Physics 211, 212, 213
This is an introductory physics course for students majoring in science and engineering. We will explore topics in physics including statics, dynamics, electromagnetism, thermodynamics, and optics using the methods of calculus.
Recommended prerequisites:
Ph 211: Mth 251; co-requisite Ph 214
Ph 212: Ph 211 and Ph 214; co-requisite Ph 215
Ph 213: Ph 212 and Ph 215; co-requisite Ph 216

Course Materials
Online component: Wiley Plus  http://wileyplus.com
Classroom clicker: Turning Tech.
    Clicker: http://www.turningtechnologies.com/studentresponsesystems/studentclickers/
    ResponseWare App:
http://www.turningtechnologies.com/studentresponsesystems/mobiledistancelearning/higheredresponseware/

Course Goals
The goal of the Physics with Calculus series is to provide the student with a broad understanding of the physical principles of the universe, to help them develop critical thinking and quantitative reasoning skills, to empower them to think creatively and critically about scientific problems and experiments, and to provide training for students planning careers in physics and in the physical sciences broadly defined, including those whose interests lie in research, K-12 or college teaching, industrial jobs, or other sectors of our society.
PH 211 Course Outcomes

1. Students will develop a broad set of knowledge concerning the fundamentals in the basic areas of physics (Measurements, motion, Force, Energy, Linear and Angular Momentum, Rotation, Gravitation).

2. Students will have knowledge of a set of basic physical constants that enable their ability to make simple numerical estimates of physical properties of the universe and its constituents.

3. Students will demonstrate an understanding of the physical principles required to analyze a physical question or topic, including those not previously seen, and both quantitative and qualitative physical insight into these principles in order to understand or predict what happens. This includes understanding what equations and numerical physical constants are needed to describe and analyze fundamental physics problems.

4. Solve problems competently by identifying the essential parts of a problem and formulating a strategy for solving the problem. Estimate the numerical solution to a problem. Apply appropriate techniques to arrive at a solution, test the correctness of the solution, and interpret the results.

5. Explain the physics problem and its solution in both words and appropriately specific equations to both experts and non-experts.

Student Responsibility
In order to meet these course goals I ask that you do three basic yet crucial things: 1) Show up – the world belongs to those who show up, 2) stay on top of the reading and complete all the assignments in a timely manner, and 3) come to class prepared to engage with the material – please do not just come to hear me talk, I am interested (and so are your classmates) in what you bring to the discussion.

Attendance Consistent participation in class, including completion of all assigned activities and work products, will be taken into consideration in the final grade. Students are responsible for all course materials missed due to absence. Refer to another student to obtain any missed handouts or notes

Grading criteria
A “superior”, high level integration and conceptual development with factual accuracy
B “above average”, accurate with significant integration and conceptual development
C “basic quality”, mostly accurate and simply factual, modest conceptual development

PASS/NO PASS OPTION: Student must pass all assignments with a C- or better to pass the course. Students taking the class P/NP must satisfactorily complete all assignments in order to receive a passing grade.
ADA Statement
Accommodations are collaborative efforts between students, faculty and the Disability Resource Center (DRC). Students with accommodations approved through the DRC are responsible for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through the DRC should contact the DRC immediately at 503-725-4150.

Academic Honesty
The issue of academic dishonesty has become a growing issue with which most universities have had to contend. There are various reasons why students 'cheat' in their classes such as lack of time, unwillingness to put forth own effort, lack of understanding of course material or assignments, and a different interpretation of what constitutes academic dishonesty. In this class, academic dishonesty is broadly defined as the use of someone else's work as yours. This includes some obvious actions such as:
• Having someone take a class for you
• Having someone take or complete part of your test or an assignment for you
• Having someone else write a paper, or a section of a paper for you
• Using a quote or direct passage from some secondary source (e.g., book, article) in a paper without citing it (this does not include your responses provided on tests that are taken directly from the professor's lecture or other class material]
• Working collaboratively on projects or assignments that are expected to be completed on an individual basis.
The above list of actions is not intended to be exhaustive.
Students who infringe the academic honesty contract will be referred to the Dean of Student Life for corrective actions.
Grading (1000 pts)

Reading Quizzes (150 pts)
Readings are assigned for each week. These readings will be most meaningful when completed before the lecture time. In order to facilitate this I am assigning reading quizzes. These are open book and untimed (warning: webpage may time-out if left to long) and consists of problems from the text book. There will be one reading quiz per week due before class on Monday of each week.

In class questions (150 pts)
In order to facilitate class attendance and participation and to encourage classroom feedback we will make use of the classroom "clickers". Throughout the lecture questions will be placed which must be answered by the student using either the Turning Tech. clicker or a web-ready device with the ResponseWare software. Each class session there will be a handful of questions. Each session is worth 10 points; in order to get the 5 pts you must correctly answer at least one of the questions.

Exams (700)

Recitation Hour or Problem Set (extra credit) (100 pts)
Two integral outcomes of undergraduate physics are the ability to solve problems competently by identifying the essential parts of a problem and formulating a strategy for solving the problem and to explain the physics problem and its solution in both words and appropriately specific equations.

