



## PHYS\*4001/4002: Advanced Physics Project: F&W 2017/2018

Department of physics course outline for students and faculty

Last updated: August 31, 2017

**Important:** Please retain this material and consult it regularly during the course. This information will be important to you as the course progresses.

### ***Coordinator:***

Mike Massa, MacN 328; Ext. 52625

[massam@uoguelph.ca](mailto:massam@uoguelph.ca)

### ***Official Class Meeting Times***

First meeting: **Thursday September 14, 2:30 pm, MacN318.**

The class only meets as a whole on a few occasions; Friday afternoons will also be used if additional time is needed beyond the Thursday 2:30-5:20 timeslot.

### ***Description of the Course***

This course aims at introducing students to Physics research through involvement in an original project within one of the research groups of the Physics Department. The work schedule, laboratory space and apparatus, and other details associated with the project will be worked out with the student's faculty supervisor. A minimum of six hours work per week is expected.

### ***Tentative timeline***

| <b>Date</b>            | <b>Activity</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Prior to Sept. 2017    | <p>Students will familiarize themselves with the research groups of the department on the Physics website, and will decide what research areas are of interest. It is important to look under <b>both</b> the headings <b>research and faculty</b> to get a complete picture. Students are strongly urged to approach faculty members during the late winter and the spring and summer (email, visit, letter, phone) and arrange a project and a supervisor.</p> <p>By the start of the Fall semester, it is expected that most students will have identified a supervisor. Any remaining ones must identify a supervisor in the <b>first two weeks of classes</b>. The department may need to close admission to the class, dependent on numbers, if a supervisor has not been identified at this time.</p> |
| Sept. 14 <sup>th</sup> | <p>The coordinator will meet with the class Thursday 2:30, MacN 318. Lab safety issues and necessary training courses will be arranged at that time.</p> <p>By the time of this meeting, all students will have met, on their own initiative, with potential faculty supervisors, selected their project, and should have some idea of the context.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

| Date                             | Activity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sept-Oct                         | During September and October, students are expected to read in depth material provided by the supervisor, to become familiar with their project's background, approaches and objectives, and to begin working on your project.                                                                                                                                                                                                                                                                                                                               |
| Sept. 28 <sup>th</sup>           | Meeting at 2:30, MacN 318 (~30-60 min). We will have someone from the Library give a brief presentation (Q&A) focussed on lit. searching tools/techniques.                                                                                                                                                                                                                                                                                                                                                                                                   |
| Sept. 29 <sup>th</sup>           | Each student will submit a <b>one-page summary of a primary reference</b> (typically a journal article), along with a copy of the reference. A list of an additional 5 references will also be submitted at this time. Submitted electronically on Courselink (word document).                                                                                                                                                                                                                                                                               |
| Oct. 27 <sup>th</sup>            | <p>Each student will have to write a "<b>Research Proposal</b>". The coordinator will advise on the preparation of these proposals, and will provide feedback afterwards. The proposal should be typed and not exceed seven pages of double-spaced text.</p> <p><u>Note:</u> Students are strongly encouraged to commence work on their research project in the laboratory or at the computer <b>prior to the proposal submission</b>. Do not interpret the proposal submission as the go-ahead on your project!</p>                                         |
| ongoing                          | The project will continue through the winter semester: it is expected that students will work for at least six hours per week. The specific hours need not correspond to the formal class schedule (except for class meetings).                                                                                                                                                                                                                                                                                                                              |
| Nov. 23 <sup>rd</sup>            | <p>Class meeting (MacN 318, 2:30-5:30) at which students give <b>both a written and an oral progress report</b>. (Depending on time constraints, we may split this session into Thursday/Friday sessions – TBA)</p> <p>The oral presentation must be brief and to the point, and use of Powerpoint (or similar) is required. Slides must be submitted to the coordinator at least 24 hours in advance. Every student will also prepare a written form of the same. Formatting of both presentation and written report will be discussed well in advance.</p> |
| Early Feb.                       | <b>Second progress report</b> , with a format similar to the Nov. 23 <sup>rd</sup> report. Specific dates/times will be confirmed after the Nov. 23 <sup>rd</sup> report.                                                                                                                                                                                                                                                                                                                                                                                    |
| Mid-March                        | In mid-March, students will individually rehearse their final Powerpoint presentations with the coordinator. The coordinator will then provide individual feedback and advice.                                                                                                                                                                                                                                                                                                                                                                               |
| Last week of class               | <p>There will be a formal class meeting at which each student will give a 15 minute Powerpoint presentation which is the "Final Report". This event will be organized like a real conference, right down to question periods, coffee break, etc, and all faculty, post-docs and graduate students will be invited to attend.</p> <p>Note: An abstract must be submitted one week prior to the presentations.</p>                                                                                                                                             |
| Following the oral presentations | Students will submit a final written report 10-15 pages (double-spaced text). <b>The class and the coordinator will decide upon an appropriate submission deadline.</b>                                                                                                                                                                                                                                                                                                                                                                                      |

