PHY293: Waves and Modern Physics

- Course will be delivered in two distinct parts:
  - Oscillations and Waves (thru October 22) [Trischuk]
  - Modern Physics (second half) [Savaria]

- Course website should become your best friend
  - `http://www.physics.utoronto.ca/~phy293h1f/`

Goals of Waves Module

- Understand simple harmonic motion
- Understand the wave equation $\Rightarrow$ waves

- Oscillators are all around us in nature
- Their physics is even more pervasive than $\vec{F} = m\vec{a}$
- Basic literacy in physics
- Will make you a better engineer

How to Succeed in PHY293

- Attend lectures and tutorials
  - Ask questions
  - Keep up with the reading
  - Compare your notes with the ones I post
- Understand the problem sets you do
  - Discuss practice problems with class-mates
  - Copying solutions won't work in the long-run
  - No substitute for getting lost in the math once-in-a-while

Relevance to Engineering (Science Options)

- Biomedical
- Aerospace
- Electrical/Computer
- Infrastructure/Mechanical
- Nano-technology
- Physics

Everyday Oscillations

- Water waves
- Earthquakes
- Automobile shock absorber
- Pendulum
- Liquid surface in a cup dragged across a table

More Subtle Oscillations

- Musical instruments
  - Guitar, piano, oboe, flute
- Suspension bridges
- Lasers
- Precision time pieces
- Radio antennae
- Car mufflers

Obscure Oscillations

- Heat in a solid
- Structure of atoms
- Superconductivity
- UV protection by Ozone
- Rings of Saturn
- Fundamental particles
  - (in string theory)

Course Outline

1. Simple harmonic oscillations Chapter 1
2. Damped oscillations Chapter 2
3. Driven oscillations and resonance Chapter 3
4. Coupled oscillations Chapter 4
5. Standing waves Chapter 6
6. Traveling waves Chapter 5
7. Reflection/Transmission & Dispersion of Waves Chapter 8