

PHYD01H3 – Fall 2019

Research Project in Physics and Astrophysics

Coordinator: Prof. Dan Weaver
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Office Hours: By appointment

Course Description:

Introduces students to current research in physics or astrophysics under the supervision of a professorial faculty member. Students undertake an independent project that can be of a theoretical, computational or experimental nature. Evaluation is by the supervising faculty member in consultation with the course supervisor. Students must obtain consent of the course supervisor to enroll in this course.

Prerequisites:

14.0 credits, cumulative GPA of at least 2.5, and permission from the coordinator.

Exclusions:

PHY478H, PHY479Y1

Enrolment:

Enrolment requires that students request the course on ACORN, inform the course coordinator of the intent to take the course, meet with a supervisor and obtain their signature on a Supervised Study form (acquired from the Office of the Registrar, e.g., [here](#)), obtain the signature of the Discipline Representative (“Secretary”), obtain the signature of the Department Chair or the Associate Chair Undergraduate (“Chair”), and submit the completed form to the Assistant to the Chair (Room EV241), who will forward the form to the Registrar’s Office to process enrolment. A copy will also be provided to the course coordinator.

Course Evaluation:

Written proposal:	20%
Progress:	25%
Final report:	35%
Final presentation:	20%

Additional details about these evaluations are found later in this document.

Course Expectations:

Students should learn about all aspects of conducting the research from the supervisor, and the student will be asked to submit a proposal for the project to the supervisor. The course coordinator must also be sent a copy of the proposal.

Students will spend as much time as necessary do to the research properly. However, UTSC regulations impose a limit of approximately six hours per week for the project. This aligns with a standard course that has three hours per week of class time plus a few hours for readings and homework.

Undergraduate research projects are expected to involve independent research, enabling academic accountability and evaluation of the work of each student. When more than one student is involved in a project, the roles of each student should be clearly specified in the course and research proposals so that some degree of independence can be assured.

Course organization:

Meetings with supervisors

Students will meet regularly with their supervisor to discuss the research project being undertaken. The frequency of these meetings is up to the student and supervisor. It is suggested that meetings should be weekly. There must be meetings a minimum of twice per month.

While it may be agreed that a student is responsible for setting meeting times with the supervisor, the supervisor has a responsibility for ensuring meetings occur should a student fail to arrange regular meetings. If a students or supervisor has concerns about meetings, they should contact the course coordinator.

The student is responsible for participating fully in course research seminars (if any) and lab meetings (if any) and meeting all deadlines for presentations and written assignments.

Co-supervision

Research time may be spent with postdoctoral and graduate students and research assistants in addition to the faculty supervisor. The responsibilities of these co-supervisors are to be specified in each case and with the agreement of all parties involved.

Details about course evaluation:

Written proposal

The research proposal is the first major component of the independent research courses. This document should:

- Describe the topic and the motivation for the research.
 - Why is this a good area for study? What is its significance? What problems does it solve or contribute to solving?
- Make connections between the proposed research and the existing literature (include references).
- Identify the specific questions you wish to answer or explore.
- Specify what methods or techniques you will use to carry out the research.
 - This should make clear whether you have an understanding of these techniques and seek to apply them, or if you are also developing these skills.
- Set out benchmarks for accomplishing the intended work. E.g., set out an expected timeline for the term.
- Identify challenges you anticipate and your strategy for overcoming them. Ensure your plan is achievable.
- Be clear about the outcomes of the project: what are the goals and objectives?

The document should be clear, concise, and focus on the major themes. 3 – 5 pages should suffice. Use 12 point font, single line spacing, and 2 cm page margins.

Progress updates

Short progress updates must be emailed to the course coordinator and supervisor *on the last day of October and November*. These updates should be a minimum of half a page long and a maximum of one page. These updates should include:

- the goal of the project,
- work done so far,
- expected challenges, and
- general plan for the next month.

Progress updates will not be graded but will be an opportunity for formative evaluation – i.e., they will be an opportunity for students to reflect on their progress and challenges, prompt feedback from the supervisor, and update the course coordinator.

Final report

Student must produce a substantive paper or written report containing significant analysis and interpretation of a previously approved topic or project. The student must submit the paper or report to the research advisor during the semester of enrolment in the independent study course.

