

# SIO 217C (Spring 2020)

**V. Ramanathan & Nick Lutsko**

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

*Instructors:* Ram Ramanathan 330 NHALL [yram@uucsd.edu](mailto:yram@uucsd.edu)  
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*Class time:* Given current events, classes will be held remotely using Zoom. More details will be provided in due course.

*Office Hours:* Students are welcome to schedule online meetings with us at any time to discuss lecture material, problem sets or exam material.

*Grading Option:* Letter grade is required for first year Climate Science graduate students.

*Grading Criteria:* The following items will receive the specified weighting in the course grade:

- Ramanathan midterm exam (Take home): 15%
- Ramanathan final project ( work in groups of 3 to 4): 35%
- Lutsko classroom discussion: 10%
- Lutsko problem sets: 40%

\*In-class problems and classroom discussion refers to Zoom meetings.

*Textbooks:*

*Global Physical Climatology* by Dennis Hartmann

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

*An Introduction to Dynamical Meteorology (4th Ed.)* by Jim Holton

UCSD only: <http://www.sciencedirect.com/science/bookseries/00746142/88>

*Climate Change and Climate Modeling* by J. David Neelin

UCSD only: <http://roger.ucsd.edu/record=b7296365~S9>

*Bending the Curve: Climate Change Solutions; Chapter 1 (BtC)*

<https://escholarship.org/uc/item/6kr8p5rq>

IPCC-AR5 Report; <http://www.ipcc.ch/report/ar5/>

*Course Website:* UCSD TritonEd

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

*Attendance Expectations:* Students are expected to log in and attend every class remotely, with exceptions only for illness and direct time conflicts. Please notify us if you expect to miss a class.

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

*Problem Sets:* There will be four problem sets. Students are expected to work in groups of 3-4. More details will be given in problem set 1.

*Examinations:* For the Ramanathan part of the course, there will be a take-home midterm exam and a Take-home final project that can be done in groups of 3 to 4 (same groups as in problem sets).

Books: *Global Physical Climatology* = GPC; *An Introduction to Dynamical Meteorology* = DM;  
*Climate Change and Climate Modeling* = CCCM; IPCC-AR5 (selected chapters)

Course Topics	Reading	Date	Instructor
Earth's energy balance and gaseous absorption	GPC pp.18-28; 40-48 Phys Today Article-posted	3/30	Ram
Atmospheric composition and vertical structure	GPC pp. 2-5, 8-10	4/01	Lutsko
Simple greenhouse model	GPC pp. 61-72 Phys Today Article	4/06	Ram
Radiative transfer-1	GPC pp. 52-57	4/08	Lutsko
Radiative transfer-2		4/13	Lutsko
Radiative transfer-3		<b>HW #1 due</b> 4/15	Lutsko
Clouds	GPC pp. 63-66, 72-79	4/20	Lutsko
Pedagogical climate change models	GPC; 81-83; 337-342 Handout-Posted	4/22	Ram
Pedagogical climate change models (cont.)	GPC pp. 27-39	4/27	Ram
Radiative imbalance	DM pp. 289-296, 370-377	4/29	Ram
Convection and equatorial tropopause	DM pp. 289-296, 370-377	<b>Midterm due</b> 5/04	Ram
Water cycle & surface flux feedbacks	GPC pp. 10-11, 115-122, 130-134	5/06	Ram
Atmospheric circulation and transport-1	GPC pp. 6-7, 15-17, 136-143, 155-168; DM pp. 380-382, 407-413	5/11	Lutsko
Atmospheric circulation and transport-2	GPC pp. 142-154	<b>HW #3 due</b> 5/13	Lutsko
Tropical circulation and precipitation	DM pp. 370-383	5/18	Lutsko
Climate variability	GPC pp. 187-188; DM pp. 383-386; CCCM pp. 103-110, 131-142	5/20	Lutsko
Memorial Day	No class	5/25	
Climate Change: Science, Impacts and Projections	Chapter 1, BtC Digital book	5/27	Ram
Open Discussion:	Climate Controversies & Politics	<b>HW #4 due</b> 6/01	Ram
Final Project	Lab Session	6/03	Ram