EOSC 112: The Fluid Earth
Homepage: http://www.eos.ubc.ca/courses/eosc112
Time: *MWF 11am-12pm*
Location: *GLSC 135*

Course objectives: In this course we will study the coupled atmosphere-ocean system, with a particular focus on climate variability and climate change. Topics such as the greenhouse effect, the impact of El Nino and the collapse of fisheries are front page news; this course is intended to provide the scientific background necessary to understand what is known and what remains to be learned about the ocean, atmosphere and marine biosphere.

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Lab Sections: L1D Monday 14:00, GLSC113C
L1A Tuesday 08:00, GLSC113C
L1B Tuesday 10:00, GLSC113C
L1C Thursday 10:00, GLSC113C

Text (required): Kump, L. R., J. F. Kasting and R. G. Crane, *The Earth System*, Prentice Hall (NJ, USA), ISBN 0-13-177387-9

Useful resources: The Writing Center: `http://www.writingcentre.ubc.ca`
Library Instruction (researching term papers):
`http://www.library.ubc.ca/home/instruct`

Marking scheme: Labs: 20%
Mini-essays (2): 20%
Mid-term: 20%
Final: 40%

Tentative schedule with lecture topics

Date	Instructor	Topic
Sept. 5	PA, TFP, PJH, LP	Introduction, course outline, grading system, overview of instructor's research areas
Sept. 7	PA	Long and shortwave radiation, units
Sept. 10	PA	Planetary energy balance *Lab 1a: Earth Radiation budget*
Sept. 12	PA	Greenhouse effect, selective absorption
Sept. 14	PA	Energy balance with a greenhouse atmosphere
Sept. 17	PA	Vertical structure of the Earth's atmosphere *Lab 1b: Earth Radiation budget (continued)*
Sept. 19	PA	Feedback, stability
Sept. 21	PA	Daisyworld and global climate
Sept. 24	PA	General circulation of the atmosphere *Mini-essay 1 assigned by PA*
Sept. 26	PA	Surface winds, global temperature/rainfall
Sept. 28	PA	The global hydrologic cycle
Oct. 1	TFP	Wind-driven surface circulation: divergence, convergence, Ekman Spiral, upwelling, downwelling
Oct. 3	TFP	Vorticity, surface currents *Mini-essay 1 due*
0ct. 5	TFP	The salty sea
0ct. 8		Thanksgiving *Lab 2: Thermohaline circulation – starts Tue. Oct. 9*
Oct. 10	TFP	The "Great Conveyor Belt" and heat transport in the sea
Oct. 12	TFP	The carbon cycle: reservoirs on land and sea
Oct. 15	LP	Modern short-term climate changes: El Nino and La Nina
Oct. 17	LP	The Arctic, North Atlantic and Pacific Decadal Oscillations
Oct. 19	LP	The Arctic, North Atlantic and Pacific Decadal Oscillations cont.
Oct. 22	PJH	Plankton: the grass and insects of the sea *Lab 3: Phytoplankton – Monday Oct. 22 and Tuesday Oct.23 Note: No Thurday lab! (phytoplankton can't live that long)*
Oct. 24		MIDTERM EXAM
Oct. 26	PJH	Primary productivity: The role of environmental factors
Oct. 29	PJH	Food chains, food webs, and the microbial loop
Oct. 31	PJH	Nutrient pollution: Red tides, dead zones, food web alteration
Nov. 2	TFP	The Biological Pump, carbon export, and nutrient distributions in the sea
Nov. 5	TFP	Impact of circulation and productivity on oxygen in the sea
Nov. 7	TFP	The chemistry of inorganic carbon in the sea
Nov. 9	TFP	Carbon fluxes in the sea *Mini essay 2 assigned by TFP*
Nov. 12		Remembrance Day

Date	Instructor	Topic
Nov. 14	TFP	Sediments on the sea floor and the link to circulation of the ocean: calcareous deposits *Lab 4: Marine sediments*
Nov. 16	TFP	Sediments on the sea floor and the link to circulation of the ocean: siliceous deposits
Nov. 19	TFP	Climate records from the past: oxygen isotopes as a tracer
Nov. 21	TFP	The Younger Dryas, Medieval Warm Period and Little Ice Age *Mini essay 2 due*
Nov. 23	PJH	The crises in fisheries: Fishing down the foodweb (Guest Lecturer: Daniel Pauly)
Nov. 26	TFP	Pending climate-related crises? (Coral bleaching, glacier loss, groundwater depletion, sea level rise)
Nov. 28	PJH	The Ecosystem of the North Pacific, Geoengineering: Offsetting global warming
Nov. 30	PA, TFP, PJH, LP	LAST CLASS: REVIEW