GGS 670 Fall 2015
Introduction to Atmosphere and Weather

http://estc.gmu.edu/GGS670-15/

Course Information

Title: GGS 670 Introduction to Atmosphere and Weather
CRN: 77934
Time: 04:30 pm-7:10 pm, Tuesdays, 08/31-12/21/2015
Location: Exploratory Hall 2312
Instructoris: Prof. John Qu and Dr. Xianjun Hao
Telephone: (703) 993-3958 and (703)993-9322
Office: Room 3411, and room 3409, Exploratory Hall
Office Hour: Stop by 2:00-4:00PM Tuesdays or make appointment

Course Description

This course will introduce the students to the fundamental principles upon which the atmospheric sciences are based and to provide quantitative description and interpretation of the wide range of atmospheric phenomena with an emphasis on sub-synoptic scales (i.e. weather and regional scale climate). One of the main goals of this course is not only to provide the basic knowledge of fundamentals of the atmosphere science and weather, but also to prepare students for the science of climate. This course is designed for both science majors and non-majors taking their first course in atmosphere science. We will focus on energy meteorology in Fall 2015.

Prerequisites

College Math (such as MATH 214) and physics (such as PHYS 262), or permission of instructor.

Schedule

Week one	09/01	Introduction to Atmosphere [PPT]
Week two	09/08	The Energy Cycle [PPT] Fundamentals of Radiation [PDF] Solar Radiation at Top of Atmosphere [PDF]
Week three	09/15	Energy Balance and Temperature [PPT]

Week four	09/22	Water in the Atmosphere [PPT] Paper: Impact of aerosols on convective clouds and precipitation (Tao et al. 2012)
Week five	09/29	Atmospheric Forces and Winds [PPT]
Week six	10/06	Observing the Atmosphere (DL) [PPT]
Week seven	10/13	No class according to Mason holiday schedule
Week eight	10/20	Global and Small Scale Winds [PPT1] PPT2 Wind Energy Meteorology Mid-term
Week nine	10/27	Atmosphere-Ocean Interactions: El Nino and Tropical cyclones [PPT]
Week ten	11/03	Air Masses and Fronts [PPT]
Week eleven	11/10	Extratropical Cyclones and Anticyclones [PPT] Homework 3 (Due on December 1st, 2015) Paper: A Review of Climate Geoengineering Appraisals Paper: Climate Change Negotiations and Geoengineering: Is This Really the Best We Can Do?
Week twelve	11/17	Thunderstorms and Tornadoes [PPT] Guest lecture: Weather, Climate and Food Security [PPT] (by Dr. Ray Motha)
Week thirteen	11/24	Weather and Climate Forecasting [PPT1] [PPT2]
Week fourteen	12/01	Past, Present and Future Climate [PPT1] [PPT2] [PPT3] Paper 1 Paper 2 1. COP21: What you need to know about the Paris climate change conference 2. FULL Speech: Barack Obama at Paris Climate Conference (Cop21) 3. David Cameron asks conference 'what would we tell our grandchildren if we fail?' - video (short 2:26) 4. Paris Climate Conference: COP21 Explained (CNN)
Week fifteen	12/08	Final project presentations ◦ Assessing Solar Power Production With Remotely Sensed Data ◦ The relation between SST and 2011-2014 California drought ◦ A study of using NDVI (VCI) for drought assessment ◦ Saharan Air Layer Impacts on Atlantic Tropical Cyclones ◦ Climate Geoengineering: What can we do? ◦ Environment Impacts of Burning Coal ◦ Satellite AEROSOL OBSETRVATION Aerosol Optical Depth Retrieval over Beijing area
Week sixteen	12/15	Final term papers

Final project

Weather and atmosphere science related final presentations and final term papers are encouraged.

Grading

Grades will be based upon your performance on the homework exercies, midterm, class attendance and final term paper and presentation. The weighted contribution of each of these utems to your final grade is:

- Homework 30%
- Midterm 30%

- Midterm 30%
- Final Project 30%
- Class Attendence 10%

(A=90-100, B=80-89, C=70-79, D=60-69, F=<60)

Textbooks
Required Textbook:
"Meteorology: Understanding the Atmosphere", Fourth Edition, by Steven A. Ackerman and John A. Knox 2014, Jones & Bartlett Learning (2014), ISBN 978-1-284-02737-2 (paperback edition), 575 pages.

Recommended References:

1. Wallace, J. M., and P. V. Hobbs, Atmospheric Science: An Introductory Survey (Second Edition), Academic Press, 2006.

Useful Links

1. NOAA/CDC
2. NOAA/NCDC
3. IPCC
4. Climate Conference in Copenhagen, 2009
5. Global Climate Change Impacts in the United States
6. Climate Change Science Compendium 2009 by UNEP
7. IPCC 2007 Reports
8. A climate threat, rising from the soil
9. Global Weather Maps
10. COP21