COURSE DESCRIPTION
This course offers an overview of Earth's climate system by describing the major climatological features in the atmosphere and oceans and by explaining the physical principals behind them. The course begins with an introduction of the global energy balance that drives motions in the atmosphere and oceans, then describes the basic structures and general circulations of the atmosphere and oceans, and finally look into major climate change and variation phenomena.

TEXTBOOKS
"The Earth System", Kump, Kasting & Crane, Prentice Hall.

GRADES
Homework (40%); midterm (60%)

HOMEWORKS
Issue and due every Thursday

SYLLABUS

Week 1  9/24 & 9/29  Overview & Global Energy Balance
Atmosphere Composition; Planetary Energy Balance
Greenhouse Effect; Role of Cloud

Week 2  10/1 & 10/6  Atmospheric General Circulation
General Circulation in the Troposphere and Stratosphere
Jetstreams; Walker Circulation
Monsoon, Sea-land Breeze, Santa Ana Wind

Week 3  10/8 & 10/13  Oceanic General Circulation
Ocean Structure; Mixed layer, Ekman Layer, and Thermocline
Water Mass Formation, Ekman Pumping, and Subduction
Surface Ocean Circulation: Wind-Driven
Deep Ocean Circulation: Density-Driven
Pacific Ocean, Atlantic Ocean, and Indian Ocean
Cryosphere

Week 4  10/15 & 10/20  Climate Variability
Feedback and Sensitivity
El Niño Southern Oscillation
Arctic Oscillation; North Atlantic Oscillation; Ozone Hole

Week 5  10/22 & 10/27  Past and Future Climate Changes
Tectonic-Scale, Orbital-Scale Climate Changes
Future Climate Projection

Midterm  11/2 (Monday)