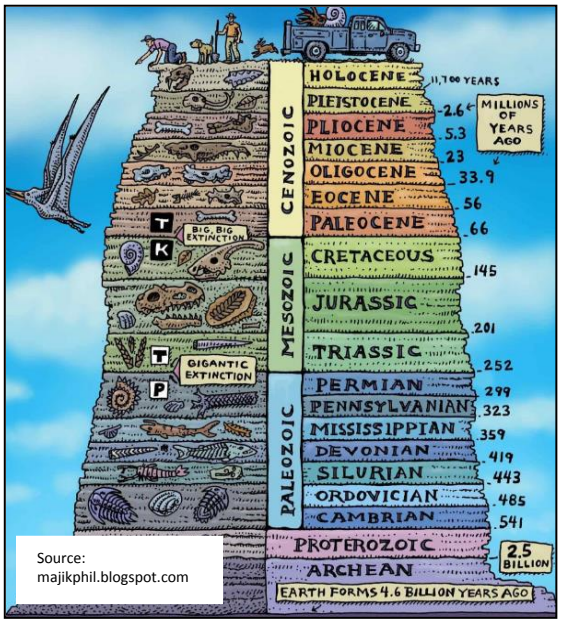
Illinois State University
DEPARTMENT OF GEOGRAPHY-GEOLOGY
GEO 341 – Climate and Global Environmental Change
SPRING 2017



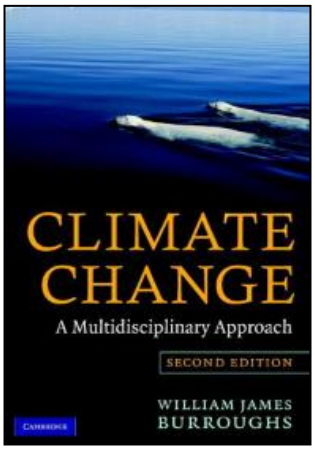
Instructor: Dr. Dagmar Budikova
Class Time: TR 9:35 am – 10:50 am in FHS 209, FHS 202
Office Hours: TR 1:00 – 1:50 pm or by appointment
Office: Felmley Hall Annex 206
Phone: 438-2546
e-mail: dbudiko@ilstu.edu

Objectives: 341 CLIMATE AND GLOBAL ENVIRONMENTAL CHANGE 3 sem. hrs. The objective of this class is to provide an overview of concepts, methods, theory and debates surrounding climate and global environmental change. Prerequisite: GEO 100 or consent of instructor.

Student Objectives and Outcomes: Through successful completion of GEO 341, students will:

1. Build on their existing knowledge of theoretical concepts, definitions, and methodologies in climatology and climate change science
2. Synthesize climate information at various geographic scales
    a. Understand why climate change is among the most pressing and complex issues facing our society in the 21st century
    b. Appreciate the complexities of some of the key debates that surround the issues of climate and global environmental change
    c. Be able to answer questions such as "what is the difference between weather and climate", "Is our climate changing?"; "How is climate change measured?"; "Why does climate change matter?", "What potential impact will climate change have on me as an individual, on society, and the life on Earth?", "To what extent is human activity a cause of the recently changing climate?"
3. Build on existing ability to use geographic tools (i.e., quantitative methods, descriptive statistics) to explore and analyze climate data at various geographic scales (from local to global)

4. Demonstrate the ability to effectively communicate climate change and its impacts at various geographic scales in writing, graphical summaries, and professional presentations



Required text: Burroughs WJ. 2007. Climate Change: A Multidisciplinary Approach. Second Edition. Cambridge University Press. 378 pp.

Other online materials documenting recent climate shifts and future projections, ensuing impacts, and mitigation strategies:

1. U.S. Global Change Research Program: GlobalChange.gov at http://www.globalchange.gov/climate-change
2. U.S. Climate Resilience Toolkit: Meeting the challenges of a changing climate. https://toolkit.climate.gov/
3. National Climate Assessment http://nca2014.globalchange.gov/.
4. Karl TR, Meehl GA, Miller CD, Hassol SJ, Waple AM, and Murray WL. 2008. Weather and Climate Extremes in a Changing Climate. Regions of Focus: North America, Hawaii, Caribbean, and U.S. Pacific Islands. U.S. Climate Change Science Program. Washington DC. https://downloads.globalchange.gov/sap/sap3-3/sap3-3-final-all.pdf.
5. Intergovernmental Panel on Climate Change (IPCC). https://www.ipcc.ch/

Required Materials: Students are strongly encouraged to purchase a USB flash drive (>2 GB) or an external hard drive to back up their assignments.

Class Structure: The class will meet for 3 hours each week. Tuesday classes will typically be used for lecturing and introducing new material; Thursday classes will typically be used to work on assignments and for testing. See the course schedule below for details.

