2011-2012 ICTP DIPLOMA PROGRAMME IN EARTH SYSTEM PHYSICS

Physics of the Atmosphere (ESP-EST)
(12 lectures : 18 hrs)

Atmospheric Physics

5 Radiation
Definitions of the radiative field
Energy balance models of the atmosphere
Sun and Earth Geometry
Radiation interactions with a slab
Direct Radiation
Emission from Slab
Scattering from other directions
Absorption by atmospheric gases
Scattering
Radiation budget of clouds

6 Cloud Physics
Introduction
Cloud drop formation
Diffusional growth
Terminal velocity of particles
Collision and coalescence
Oct 12, 12 14:58 syllabus.txt Page 1/2
Ice crystal nucleation
Ice saturation
Ice nucleation mechanisms
Ice crystal growth
Competition between ice nucleation mechanisms
Aggregation
Riming
Ice particle fall−speeds
Ice multiplication

7 Boundary Layer
Heat capacity of the surface
Structure of the PBL
The laminar layer
Turbulence
Diurnal cycle of the PBL
Surface fluxes of heat and moisture

8 Representing Physics in weather and climate models
Concept of parametrization
Example 1: parametrizations for turbulence
Example 2: parametrizations for radiation transfer
Example 3: parametrizations for convection
Example 4: parametrizations for cloud physics

Kinetic aspects of chemical reactions in the environment.