

PHYS 4221, UNDERGRADUATE RESEARCH EXPERIENCE IN PHYSICS I

Fall Semester, 2014

Physics Department, Dr. Evelyn Potter, Department Chair

COURSE DESCRIPTION

Senior physics majors will investigate a topic of current research interest with physics faculty. The course will involve problem identification, literature search, and start of research (building the necessary background or setting up the necessary experiment(s) to solve the research problem, development of the solution of the problem). All students will meet with faculty twice a week for instruction, guidance and exploration of the topic.

COURSE SEQUENCE IN CURRICULUM

This is an advanced course for physics majors which is a requirement for the physics major.

PRE-REQUISITE INFORMATION

At least 29 hours of Physics completed.

INSTRUCTOR INFORMATION

Name: Dr. Gardo Blado
E-mail: gblado@hbu.edu
Office Phone: 281-649-3187
Office Location: S217
Office Hours: To be Announced
Web Page Address, Web Board, ListServ: See Blackboard

LEARNING RESOURCES

Course Text: None
Supplementary Text: None
Other Required Materials: articles from <http://arxiv.org/> and other assigned journal articles

COURSE OBJECTIVES

Purpose of the course:

The purpose of this course is the development of individual initiative and responsibility in addition to skills in critical thinking and independent study. The seminar is designed to equip the student with the basic tools of research and with knowledge of significant literature in the field of study.

Aims for the course:

To provide in-depth knowledge of a specific topic of current research interest, by means of a study of the significant literature, and practical work.

On completion of this course, students should be able to:

Demonstrate a detailed knowledge of an aspect of the specific topic in presenting the results of their research.

RELATION TO DEPARTMENTAL GOALS AND PURPOSES

The Mathematics/Physics Department "...will offer an academically rigorous, undergraduate curriculum in classical and modern mathematics. The curriculum will prepare students majoring in mathematics and mathematical studies for careers and further education in mathematics and will encourage a lifetime of learning."

"...will provide academically rigorous and modern courses in mathematics to support other programs at the University."

"...will offer courses to enable all graduates of the University to become mathematically literate and develop useful skills in mathematics."

"...will provide the appropriate administrative processes, facilities, research experiences, and faculty to achieve the goals stated above."

RELATION TO COLLEGE GOALS AND PURPOSES

"...to prepare students for careers and further education in the natural sciences and mathematics in a nurturing Christian environment. The College will also serve the HBU community by providing science and mathematics classes that empower HBU students to meet the goals and requirements of their field of study and enrich their liberal arts education."

RELATION TO THE PURPOSE STATEMENT OF THE UNIVERSITY

University mission and purpose statement from the Houston Baptist University Catalog, 2009-2010: "...to provide a learning experience that instills in students a passion for academic, spiritual, and professional excellence as a result of our central confession, "Jesus Christ is Lord"

"...Committed to providing a responsible and intellectually stimulating environment that:

- fosters spiritual maturity, strength of character, and moral virtue as the foundation for successful living
- develops professional behaviors and personal characteristics for life-long learning and service to God and to the community
- meets the changing needs of the community and society
- remains faithful to the '**Nature of the Institution**' statement"

"...Promotes learning, scholarship, creative endeavor, and service".

ATTENDANCE

Please see the official Attendance Policy in the HBU Classroom Policy on Blackboard. Students missing more than 25% of the class will be given a failing grade.

For this class, students will receive a grade of "F" after the 4th absence.

ACADEMIC ACCOMODATIONS

Students needing learning accommodations should inform the professor immediately and consult the Academic Accommodations section of the HBU Classroom Policy posted on Blackboard.

COURSE REQUIREMENTS & GRADE SCALE

Course requirements:

Attendance of a weekly meeting with the professor, participation in practical work in and outside class and discussion are required. Three oral presentations, a rough draft of the report and a final report on the research are also required. A more detailed discussion of how the research project is conducted is found in the handout "Phys 4221 Research Project" in Blackboard.

Grading standards:

Course grading is as follows:

Weekly Meetings	40%
Oral Presentations	30%
Written Research Paper	30%

The grading scale is:

A = 90 – 100; B = 75 – 89; C = 60 – 74; D = 50 – 59; F = below 50.

PROFICIENCIES:

Technology component:

If the student chooses a topic involving practical laboratory work, the student will learn proper use of the appropriate laboratory equipment, possibly including computers.

Designated essay/writing component:

A written research paper is required.

Reading component:

The student is expected to read and understand the relevant literature, including books and papers.

Oral communication component:

The student will discuss the literature and the research project with the professor, and will make three oral power point presentations throughout the course.

Mathematics component:

A knowledge of calculus, advanced mathematics and computer programming using *Maple* are required for an understanding of the physical theory and the ability to do calculations on the topic of research.

Critical thinking component:

The student will develop the critical thinking skills which are essential for research.

LATE WORK & TEST POLICY

Late work:

Late work will be penalized.

Missed tests:

Not Applicable

EVALUATION

Method of student appraisal of faculty:

Students will be given an opportunity to appraise the professor by completing the IDEA Faculty Evaluation Questionnaire, and/or the COSM course evaluation at the end of the semester. The instructor, the department chairman and dean will review the responses of the students after the completion of the course.

Method of evaluating student response to course:

Students will be given an opportunity to describe their response to the course by completing the IDEA Faculty Evaluation Questionnaire and/or the COSM course Evaluation at the end of the course. The instructor, the department chairman and dean will review the responses of the students after the completion of the course.

LABORATORY DRESS CODE

Students may be asked in advance to wear closed-toed shoes and long pants during certain experimental procedures.

Does not apply to this course.

LABORATORY CONDUCT AND SAFETY

IMPORTANT INFORMATION FOR THIS COURSE: IF A STUDENT IS PREGNANT OR NURSING, SHE WILL NOT BE ALLOWED TO ATTEND THE LABORATORY SESSIONS BECAUSE SOME OF THE CHEMICALS, WHICH ARE NORMALLY INNOCUOUS, USED IN THESE LABORATORY EXPERIMENTS, MAY BE HARMFUL TO A DEVELOPING FETUS. IF A STUDENT BECOMES PREGNANT DURING THE COURSE, SHE MUST STOP ATTENDING THE LABORATORY SESSIONS IMMEDIATELY AND SHE IS TO NOTIFY HER PROFESSOR. THE PROFESSOR WILL DISCUSS OPTIONS THAT THE STUDENT WILL HAVE TO ENABLE HER TO COMPLETE THE COURSE REQUIREMENTS.

Does not apply to this course.

TOPICAL OUTLINE - *include table, calendar, or topical outline with dates*

Topics Covered:

The "Research Schedule" is posted in Blackboard.

Course Outline:

The detailed outline will depend on the specific topic selected by the student for research.

The senior seminar work will include the following:

1. Survey of the topic and selection of a specific aspect for detailed study.
2. Review of the relevant literature in the field and selection of project for research.

3. Practical work to carry out the project. This may include any or all of the following: laboratory experimental work, computer programming, simulations, calculations, or a further in-depth study of the literature.
4. Two oral presentation of the progress of the research.
5. Submission of a first draft of the research paper.
6. Submission of the final draft of the research paper.
7. Final oral presentation of the results of the research.

The content of this outline and the attached schedule are subject to change at the discretion of the professor.

Student Signature – I have read and understand the syllabus for this class. I understand that the content of this syllabus and the topical outline are subject to change at the discretion of the professor. I have read and understand the HBU Classroom Policy posted on Black Board. **I promise to uphold the Code of Academic Integrity at Houston Baptist University and will not tolerate its violation by others.**