

PHYC 482: Independent Studies in Physics

Course Description

Scientific investigations in physics on an individual basis, consisting of experimental or theoretical/computational work, reading, and development of research techniques and skills.
(3 credit hours)

Prerequisite: permission of department chairperson.

Course Rationale

This course converts the experience and information students have obtained in prior coursework to action, as they take what they have learned in the classroom to create new knowledge on their own. In doing so, it prepares them for careers in physics or related subject areas. The course provides an opportunity for students to gain practical experience in physics research within a specific area related to faculty expertise, such as, for example, astrophysics, nanotechnology, or medical physics. Students gain knowledge in their chosen area through readings in texts, lectures, and journal articles, and, with faculty mentoring, gain expertise in the varied skills needed to perform research. The goal is that students themselves will eventually perform new research or practical applications of their own. The scope of the course is very broad and open, encompassing the large variety of research topics and methods in physics and related fields. Examples include: observational, experimental, or computational research, clinical experience, and the development of new research tools, techniques, or software. Experiences of particular value that prepare students for employment or careers in physics or related areas will be emphasized.

Course Objectives

A sample of the different course objectives are provided below. Students in PHYC 482 will:

Learn how to use scientific and industrial equipment;

Gain knowledge of the terminology and underlying physical science of various equipment and resources used in their work;

Identify and use basic physical laws in explaining the results and phenomena that they encounter in their project;

Collect and analyze data, display results, and draw conclusions that explain their data;

Be able to model phenomena and predict behavior based on this model;

Gain knowledge about a particular topic, equipment, software, or physical phenomenon in detail so that the student can use it later in their career; and

Develop oral and writing skills at a professional level to present the results of their project.

Course Content, Format, and Bibliography

The nature of the PHYC 482 course makes the course content and format dependent on the nature of the research work and on the advising professor. It will vary according to the field of study and the proposed project. A written or oral report on the research work performed by the student would be submitted at the completion of the project. The contents of the report would contain the following:

- Abstract / Project description
- Outline
- Detailed reading or experimental work
- Collect data / calculations
- Analyze data / develop model
- Results and discussion
- Narrative
- Conclusion
- References
- Written report
- Oral report

Bibliography

Books, reference papers, and article selection are dependent on the nature of the research work and on the advising professor. Selective books and references will be recommended by the mentor of the student. It is solely dependent on the research topic.