To this extent it is important that you work on problems which go beyond domain specific knowledge (e.g. constants and formulas) and practice discussing the specifics of a problem, deciding on an approach to solving the problem, assessing the validity of the answer and correcting course. This practice can be very fruitful when done with others. Therefore we have established an optional recitation hour (there are several sections please search banweb for Ph299). These sections are peer led and are spent discussing and solving problems.

Because these sections may not fit everyone's schedule there is also the option of solving the assigned problems independently (it is highly encouraged to work together). You can submit the solutions for the problem sets for credit; solutions consist of both the worked solution to the problem and a minimum 200 word paragraph which describes the problem and the steps needed to solve the problem (see example below)

Extra credit will be given for completion of all the problem assignments (turned in weekly) or attending all of the recitation hours (one allowed absence).
Example Problem Solution
An airplane accelerates down a runway at 3.20 m/s\(^2\) for 32.8 s until it finally lifts off the ground. Determine the distance traveled before takeoff.

This problem is asking me to determine distance traveled by an airplane (d) from the moment when it is at rest (t\(_{0}\)=0) until the moment when the plane leaves the runway (t\(_{f}\)= 32.8 sec). The problem specifies the acceleration of the airplane (a = 3.2 m/s\(^2\)), which I assume is constant because I have not been told otherwise (but this would be an important question if I was working for a runway engineering firm). The units of acceleration are meters per second per second (that is length per time squared).

If the velocity of the airplane was constant (v) this problem would be easily solved by multiplying the velocity v by the time t, \(v \times t = d\). This is because velocity is a measure of distance covered per time.

Because, the airplane is accelerating the velocity is changing with time (that is it is a function of time) and therefore the velocity must be treated as a continuously changing variable in the above formulation. By definition acceleration describes how velocity changes with time and can be written as: \(a = \frac{dv}{dt}\). By integrating both sides with respect to time we have the general function for velocity (for constant acceleration): \(v(t) = a \times t + C\), where C is a constant of integration which we can solve for by noting that for \(t = 0\) \(v = 0\), hence \(v(0) = 0 = C\).

We are still unable to determine the distance covered, for this we can use the definition of velocity as the change of distance per infinitesimal change in time: \(v = \frac{d}{dt}\). By integrating both sides with respect to time we have \(d = 0.5a \times t^2 + C\), where C which we can solve for by noting that at \(t = 0\) \(d = 0\), thus \(d(0) = 0.5 \times a \times 0^2 + C = 0\) or \(d = 0\).

We know have the equation we need to determine the distance covered by the airplane as a function of time \(d(t) = 0.5a \times t^2\). We are interested in the distance covered when for \(t = 32.8\) sec, \(d = 0.5 \times (3.20 \text{ m/s}^2) \times (32.8 \text{ s})^2\). The distance traveled before takeoff is \(d = 1720\) m.

Given:
\(a = +3.2\) m/s\(^2\), \(t_f = 32.8\) s, and \(v_i = 0\) m/s

Find:
\(d = ?\)

\(a = d^2/dt^2 \Rightarrow d = v_i \times t + 0.5a \times t^2\)
\(d = (0 \text{ m/s}) \times (32.8 \text{ s}) + 0.5 \times (3.20 \text{ m/s}^2) \times (32.8 \text{ s})^2\)
\(d = 1720\) m
### Reading and Problems

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University Studies Goals

- Inquiry and Critical Thinking
- Communication
- The Diversity of Human Experience
- Ethics and Social Responsibility

Course Goals

1. Identify fundamental principles of modern science inquiry and how modern science contributes to human knowledge. (The Diversity of Human Experience)

2. Conduct research according to the methods and processes of scientific inquiry including experimental design, recording data, quantification of data, and interpretation of observations. Communicate results and their importance within a specific topic of relevance. (Inquiry and Critical Thinking) (Communication)

3. Access and utilize scientific information, found in peer-reviewed scientific literature and experimentation according to the scientific method, to advocate specific positions on issues of concern, while avoiding cognitive bias and reference to pseudo-scientific claims. (Inquiry and Critical Thinking) (Communication) (Ethics and Social Responsibility)

Course Outcomes

1. Students will be able articulate, through reflective writing, the development and social importance of modern science.

2. Students will be able to assess the scientific nature of a claim made in everyday arenas (e.g. product marketing, politics, media coverage). Students will be able to differentiate between claims made through the methodology of modern science and those made through pseudo-science.

3. Students will be able to reflectively identify cognitive bias and articulate how empirical reasoning may overcome certain biases.

4. Students will be able to search for scientific literature using one or multiple information resources; students will learn and make use of research strategies (e.g. keywords, synonyms and related terms in order to flexibly search). Students will be able to narrow, broaden or modify their search, research topic, question or thesis based on initial search results.

5. Students will be able to design an unbiased experiment, record data, quantify and analyze the data, and effectively communicate results through oral, graphical and written modalities.
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