

**Earth System Science 200: Global Physical Climatology (Fall 2018)**  
(<http://www.ess.uci.edu/~yu/ess200.html>)

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Tuesdays & Thursdays 02:00-03:20pm, PSCB240

**COURSE DESCRIPTION**

This course builds a physical understanding of Earth's climate system. An overview of Earth's climate system and energy budget. Large-scale circulations, key physical processes, and climate sensitivity of the atmosphere, ocean, land surface, and cryosphere.

**TEXTBOOKS**

Global Physical Climatology (2nd Edition), by Dennis Hartmann, Elsevier Inc. **(required)**  
The Earth System (3rd Edition), by Kump et al., Prentice Hall **(optional)**  
Meteorology Today (11th Edition), by Donald Ahrens, Brooks/Cole **(optional)**

**GRADES**

Homework (30%); midterm (35%); Final (35%)

**HOMEWORKS**

Issue and due every Thursday

**SYLLABUS**

Week 1	9/27	<b>Introduction to the Climate System</b> (Ch.1) Atmospheric properties and structures World Ocean, land surface, and cryosphere
Week 2	10/2 & 10/4	<b>The Global Energy Balance</b> (Ch.2) Planetary balance, greenhouse effect Global radiative energy balance, poleward energy flux
Week 3	10/9 & 10/11	<b>Atmospheric Radiative Transfer and Climate</b> (Ch.3) Solar and infrared radiation, selective absorption and emission Cloud and radiation, radiative-convective equilibrium
Week 4	<b>10/16</b> (15) & <b>10/18</b> (10) (10am) (12:30)	<b>The Energy Balance of the Surface</b> (Ch.4) Surface Properties, Storage, Heating, Albedo, Emission Planetary boundary layer, drag, mixing, fluxes
Week 5	<b>10/23</b> (26) & 10/25 (10am&3pm)	<b>Atmospheric General Circulation and Climate</b> (Ch.6) Zonal-mean circulation, eddies Angular momentum, moist static energy
Week 6	<b>10/30</b> & <b>11/1</b> (14) <b>(Midterm)</b> (12:30)	<b>The Ocean General Circulation and Climate</b> (Ch.7) Ocean properties and structures, water mass Wind-driven circulation, thermohaline circulation, and transports
Week 7	11/6 & 11/8	<b>cont.</b> (Ch.7)
Week 8	11/13 & 11/15	<b>Cryosphere</b> (Kump et al. 2016; Ch. 6) Glaciers, ice sheets, mass balance, sea-Level
Week 9	11/20 & <b>11/22</b> <b>(holiday)</b>	<b>Natural Intraseasonal and Interannual Variability</b> (Ch.8) Internal atmospheric variability, El Niño and the southern oscillation, Decadal variations of weather and climate
Week 10	11/27 & 11/29	<b>Climate Sensitivity and Feedback Mechanisms</b> (Ch.10) Sensitivity and feedback Water vapor, ice-albedo, cloud, dynamical
Week 11	12/4 & 12/6	<b>Natural Climate Change</b> (Ch.12) Natural solar, aerosol, volcanic forcing Past climate changes
Final	TBD	