PHYS 2300: Vibrations, Waves and Optics

http://www.ap.smu.ca/∼thacker/teaching/2300.html
11:30-12:45 Tuesday-Thursday, AT 305
Dr Robert Thacker (thacker@ap.smu.ca), 319E Atrium
Office hours: 9-11 Thurs & Friday, other times by appointment as well
Cancelled class notifications will appear on the class website and in emergencies I may send emails.

Syllabus

1. Introductory concepts
    - Periodic motion, superposition of periodic motion. Free vibrations of physical systems.
2. Damped systems
    - Under/over and critically damped systems. "Q" parameter.
3. Forced vibrations and resonance
    - Variation in amplitude with driving frequency. Resonances in damped and undamped systems.
4. Coupled oscillators
    - Coupled pair of oscillators. Modes of oscillation. Application to N coupled oscillators.
5. Continuous systems (e.g. vibrations on a string) including driven continuous systems.
6. Waves and optics
    - Energy in a wave, boundaries and interference. Huygens-Fresnel principle. Double-slit experiment.

Text

1. *Vibrations and Waves* by A. P. French.

Much of the course draws closely from this text, so buying a copy is important. Many assignments are taken from it as well. While it may appear somewhat dated, it is a beautifully detailed introduction to the subject.

Laboratory Component

Almost all physical theories are derived from experimental and observational methods (indeed many professional physicists view their job as translating real world problems into mathematics and solving those problems). It is thus important to see how mathematical models translate into the real world, so the laboratory component reinforces this connection directly. At the same time, laboratory skills are highly practical and give you an appreciation for difficulty of working both precisely and accurately. This requires discipline and patience, that can take time to develop.

Marking Scheme

25%: Assignments (set weekly)
25%: Mid-term (dates to be arranged)
25%: Labs (see note below)
25%: Final exam (set by registrar during term)

Note: *You must pass the lab component to pass the whole course*: i.e. if you receive an "F" for the lab you will receive an "F" for the whole course.
Late assignment policy: all assignments are due on the date given, and, in keeping with previous years, no partial credit will be given for any submissions beyond the due date.

Collaboration and Academic Integrity

Please ensure you read the regulations in the undergraduate calendar on academic integrity - there are some important rules in there (for example, *"knowingly assisting someone to cheat is itself cheating"*).
With that said, collaboration and discussion is an expected part of working as an undergraduate, and it is a good thing to talk to peers about the assignments and approaches to solutions. But remember, *work that you hand in must be your own work and arguments should be presented sufficiently clearly to show that you understand the solution you are presenting.*

"How to get a good grade in this class"

Second year is when the difficulty ramps up in the core physics courses. The further you get into the program the more assignments will be about applying what you see in class rather than merely repeating it. So not only will you find assignments more challenging, you will also need to manage your time better. *Do not leave assignments until the night before they are due!* It may take a few hours or even a day or two for ideas to really sink in after you've first gone through them in detail. So plan ahead: start looking at assignments when they are set and you might even want to plan time to sit down with peers to talk about them. Please attend lectures too - we're working on some important physical concepts and I like to have an interactive environment. *When you don't know - ask!*