Online Introduction to Physical Geography: Bringing a Core Environmental Class to Regional and Off-Campus Sites

John-Andrew Ballantine, Assistant Professor-in-Residence
andy.ballantine@uconn.edu
Introduction to Physical Geography, GEOG 2300 in the Department of Geography

Overview

I seek funding to complete the transition of Introduction to Physical Geography to an online format (Spring-Summer, 2012) and then generate a series of exercises and discussion modules that will fully take advantage of the online platform and improve the live versions of this class taught in Storrs during the academic year (2012-2013). These improvements will both extend the offering of this important class to many more students at the regional campuses, and dramatically improve the existing class.

Background

Over the course of this academic year, I have been working with Glenda Harrison and Cathy Healy of ITL to create an online version of Geography 2300: Introduction to Physical Geography. The initial effort has been to align the structure of the existing, in-person version of the class with specific goals, objectives, and assessment tools while placing the materials in an online environment. Through these efforts, we have developed a concrete set of learning outcomes and assessment tools to complement the student learning objectives. The details of these are included below in the Course Plan.

By the end of this semester, the basic online class will be completed following the rigorous standards of ITL and Quality Matters. The first version of this online class is scheduled to be taught in two sections during Summer Session 1.

Because these efforts have been on top of my usual load, I have not had the time to do more than transfer existing class materials into the online format and place them more formally in the context of goals, objectives, and outcomes. This proposal seeks to support me with the time and materials necessary to truly take advantage of the online environment by developing online-specific exercises, discussions, and learning modules.

Why Geography 2300?

Geography 2300 teaches about the Earth's natural systems (atmosphere and climate, hydrology, oceans, Earth materials and tectonics, biosphere) and is therefore a foundational class in teaching the students of UCONN about our environment. Geography 2300 helps to promote environmental literacy among the students of the University and thereby supports one of the core topical areas of the Academic Plan.

Geography 2300 fulfills the CA3 requirement so it is broadly relevant to all UCONN undergraduates. Because of this, it has consistently high enrollment (120-130 students per semester) and discussions with administrators at Avery Point indicate that there is demand for Geography 2300 at least on that regional campus.

In addition to fulfilling the CA3 requirement, Geography 2300 serves as a core major requirement in at least Geography, Environmental Science, and the proposed Environmental Studies program. By having this class available during the summer and outside of the Storrs campus through an online format, students can fulfill an important content area requirement and/or make progress in a class that is core to several different majors on campus.

Proposed project and work to be done during the grant period

I propose to improve Geography 2300 in three stages:

1) Finish transitioning to the online environment for teaching this summer by working with ITL (March-April, 2012). This step will include building modules 3-8 as presented on the attached sheet.

2) Evaluate the effectiveness of the online version throughout the course of teaching the class during summer session 1. This will give me definitive feedback from evaluations during, and at the end of, the class that I can use to improve the class during step 3 (May-July, 2012).

3) Further develop the class to fully take advantage of the online environment. In doing this, I will try to adhere to the seven principles for good practice in undergraduate education (Chickering and Gamson, 1987). This further development will include:

a) Incorporating feedback from Summer, 2012.

b) Building interactive, online discussion modules to make a higher level of interactivity and contact between the students, me, and the material we are working with. As shown in the attached Course Plan, I have discussion topics associated with many of the modules, but as I become familiar with the online environment, I will be able to target readings to guide these discussions and pick topics that will be compelling to the students and related to the course material. I also see the discussion threads as ways to build mini-research projects where the students will seek out information to bring to the discussion. Perhaps most importantly, the discussions are a place where I can encourage a sense of community and reciprocal learning so that the students know each other and me better and thereby become more invested in the material they are learning.

c) Building online activities where the students interact with real environmental data and ask questions of those data to explore the mechanisms driving natural processes on our planet. These activities will make use of environmental data from campus, municipalities in CT, and national and global datasets to promote active learning and give the students a sense of how the environment is relevant to their lives at the local scale, but also relevant to processes at the scale of the planet, and all scales in between.

d) Identifying examples of current, environmentally-related news that will tie the students' online learning to real-world events that are pertinent to them. I find that students identify with current events, even if they don't follow the news closely enough to know what those events are. By bringing news into their activities and discussion threads, the material will acquire an immediacy and context that will draw the students interest.

Through these improvements, I will be strengthening my ability to achieve the course objectives stated in the attached Course Plan. More importantly, I hope to better achieve the student learning outcomes tied to those objectives by grabbing the attention of students using compelling and well thought out discussion topics, exercises relevant to the material and their experience, and the use of current news and data.

