NANO*4910/4920
Nanoscience Research Project

Course Outline Fall 2014 & Winter 2015

COORDINATOR: John R. Dutcher, MacN 451, x53950
dutcher@uoguelph.ca
http://www.physics.uoguelph.ca/psi

OVERVIEW: The aim of this course is to allow the students to pursue an original research project within one of the research groups of the Physics or Chemistry Departments. The project will extend over the Fall 2014 and Winter 2015 semesters, with marks awarded at the end of each semester. The work schedule, laboratory space and apparatus, and other details associated with the project, will be worked out with the student's faculty supervisor.

TIMELINE:

Time	Activity
Fall semester	
Week of Sept 8 (date & time TBA)	The coordinator will meet with the class to discuss project selections and to identify lab safety issues and necessary training courses. Students are expected to begin their project work immediately. The students are expected to work for at least 10 hours per week on their project, arranged for mutual convenience between the student and the research laboratory personnel. A proper laboratory notebook must be maintained (see detailed instructions below).
Oct 23	Each student will give an oral Powerpoint presentation (20 minute talk) describing a brief literature review and a research proposal for their project.

Oct 30	Each student will submit a 10-15 page (doubled spaced) report describing a literature review and research proposal for their project, incorporating feedback from their oral presentation.
Week of Dec 1 (date & time TBA)	Each student will give an oral Powerpoint presentation (20 minute talk) focusing on their research progress.

Winter semester

Week of Feb 23 (date & time TBA)	Each student will give an oral Powerpoint presentation (20 minute talk) focusing on their research progress.
Week of Mar 30 (date & time TBA)	Each student will give a final oral Powerpoint presentation (20 minute talk) on their project.
Week of Apr 6	Each student will submit a 15-20 page (double spaced) final report on their project, incorporating feedback from their final oral presentation.

MARKING SCHEME:

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Literature review and research proposal	20%
Oral presentations (2)	25%
Notebook	20%
Performance & progress	35%
Total	100%

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Oral presentations (2)	25%
Final report	20%
Notebook	20%
Performance & progress	35%
Total	100%

The **literature review and research proposal** is a 10-15 page (double spaced) report that will describe the motivation and objectives for the proposed research project,

give a review of the background literature that forms the basis for the project, and give a description of the proposed methods that will be used in the project. The student is expected to perform an extensive literature search and to include a description and reference to the work on which the project is based.

The **oral presentations** should be well-organized Powerpoint presentations. The first presentation will focus on the literature review and research proposal. The second and third presentations will focus on research results and progress. The final presentation will give an overview of the background, a description of the methods used and a discussion of the results of the project. Conclusions from the work and how these relate to the original expectations of the project should be presented. Suggestions for further work should also be given.

The **final report** should be a detailed summary of the project that is 15-20 pages (doubled spaced). It will include the details on which the final presentation is based. It should clearly and succinctly describe:

- an abstract
- the objectives
- methods
- results
- discussion
- conclusions

Each student must maintain a **notebook** to be used on a day-to-day basis to record all relevant information from the laboratory, e.g. experimental setup, data. It should be legibly written and as complete as possible. It should include:

- experimental design
- overall project plan
- apparatus and plan changes
- experimental data and calculations
- relevant observations

All information should be recorded in the notebook at the time of the experiment or calculation, and should be clearly dated. A useful measure of a good notebook is whether it would allow a successor student to take over the project and continue with the work.

The **performance** of the student in the lab and the **progress** achieved in the project represent a very important component of the final marks. This evaluation will be determined by consultation with the faculty supervisor.

In each of the areas described above, the student is expected to demonstrate an intellectual grasp of the project. On the basis of the presented and submitted work, the coordinator will determine a preliminary overall grade. The coordinator will then compare the set of preliminary grades with those awarded in this course in previous years as a consistency check. This process may result in an overall upward or downward adjustment of the preliminary grades in reaching the final numerical grades.

LABORATORY SAFETY:

Laboratory safety (for you and for all the other people around you) is an integral part of the conduct of experimental science. It is not an add-on. Safety issues must be considered in the design of equipment, the procurement, storage and handling of materials, the planning of experimental work, and the actual conduct of the work.
All students in this course must read and comply with the **Department of Physics Safety Policy**, which is found on the department intranet via its website.
Students who will be involved with chemicals, lasers or radionuclides must discuss with their faculty advisors if they should attend one of the university's regular short training sessions. Students are not permitted to work alone after normal daytime working hours. If working after hours is contemplated, an explicit arrangement must be put in place whereby the advisor or another expert within the research group is on hand.

When anything whatsoever causes you to be concerned in the context of safety, raise the matter immediately with your faculty supervisor before you take any further action. Do not hesitate on grounds that the matter may be trivial: probing of established procedures by a new person can be valuable in improving the safety of everybody.