### ***Role of the Course Coordinator:***

- Canvass faculty regarding suitable research projects
- Help students select a project
- Provide guidance and feedback with respect to oral presentations
- Be available to deal with specific problems or difficulties
- Organize class meetings and presentations
- In consultation with the student's faculty advisor, assess each student's work and assign the final grade

### ***Role of the Faculty Supervisor:***

- Provide clear guidance as to the scope and objectives of the project
- Meet with students at least weekly, and more often if required
- Ensure a safe working environment, consistent with University and departmental safety policies
- Provide the coordinator, after the project is completed, with an assessment of the student's overall performance relative to expectations and taking into account any unforeseen difficulties

### ***Class Meetings and Important Dates***

The formal class meetings give the students experience in presenting short research talks as one might give at a research conference. They also serve to check on the student's progress during the year. Each student will give presentations as described above, in addition to the one-on-one rehearsal with the coordinator. The **Progress Report talk** will provide an opportunity to gain constructive feedback from both the coordinator and your peers. For all the talks, assistance with preparation of necessary Powerpoints, overheads, demonstrations, etc can be obtained from the student's faculty advisor or the course coordinator. **Written Proposal and Progress Reports will be marked.**

### ***First Meeting: Entire Class (Organization and Safety)***

**14<sup>th</sup> September 2016 at 2:30 pm MacN318:**

By the time of this very brief meeting, all students will have met, on their own initiative, with potential faculty supervisors, selected their project, and should have some idea of the context.

### ***Research Proposal***

**Thursday, October 27** deadline for Research proposal.

This report **MUST BE TYPED** (hand-written reports will not be accepted) and should include:

- Scientific motivation and purpose of the project
- Hypotheses or experimental observations that are being tested during the project.
- Literature review: any similar or related experiments or calculations that have been done and how this project is different from previous work.
- Specific experimental design and project plan.
- The apparatus and techniques to be used.
- How the results are to be analyzed.
- Any anticipated outcomes and their significance

## ***Progress Reports (Nov. 23<sup>rd</sup> & Feb.)***

This presentation must be brief and to the point. Please use Powerpoint. Powerpoint files should be supplied to the Instructor at least 24 hours ahead of time. Students should rehearse their presentations.

## ***Individual Students Meet with Coordinator (Rehearsal for Final Report)***

Dates/TBA – mid-March

This talk will follow a similar format to the previous ones, but should now include final results obtained by the student. The talk should be seen as a rehearsal of the final presentation and should therefore report on the entire project: each student should assume that the audience has not heard anything from him/her earlier in the semester. Data analysis that has been done should also be presented as well as any further experiments or analysis still required. Any data should be shown in graphical form on well prepared overheads or in Powerpoint. Powerpoint files should be supplied to the coordinator at least 24 hours ahead of time. Students should rehearse their presentations beforehand. The coordinator will provide feedback and advice to help in preparing the final public presentation.

## ***Abstracts of final presentation:***

Due before noon on Monday of the week of the final class meeting. TBA.

One paragraph (maximum 150 words) summarizing your project. This abstract will be used to advertise your final talk to the faculty and graduate students in the Physics Department.

## ***Final Presentation***

Date TBA: late March/early April

Powerpoint files should be supplied to the coordinator at least 24 hours ahead of time. All members of the Physics Department will be invited to attend these talks.

