PHY115: Introduction to Applied Math and Physics

Spring 2023

General Information

Class Schedule: Wednesdays 9:00am-12:00pm

Class room: Auditorium

Professor: Anabela Turlione

Contact: anabela.turlione@digipen.edu - int:1029

Class web page: PHY115 at distance.digipen.edu

Office hours: by appointment

Description

This course examines the basic physics and mathematics governing natural phenomena such as light, weight, inertia, friction, momentum, and thrust as a practical introduction to applied math and physics. Students will explore geometry, trigonometry for cyclical motions, and physical equations of motion for bodies moving under the influence of forces. With these tools, students will develop a broader understanding of the impact of mathematics and physics on their daily lives.

Course Objectives and Learning Outcomes

Upon a successfully completion of this course the students will gain a fundamental understanding of basic physical principles including:

1. Kinematics (linear motion, circular motion)

2. Mechanics (Newton's Laws, Rotation of Rigid bodies)

3. Light (phenomenological description)

It will also provide skills in the geometry, trigonometry and algebra needed to solve related problems. Applications to animation and every day life will be emphasized.

Textbooks

- College Physics 7th edition, by Sears, Zemansky, Yound, Ed. Addison-Wesley

Grading Policy

The breakdown of the weighting of the Total Score will be as follows:

1. Assigments (20 %)

2. Midterm exam (40%)

3. Final exam (40%)

The minimum grade to pass the subject is 70 %

Mechanisms and Procedures

1. Before the class: To optimize the learning experience and the efficient use of our time, reading the relevant book sections before the material is taught is recommended.

2. Attendance: attendance in class is mandatory. If you are absent for 2 weeks or more you are considered to have withdrawn from the course. If you decide to drop the course it is your responsibility to follow the correct procedures.

3. No food is allowed in class. I strongly recommend to take notes during the class.

4. Working problems is essential in mastering the material. There will be approximately an assignment every two weeks. At least, one of the assigments will be a programming assignments. Programming assignments must be submitted to Moodle before the deadline.

5. Late Policy: Late homework will not be accepted.

6. Please fell free to send me an email whenever you need help.

7. A calculator is required for tests and homework. You can use any programming calculator without an Internet connection during any test or exam.

8. All exams are closed book. As this course is about understanding and not memorization, one sheet of notes is permitted for an exam with the formulas you consider. This sheet of notes must be handwritten by you, and no larger than a 'normal' (DIN4) piece of paper. Front and back of the page may be used.

9. Missing a test without a timely, valid excuse will result in a 0 score for the test. There are NO make up exams unless you have a compelling and well documented reason for missing a test. Notice that make ups are only considered under relevant medical, familiar or administrative situations that cannot be postponed.

Rubrics and Assessment

To get full credit you need to show all the important steps of your work which are:

1. Do a drawing of the schedule/body diagram in each problem.

2. Indicate the law/theory applied (or your reasoning).

3. Develop your calculus. The level of detail required is what your colleagues would need to see in order to understand your solution, without having to work it out for themselves.

4. Give the solution, specifying the unit of each magnitude and the direction of them (it's a vector). A penalty of 10

- Before submitting an assignment your grade is a 0, not a 100. This means that you obtain points for doing things right, and I do not subtract points from that non existing 100.

- Partial credit will be given only if your work is clearly presented and mostly correct.

- If the process that you follow is correct but you arrive to a conclusion that is totally inconsistent with the theory learned in class, you will get a zero in that exercises with the note "misconception" attached.

- If an error is accumulative along an exercise, that will not penalize the rest of the exercise unless this means inconsistency with the theory learned in class.

- Any material covered in the course is valid for testing, including concepts covered in lecture, homework, or other communications and/or assigned work (as reading the textbook).

- No messy tests/homework will be graded.

Relevance/Statement

It is important to keep up with the material, to study regularly at home (at least 2 hours for every hour in class) and to do as many problems as you can (don't limit yourself to the assigned or recommended problems, or merely the problems that are due).

You are welcome to work with other students, so long as the aim is furthering your understanding of the concepts and problem solving techniques. I am happy to help work through problems, either in office hours or in class. Just remember, doing a problem yourself is very different from watching another person do so. If you work together on problem sets, be sure to provide your own solution to every problem proving that you understand your writing. In addition, some exam questions may be a resemblance to homework questions, so you're encouraged to fully understand what you turn in. Again, reading the relevant book sections before the material is taught is highly recommended.

Last Day to Withdraw: On Sunday 3/7/2022

Academic Integrity Policy

Academic dishonesty in any form will not be tolerated in this course. Cheating, copying from any sources (including current or past students work, online sources or books), plagiarizing, or any other form of academic dishonesty (including doing someone else's individual assignments) will result in, at the extreme minimum, a zero on the assignment in question, and could result in a failing grade in the course or even expulsion from DigiPen. Assisting others in cheating is prohibited and will be equally punished.

Disability Support Services

Students that have special needs due to medical issues, can apply for formal accommodations. The accommodations are student specific and are focused on helping the student to complete the learning process and achieve the goals in the course. Students that apply for accommodations for the first time should contact the Administration Office at 94 6365163 in order to start the process. Students that have already contacted the Administration Office will be informed about the general considerations through their Academic Advisor. Additionally, students should talk to the teacher in order to be informed about the details of the accommodations in this particular course.

Outline and Tentative Dates

Timeline	Topic	HW	Approximate book Section
Week 1	Operations with vectors, trigonometry, solving quadratic equations.		Ch1
Week 2	Distance and velocity, Motion with constant velocity Motion with constant acceleration	HW 1	Ch 2
Week 3	Newton's Laws of motion		Ch 4
Week 4	Different kind of forces. Free bodies diagrams	HW 2	Ch 4
Week 5	Motion in the plane, component of acceleration		Ch 3
Week 6	Applying Newton's Laws	HW 3	Ch 3
Week 7	**Midterm test**		Ch 5
Week 8	Impulse, Momentum and Collisions	HW 4	Ch 8
Week 9	CM and conservation of the linear momentum.		Ch 9
Week 10	Rotation of Rigid Bodies	HW 5	Ch 10
Week 11	Dynamics of Rotational Motion		Ch 34
Week 12	Light: basic concepts	HW 6	Ch 34
Week 13	Physics of shading		Ch 36
Week 14	Review before the Final test	HW7	
Week 15	**FINAL test**		

[This entire syllabus, particularly the time line, may be adjusted or changed at any time by the instructor.]