ATS 681 Climate Variability and Change- Fall 2018

Instructor: Professor Eric Maloney
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Maloney's Office Hours: Any time

Web: Class webpage is available on Canvas. Please let me know if you have trouble. Discussion papers will be posted on this site.

Class Schedule: Class meets in ATSW 121 at 11 a.m.-11:50 a.m. MW.

Maloney Office Hours: Any time

Contact hours: 2 (*At least 2 hours of effort are expected to complete and homework and projects outside of class for each hour of class time.)*

Student Learning Goals and Objectives: The successful student will gain a broad graduate level process-oriented understanding of the Earth's past, present, and future climate system and its variability. The material will provide a strong foundation for further specialized study on the climate system that provides contributions to the peer-reviewed scientific literature.

Text: No textbook will be required, and I will largely use my own notes for the course, which will be posted on Canvas. Three good general references are: 1) *Global Physical Climatology*, by D.L. Hartmann, Elsevier, 2016, 485pp (second edition) and 2) *Atmospheric Science: An Introductory Survey,* by J. M. Wallace and P. V. Hobbs, Second Edition, Academic Press, 483pp. 3) *Atmosphere, Ocean, and Climate Dynamics, An Introductory Text*, by John Marshall and Alan Plumb, 319 pp.

Class Format: The format of the class will be lecture and discussion, including paper discussions. I intend to follow the outline included here. The course builds upon the material in ATS 606, *Introduction to Climate*. The topics here provide more emphasis on climate variability, paleoclimate, and a broader investigation of future climate projections, including those on a regional scale. We will also address current themes or problems in climate research and spend time reading papers from the recent scientific literature and discussing them in class, especially near the end of the course. Students will be expected to help lead paper discussions.

Grading: The course requirements and grading will be approximately as follows:
Homework: 40%
Class Project: 40%
Class Participation in Discussions, Including Paper Discussions: 20%

+/- grades will be assigned for a final course grade.

Final Paper/Project: A final paper or project description of no more than 10 double-spaced pages is required. This will deal with a review of some topic of current interest in climate or climate variability, or some independent research if you prefer. Topics need to be defined and committed to by October 31. If desired, a first draft can be handed to me by November 23, during which I will make suggestions on style and content. This step is purely optional. The final version is due at the end of finals week.

Course Outline:

Week 1: No class

Week 2: No class

Week 3: No class (and Labor Day)

Week 4: Introduction, tropical atmosphere-ocean mean state

Week 5: Tropical atmosphere-ocean mean state, Madden-Julian oscillation (MJO)

Week 6: Response of ocean to tropical wind stress and equatorial waves, El Nino observations

Week 7: El Niño-Southern oscillation (ENSO) theory

Week 8: Tropical-extratropical teleconnections, including ENSO and the MJO. Impact of midlatitude wind variability on the ocean.

Week 9: The Pacific Decadal oscillation, the impact of midlatitude SST anomalies on the atmosphere

Week 10: High latitude climate variability

Week 11: Paleoclimate

Week 12: Paleoclimate

Week 13: The hydrologic cycle and climate change

Week 14: Regional climate change, the changing nature of the MJO

Week 15: Sea level rise, special topics in climate change

Statement on Academic Integrity

This course will adhere to the CSU Academic Integrity Policy as found in the General Catalog (http://catalog.colostate.edu/general-catalog/policies/students-responsibilities/#academic-integrity) and the Student Conduct Code (https://resolutioncenter.colostate.edu/conduct-code/). At a minimum, violations will result in a grading penalty in this course and a report to the Conflict Resolution Services and Student Conduct Services.