ReggieNet: Class materials including the syllabus, lecture notes, assignments, grades, and other information will be posted online at the class ReggieNet site. To access the site, go to https://reggienet.illinoisstate.edu/xsl-portal and log in with your ULID and password.

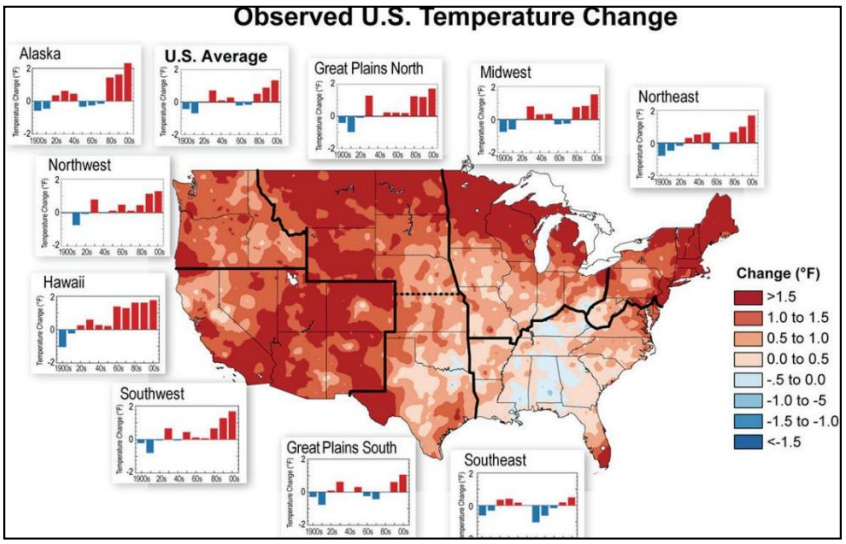
Note: Please let me know immediately if you do not have access to ReggieNet for this course, as this probably means that you are not registered for the class and will not be allowed to receive credit.

Computer Labs: The computer labs in FHS 202 and FSA 429 are available for your use in the course. Please check the schedule posted in the labs for open hours. I strongly encourage you to back-up all your files frequently on a second flash drive! Corrupt or lost files are not acceptable reasons for turning in an assignment late.

Required Student Tasks/Assignments:

Tests: There will be five (5) mini-tests scheduled throughout the semester (see course schedule below) to assess your knowledge and learning of climate and climate change concepts. Each will take about a half hour to complete. These tests will be administered during regular class time. Exam questions will be derived from class materials, readings, assignments, and discussions. Specific details regarding format and content will be provided prior to the tests.

Assignments: Four (4) assignments will be given throughout the semester (see course schedule below). These will be designed to provide the opportunity to learn how to analyze state-of-the-art climate data and synthesize climate information at various geographic scales. Throughout the process, students will explore climate variability and change at various geographic scales, from the local to regional, national, and global scales. Potential topics for the various assignments are as follows:



- *Assignment 1:* Defining local climates, their variation and exploring recent climate changes; exploring carbon dioxide trends (data analysis)
- *Assignment 2:* Explore local surface energy and radiation budgets and how they tie to large-scale climatic processes (data analysis)
- *Assignment 3:* Research recently-observed regional and national climate variability and change across the United States and relate these changes to the local level (research and reading of existing literature, produce a five-page report, oral class presentation and discussion)
- *Assignment 4:* Explore middle-to-late 21st century changes in climate, as forecasted by global climate models at various geographic scales (data analysis)

Class Project (Graduate Students only): Each student is required to conduct a literature review on a topic of choosing related to climate change. The review will be presented in a written report plus shared with the rest of the class through an oral presentation during the finals' week.

Class Participation: Students are expected to attend all classes and participate in discussions. A portion of the final grade will be given to participation for undergraduate students.

Attendance: Attendance at all class meetings is required and expected. If you know in advance that you will be unable to attend a class, I would strongly encourage you to contact me prior to the class meeting. *Make-up exams will not be issued unless proper documentation can be provided for a medical illness, an approved university function, or another reason that I deem acceptable*.

Incompletes and Withdrawals: No incomplete (I) grades will be issued for the course except in extreme circumstances such as serious illness. If you choose to withdraw from the course, you may do so by the University deadline and a withdrawal grade will not be assigned. Please note that you will receive a withdrawal (WX) grade if you withdraw from the course after a specific University deadline.

Late Policy: All assignments are due on the assigned due date. Assignments turned in after the due date, will be deducted a letter grade per day.

Academic Dishonesty: Academic dishonesty (cheating, plagiarism, etc.) is a serious offense and will not be tolerated. Those found guilty of academic dishonesty will be penalized in accordance with university policy.

Special Needs or Disabilities: Any student needing to arrange a reasonable accommodation for a documented disability should contact Disability Concerns at 350 Fell Hall, 438-5853 (voice), 438-8620 (TTY).

