

## **PHYS 2413, PRINCIPLES OF PHYSICS I**

*Fall Semester, 2014*

Physics Department, Dr. Evelyn Potter, Department Chair

### **COURSE DESCRIPTION**

An introduction to Newton's laws of motion, gravitation, fluids, and sound. This course includes one semester hour credit for laboratory sessions.

### **COURSE SEQUENCE IN CURRICULUM**

Principles of Physics I is the required first course in physics for physics majors and other students requiring courses in physics.

### **PRE-REQUISITE INFORMATION**

MATH 1451

### **INSTRUCTOR INFORMATION**

Name: Dr. James Claycomb  
E-mail: [jclaycomb@hbu.edu](mailto:jclaycomb@hbu.edu)  
Office Phone: 281-649-3190  
Office Location: S216  
Office Hours: MWF 11:15 – 12:00  
Web Page Address, Web Board, ListServ: See Blackboard

### **LEARNING RESOURCES**

Course Text: Serway& Jewett, Principles of Physics, 5<sup>th</sup> ed., Thompson Brooks/Cole, 2006. ISBN 0-534-49143-X (required)  
Supplementary Text: Gordon, McGrew, Serway& Jewett, Study Guide / Student Solutions Manual for Principles of Physics 5<sup>th</sup> edition, Volume 1, 2012. ISBN 0-534-49145-6 (optional)  
Other Required Materials: A scientific calculator should be brought to all classes, labs, quizzes, and exams. Be sure you know how to operate your own calculator. Programmable calculators will not be allowed during quizzes and exams.

### **COURSE OBJECTIVES**

#### Purpose of the course:

This calculus-based course provides the student with the knowledge of physical fundamentals necessary to study and understand more advanced subjects in physics and other sciences. The course deals specifically with mechanics and vibrations. The major emphasis is on problem solving through an understanding of physical principles. This course includes twenty hours of laboratory work.

#### Aims for the course:

This course is designed to equip students with the basic physics knowledge they need to solve problems in mechanics, waves and vibrations.

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

1. understand dimensional analysis and order of magnitude estimations as applied to the physical world

2. have a proficiency in the use of elementary vector analysis.
3. understand kinematics and dynamics as applied to motion in one and two dimensions and rotational motion.
4. understand and be able to apply Newton's three laws of motion in solving physics problems.
5. understand and be able to apply the concepts of work and energy.
6. understand the principle of conservation of energy with respect to potential energy and kinetic energy.
7. understand the concept of conservation of linear and angular momentum.
8. understand oscillatory and wave motion and the superposition of waves with specific applications to sound waves.
9. understand the principles of fluid mechanics
10. understand relativity

### **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.

Excused absences (personal illness, illness of dependents, death in the immediate family, or legal obligations) must be documented on the first day of returning to class.

## **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:

Homework problems are assigned for each chapter and weekly quizzes are given. Three examinations and a comprehensive final examination comprise the bulk of the grade. Laboratory reports are required.

### Grading standards:

Course grading is as follows:

|                          |     |
|--------------------------|-----|
| Four Exams               | 40% |
| Laboratory Work          | 20% |
| Quizzes, Homeworks       | 15% |
| Comprehensive Final Exam | 25% |

The grading scale is:

A = 90 – 100; B = 80 – 89; C = 70 – 79; D = 60 – 69; F = below 60.

## **PROFICIENCIES:**

### Technology component:

The students use lab equipment such as electronic timers, oscilloscopes and function generators.

### Designated essay/writing component:

Students are required to write several laboratory reports that constitute a part of their final grade.

### Reading component:

The students are expected to read and understand the textbook.

### Oral communication component:

The students are encouraged to ask questions in class, and join in classroom discussions with other students.

### Mathematics component:

The class assumes and fully utilizes a working knowledge of algebra, trigonometry, and calculus.

Critical thinking component:

In quizzes and examinations, students are expected to apply the concepts learned in new situations by solving both quantitative and conceptual problems.

**LATE WORK & TEST POLICY**

Late work:

Lab reports are due the following lab meeting. Late lab reports and homework will be discounted 25% per day.

Missed tests:

Any student missing an exam will receive a zero (0) for that exam. No make-up exams will be given. Any student missing the final exam will receive an "F" for their final grade in the course. The final exam grade may replace the lowest test grade.

