UC 12300 135
(Revised)

CBM003 ADD/CHANGE FORM

☒ Undergraduate Committee ☐ New Course ☒ Course Change Core Category: Life/Phys Sci Effective Fall 2014	or	☐ Graduate/Professional Studies Committee ☐ New Course ☐ Course Change Effective Fall 2014

Approved 10/2/13

1. Department: EAS College: NSM
2. Faculty Contact Person: Robert Talbot Telephone: 603-969-3806 Email: rtalbot@uh.edu
3. Course Information on New/Revised course:
   - Instructional Area / Course Number (*see CBM003 instructions) / Long Course Title: GEOL / 1302 / Introduction to Global Climate Change
   - Instructional Area / Course Number / Short Course Title (30 characters max.) GEOL / 1302 / CLIMATE CHANGE
   - SCH: 3.00 Level: FR CIP Code: 40.0401.00.02 Lect Hrs: 3 Lab Hrs: 0
   - Term(s) Course is Offered (*see CBM003 instructions about selection): Contact Your Academic Advisor
4. Justification for adding/changing course: **To meet core curriculum requirements**
5. Was the proposed/revised course previously offered as a special topics course? ☐ Yes ☒ No
   If Yes, please complete:
   - Instructional Area / Course Number / Long Course Title: ____ / ____ / _____
   - Course ID: _____ Effective Date (currently active row): _____
6. Authorized Degree Program(s): BS
   - Does this course affect major/minor requirements in the College/Department? ☒ Yes ☐ No
   - Does this course affect major/minor requirements in other Colleges/Departments? ☒ Yes ☐ No
   - Can the course be repeated for credit? ☐ Yes ☒ No (if yes, include in course description)
7. Grade Option: Letter (A, B, C ...) Instruction Type: lecture ONLY (Note: Lect/Lab info. must match item 3, above. *See CBM003 instructions.)
8. If this form involves a change to an existing course, please obtain the following information from the course inventory: Instructional Area / Course Number / Long Course Title
   GEOL / 1302 / Introduction to Global Climate Change
   - Course ID: 29682 Effective Date (currently active row): 08262013
9. Proposed Catalog Description: (If there are no prerequisites, type in "none".)
   Cr: 3. (3-0). Prerequisites: MATH 1301 or MATH 1311 Description (30 words max.): Examines how past climate records and models provide a better understanding of possible future climate changes. Greenhouse gases, solar output, Earth's orbit, and anthropogenic effects.
10. Dean's Signature: _____ Date: _____

    Print/Type Name: Ian Evans

REQUEST FOR COURSES IN THE CORE CURRICULUM

Originating Department or College: Department of Earth & Atmospheric Sciences
Person Making Request: Robert Talbot Telephone: 603-969-3806
Email: rtalbot@uh.edu
Dean's Signature: _____ Date: 01/10/2013

Course Number and Title: 34T
Please attach in separate documents:

X Completed CBM003 Add/Change Form with Catalog Description
X Syllabus

List the student learning outcomes for the course (Statements of what students will know and be able to do as a result of taking this course. See appended hints for constructing these statements):

1. Understand the difference between weather and climate.
2. Explain what a greenhouse gas is and how it modifies climate.
3. Explain the general circulation of the Earth's atmosphere and how it can be modified by climate change.
4. Describe what causes the different seasons on the Earth and how they can be modified by natural and anthropogenic climate changes.
5. Relate the rates of global warming to increasing greenhouse gases concentrations in the Earth's atmosphere.
6. Solve geoscience problems using graphical methods and critical thinking.

Component Area for which the course is being proposed (check one):

***Note:** If you check the Component Area Option, you would need to also check a Foundational Component Area.

☐ Communication
☐ Mathematics
☐ Language, Philosophy, & Culture
☐ Creative Arts
X Life & Physical Sciences
☐ American History
☐ Government/Political Science
☐ Social & Behavioral Science
☐ Component Area Option

Competency areas addressed by the course (refer to appended chart for competencies that are required and optional in each component area):

X Critical Thinking	X Teamwork
x Communication Skills	☐ Social Responsibility
X Empirical & Quantitative Skills	☐ Personal Responsibility

Because we will be assessing student learning outcomes across multiple core courses, assessments assigned in your course must include assessments of the core competencies. For each competency checked above, indicated the specific course assignment(s) which, when completed by students, will provide evidence of the competency. Provide detailed information, such as copies of the paper or project assignment, copies of individual test items, etc. A single assignment may be used to provide data for multiple competencies.

