2011-2012 ICTP POSTGRADUATE DIPLOMA PROGRAMME
EARTH SYSTEM PHYSICS

Atmospheric Thermodynamics (ESP-AT)

(12 lectures : 18 hrs)

Books:

1. Rogers and Yau A short course in cloud physics.
2. Goody, R. M. Atmospheric radiation: theoretical basis.
3. Liou, K. An introduction to atmospheric radiation.
4. Emanuel, K.A. Atmospheric convection.

Atmospheric Thermodynamics

1 Introduction to the atmosphere

2 Dry Thermodynamics

- Equation of state: The ideal gas law
- The 1st law of thermodynamics
- Rules for differentiating
- Enthalpy and speci c heat
- Hydrostatic balance
- Adiabatic Processes
- Potential Temperature
- Entropy
- Thermodynamic charts
- Buoyancy force on a parcel

3 Moist Thermodynamics

- Saturation
- Other measures of water vapour
- Water variables in the liquid and ice state
- Specific heat of moist air
- Ways of reaching saturation

4 Atmospheric Convection

- Shallow convection regimes
- Mid-level and upper-level convection
- Deep convection
- Static stability in a moist environment