**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.

**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.

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

Topics Covered:

- I. Measurement and Vectors
- II. Motion in One Dimension
- III. Motion in Two Dimensions
- IV. The Laws of Motion
- V. More Applications of Newton's Laws
- VI. Energy and Energy Transfer
- VII. Potential Energy and Conservation of Energy
- VIII. Linear Momentum and Collisions
- IX. Rotational Motion
- X. Gravitation & Relativity
- XI. Oscillatory Motion
- XII. Mechanical Waves and Sound
- XIII. Superposition and Standing Waves
- XIV. Fluid Mechanics

Chapters 1 -15 in Serway & Jewett (4<sup>th</sup>ed.) will be covered. Topics in Chapter 9 will be covered concurrently with related subjects in mechanics. You will be responsible for all material covered during the lecture as well as specific chapter sections covered as reading assignments

Tentative Schedule:

| WEEK | MONDAY             | TUESDAY | WEDNESDAY     | THURSDAY    | FRIDAY          |
|------|--------------------|---------|---------------|-------------|-----------------|
| 1    | 08/25<br>Ch 1      | 08/26   | 08/27<br>Ch 1 | 08/28       | 08/29<br>Ch 2   |
| 2    | 09/01<br>Labor Day | 09/02   | 09/03<br>Ch 2 | 09/04       | 09/05<br>Ch 3   |
| 3    | 09/08              | 09/09   | 09/10<br>Ch 3 | 09/11       | 09/12<br>Ch 4   |
| 4    | 09/15<br>Ch 4      | 09/16   | 09/17<br>Ch 4 | 09/18       | 09/19<br>Test 1 |
| 5    | 09/22<br>Ch 5      | 09/23   | 09/24<br>Ch 5 | 09/25<br>Ch | 09/26<br>Ch 5   |
| 6    | 09/29<br>Ch 6      | 09/30   | 10/01<br>Ch 6 | 10/02       | 10/03<br>Ch 6   |
| 7    | 10/06<br>Ch 7      | 10/07   | 10/08<br>Ch 7 | 10/09       | 10/10<br>Ch 7   |
| 8    | 10/13<br>Test 2    | 10/14   | 10/15<br>Ch 8 | 10/16       | 10/17<br>Ch 8   |

|    |                      |                 |                 |                       |  |
|----|----------------------|-----------------|-----------------|-----------------------|--|
| 9  | 10/20<br>Ch 10       | 10/21           | 10/22<br>Ch 10  | 10/23                 | 10/24<br>Ch 10                                 |
| 10 | 10/27<br>Ch 10       | 10/28           | 10/29<br>Ch 10  | 10/30                 | 10/31<br>Test 3<br>Last day to drop with a 'W' |
| 11 | 11/03<br>Ch 11       | 11/04           | 11/05<br>Ch 11  | 11/06                 | 11/07<br>Ch 11                                 |
| 12 | 11/10<br>Ch 12       | 11/11           | 11/12<br>Ch 12  | 11/13                 | 11/14<br>Ch 12                                 |
| 13 | 11/17<br>Ch 13       | 11/18           | 11/19<br>Ch 13  | 11/20                 | 11/21<br>Ch 14                                 |
| 14 | 11/24<br>Ch 14       | 11/25           | 11/26<br>Ch 15  | 11/27<br>Thanksgiving | 11/28<br>Thanksgiving                          |
| 15 | 12/01<br>Test 4      | 12/02           | 12/03<br>Ch 15  | 12/04                 | 12/05<br>Ch 15<br>Last Day of Classes          |
| 16 | 12/08<br>Reading Day | 12/09<br>Finals | 12/10<br>Finals | 12/11<br>Finals       | 12/12<br>Finals                                |

### Homework:

Homework will be assigned in WebAssign. It is strongly recommended that additional problems also be attempted.

It is very important to keep up with the homework. The best way to learn how to solve problems is to practice: by working through many examples, and by doing homework problems. Work on homework problems regularly, as soon after class as possible. Students are encouraged to discuss and work on homework problems with their classmates.

### Quizzes:

Additional quizzes may be given at the end of class - these will be announced ahead of time. These may include conceptual multiple-choice questions, as well as problems similar to: the assigned homework problems, example problems from the textbook, and example problems discussed in class. Daily Mosquito Quizzes will also be given.

### Note:

Topics in the course build on previous material, so it is essential that all material should be fully understood. Be sure to ask questions if you do not understand

something. I'd like to know throughout the course how the class is going. If you have any problems, please mention them as soon as they occur. Stop by my office at any time.

**Laboratory Outline:**

A student must have a passing grade in the laboratory to pass the course. All labs must be completed.

Tentative schedule:

| WEEK | MO | LABORATORY                              |
|------|----|---|
| 1    | 8  | #1 Measurement and Data Analysis        |
| 2    | 9  | #2 Vector Addition Force Table          |
| 3    | 9  | #3 Gravitation Free Fall (Picket Fence) |
| 4    | 9  | #4 Projectile Motion                    |
| 5    | 9  | #5 Newton's Second Law (Atwood Machine) |
| 6    | 9  | #6 Newton's 3 <sup>rd</sup> Law         |
| 7    | 10 | #7 Static Friction                      |
| 8    | 10 | #8 Air Resistance                       |
| 9    | 10 | #9 Conservation of Energy (Tossed Ball) |
| 11   | 10 | #10 Impulse and Momentum                |
| 12   | 10 | #12 Rotational Motion                   |
| 13   | 11 | #13 Simple Harmonic Motion              |
| 14   | 11 | #14 Sound I (Speed of Sound)            |
| 15   | 12 | # 15 Sound II (Analysis of Sound)       |

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.**