

# SIO 217C (Spring 2015)

**V. Ramanathan & Joel Norris**  
**SPRING 2015**

## *Atmospheric and Climate Sciences III: Climate and Climate Change*

*Instructors:* Ram Ramanathan 330 NHALL [vram@ucsd.edu](mailto:vram@ucsd.edu)  
Joel Norris 327 MESOM [jnorris@ucsd.edu](mailto:jnorris@ucsd.edu)

*Office Hours:* Students are welcome to stop by our offices at any time, but we recommend checking with us ahead of time.

*Grading Option:* Letter grade is required for first year Climate Science graduate students. S/U is permissible for all other students.

*Grading Criteria:* 20% classroom discussion, 40% homework exercises, 40% final examination

*Textbooks:*

*Climate Dynamics* by Kerry Cook

Available at SIO Course Reserves Reading Room

*Atmosphere, Clouds, and Climate* by David Randall

Available at SIO Course Reserves Reading Room

*Global Physical Climatology* by Dennis Hartmann

UCSD only: <http://www.sciencedirect.com/science/bookseries/00746142/56>

IPCC-AR5 Report

Available at <http://www.ipcc.ch/report/ar5/>

*Websites:*

*Course:* UCSD Ted

You should frequently check the course website for class information, discussion questions, and homework assignments.

*Climate Dynamics textbook:* <http://www.jsg.utexas.edu/climate-dynamics-book/>

This provides electronic versions of figures and a list of errors.

*Attendance Expectations:* Students are expected to attend every class with exceptions only for illness and direct time conflicts such as out-of-town conferences.

*Reading Expectations:* Students are expected to read the assigned material and talk about the discussion questions with their discussion partners ahead of class.

*Homework Assignments:* There will be six homework assignments. Students may collaborate as long as each student submits his or her own work.

*In-Class Discussion:* During class time students will collaboratively work on questions and discuss answers with the instructor's guidance. It is not necessary to have mastered the material, but lack of preparation will result in a lower grade.

Books: *Atmosphere, Clouds, & Climate* = ACC, *Climate Dynamics* = CD,  
*Global Physical Climatology* = GPC; IPCC-AR5 (selected chapters)

<b>Course Topics</b>	<b>Reading</b>	<b>Date</b>	<b>Instructor</b>
Atmospheric composition and vertical structure	ACC pp. 5-19; CD pp. 5-7, 153-160; GPC pp. 2-5, 8-10	3/30	Norris
Earth's energy balance and gaseous absorption	CD pp. 66-82; 98-100; GPC pp.40-52	4/01	Ram
Simple greenhouse model	CD pp.76-82; GPC pp. 61-63	4/06	Ram
Simple climate change model	CD pp. 160-166	4/08	Ram
Radiative transfer-1	CD pp. 82-84; GPC pp. 52-57	4/13	Norris
Radiative transfer-2		4/15	Norris
Clouds	CD pp. 85-87; GPC pp. 63-66, 72-79	4/20	Norris
Radiative imbalance	CD pp. 98-104; GPC pp. 27-39	4/22	Ram
Atmospheric circulation and transport-1	ACC pp. 103-127; CD pp. 7-22, 126-134; GPC pp. 6-7, 15-17, 136-143, 155-168	4/27	Norris
Atmospheric circulation and transport-2	ACC pp. 127-134; CD pp. 135-136; GPC pp. 142-154	4/29	Norris
Convection and equatorial tropopause	ACC pp. 55-96; CD pp. 89-92	5/04	Ram
Surface fluxes and air-sea interactions	CD pp. 92-107; GPC pp. 81-83, 87-92, 99-114, 243-249	5/06	Ram
Ocean and cryosphere	ACC pp. 211-218; CD pp. 22-33, 42-46, 137-146; GPC pp. 12-15, 171-188, 193-201	5/11	Norris
Water cycle	CD pp. 33-42, 148-151; GPC pp. 10-11, 115-122, 130-134	5/13	Ram
Tropical circulation and precipitation	ACC pp. 91-96, 168-182; CD pp. 171-172	5/18	Norris
Climate variability	ACC pp. 218-222; CD pp. 49-65	5/20	Norris
Memorial Day (no class)		5/25	
Climate forcing and feedbacks	CD pp. 166-171; IPCC-AR5; GPC pp. 229-236	5/27	Ram
Observed Twentieth Century climate changes	IPCC-AR5	6/01	Ram
21 <sup>st</sup> Century projections and mitigation options	IPCC-AR5	6/03	Ram
Final exam (written/open book)		6/12	Norris