Syllabus - 2022

PHYS 488: Honors Thesis

Overview

In this course, students in the physics departmental honors program will synthesize knowledge and experience gained through independent academic research in physics by creating written, oral, and visual presentations.

Prerequisites: Admission to the departmental honors program, 2 credits PHYS 499 or equiv.
Recommended: At least 12 physics credits at the 300 level.

Requirements to Register: To obtain an add-code for this course, students must:

1. Be admitted to the physics departmental honors program.
2. Have either completed, or be in the process of completing, an original research project in physics.
3. Provide an abstract (<300 words) of the proposed research thesis, submitted on [this form]
4. Have their research advisor agree that this proposed project is suitable for a thesis to be completed during the given quarter and that they will provide guidance on the scientific content of the thesis. [approval request is automatically sent to supervisor after identification on [this form]
5. If the research advisor is not a physics faculty member, the student will use [this form] to provide contact information for their supervisor, who will be approached for a support statement by the physics Undergraduate Faculty Advisor after the UFA reviews the abstract for physics content.

Learning Objectives

By the end of this course, students should be able to:

- synthesize prior knowledge and experience gained through independent academic research.
- communicate scientific results through clear, well-structured prose.
- convey scientific information orally and visually to their peers.

The performance of the research will be under separate aegis, e.g., PHYS 499. This course is intended to teach communication skills relevant for the presentation of original research.

Required Work:

1. **Written thesis**. A report of at least 10 "NSF pages" (12 pt font; 1-inch margins, single spaced) describing the context, methods, and results of independent scholarship. It should include references to the relevant literature in the style of a scientific publication. Students who are primary author on a manuscript or publication may use this as a major portion of their thesis, but must write an independent summary of their personal contribution, independent of their co-authors, in addition to the paper.

Students must provide documentation that their research supervisor has read and approved their thesis.

2. **Oral presentation**. A presentation of at least 15 minutes, using prepared visuals (e.g., Powerpoint slides), that explains the context, general methodology, and results and their implications contained in the thesis. The presentation will be made in the concurrent honors seminar, PHYS 485, 486 or 487 (depending on the quarter); the intended audience is thus peers in the Departmental Honors Program.
3. **Poster presentation**. A poster presentation on the thesis research suitable for display at the Mary Gates Research Symposium. Students must complete an electronic version of the poster for this class. It need not be printed.

Grading and Evaluation:

Students are expected to work with their research supervisor on the physics content of their thesis and presentations. They will be evaluated for PHYS 488 on the quality of the presentation of their ideas in different media.

Overall grading scale: 4.0 = a good presentation at a professional meeting (poster or talk) or contribution to a conference proceeding (thesis); 3.0 = presentation is deficient in organization, clarity, or visual appearance, but the general idea is communicated; 2.0 = multiple deficiencies in clarity and effectiveness, such that it is not easy to glean the major ideas.

Thesis (30%): The written thesis should include (a) a clear discussion of the context of the research and the physics question(s) being explored, including relevant citations to the existing literature; (b) description of the methodology used, whether theoretical, experimental, or synthetic; (c) presentation of key results, using appropriate graphs and tables as well as words; (d) discussion of results and how they relate to previous experimental and/or theoretical results. It should also include a summary abstract (≤ 1 page). It will be evaluated for clarity and effectiveness at presenting the research. Students must submit a draft no later than the end of the 7th week of the quarter, and respond to feedback with a revised version by the end of the 10th week. The final version must also include a note from the research supervisor.

Oral Presentation (40%): The oral presentation should summarize the thesis for an audience of peers in the Senior Honors Seminar. It will be evaluated for clarity, effective use of visuals, organization, balance of topics (context, methodology, results, discussion) and ability to answer questions from the audience. Students must submit draft slides one week prior to their presentation, and meet with the instructor as directed.

Poster Presentation (30%): The poster should summarize the thesis for an audience at a conference such as the Mary Gates Research Symposium. It will be evaluated for clarity, effective use of visuals, organization, and balance of topics (context, methodology, results, discussion). Students who submit a draft two weeks prior to the due date will receive feedback that will allow them to resubmit a revised version.