OCEANIC AND ATMOSPHERIC PROCESSES
SYLLABUS
SPRING, 2017

Course Day/Time: Tuesdays, 6:00 PM – 8:45 PM
Course Number: AS.420.608.51.SP17
Location: Room 213, Washington DC Campus
Office Hours: The hour before class/by appointment

INSTRUCTOR:

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First and foremost, I am a weather nut! Ever since I was a child I have been fascinated by the weather – especially the severe, destructive type of weather. If you have ever watched Jim Cantore on the Weather Channel standing on the beach in the middle of a hurricane – well that's the kind of person I am. I used to stay up all night as a kid in North Carolina waiting for snow to fall and I have always loved weather in all of its forms (except the sunny kind).

I am one of those people fortunate enough to have the opportunity to have a career in something that I truly enjoy. I went to Duke University as an undergraduate where I majored in mathematics. I then attended Penn State University for graduate school where I obtained my MS and PhD in meteorology. After graduating, I lived in Seattle for a year as a post-doctoral research scientist at the University of Washington and I stayed there for a year and a half. Then, in May 2000 I became a research scientist in the Ocean Remote Sensing Group at the Johns Hopkins University Applied Physics Laboratory where I remain today. The bulk of my research career has been spent applying new techniques in satellite and aircraft remote sensing to study strong wind events in coastal Alaska and off the East Coast of the United States. My main area of current research involves the use of numerical weather prediction models to characterize atmospheric phenomena.

COURSE TEXT BOOKS:

The primary text that we will be using this semester is:

A World of Weather – Fundamentals of Meteorology 5th Edition, by Lee Grenci and Jon Nese. Published by Kendall-Hunt Publishers.

This book is an excellent survey course in basic meteorology and will be the foundation for the class.

A second text that I draw much of my oceanographic material from (but is not required) is:

Ocean Circulation – 2nd Edition, published by the Open University

It is a useful resource for the bookshelf and I would recommend it – but you do not need it for the class.

Additional reading materials including reports, articles, etc. handed out in class will also be required reading. I sometimes begin the class each week with a news article that I ran across pertaining to weather, climate or oceanography. I also welcome student suggestions for discussion topics as well – so email me ideas as you run across them!

CLASS TOPICS:

The primary objective of this class is to explore the complex physics and dynamics underlying the atmosphere – ocean system. A "sound-bite" description of the class would be "a basic introduction to meteorology and physical oceanography with diversions into topics involving earth science". While every effort will be made to keep the course conceptual, both oceanography and meteorology are "quantitative" sciences and so you will be expected to apply quantitative skills to solve tough but practical problems. Some of the major meteorological topics to be covered include: basic climate science beginning with the major, global scale processes that force the climate system. We will then move to the general circulation of the Earth's atmosphere and oceans. We then move "down-scale" to look at smaller-scale processes including synoptic meteorology with a focus on mid-latitude weather (includes air masses, fronts, and storms), severe weather including hurricanes, thunderstorms, winter storms and operational meteorology including numerical weather prediction and weather forecasting as well as other meteorological topics that I deem worth covering. While we will focus somewhat less on oceanography, we will not ignore the role that the ocean plays in climate. For example, we will focus on the coupled nature of the ocean/atmosphere system by examining some of the following topics: ocean currents and gyres; and air-sea interactions such as the ENSO. We will explore the close interactions between the ocean and atmosphere as well. By the end of the class, I hope everyone in this class will have a basic understanding of the physical processing governing the atmosphere – ocean system.

In addition to the topics discussed above, every effort will be made to link the topics covered in this class to real-world, practical events as well as whatever interesting weather is ongoing. The Spring semester tends to include winter storms and severe weather outbreaks and these can be extremely helpful in illustrating the concepts we will be discussing. We will therefore have map discussions as appropriate to link the concepts of the course to what is actually happening in the atmosphere.

GRADING POLICY:

Grades are based on homework assignments, a final paper and presentation:

Homework Assignments: 50%
Paper: 30%
Class Presentation: 20%

Homework assignments throughout the semester will consist of quantitative problems and analysis questions, mainly from the Nese-Grenci text. I consider the homework assignments to be very important. Occasionally, an effort will be made to give some time in class to work on some of the more difficult laboratory assignments if time permits.

