Physics 1000: Physics for Future Presidents
January Term 2022

Instructor: Kevin Morris, Straz 178
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Course Plan

In Physics 1000 we will learn the physics and science needed to be an informed citizen and leader. Topics to be discussed include energy production and consumption, gravity and rocketry, nuclear power, light and waves, relativity, and the Big Bang theory.

Course Materials

The textbook for the course is *Physics and Technology for Future Presidents,* by Richard Muller, (McGraw Hill). Bring the textbook and a scientific calculator to each class meeting. We will sometimes do Internet exercises from the textbook in class, so you may want to bring your laptop as well.

Course Organization

Most class periods will begin with a presentation highlighting important topics from a textbook chapter. Time will also be spent solving representative problems. Afterwards we will split into groups and complete in-class problem assignments consisting of Discussion Questions and Internet Investigations from the textbook and other supplemental problems. Time in selected classes will also be spent watching documentaries or YouTube clips that illustrate the course concepts.

Homework

We will have five homework assignments during the term. These assignments will include multiple choice questions from the end of specified textbook chapters and problems similar to those considered in class. Homework assignments should be turned in at the beginning of class on the day that they are due.

Exams

We will have three exams on the dates indicated in the table below. The third exam is not cumulative.

Grades

Final grades will be computed on the following basis.

Exams: 50%, *Homework Assignments:* 25%, and *In-Class Assignments:* 25%

Calculators

Bring a calculator to all class meetings. A scientific calculator app can be downloaded on most smart phones. A phone calculator can be used for in-class problems, but you must use a hand-held calculator on exams. Your calculator should have the four arithmetic functions plus log, 10^x, 1/x, y^x, and square root keys. It should also be able to handle scientific notation. An inexpensive calculator that will carry out these functions will suffice.

Students with Disabilities

Carthage College strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers due to your disability (including mental health, learning disorders and chronic medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, also register with Diane Schowalter in Learning Accessibility Services (dschowalter1@carthage.edu).

Personal Protective Equipment

Carthage's policies regarding face masks and social distancing can be found at the following link. https://www.carthage.edu/carthage-covid-19/stay-safe-carthage/face-coverings/
Please read and comply with all these policies and rules.

Academic Honesty

All students are expected to adhere to the College's code of academic conduct at http://www.carthage.edu/campus-life/code/academic-concerns/. Students are also expected to comply with any guidelines specific to remote learning and COVID-19. Academic misconduct includes attempting to copy, plagiarize, duplicate, or misrepresent work by others on exams and assignments. This includes material found on sites such as Chegg, or other homework cheat sites. Cheating will be handled by assigning a grade of zero on the affected work for the first offence, and failure of the course on subsequent offences.

Course Schedule

			Thursday 1-6 Chapter 1: Energy and Power	**Friday 1-7** Complete Chapter 1
Monday 1-10 Chapter 2: Atoms and Heat **Homework #1 is due**	**Tuesday 1-11** Chapter 3: Gravity	**Wednesday 1-12** Complete Chapter 3 **Homework #2 is due**	**Thursday 1-13** Chapter 4: Nuclei and Radioactivity	**Friday 1-14** ***Exam I Chapters 1-3***
Monday 1-17 Chapter 5: Chain Reactions	**Tuesday 1-18** Chapter 6: Electricity and Magnets **Homework #3 is due**	**Wednesday 1-19** Chapter 7: Waves	**Thursday 1-20** Chapter 8: Light **Homework #4 is due**	**Friday 1-21** ***Exam II Chapters 4-7***
Monday 1-24 Chapter 9: Invisible Light	**Tuesday 1-25** Chapter 12: Relativity	**Wednesday 1-26** Chapter 13: The Universe and the Big Bang Theory NOVA Video **Homework #5 is due**	**Thursday 1-27** Complete Chapter 13	**Friday 1-28** ***Exam III Chapters 8, 9, 12, and 13***

Learning Objectives

1. To understand that energy is the capacity to do work and to appreciate the technologies used to meet the world's energy needs.

2. To understand the concept of temperature and the laws of thermodynamics and how thermodynamic principles govern the efficiencies of engines.

3. To understand Newton's Laws of Motion and how they govern the motions of rockets, satellites, and falling objects.

4. To understand the properties of radioactive nuclei and how radioactivity is used in medicine and power generation.

5. To understand how nuclear fission proceeds via a chain reaction and to be able to describe other chain reactions occurring in nature.

6. To understand the relationship between electricity and magnetism and how electrical power is generated at a power plant and then transmitted to our homes.

7. To understand the properties of waves, including electromagnetic radiation, and to be able to describe how light waves with different wavelengths are used in medicine and communication.

8. To understand the fundamental ideas from the Special and General Theories of Relativity.

9. To understand the historical development of the Big Bang Theory and recent developments in the field of cosmology.