

PHYS:1200:0001 (029:006)

## Physics of Everyday Experience

Professor Robert Merlino

course webpage:

[http://www.physics.uiowa.edu/~rmerlino/1200\\_F\\_14/index.html](http://www.physics.uiowa.edu/~rmerlino/1200_F_14/index.html)

this webpage can also be accessed from ICON

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PHYS:1200:0001

## The Physics of Everyday Experience

- Technology plays a big role in everyday life → computers, smart phones, GPS, etc.
- Technological advances result from applications of scientific discoveries
- In this course we will discover the scientific principles in the everyday experiences and objects around us
- We will see that we can make sense of what is going on around us in terms of a few basic principles of physics

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### COURSE GOALS

- To learn some of the basic concepts of physics by observing some of the common phenomena occurring in everyday life
- To understand the physical concepts behind what makes things work
- To *participate* in science by exploiting our natural curiosity
- To exercise our critical thinking skills
- To appreciate the *quantitative* nature of physical science → numbers matter!
- To recall how to deal with *simple formulas* to obtain *numerical solutions* to problems

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### SOME OF THE QUESTIONS THAT WE WILL BE DISCUSS IN THIS COURSE

- Why do things move?
- Does everything that goes up come down?
- Why does a bicycle stay upright when it's moving but falls when it stops?
- What is the physics behind seatbelts?
- Why doesn't the moon fall into the earth or the earth fall into the Sun?
- Why is it difficult to walk on ice?
- Why does ice melt?

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- What is light?
- What is lightning?
- What makes rainbows?
- How can a boat made of steel float?
- Why do my socks stick to my shirts in the clothes dryer?
- Why do I get a shock after I walk across the carpet room and touch a doorknob?
- Why is it a bad idea to plug every appliance into the same outlet?
- How do magnets work?
- How does a compass work?

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- How do refrigerators work?
- Why can't I cool my room by keeping the refrigerator door opened?
- What is sound?
- Why do I sound funny when I breath helium?
- How is electricity produced?
- What's the difference between DC and AC?
- What is work and energy?
- What do airplanes and curveballs have in common?
- Why do golf balls have dimples?

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- How tall does a mirror need to be to see my entire self?
- What is the Greenhouse effect, the ozone layer?
- Is the climate changing? Is it our fault? What's the difference between heat and temperature?
- What is a day, month, year?
- Why is a Jupiter year 12 Earth years?
- How do CAT scans and MRIs work?
- How do you make an atom bomb?

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## What Physics isn't

- Art
- Philosophy
- Engineering
- Religion
- Math
- Astrology
- Magic
- Boring and impossible to understand
- Done only by mad scientists



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## What is Physics?

- Physics is the *natural science* that involves the study of matter and its motion through space and time, along with the related concepts such as energy and force.
- More broadly, it is the analysis of nature, conducted in order to understand how the universe behaves, from the largest objects to the smallest.
- A search for patterns or rules (laws) for the behavior of all physical objects

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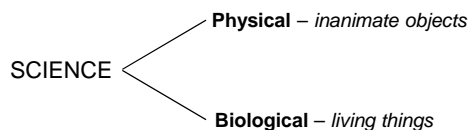
## What is the relation of Physics to the other sciences?

The attempt to understand the behavior of everything requires more than one field, so various sub-fields have emerged over time:

- Astronomy
- Chemistry
- Biology
- Geoscience
- Oceanography
- Meteorology
- Atmospheric Science
- Environmental Science

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## Specialization in Science



Physics deals with questions at the most fundamental level:

- *What is matter made of? What holds it together? What are its smallest constituents?*
- *What are the forces in nature?*
- *What is time (Einstein)?*

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## The Social Sciences

- Human behavior cannot be understood on the basis of physical or biological science alone.
- We cannot understand people simply by studying the behavior of their atoms and molecules
- The Social Sciences are the disciplines that investigate the social, financial, and political interrelationships among people
  - Sociology
  - Psychology
  - Political science
  - Economics

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### Where do the laws of physics come from?

- The laws of physics are based on observations (experimentation)
- We must observe nature to understand it
- We look for patterns of behavior
- We quantify these patterns into mathematical statements – formulas
- We continually test these “laws” to find the limits of their applicability
- We revise the “laws” when they fail

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### How can I do well in this course?

- Download the lecture presentations
- Pay attention to the **demonstrations**
- Go over the lecture presentations
- Do the review questions and exercises

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