

CBM003 ADD/CHANGE FORM

Undergraduate Council
 New Course Course Change
 Core Category: Life/Phys Sci Effective Fall ~~2013~~ 2014

or

Graduate/Professional Studies Council
 New Course Course Change
 Effective Fall 2013

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 / 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 Level: FR CIP Code: 40.0401.0002 Lect Hrs: 3 Lab Hrs: 0

RECEIVED APR - 4 2013

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): ____
 • 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 Instruction Type: Lect (Note: Lect/Lab info. must match item 3, above.)

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

- ____ / ____ / ____
 • Course ID: 29682 Effective Date (currently active row): ____

9. Proposed Catalog Description: (If there are no prerequisites, type in "none".)
 Cr. 3. (3-0). Prerequisite: MATH 1310 or MATH 1311. 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. _____

Print/Type Name: Ian Evans

REQUEST FOR COURSES IN THE CORE CURRICULUM

Originating Department or College: [Click here to enter text.](#)

Person Making Request: Robert Talbot

Telephone: 603-969-3806

Email: rtalbot@uh.edu

Dean's Signature: _____

Date: 01/10/2013

Course Number and Title: [Click here to enter text.](#)

Please attach in separate documents:

Completed CBM003 Add/Change Form with Catalog Description

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

American History

Mathematics

Government/Political

Science

Language, Philosophy, & Culture

Social & Behavioral Science

Creative Arts

Component Area Option

Life & Physical Sciences

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:

Professor brings one point or fact to each class on current climate change for discussion in class.

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:

Professor brings one point or fact to each class on current climate change for discussion in class.

Empirical & Quantitative Skills:

There are multiple opportunities to learn and develop empirical and quantitative skill in this class. 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 to 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 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 sections of the course? Yes No

If yes, list the assignments that will be constant across sections:

[Click here to enter text.](#)

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: _____

The following courses have been reviewed and approved by the NSM Curriculum Committee to meet the new core requirements. Given the length of the individual submissions I have elected to submit these requests by electronic means only.

Natural Sciences: Core Courses

BIOL 1309 – Human Genetics and Society

BIOL 1310 – General Biology

BIOL 1320 – General Biology

BIOL 1361 - Introduction to Biological Science I

BIOL 1362 - Introduction to Biological Science II

CHEM 1301 – Foundations of Chemistry

CHEM 1331 – Fundamentals of Chemistry I

CHEM 1332 – Fundamentals of Chemistry II

GEOL 1302 - Introduction to Global Climate Change

GEOL 1330 - Physical Geology

GEOL 1340 - Introduction to Earth Systems

GEOL 1350 - Introduction to Meteorology

GEOL 1360 - Introduction to Oceanography

GEOL 1376 - Historical Geology

PHYS 1301 - Introductory General Physics I

PHYS 1302 - Introductory General Physics II

PHYS 1321 - University Physics I

PHYS 1322 - University Physics II

Mathematics: Core Courses

MATH 1310 – College Algebra

MATH 1311 – Elementary Mathematical Modeling

Math/Reasoning: Core Courses

COSC 1306 – Computer Science and Programming

MATH 1330 - Precalculus

MATH 1431 - Calculus I

MATH 1432 - Calculus II

MATH 2311 - Introduction to Probability and Statistics

Writing in the Disciplines: Core Courses

BCHS Biochemistry Lab II

BIOL 3311 - Genetics Lab

PHYS 3313 - Advanced Lab I


Ian Evans

Associate Dean

4/4/13

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

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.

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

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***** 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

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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

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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)