western Academic Calendar). All required papers may be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com (http://www.turnitin.com).

Classroom Conduct

Disruptive behaviour will not be tolerated in class. Please respect the rights of your classmates to benefit from the lecture by limiting your conversations to those essential to the class. Students who persist in loud or rude behaviour will be asked to leave.

Accessibility

Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Student Accessibility Services (SAS) at 661-2147 if you have any questions regarding accommodations. The policy on Accommodation for Students with Disabilities can be found here: https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic%20Accommodation_disabilities.pdf
The policy on Accommodation for Religious Holidays can be found here:
http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_religious.pdf

Help

Students who are in emotional/mental distress should refer to Mental Health@Western (http://www.health.uwo.ca/mental_health) for a complete list of options about how to obtain help. Additional student-run support services are offered by the USC, http://westernusc.ca/services..

Contacting Us

The simplest way to contact us outside of lectures is via your UWO e-mail account. Please allow 3–5 working days for a response. We will not **read or respond** to emails from addresses that do not end in "@uwo.ca" and they may be treated by the Western University servers as spam.
This course is supported by the Science Student Donation Fund. If you are a BSc or BMSc student registered in the Faculty of Science or Schulich School of Medicine and Dentistry, you pay the Science Student Donation Fee. This fee contributes to the Science Student Donation Fund, which is administered by the Science Students' Council (SSC). One or more grants from the Fund have allowed for the purchase of equipment integral to teaching this course. You may opt out of the Fee by the end of

September of each academic year by completing the online form linked from the Faculty of Science's Academic Counselling site. For further information on the process of awarding grants from the Fund or how these grants have benefitted undergraduate education in this course, consult the chair of the department or email the Science Students' Council at ssc@uwo.ca.
The Department of Physics and Astronomy may, in exceptional circumstances, adjust the final course marks in order to conform to Departmental policy."

Physics 4910G –Advanced Physics Project

Learning outcomes

Students will be able to…

Computational, laboratory and writing skills

- Effectively use software codes or physical instrumentation related to their project
- Practice skills in keeping a record of your activities, data, and results, and in preparing research reports
- Find different errors associated with laboratory measurements to be able to explain if experimental results are significantly different from calculated or theoretically predicted values
- Improve your understanding of the importance of experimental uncertainties in the analysis and interpretation of data
- Get training in computerized data acquisition and analysis

Last updates: January 6, 2021