Critical Thinking:

There is plenty of class discussion on various topics. I bring one point or news item to each class on current climate change and we discuss it. This will usually be on a topic that might be controversial and the students need to think about it and then present their own view on it. This is not intended to be a debate, just stimulating the students to think critically about the issue. This also extends into the labs.

Examples: The principal threat to the ozone shield is (are)

a. chlorofluorocarbons (CFCs).
b. automobile exhaust.
c. burning of fossil fuels.
d. volcanic eruptions.
e. global warming.

Milankovitch argued that regular changes in Earth-Sun geometry explained the large-scale climatic fluctuations during the Pleistocene Ice Age primarily by
a. altering the solar constant.
b. changing the seasonal and latitudinal distribution of solar radiation on Earth.
c. producing sunspots.
d. increasing the planetary albedo.
e. altering the aerosol content of the troposphere.

The cumulative evidence is now convincing that
a. global warming is real and unequivocal.
b. human activity is primarily responsible for warming since the mid-20th century.
c. the sunspot cycle is primarily responsible for warming since the mid-20th century.
d. Only a and b are correct.
e. Only a and c are correct.

Communication Skills:

There is plenty of class discussion on various topics. I or a student brings one point or news item to each class on current climate change and we discuss it. Students have to think about the issue and then communicate their points on it to the whole class. This will force the students to communicate in a clear

manner. In the lab the students take turns reading questions and then explaining their thinking and answers.

Example:
I will pick out a recent climate news item, or pick something off of the NOAA web page, or a recent paper in Science or Nature and it will be discussed in class. Alternatively, I could ask the students to bring in a climate item to class for discussion. The class will break into smaller groups and discuss the topic for a while, and then several students from a few groups will present what they think about the topic to the class. After this is completed, I will lead a class discussion on the topic. This will involve critical thinking and then practice in communicating their ideas to the group and/or class. Students will be graded in both areas.

Empirical & Quantitative Skills:
There are multiple opportunities to learn and develop empirical and quantitative skill in this class, particularly in the laboratory component. Students learn how to correctly read and interpret graphical presentations. In the lab students learn how to use Excel for data analysis and graphing.

Examples: According the inverse square law, tripling the distance traversed by radiation reduces its intensity to _____ of its initial value.

a. one-half
b. one-third
c. one-fifth
d. one-ninth

Global radiative equilibrium implies that the total energy absorbed by Earth is _____ the total energy emitted by the Earth-atmosphere-ocean system to space.
a. less than
b. equal to
c. more than

Teamwork:
Students work in small teams in the lab to complete the work. They discuss the answers to assigned questions and debate which one is correct.

Social Responsibility:
N/A

Personal Responsibility:
N/A

Will the syllabus vary across multiple section of the course? ☐ Yes X No
If yes, list the assignments that will be constant across sections:

34T

Inclusion in the core is contingent upon the course being offered and taught at least once every other academic year. Courses will be reviewed for renewal every 5 years.

The department understands that instructors will be expected to provide student work and to participate in university-wide assessments of student work. This could include, but may not be limited to, designing instruments such as rubrics, and scoring work by students in this or other courses. In addition, instructors of core courses may be asked to include brief assessment activities in their course.

Dept. Signature: _____

COURSE SYLLABUS

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YEAR COURSE OFFERED: 2013
SEMESTER COURSE OFFERED: Spring
DEPARTMENT: Earth & Atmospheric Sciences
COURSE NUMBER: GEOL 1302
NAME OF COURSE: Introduction to Global Climate Change
NAME OF INSTRUCTOR: Robert Talbot

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The information contained in this class syllabus is subject to change without notice. Students are expected to be aware of any additional course policies presented by the instructor during the course. If I see a cell phone or hear someone with one, you will present the next class lecture.

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Learning Objectives

1. Understand the difference between weather and climate.
2. Explain what a greenhouse gas is and how it modifies climate.
3. Explain the general circulation of the Earth's atmosphere and how it can be modified by climate change.
4. Describe what causes the different seasons on the Earth and how they can be modified by natural and anthropogenic climate changes.
5. Relate the rates of global warming to increasing greenhouse gases concentrations in the Earth's atmosphere.
6. Solve geoscience problems using graphical methods and critical thinking.