Evaluation and Assessment

Assessing the degree to which students achieve the learning outcomes set forth as objectives in the attached Course Plan will be accomplished through the diverse tools of discussion modules, content-related activities, and more traditional exam-style assessments. Evaluating the success of the course improvements described in this proposal will be accomplished by:

1) Comparing an instructor-designed final evaluation for the class that has been used for several years in the live class with the same evaluation applied to the online setting.

2) Designing a final course evaluation specific to the online class that will evaluate student satisfaction with the essential aspects of the class (content modules, interaction with the professor and other students, discussions, activities, etc.). This evaluation will be given for both class sections being taught during Summer, 2012 as a baseline and then in future summers to determine how effective the changes have been.

3) Providing frequent opportunities during the course of the class for anonymous feedback to the instructor on the students' perceptions of contemporaneous aspects of the class. These could include exercises like "The Muddiest Point" for topics that are confusing, as well as critical evaluations whereby the students can critique both course structure and content.

Applicability to UCONN's General Education Curriculum

Introduction to Physical Geography fulfills the CA3 requirement and has been designed to meet the various standards for CA3 (learning the scientific method, learning tools and techniques used in modern science, distinguishing science from pseudoscience, etc.). Furthermore, the broader general education goals of the University are supported in several ways. The discussion modules are designed to encourage articulate expression of ideas and will encourage research by which the students will develop their ability to acquire and use knowledge. The activities will require intellectual breadth and critical judgment while using current data from local sources will encourage awareness of their era and their place in society. A great advantage of Physical Geography is that it focuses on scientific concepts, but does so in the context of human-environmental interactions so current relevance is a part of the class.

Enhancement of Current and Future Offerings

The online version of GEOG 2300 will enhance the live offerings of this class by allowing me to develop new activities, ways to engage students in discussion, and new content. I expect my experience with this class will also benefit my colleagues teaching GEOG 2300 as we frequently discuss ideas and methods that work and don't work in our classes.

By having support for developing sophisticated online content for this class, I believe I will be able to create innovative, interactive course activities and discussion modules that will be models for other classes to be developed in the future. I am a strong believer in both the interactive use of real data in understanding problems related to our world (e.g. climate model output, or river data related to floods), and the importance of connecting students with their local environment. Both of these approaches could be models for other classes.

This proposal is not linked to any other proposal.

Supplementary material

GEOG 2300 Course Plan

Note that items in **[bold]** are assessments of student learning.
The objectives described here align with expected student learning outcomes for the class.

- **Module 01 –Thermodynamics**
  - Objectives
    - Discuss the importance of the scientific method **[Online discussion of the scientific method, Exam 1]**
    - Define the importance of the sun to life on Earth. **[EXAM 1]**
      - Interpret how energy flows through systems (thermodynamics), including:
        - Closed systems & open systems. **[EXAM 1]**
        - 1st law of thermodynamics. **[EXAM 1]**
        - 2nd law of thermodynamics. **[EXAM 1]**
      - Explain how the position, size, and shape of the Earth dictate the amount of energy reaching the surface. **[RADIATION/TEMP EXERCISE AND EXAM 1]**
  - Activities
    - Read text
    - View/read lecture content
    - Online discussion
    - Radiation and Temp exercise

- **Module 02 – Atmosphere**
  - Objectives
    - Explain the radiative energy budget of the Earth and how this drives global temperatures. **[Exam 1]**
    - Describe the characteristics of radiation and solar energy . **[Online discussion of radiation, Exam 1]**
    - Illustrate how solar energy is distributed across different parts of the planet. **[Radiation and temperature exercise, Latitude and temperature exercise, Exam 1]**
    - Diagram how the structure of the atmosphere affects the amount of solar radiation received at the Earth's surface. **[Exam 1]**
      - Describe the structure and composition of the atmosphere.
    - Identify the ways in which radiation interacts with the Earth's surface and atmosphere and feeds into the greenhouse effect. **[Exam 1]**
    - Construct a conceptual model of global patterns of heat and energy and how these relate to the position of the Earth. **[Radiation and temperature exercise , Exam 1]**
    - Combine the concepts of insolation with the other factors that influence air temperature and produce an explanation/map of how these factors vary spatially across the planet. **[Radiation and temperature exercise , Latitude and temperature exercise, Exam 1]**
  - Activities
    - Read text
    - View/read lecture
    - Online discussion
    - Radiation and temperature exercise
    - Latitude and temperature exercise
- **Module 03 - Climate Change**
  - Objectives
    - Describe the evidence for climate change, the mechanisms responsible for climate change, the consequences of climate change, and how climate change is being dealt with.
      - Distinguish between the pieces of evidence for climate change and the tools that help us learn more about climate change. **[Exam 1]**
      - Analyze how the greenhouse effect is affected by human and natural forcings. **[Global warming bathtub exercise]**
      - Appraise some of the future predictions of the effects of climate change and how models produce these. **[Exam 1]**
      - Identify how feedbacks influence climate change. **[Exam 1]**
      - Judge some of the likely and already observed impacts of climate change. **[Exam 1]**
      - Compare and criticize the national and international efforts to deal with climate change and formulate options for society. **[Online discussion, Exam 1]**
  - Activities
    - Read text
    - View/read lecture
    - Online discussion
    - Global warming bathtub exercise
- **EXAM 1**

