SIO 217C (Spring 2014)
Atmospheric and Climate Sciences III: Climate

Instructor: Joel Norris 327 MESOM 822-4420 *jnorris@ucsd.edu*

Instructor Absence: I may need to miss class on May 7.

Office Hours: Students are welcome to stop by my office at any time, but I recommend checking with me ahead of time to make sure I will be in.

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 D. L. Hartmann
UCSD only: http://www.sciencedirect.com/science/bookseries/00746142/56

Websites:

Course: http://meteora.ucsd.edu/~jnorris/sio217C/sio217C.html
You should frequently check the course website for class information, supplemental notes, 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 ahead of class and submit via email the day before class any questions they have on the material.

In-Class Exercises: During class time students will collaboratively work on exercises and discuss answers with my guidance. Lectures will be infrequent. It is not necessary to have mastered the material, but lack of preparation will result in a lower grade.

Homework Exercises: Homework exercises will apply material discussed in class to new situations. Homework exercises must be completed on time and extensions will be granted only in exceptional circumstances.

Collaboration: Students must collaborate in classroom discussions and are encouraged to collaborate on homework exercises as long as each student does his or her own work. No collaboration is allowed on exams.

Examinations: There will be a final examination.

Course Topics:

Atmosphere, Clouds, & Climate = ACC, *Climate Dynamics* = CD,
Global Physical Climatology = GPC

1. Atmospheric composition (ACC pp. 5-15; CD pp. 153-160; GPC pp. 8-9)
2. Atmospheric vertical structure (ACC pp. 8-19; CD pp. 5-7; GPC pp. 2-5, 9-10)
3. Earth's energy balance (ACC pp. 27-35; CD pp. 66-71; GPC pp. 18-26)
4. Gaseous absorption (ACC pp. 35-37; CD pp. 71-77; GPC pp. 40-52)
5. Simple greenhouse model (ACC pp. 37-45; CD pp.76-82; GPC pp. 26-27, 61-63)
6. Simple climate change model (ACC pp. 45-49; CD pp. 160-166)
7. Radiative transfer (CD pp. 82-84; GPC pp. 52-55)
8. Clouds (CD pp. 85-87; GPC pp. 63-66, 72-79)
9. Radiative imbalance (ACC pp. 20-26, 49-54; CD pp. 98-104; GPC pp. 27-39)
10. Convection (ACC pp. 55-96; CD pp. 89-92)
11. Surface fluxes (ACC pp. 96-102, 206-211; CD pp. 92-107; GPC pp. 81-83, 87-92, 99-114)
12. Zonal mean circulation (ACC pp. 103-114; CD pp. 16-19, 126-131; GPC pp. 136-143)
13. Thermal and height structure (ACC pp. 125-127; CD pp. 7-16; GPC pp. 6-7, 15-17)
14. 3-dimensional circulation (ACC pp. 115-124; CD pp.19-22, 131-134; GPC pp. 155-168)
15. Storms and eddy flux (ACC pp. 127-134; CD pp. 135-136; GPC pp. 142-154)
16. Ocean (ACC pp. 211- 218; CD pp. 22-33, 137-146; GPC pp. 12-14, 171-188, 193-201)
17. H_2O cycle (ACC pp. 160-168; CD pp. 33-42, 148-151; GPC pp. 10-11, 115-122, 130-134)
18. Vegetation (ACC pp. 222-226; GPC pp. 122-130)
19. Tropical circulation and precipitation (ACC pp. 168-182; CD pp. 171-172)
20. Climate variability (ACC pp. 218-222; CD pp. 49-65)
21. Cryosphere (CD pp. 42-46; GPC pp. 14-15)
22. Climate feedbacks (ACC pp. 140-159; CD pp. 166-171; GPC pp. 229-236, 243-249)
23. Modeling and predictability (ACC pp. 183-205; CD pp. 174-186; GPC pp. 254-284)