

MET 3103, PLANETARY CLIMATE CHANGE (U01/14011)

FLORIDA INTERNATIONAL UNIVERSITY

Spring 2018

Instructor: Dr. Hugh Willoughby, Office: AHC5 363. Phone: 305-348-0243. Email: hugh.willoughby@fiu.edu.

Time and location: MWF, 2:00-2:50PM, AHC5-357

Office Hours: MW 10:00-11:00 AM, TU 2:00-3:00 PM, or by appointment.

Prerequisites: None.

Text: Bloom, Arnold, J., 2010: *Global Climate Change*. Sinauer Assoc. Inc., Sunderland, MA, USA, 398 pp., ISBN 978-0-87893-027-2 (pbk.) Supplementary class notes. You can reach an on-line version of this syllabus at:

http://faculty.fiu.edu/~willough/met_3103_5105/0_Syllabus.pdf

And a file with links to the course notes at:

http://faculty.fiu.edu/~willough/met_3103_5105/0_LINKS.html

Course description:

MET 3103 is a broadly interdisciplinary examination of climate change primarily for non-Atmospheric-Sciences majors. Still, students with an Earth-Science background can benefit from its wider scope. Although by design it is not highly quantitative, it does address the essential chemistry and physics of Earth Systems Science as they apply to climate change.

Course Goals and Objectives:

MET 3103 is intended to build upon the interdisciplinary strengths of the Department of Earth and Environment. Climate change may become the greatest challenge that humanity has faced. In addition to your learning the factual content, I hope and expect that you will develop sharper skills in critical thinking, quantitative reasoning, and rigorous analysis. These are the tools that will enable us, as a species, to survive this challenge and to prosper. Broadly defined topics include:

- History of the Earth's (and to some extent other Earth-like planets') climates
- Causes of climate change with emphasis of external and internal forcing and feedbacks
- Numerical climate simulation, including the philosophy and limitations of the modeling enterprise
- Biology of increased atmospheric CO₂
- Climate-change mitigation strategies in transportation, power generation, and elsewhere
- Economics of climate change
- Human response to climate change

Course organization and philosophy: I hope and expect that you are self-selected for motivation and interest in the atmosphere. The lectures are important. Please, **no cell phones, texting, web surfing, or off-line conversations during class.** This is a reasonably demanding course, but the class is small enough for substantial interaction and individual attention. Make a genuine effort, and you should do well.

The basis of MET 3103 is Bloom’s outstanding text. I chose it because it is interdisciplinary. Some of the topics are outside my expertise, but I’m a quick study. My intention is to add material in the notes that goes beyond the text in first four chapters. Among the key objectives of MET 3103 is critical thinking. Why do specific pieces of evidence convince us, or not? I expect that we will discuss issues where honorable men and women may differ in their conclusions.

I see atmospheric science as a descriptive natural science that often speaks the language of physics and mathematics to describe phenomena that can have huge human and economic impacts and ad beauty and meaning to our lives. We will use some basic mathematical ideas here, but we will be selective and focus on essential concepts. Attending the lectures, doing the reading, participating in discussion, and taking careful notes will be keys to success.

One-Page Essays	40%
Midterm Exam	25%
Final Exam	30%
Participation	5%
Total	100%

Writing will be an essential part of this course. We will write five “Churchillian” single-page essays on climate change issues. Grading will be determined by the quality of your writing and the strength of your arguments. I will use Turnitin to ensure originality. A focused effort and understanding of the material should be enough to do well.

Grading Scale	
100-90	A
89-80	B
79-70	C
69-60	D
below 60	F

There will be a midterm and a final. Format of the exams will be multiple choice, short (1-2 paragraph) essay, draw and label a sketch. Essays and exams will contribute to grades as indicated in the table above on the left, and I plan to use a standard 90-80... scale, as shown to the right, for assigning letter grades.

A word about intellectual dishonesty, which I define as claiming someone else’s work or ideas as your own. I won’t tolerate it, and it is a certain way to have a bad outcome in MET 3103. Everyone is trustworthy unless proven otherwise. You are to have no hats, hoodies, dark glasses, or cell phones available during exams.

Objectives and Learning Outcomes; Students will:

- Understand the causes of climate change, their mechanisms and timescales, including the roles of positive and negative feedbacks.
- Understand the impacts of climate change on human and natural systems
- Understand the efficacy, costs, and benefits of mitigation measures
- Learn to think critically about climate change and to express their ideas clearly and concisely.

MET 3103 TOPICS AND ASSIGNMENTS

Week	Date	Topic	Reading
1	8-12 JAN	Introduction, Essay #1	Ch. 1
2.1	15 JAN	MLK Day, No Class	
2.2-3.2	17-24 JAN	History of Earth's Climate	Ch. 2
3.3-4	26JAN-2FEB	Causes of Climate, Essay #2	Ch. 3
5	5-9 FEB	Climate Models	Ch. 4
6-7.1	12-19 FEB	Biological Impacts of More CO ₂	Ch. 5
7.2 -7.3	21-23FEB	Mid-term review and exam	Ch. 1-5
8	26FEB-2 MAR	Biosphere Impacts, Essay # 3	Ch. 6
9	5-9MAR	Mitigation Strategies for Transport	Ch 7
	12-16 MAR	Spring Break, No Class	
10	19-23 MAR	Mitigation Strategies for Electric Generation	Ch 8
11	26-30 MAR	Mitigation in Other Sectors, Essay #4	Ch. 9
12.1-12.2	2-4APR	Economics of Climate Change	Ch. 10
12.3-13.2	6-11 APR	Law & Human Response, Essay #5	Chs. 11 &12
13.3	13 APR	Summary & Review	Cumulative
14	16-20APR	HEW at AMS Hurricane Conference. NO CLASS	
	TBA	Final Exam	Cumulative

Single-Page Essay Topics

Essay #	Topic	Due
1	Global warming is a) real and b) caused by humans: Yes or no; why or why not?	Week 2
2	Numerical models versus observations for understanding global warming.	Week 6
3	Anthropogenic global warming impact on the biosphere.	Week 8
6	Global Minister of the Environment	Week 11
5	Offer convincing counters to the arguments you advanced in Essay 1	Week 12