- **Module 04 – Wind/Weather Patterns**
  - Objectives
    - Explain how air masses work and drive weather.
      - Explain the forces that drive wind and how they work. **[Exam 2]**
        - Describe how gravity drives winds.
        - Explain how the pressure gradient force drives winds.
        - Identify how the Coriolis effect changes the direction of winds.
        - Explain how friction with the Earth's surface influences wind speed and direction.
      - Demonstrate how cyclones and anticyclones reflect the forces driving wind. **[Exam 2]**
        - Illustrate the wind patterns of global circulation and how these general patterns are arranged around the planet and interpret why they occur.
        - Infer the kinds of vegetation that would occur as a result of seasonal precipitation and temperature patterns around the planet.
        - Diagram the causes of the Indian monsoon weather system.
        - Illustrate the conversion among the three states of water and how heat is absorbed or released by different phase changes.
        - Demonstrate the difference between specific and relative humidity.
        - Analyze the graphical relationship between these and generate dew point temperature.
        - Produce a design of the adiabatic lapse rate.
        - Describe clouds and explain the conditions under which different cloud types occur.
        - Distinguish between different types of fog and how they are formed.
        - Illustrate the process involved with orographic precipitation.
        - Explain how convectional precipitation works and how it leads to rain, lightning, thunder, and hail.
        - Interpret weather maps based on the pressure, winds, temperatures, weather, and frontal systems illustrated by them. **[Online discussion of the weather]**
        - Synthesize your knowledge of regional weather maps with your knowledge of global circulation patterns to understand global weather phenomena like the intertropical convergence zone. **[Weather patterns exercise, Exam 2]**
  - Activities
    - Read text
    - View/read lecture
    - Online discussion
    - Weather patterns exercise
- **Module 05 – Hydrologic Cycle**
  - Objectives
    - Describe the hydrologic cycle and its processes.
      - Describe where water occurs in the Earth system and how it moves between reservoirs. **[Exam 2]**
      - Recreate the hydrologic cycle, including all of its components. **[Exam 2]**

- Explain evaporation and evapotranspiration . **[Exam 2]**
- Discuss precipitation. **[Exam 2]**
- Relate interception, infiltration, and overland flow. **[Exam 2]**
- Surface water flow (including discharge, hydrographs, drainage basins, and drainage networks, baseflow vs. surface flow). **[Exam 2]**
- groundwater recharge and percolation. **[Exam 2]**
- groundwater flow and resources. **[Exam 2]**
- Appraise the issues associated with water scarcity. **[Online discussion of water resources, Water use exercise, Exam 2]**
- Compare hydrologic responses under different land uses. **[Exam 2]**
- Discuss the problems with flooding and possible solutions related to **[Online discussion of water resources, Exam 2]**:
    - levies
    - dams
    - zoning
- Evaluate household water use and how to change water usage. **[Water use exercise, Exam 2]**

- Activities
    - Read text
    - View/read lecture
    - Online discussion
    - Water use exercise

- **Module 06 – Oceans**
    - Objectives
        - Explain how oceans work and are affected by people. **[Exam 2]**
            - Define oceanography and subsets.
            - Represent the forces that drive ocean currents, including gravitation and radiation flux.
            - Demonstrate a knowledge of how latitude influences ocean currents through differential heating.
            - Sketch a diagram of surface winds over the world ocean in different seasons and months.
            - Extend concepts of Coriolis effect to the mechanisms driving the Ekman spiral.
            - Illustrate how horizontal circulation is influenced by winds.
            - Interrelate the core components of heat flux.
            - Compare different densities of surface in deep waters and how that is driven by salinity and temperature.
            - Combine the concepts of ocean currents to reproduce the motion of objects in the ocean .
            - Describe the properties and features of waves.
            - Explain the factors that cause waves.
            - Show how waves move in orbital fashion.
            - Classify the three zones of the life history of waves.
            - Identify the processes involved in wave interactions with the ocean bottom.
            - Compare how wave energy differs between headlands and bays.
            - Distinguish between different surf types associated with steep and shallow bottoms.