Student Evaluation:

Evaluation Scheme for Undergraduate Students

Task	% Grade	% Task Category	Points
5 Mini-tests	**45**	**100**	**450**
Test #1	9	20	90
Test #2	9	20	90
Test #3	9	20	90
Test #4	9	20	90
Test #5	9	20	90
4 Assignments	**45**	**100**	**450**
Assign #1	10	22.22	100
Assign #2	10	22.22	100
Assign #3	15	33.33	150
Written Report			
Presentation			
Assign #4	10	22.22	100
Class Participation	**10**	**100**	**100**
Overall Gradebook	**100**	**100**	**1000**

Grade Scale for Undergraduate Students

Points (P)	Letter Grade
$P \geq 900$	A
$800 \geq P \geq 899$	B
$700 \geq P \geq 799$	C
$601 \geq P \geq 699$	D
$P < 600$	F

Graduate Student Evaluation: In addition to the assignment and test activities, graduate students will be expected to perform at a significantly higher level and write a short state-of-science paper on a climate change-related topic of their own choosing. The topic must be approved by the instructor within the first month of class.

Evaluation Scheme for Graduate Students

Task	% Grade	% Task Category	Points
5 Mini-tests	**45**	**100**	**450**
Test #1	9	20	100
Test #2	9	20	100
Test #3	9	20	100
Test #4	9	20	100
Test #5	9	20	100
4 Assignments	**45**	**100**	**450**

Task	% Grade	% Task Category	Points
Assign #1	10	22.22	100
Assign #2	10	22.22	100
Assign #3	15	33.33	100
Assign #4	10	22.22	100
1 Class Project	**10**	**100**	**100**
Written Report	5	50	50
Oral Presentation	5	50	50
Overall Gradebook	**100**	**100**	**1000**

Grade Scale for Graduate Students

Points (P)	Letter Grade
$P \geq 900$	A
$800 \geq P \geq 899$	B
$700 \geq P \geq 799$	C
$600 \geq P \geq 699$	D
$P < 600$	F

COURSE OUTLINE

Week	Week of	Topics	Text Readings	Ongoing Tasks	Benchmarks
1	16-Jan	Introduction, weather and climate, climate variability versus climate change	Chapter 1	T: Lecture R: Lecture	
2	23-Jan	Terrestrial radiation and Earth's energy balance, radiation laws	Chapter 2	T: Lecture R: Assign. #1	
3	30-Jan	Surface energy budget, latent and sensible heat fluxes	Chapter 2	T: Lecture R: Assign. #1	Test #1
4	06-Feb	Solar radiation, surface radiation budget, earth's surface temperature	Chapter 2 Chapter 3.3	T: Lecture R: Assign. #1	
5	13-Feb	Hydrological cycle, water's heat-energy characteristics; latent heat of evaporation	Chapter 3.4	T: Lecture R: Assign. #2	Assign. #1
6	20-Feb	Atmospheric stability; Regional and global precipitation distribution and latitudinal hydrological imbalance	Chapter 3.2 Chapter 3.4	T: Lecture R: Assign. #2	Test #2
7	27-Feb	General circulation and global climate, Rossby waves	Chapter 3.1 Chapter 3.2	T: Lecture R: Assign. #2	
8	06-Mar	Ocean-atmosphere variations; internal climate variability; sea surface temperatures; El Niño and Southern Oscillation, North Atlantic Oscillation, Arctic Oscillation, Atlantic Multi-decadal Oscillation	Chapter 3.6 Chapter 3.7 Chapter 3.8 Chapter 6.2	T: Lecture R: Assign. #3	Assign. #2
9	13-Mar	SPRING BREAK			
10	20-Mar	Natural causes of climate change over the past 1000 years, volcanoes, solar activity	Chapter 6.4 Chapter 6.5	T: Lecture R: Assign. #3	Test #3
11	27-Mar	Natural causes of climate change over the past 1000 years, ocean currents, changes in atmospheric composition	Chapter 6.3 Chapter 6.9	T: Lecture R: Assign. #3	
12	03-Apr	Climatic consequences of human activities, greenhouse gas emissions, land use and land-cover change, atmospheric pollution & ozone	Chapter 7	T: Lecture R: Assign. #3 presentations	Assign. #3
13	10-Apr	Climates of the past, paleoclimatology	Chapter 8	T: Lecture R: Assign. #3 presentations	Test #4
14	17-Apr	Evidence of 20th century atmospheric warming; temperature hockey stick	Chapter 9	T: Lecture R: Assign. #4	
15	24-Apr	Recent climate trends in temperature, precipitation, extreme weather, hurricanes, storms, melting ice, sea level rise	Chapter 10	T: Lecture R: Assign. #4	
16	01-May	Modeling the climate, global circulation models and current challenges Predicting climate change, future climate, accomplishments and challenges	Chapter 10 Chapter 11	T: Lecture R: Lecture	Assign. #4
17	08-May	Final's week – Exam Day			Test #5 Grad. Student presentations