This course covers the fundamentals of atmosphere and ocean dynamics, and aims to put these in the context of climate change in the 21st century. The lectures will focus on the physical mechanisms responsible for the global energy balance and large-scale atmospheric and oceanic circulation. We will introduce fundamental concepts of fluid dynamics and we will apply these to the vertical and horizontal motions in the atmosphere and ocean. Fundamental concepts covered include: hydrostatic law, buoyancy and convection, basic equations of fluid motions, flow on a rotating planet, Hadley and Ferrel cells in the atmosphere, Walker circulation, thermohaline circulation, modes of climate variability (El-Nino, North Atlantic Oscillation, Southern Annular Mode), wind driven ocean circulation, turbulent flow.

Aimed at undergraduate and graduate students who have no prior knowledge of meteorology or oceanography or training in fluid mechanics. This is a general course, which spans many sub-disciplines: fluid mechanics, atmospheric science, oceanography, hydrology. The course will include sessions in which students will learn how to write and run simple Matlab programs to study the climate system. Computer related assignments will enhance the learning of the class material. No prior Matlab experience is needed.