The report shall be 5 – 10 pages and use 12 point font, single line spacing, and 2 cm page margins. This length includes figures and excludes references or appendices. Latex is preferred. If using Word, please submit final files as a PDF.

The Centre for Teaching and Learning (CTL) has a writing centre with resources and staff to assist in your report writing skills. It is strongly advised that you make use of this service.

The supervising faculty member is responsible for reading research proposals and drafts of the final report, giving timely and constructive feedback, and submitting the final grade for the course coordinator.

The final report is due on the last day of classes: December 2, 2019. A printed and electronic (PDF format) copy must be given to both the supervisor and course coordinator.

The report grade will be the average of the grade awarded by the supervisor and the course coordinator.

Tips:

- All writing benefits immensely from having someone read it and offer comments. This can be your supervisor, a post-doc or grad student in the lab you work in, or a friend.
- Editing is critical to good writing. Ensure you leave sufficient time to write a draft, get comments from others, and carefully re-read and edit the work.
- All tables and figures must have captions.
- References must be properly cited and formatted. If unsure, talk to the library and your supervisor.
- Re-check that you have fully expressed the different parts of your report and that it is well organized, e.g.: introduction, a description of methods used, results, discussion, and conclusions.
- An abstract is required. Writing a short (~one paragraph) summary of your work can be helpful in identifying the core idea/result/story.
- Check spelling and grammar!

Final presentation

Every student should present their work to other students and members of the physics and astronomy faculty at the end of course. At least one faculty member other than the supervisor should be present and be able to provide feedback to the supervisor that may be taken into account when assigning a grade for the presentation.

These presentations will be structured as an oral exam and held during exam period.

Presentations are to be a minimum of 10 minutes and a maximum of 15 minutes long. This presentation time limit will be strictly enforced. There will be up to 10 minutes for questions.

A practice session for the final presentations will be scheduled before the end of the term.

The presentation grade will be the average of the grade awarded by the supervisor and the course coordinator.

Tips:

- What is the story? There should be a beginning (e.g., a problem or question and motivation for doing the research), middle (data/methods/analysis), and end (results/conclusions).
- How does your work fit within the work of others?
- **Rehearsing is key to effective presentations.** This is true of novices and experts alike.
 - Being a good speaker/presenter is not a matter of innate talent; it is a skill that is developed through deliberate practice and effort.
- Do. Not. Simply. Read. Your. Slides.
- Eye contact with your audience is important for engagement.
- Dress professionally. Practice to be a leading researcher in your field at a conference.

When using figures on slides, make sure that the axes labels and scales can be read by your audience. A common mistake is to have labels that are too small to read. For this reason, you likely want to save two copies of your figures: one for a report (small font) and one for presentations (larger font).

Questions and email policy:

Students can use the discussion board on Quercus to ask questions about the course, expectations, and advice. Often, other students will respond helpfully in addition to the course coordinator.

My email policy is to respond within two business days. You should consult your supervisor for their email policy; however, they are also balancing many obligations and should not be expected to reply to emails immediately. Please plan accordingly.

Please include PHYD01 in the email subject and provide your full name and student number in your message.

Relevant U of T Policies

Academic Integrity

The University treats cases of cheating and plagiarism very seriously. The University of Toronto's Code of Behaviour on Academic Matters outlines the behaviours that constitute academic dishonesty and the processes for addressing academic offences.

Details: <http://www.governingcouncil.utoronto.ca/policies/behaveac.htm>

Potential offences in papers and assignments include using someone else's ideas or words without appropriate acknowledgement, submitting your own work in more than one course without the permission of the instructor, making up sources or facts, obtaining or providing unauthorized assistance on any assignment.

On tests and exams cheating includes using or possessing unauthorized aids, looking at someone else's answers during an exam or test, misrepresenting your identity, or falsifying or altering any documentation required by the University, including (but not limited to) doctor's notes.

Accessibility

Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability/health consideration that may require accommodations, please feel free to approach me and/or the *AccessAbility* Services as soon as possible.

AccessAbility Services staff (located in Room SW302, Science Wing) are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations 416-287-7560 or email ability@utsc.utoronto.ca. The sooner you let us know your needs the quicker we can assist you in achieving your learning goals in this course.