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## ***Laboratory Safety***

Laboratory safety (for you and for all the other people around you) is an integral part of the conduct of experimental physics. 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 advisor 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.**

## **Assessment**

There are 6 elements here. The approximate relative weight of each element is indicated, but this does imply a simplistic approach wherein marks are assigned individually to each component and then added up; the coordinator has to employ his experience and his judgment in assessing the interplay of the various components as well as the quality of each.

1. The **progress** made on the project. (25%) This mark will assess how well the student has progressed toward the anticipated goals of the project. Account will be taken of the effort (quality as well as quantity) applied to the project, the student's independent creative input to the project, and how well the student coped with the inevitable problems which arise in any research project.
  
2. The **notebook**. (10%) Each student must maintain a notebook to be used on a day to day basis to record all relevant information and theoretical developments. The notes should be legibly written and as complete as possible. The notebook should log your work, in a manner that would allow you (or another individual) to track/reproduce your efforts. Examples of essential material to include:
  - Experimental design
  - Overall project plan
  - Apparatus and plan changes
  - Details of experiments
  - Revision logs for computer coding
  - Measurements
  - Relevant observations (taped in graphs, notes on key pts.)
  - Ideas for changes in experimental method
  - Summary of calculations
  - List of references, with notes on relevanceAll information should be recorded at the time of the experiment or calculation and should be clearly dated.  
**Notebooks will be delivered to the coordinator before a date early in the exam period: this date will be established in consultation with the class.**
  
3. **Final presentation**. (20%) Each student will give an oral presentation (about 15 minutes). The final talk should be a well-prepared overview of the background, methods used and results of the project. Any conclusions from the work and how these relate to the original purpose of the project should be presented.
  
4. **Summary of primary reference** (3%)
  
5. **Proposal (not to exceed 5 double-spaced pages)** (12%) should address the following points:
  - Scientific motivation and purpose of the project
  - Hypotheses or experimental observations that are being tested during the project.
  - Literature review: any similar or related experiments or calculations that have been done and how this project is different from previous work.
  - Specific experimental design and project plan.
  - The apparatus and techniques to be used.
  - How the results are to be analyzed.

- Any anticipated outcomes and their significance
6. **Progress Reports (not to exceed 4 double-spaced pages) should describe how you progress (15%):** state purpose of the project and key hypotheses or experimental observations that are being tested. Describe your intermediate goals, how they have been achieved, and where the project is headed.
  7. **Final Report (15%):** This report should be a more detailed summary of the project. It will include the details on which the final presentation was based. It should clearly and succinctly describe:
    - An abstract
    - The objectives
    - Methods
    - Results
    - Discussion
    - Conclusions

In each of these areas, demonstration by the student of an intellectual grasp is paramount. The coordinator reaches a **preliminary grade** based on the criteria listed above. He/she then examines the entire set of grades within the context of all student grades in this course over the prior four years. The objective here is to test that the present class is being treated consistently with prior groups. This examination may result in a small upward or downward adjustment of the preliminary grades.

### ***Course assessment by students***

The Department of Physics requires student assessment of all courses taught by the Department. These assessments provide essential feedback to faculty on their teaching by identifying both strengths and possible areas of improvement. In addition, annual student assessment of teaching provides part of the information used by the Department Tenure and Promotion Committee in evaluating the faculty member's contribution in the area of teaching.

The Department's teaching evaluation questionnaire invites student response both through numerically quantifiable data, and written student comments. In conformity with University of Guelph Faculty Policy, the Department Tenure and Promotions Committee only considers comments signed by students (choosing "I agree" in question 14). Your instructor will see all signed and unsigned comments after final grades are submitted. Written student comments may also be used in support of a nomination for internal and external teaching awards.

**NOTE:** No information will be passed on to the instructor until after the final grades have been submitted.

### ***Academic misconduct***

The University of Guelph takes a serious view of academic misconduct and will severely penalize students, faculty and staff who are found guilty of offenses associated with misappropriation of others' work, misrepresentation of personal performance and fraud, improper access to scholarly resources, and obstructing others in pursuit of their academic endeavors. Each student is assumed to be familiar with the regulations surrounding academic misconducts, as spelled out in the Undergraduate Calendar.