Course Description:

*Physics for Future Leaders* will teach you the essential physics that any future leader, world or otherwise needs to know. This is NOT a watered-down *Physics for Poets* course but a rigorous and stimulating physics course *and not highly mathematical*. This course is designed to make physics accessible and engaging to an intellectually curious cohort. The overall goal is to facilitate an understanding of physics in order to (one day!) use physics to solve some of the world's most vexing problems. Through the use of demonstrations and online videos, the elegant beauty of fundamental physical principles will be elucidated to provide the foundation for in-class discussions on how physics could be used to support decision-making and public policies. You will be learning material that is generally not learned by a physicist until after they have completed their Ph.D.

Prerequisites

No prior physics is required. In fact, if you have not taken physics in high school, you will not be at a disadvantage. And if you have taken high school physics, you will find that much of the material will be new to you. Typical physics courses spend so much time teaching the math and how to perform abstract calculations that students in those courses often do not get to the important results. But you will.

The learning goals of this course are the following:

i. To understand fundamental physical principles without sophisticated calculations.

ii. To learn how to separate the physics of a particular phenomenon from the politics of polarizing, science-based issues.

iii. To learn how to use your understanding of the physics that underlies a particular phenomenon in order to generate a consensus on policies that involve science-based issues.

Textbook

*Physics and Technology for Future Presidents: An Introduction to the Essential Physics Every World Leader Needs to Know* (2010)

Author: Richard A. Muller


Publisher: Princeton University Press

Please, do not confuse this text with the popular book entitled, *Physics for Future Presidents*, (also by Richard A. Muller). That book was published by Norton and is about half as long and contains about half of the material we will cover.
Homework

1. Homework assignments will consist of problems from the textbook and short essays that you will write, related to the material we cover in class.

2. The essays will consist of the following: You are expected to find and read an article on physics or technology from a newspaper or magazine. It should be a serious article and should discuss a topic that we have covered. Below is a (non-exhaustive) list of some good sources. You will note that some are not typically considered to be science sources. Why are they included? Because science is often written for the lay audience and you should be able to see not only what they write about but how it is presented. Are the articles biased one way or another? Remember that you are taking this course so that you can read and then make decisions with a critically trained scientific mind.

The Economist - http://www.economist.com
Science News - https://www.sciencenews.org
Popular Science - http://www.popsci.com
Scientific American - http://www.scientificamerican.com
Discover - http://discovermagazine.com
New Scientist - http://www.newscientist.com

Please note:

i. These sources are also available through the Georgetown University library website, (http://www.library.georgetown.edu/). This is useful if you are on campus and do not have a paid subscription to access on your own.

ii. My list is not exhaustive but I do think you should find something suitably written that will be rigorous enough for our purposes. However, if you have another source that you would like to use, please let me know so that I can check it out.

iii. It is advisable that you do NOT use ScienceDaily.com. Their articles tend to be superficial and misleading, and that could lead to a lower grade for your essay.

iv. NEVER use the Yahoo science page. It is too frequently of low quality.
3. Half of an essay grade will be based on the quality of the writing. Imagine that you are briefing the U.S. President on an issue that you consider important. Your essay should be a pleasure to read! You will lose credit if you have more than one misspelling, or have any error in grammar (run-on sentence etc.).

4. Your essay grade will be 0 (if you didn't hand it in), 1 (if you did a poor job), 2 (if you did a good job), or 3 (if you did an exceptionally good job). I plan to post the best submission every now and then so that others can see what we like.

Note: You do NOT have to completely understand the article you read, as long as you can clearly state what aspects of the article you did not understand! Try to write something that other students will find interesting.

5. Late homework is usually not accepted, unless there is an extraordinary excuse.

**What about the math?**

1. While you will not be required to performed sophisticated calculations, the course does require the use of some math. I expect everyone to be able to use calculator notation, which means using the symbols on calculators when the numbers are large or small. So, for example, one billion is usually represented as 1E9 on a calculator. 1E9 means 1 followed by 9 zeros, or equivalently 10 raised to the 9'th power, i.e. 10^9, or for more clarity 1x10^9. (The “E” stands for “exponent” and means 10 to the power of ”.) One billionth is written as 1E-9 or, equivalently, 1x10^-9. Writing numbers in the form of 1x10^y, where y is a number (such as 9 or -9 as in the preceding examples), is what is known as scientific notation.

2. You will also need to be able to calculate square roots. For your homework and exams, you should have a calculator that will be able to perform this function.

3. Always, if you are feeling lost with the math, PLEASE ask for clarification!

**Exams and Quizzes**

Exams: There will be three, thirty minute, in-class exams.

Quizzes: There will be five quizzes.

Final Exam: There will be a final exam that will cover all of the course material.
Grades

Your final grade will be based upon the following breakdown:

1. Homework: 31%
2. Three 30-minute Tests: 24%
3. Five quizzes: 20%
4. Interest & participation in class: 3%
5. A 2-hour Final Examination: 22%

The Honor System

In this course, you will be expected to refrain from cheating, plagiarizing, etc. Any student discovered cheating in any aspect of the course will be reported to the Honor Council. Examples of academic misconduct include, but are not limited to, submission of written work that is a copy of someone else’s work or consulting with others while taking the midterm or final exams.