        - Discuss how human activities affect ocean life **[Seafood watch exercise, Exam 2]**
    - Activities
        - Read text
        - View/read lecture
        - Seafood watch exercise
- **EXAM 2**
- **Module 07 – Plate Tectonics**
    - Objectives
        - Explain the structure of the Earth and plate tectonics and how landforms, earthquakes, and volcanoes are related to plate tectonics. **[Exam 3]**
            - Label the components of the structure of the earth and describe the characteristics of each.
            - Illustrate the major relief features of the earth.
            - Explain the plate tectonics and continental drift.
            - Categorize the types of plate boundaries.
            - Distinguish between the types of geological hazards associated with plate tectonics.
            - Indicate the ways in which an earthquake is measured. **[Earthquake exercise]**
            - Compare the different depths and strengths of earthquakes with different plate boundaries. **[Earthquake exercise]**
            - Describe the different expressions of earthquakes at the earth's surface
            - Identify the composition of the earth's crusts.
            - Define the three types of rocks and their component minerals.
            - Recognize the different types of volcanoes and intrusive features and the types of lavas associated with them. **[Seamounts exercise]**
            - Distinguish between different types of sedimentary rocks and discuss their origins.
            - Illustrate how sedimentary and igneous rocks turn to metamorphic rocks.
            - Combine different rock types to illustrate the rock cycle.
    - Activities
        - Read text
        - View/read lecture
        - Seamounts exercise
        - Earthquakes exercise
- **Module 08 – Biogeography**
    - Objectives
        - Describe how organisms are distributed on the planet and why. **[Exam 3]**
            - Represent the influence of climate on general vegetation type through temperature precipitation and seasonality.
            - Indicate how biomes are influenced by temperature and precipitation in:
                - Forests
                - Savanna
                - Grassland
                - Desert
                - Tundra
            - Interrelate the concept of biomes with vertical zonation along elevation gradient.

    - Activities
        - Read text
        - View/read lecture
- **Module 09 – Human Impacts**
    - Objectives
        - Explain how humans affect and are affected by the natural systems of the Earth.
            - Combine the concepts discussed in class to illustrate factors involved in overfishing. **[Ecological footprint exercise, Exam 3]**
    - Activities
        - Read text
        - View/read lecture
        - Discussion of human impacts
        - Ecological footprint exercise
- **EXAM 3**

2012 GENERAL EDUCATION COURSE ENHANCEMENT GRANT COMPETITION

Proposer's name: John-Andrew Ballantine Proposal Title: Online Introduction to Physical Geography: Bringing a Core Environmental Class to Regional and Off-Campus Sites

The maximum amount available for each proposal is $10,000, payable in two installments at the beginning of fiscal years 2013 (July 1, 2012- June 30, 2013) and 2014 (July 1, 2013-June 30, 2014). A maximum of $5,000 will be distributed per year for each proposal. Funds can be used at any time during the fiscal year for purposes that support the activities of the proposal and conform to University of Connecticut guidelines.

Fiscal 2013	**Amount budgeted**	**Fringe ***	**Total**
Summer salary	$3333.33	$666.67	$4000.00
Supplies	$1000.00	None	$1000.00
Travel		None	
Research (Faculty Account) Ledg 2			
Other			
Total	$4333.33	$666.67	**$5000.00**

Fiscal 2014	**Amount budgeted**	**Fringe ***	**Total**
Summer salary			
Supplies		None	
Total			

* Please check the Accounting Office website for summer fringe rates. www.accountingoffice.uconn.edu. As following year fringe rates are not posted until July, estimate 20% fringe for regular faculty.

Justification:

Briefly explain how the expenditure of funds will support this proposal.

I will be spending much of the second half of the summer developing new content, discussion modules, and activities in the context of the comments from teaching during Summer Session 1. I am requesting summer salary of $3333.33 + 20% fringe ($666.67) = $4000

Because the online format of this class requires mobility and constant access to communication with students, I am asking for an iPad 2 ($499 at the Co-op + tax and accessories = ~$620).

For developing course applications, I am asking for a software copy of Dreamweaver and Flash per recommendation of Cathy Healy ($369.95 for Adobe Creative Suite 5.5 Design Premium at the Co-op) and Respondus for developing course materials and exams ($10 at UITS).

Total supplies = $1000

Department Head's statement
Please arrange for your department head to send a message to GEOC@uconn.edu containing the following statement:

"I support the enhancement/development of this course. Upon completion of the project, I will make every effort for the course to be offered every, or every other, year at the typical class size for the duration of at least five years."