PHY492F / PHY1498F
Advanced Atmospheric Physics / Introduction to Atmospheric Physics
Fall Term 2012
GENERAL INFORMATION

LECTURER:

Prof. Kimberly Strong
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LECTURES: 9:10 – 11:00 AM, Thursdays, Room MP137

OFFICE HOURS: 3:00 – 4:00 PM Thursdays, Room MP710A
Also, feel free to drop by or make an appointment.

HOMEWORK: There will be four problem sets. They will be due, in class, two weeks after they are assigned. There will be a late penalty of 5% per day, up to seven days, after which material will not be accepted.

MARKING:

PHY492		PHY1498	
40%	Four problem sets	30%	Four problem sets
20%	Mid-term test	15%	Mid-term test
40%	Final exam	20%	Term paper
		35%	Final exam

HOMEPAGE: http://www.atmosp.physics.utoronto.ca/people/strong/phy492/phy492.html
Slides and supplementary material will be posted on the course homepage.

TEXTBOOKS: **Recommended Text – available in the University of Toronto bookstore**
Atmospheric Science, An Introductory Survey, Second Edition,
John M. Wallace and Peter V. Hobbs, Academic Press, 2006.

Additional Suggested Reference Books:
Introduction to Atmospheric Physics, David G. Andrews, Cambridge University Press, 2000.
Atmosphere, Ocean, and Climate Dynamics, John Marshall and R. Alan Plumb, Academic Press, 2008.

OUTLINE:
This course provides an introduction to atmospheric physics, describing the fundamental physical principles that determine the structure, composition and dynamics of the atmosphere. Topics to be covered include atmospheric thermodynamics, radiative equilibrium, radiative transfer, chemical constituents, aerosols, geophysical fluid dynamics, atmospheric waves and instability, the general circulation, and climate.

TENTATIVE LECTURE SCHEDULE:

- Lecture 1 - Introduction, Atmospheric Thermodynamics
  (atmospheric science, the climate system, ideal gas law, hydrostatic equation)
- Lecture 2 - Atmospheric Thermodynamics
  (stability, potential temperature, convection, humidity)
- Lecture 3 - Atmospheric Thermodynamics, Atmospheric Radiation
  (moist convection, radiometry, blackbody radiation)
- Lecture 4 - Atmospheric Radiation
  (solar and terrestrial radiation, greenhouse effect)
- Lecture 5 - Atmospheric Radiation
  (Beer's law, absorption, scattering, spectroscopy)
- Lecture 6 - Atmospheric Radiation
  (Schwarzchild's equation, heating rates, remote sounding)
- Lecture 7 - Atmospheric Radiation, Atmospheric Chemistry
  (global radiation balance, tropospheric chemistry, air quality)
- Lecture 8 - Atmospheric Chemistry
  (aerosols, stratospheric chemistry, ozone depletion)
- Lecture 9 - Atmospheric Chemistry, Atmospheric Dynamics
  (ozone recovery, atmospheric motion, kinematic properties of flow)
- Lecture 10 - Atmospheric Dynamics
  (horizontal equation of motion, geostrophy)
- Lecture 11 - Atmospheric Dynamics
  (baroclinic and baratropic atmospheres, continuity equation, primitive equations)
- Lecture 12 - Atmospheric Dynamics, Climate Change
  (general circulation of the atmosphere, changes in the climate system, model predictions)