MAST-467/667 Introduction to Arctic Oceanography (Fall 2014)

Instructor: Andreas Münchow (muenchow@udel.edu)

Web-Site: http://muenchow.cms.udel.edu/classes/Arctic

Time and Location: Tuesday and Thursday 17:00-18:15 in 203 Robinson Hall

Goal: Provide each student with a set of basic knowledge and quantitative tools to confidently argue polar issues that relate to ongoing public climate change debates.

Synopsis: The class enhances and transcends introductory oceanography classes with a regional and observational emphasis on the Arctic Ocean. It relates oceanography to statistics, physics, meteorology, glaciology, geology, climatology, and biology within a Climate Change context. Lectures and workshops relate knowledge to skill-based extraction of quantitative information from online data, respectively. Topics include

(1) Arctic Oceanography (3 weeks)
(2) Arctic Sea Ice (2 weeks)
(3) Greenland’s Glaciers (2 weeks)
(4) Arctic Climate Syntheses (2 weeks)

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(5) Computer Literacy (3 weeks)
(6) Statistics (2 weeks)
(7) Communication (2 weeks)

Pre-requisites: Science background such as an introductory class in physical, chemical, geological, or biological oceanography.

Grades: 45% analysis projects, 25% homework problems, 20% Final project/Exam, 10% in-class participation --- Expectations and assignments will vary between graduate (MAST-667) and undergraduate (MAST-467) sections of this class.

Text: This is an experimental class without a definite textbook; materials will be drawn from the peer-reviewed primary and secondary literature that will be made available as .pdf files on the class web-site. Some useful textbook references are


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Grading:  
45% three project based problems  
(a) Data retrieval and presentation  
(b) Data analysis  
(c) Science Communication  
25% five home work exercises;  
20% Final Project/Exam;  
10% Active Class Room Participation

Text Books: n/a  
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Course Outline (numbers indicate approximate number of weeks per topic)

A. Introduction (1)  
The Dynamic Arctic  
Personal Observations 1993-2014

B. Deep Time (1)  
Glacial and Geological Cycles  
Polar Exploration

C. Physical Oceanography (1)  
Norwegian Sea and the Bergen School, early 20th century  
Arctic Circulation 21st century

D. Sea Ice – Ocean - Atmosphere Interaction (2)  
Albedo, Winds, Heat Flux  
Arctic Amplification

E. Glacier – Land –Ocean Interaction (1.5)  
Ice Sheets and their marine termini  
Shelf-Basin Interactions

F. Climate Impacts (1)  
Plants, Animals, and Carbo Cycling  
Synthesis and Feedbacks

G. Computer Programming (2 weeks)  
Unix Philosophy and Action  
Scripting for Data Flow and Control

H. Statistics and Communication (2)  
Trends, Uncertainty, and Probability  
Writing, editing, and speaking for Public Debate