Tutoring Help for this class is through the Geoscience Learning Center, Old Science room 9. http://www.geosc.uh.edu/undergraduate/learning-center/

Major Assignments/Exams

Note: Exam #1 & #2 dates may change, please consult WebCT calendar and announcements in class.

Exam #1 Monday February 18 – during class time
Exam #2 Monday March 25 – during class time
Exam #3 Friday May 8 - 2-5 PM

This course has a Blackboard component. Homework will be chapter readings from the text book as we cover the material in class lectures and participate in class discussion. You are expected to keep up with lectures.

COURSE SYLLABUS

****** All exams are mandatory. ******

****** Three exams, not cumulative, but mandatory. ******

******No make-up exams offered.*****

******Please do not ask for extra credit******

Required Textbook

Climate Studies – Introduction to Climate Science

By Joseph M. Moran

List of discussion/lecture topics

GENERAL TOPICS

First Class: General course information and introduction of basic course topics.

Chapter 1 – Climate Science for Today's World (2 lectures)

Climate versus Weather

Climate and Society

Climate System

Chapter 2 – Monitoring Earth's Climate System (2 lectures)

Spatial Scales of Climate

Climate Variability

Climate Anomalies

Observing Earth's Climate

International Cooperation in Understanding Climate

Modeling Earth's Climate System

Chapter 3 – Planetary Energy Budget in Earth's Climate System (2.5 lectures)

Electromagnetic Radiation

Radiation laws

Incoming Solar Radiation

Earth's Atmosphere and Solar Radiation

Stratospheric Ozone Shield

Earth's Surface and Solar Radiation

Global Solar Radiation Budget

Outgoing Infrared Radiation

Global Radiative Equilibrium and Climate Change

Chapter 4 – Thermal Response of the Climate System (2.5 lectures)

Distinguishing Temperature and Heat

Heat Transfer Processes

Thermal Response and Specific Heat

COURSE SYLLABUS

Heat Imbalance
Controls on Air Temperature

Chapter 5 – Water in Earth's Climate System (3 lectures)
Global Water Cycle
Water Vapor in the Atmosphere
Monitoring Water Vapor
How Air becomes Saturated
Clouds
Precipitation
Measuring Precipitation

Chapter 6 – Global Atmospheric Circulations (3 lectures)
Wind: The Forces
Wind: Joining Forces
Continuity of Wind
Wind Measurement
Scales of Atmospheric Circulation
Planetary-Scale
Seasonal Shifts and Climates
Westerlies of Mid-Latitudes
Wind-Driven Ocean Gyres

Chapter 7 – Atmospheric Circulation and Regional Climates (3.5 lectures)
Air Masses
Fronts
Extratropical Cyclones
Anticyclones
Monsoon Climates
Local and Regional Circulation Systems

Chapter 8 – Climate and Air-Sea Interactions (2 lectures)
Air-Sea Interactions
Mean State of Ocean Circulation
El Niño, La Niña, and the Southern Oscillation
North Atlantic Oscillation
Arctic Oscillation
Pacific Decadal Oscillation

Chapter 9 – skip

Chapter 10 – Instrument-Based Records and Climatology of Severe Weather (3 lectures)
Global Climate Patterns
Trends in Mean Annual Temperature
Changes in the Water Cycle
Climatology of Severe Weather
Thunderstorms

COURSE SYLLABUS

Tornadoes
Tropical Storms and Hurricanes
Chapter 11 – Natural Causes of Climate Change (1.5 lectures)
Solar Variability and Climate Change
Earth's Orbit and Climate Change
Atmospheric Composition and Climate Change
Earth's Surface Properties and Climate Change
Chapter 12 – Anthropogenic Climate Change and the Future (2 lectures)
Human Activity and Climate Change
Anthropogenic versus Natural Forcing of Climate
The Climate Future
Potential Impacts of Global Climate Change
Chapter 13 – Skip
Chapter 14 – Responding to Climate Change (1.5 lectures)
Managing Anthropogenic Climate Change
Climate Adaption
Geoengineering the Climate System
Climate-Conscious Architecture
Chapter 15 – Climate Change and Public Policy – If time allows. (1.5 lectures)