

Welcome to

Physics 105
Section 006, 008!

Instructor: Ken Ahn

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Today in this class...

1. Physics 105 Course information
2. Brief Introduction to Physics
3. Chapter 1. Introduction

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What is Physics?

Branch of science that deals with the nature and properties of matter and energy

Physics 105: Classical Mechanics

Motion of objects that are NOT

- too small
atoms and subatomic particles → Quantum Mechanics
- too fast
objects near the speed of light → Special Relativity
- too dense
black holes, the early Universe → General Relativity

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Classical mechanics deals with a lot of our daily-life objects !



Classical mechanics

Oldest, most fundamental branch in Physics

Foundation of all science & engineering

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Course objectives

1. Understanding the basic principles governing elementary mechanics (Example: Newton's laws)
2. Applying the basic principles to explain commonly observed phenomena (Example: free fall motion of an apple)
3. Improvement of analytical reasoning and problem-solving skills (Example: think like Newton)



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Chapter 1. Introduction

Fundamental quantities in Physics

Quantities in Physics: speed, acceleration, force, distance, time, area, energy, mass,.....

→ Not independent, but related

Example: speed 60 mi/h

$$\frac{60 \text{ mile per } 1 \text{ hour}}{\text{distance} \quad \text{time}} \quad \text{speed} = \frac{\text{distance}}{\text{time}}$$

Fundamental quantities: Length, Mass, Time

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Units

Length: mile, foot, inch, meter, kilometer, nanometer,...

Time: second, minute, hour, day, year, century, ...

Mass: gram, kilogram, ... (pound: unit for force, not mass)

Standard system of unit

SI (Système Internationale) unit or MKS unit

Meter(m), kilogram(kg), second(s) for length, mass, time

SI unit for other quantities

$$\text{(example) speed} = \frac{\text{distance}}{\text{time}} : \text{m/s}$$

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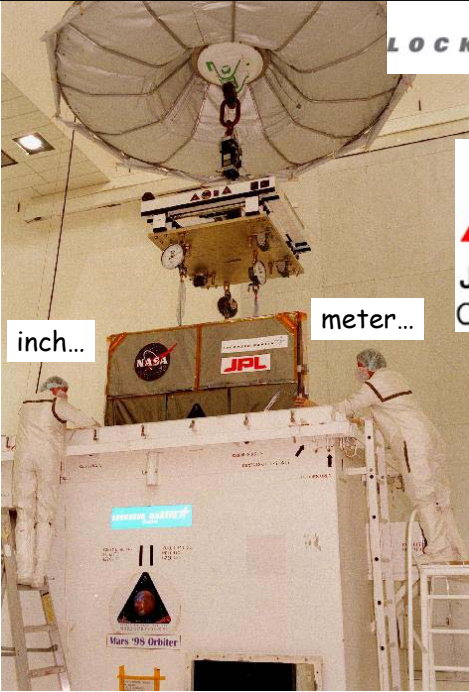
NASA's Unit Confusion!

- **\$125 million** Mars climate orbiter approached Mars on September 23rd, 1999, but crashed or burned in Mars' atmosphere.
- Built by **Lockheed Martin aeronautics engineers** who used **British system** for navigational information.
- **Spacecraft operators at NASA jet propulsion lab** thought it was **the SI (metric system)** as was required.
- Spacecraft was supposedly directed to a safe orbit of **87 mi** above Mars' surface but instead it was only **35 mi**.

<http://mars.jpl.nasa.gov/msp98/orbiter>

→ Unit is important !

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LOCKHEED MARTIN

(British unit system, inch,...)

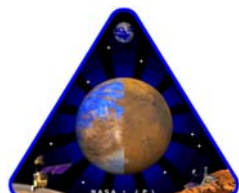
JPL

Jet Propulsion Laboratory
California Institute of Technology

(SI system, meter...)

inch... meter...

Did not convert units!
→ Lost \$1M Mars Climate Orbiter!



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Quick Quiz

Example: What is Prof. Ken Ahn's website address?

<http://web.njit.edu/~kenahn>

Quick Quiz



What are we going to learn in Physics 105?

- a. Quantum mechanics
- b. Special relativity
- c. Classical mechanics
- d. General relativity
- e. Optics

Answer : c. Classical mechanics

Quick Quiz

What are the three basic units in the SI Unit system?

m (meter), kg (kilogram), s (second)

● **Assignment**

Study Appendix A in B1, "Mathematical Review".
Some Quiz problems next Friday will be from it.

Create UT EID, request enrollment for the course, download
and start HW #1: Introduction (due 2/2, 1 am Central Time).

Announcement

Bring iClicker every class.

Lecture Quiz on every Friday