The other primary assignment will be a paper and presentation on a climate/weather/oceanography related topic of your choice. During the last two class sessions, you will be allotted time to present your results in a "conference/symposium" format. The rest of you will be the audience and you will provide feedback to the presenter in writing. This will be part of your grade.

University Policies

General

This course adheres to all University policies described in the academic catalog. Please pay close attention to the following policies:

Students with Disabilities

Johns Hopkins University is committed to providing reasonable and appropriate accommodations to students with disabilities. Students with documented disabilities should contact the coordinator listed on the Disability Accommodations page. Further information and a link to the Student Request for Accommodation form can also be found on the Disability Accommodations page.

Ethics & Plagiarism

JHU Ethics Statement: The strength of the university depends on academic and personal integrity. In this course, you must be honest and truthful. Ethical violations include cheating on exams, plagiarism, reuse of assignments, improper use of the Internet and electronic devices, unauthorized collaboration, alteration of graded assignments, forgery and falsification, lying, facilitating academic dishonesty, and unfair competition. Report any violations you witness to the instructor.

Read and adhere to JHU's Notice on Plagiarism.

Dropping the Course

You are responsible for understanding the university's policies and procedures regarding withdrawing from courses found in the current catalog. You should be aware of the current deadlines according to the Academic Calendar.

Getting Help

You have a variety of methods to get help on Blackboard. Please consult the resource listed in the "Blackboard Help" link for important information. **If you encounter technical difficulty in completing or submitting any online assessment, please immediately contact the designated help desk listed on the AAP online support page**. Also, contact your instructor at the email address listed in the syllabus.

Disability Services

All students with disabilities who require accommodations for this course should contact Disability Services at their earliest convenience to discuss their specific needs. If you have a documented disability, you must be registered with the Disability Services to receive accommodations.

TARGET COURSE OUTLINE:

Week 1 – 10 January 2017: Syllabus**,** Class Introduction, scientific tools, Introduction to Ocean/Atmosphere System: NG: 1 *HW 1 Assigned.* **CALL FOR ABSTRACTS: 2ne SYMPOSIUM ON OCEANIC AND ATMOSPHERIC PROCESSES**

Week 2 – 17 January 2017: Earth's Radiation Budget – Atmospheric Temperature Structure. NG 1, 2 Combined *HW 2 assigned*

Week 3 – 24 January 2017: Earth's Radiation Budget, Atmospheric Temperature Structure cont. NG: 2, 3, **HW 1 Due**

Week 4 – 31 January 2017: The Role of Water Vapor in the Climate System. HW 3 assigned. *HW 3 assigned*, **HW 2 Due**

Week 5 – 7 February 2017: General Circulation of the Atmosphere Ocean System – Forces, Pressure, Winds: NG: 6, 7, and 10. *HW 4 assigned*

Week 6 – 14 February 2017: General Circulation of the Atmosphere Ocean System – Tropical and mid-latitude Circulation patterns: NG: 6, 7 and 10. **HW 3 Due**

Week 7 – 21 February 2017: The Ocean System – Introduction to Oceanography – Anaologies to the Atmosphere. **HW 4 due SYMPOSIUM ABSTRACT DEADLINE**

Week 8 – 28 February 2017: The Ocean System: Ocean Current Systems, El Nino and its Impact. Begin Stability and Thunderstorms – NG 8 – 9. *HW 5 assigned*

Week 9 – 7 March 2017: Stability and Thunderstorms, Severe Weather, NG: Chapters 14 & 15

Week 10 – 17 March 2017: Hurricanes. NG 11, *HW 6 assigned* **HW 5 Due**

*****24 **MARCH 2017 – SPRING BREAK – NO CLASS**********

Week 11 – 31 March 2017: Hurricanes, contd. Human Impacts on Weather and Global Climate Change.

Week 12 – 7 April 2017: Human Impacts on Weather and Global Climate Change, **HW 6 due**

Week 13– 14 April 2017: 2nd SYMPOSIUM ON OCEANIC AND ATMOSPHERIC PROCESSES

Week 14 – 21 April 2017: 2nd SYMPOSIUM ON OCEANIC AND ATMOSPHERIC PROCESSES