Best practices for teaching non-science majors Environmental Science online

Executive Summary

This Environmental Science Teaching Circle accomplished our three original goals: 1) Discuss best practices, challenges and methods for teaching science to non-science majors. 2) Examine strategies for online teaching and 3) Develop a new Environmental Science course that could be taught either online during our summer sessions or face-to-face. Teaching circle members were provided with a shared resource (Essentials of Online Course Design: A Standards-Based Guide) which we used to facilitate our discussions about online teaching. We developed a new ENSC course for non-science majors: ENSC 1050: Sustainability and the World Population. This course was approved by the CoAS C&I and the GC SoCC committees this past spring and we are planning on offering this course online next summer.

Teaching Circle Membership

- Caralyn Zehnder (chair)
- Kalina Manoylov
- Christine Mutiti
- Sam Mutiti
- Allison VandeVoort

Each year approximately 450 undergraduate students, the majority of them non-science majors, enroll in Introduction to Environmental Science. Many of these students have indicated that they are interested in taking another Environmental Science course, but currently this is the only ENSC course for non-science majors that our program offers. Additionally, many Georgia College students are interested in taking online courses from Georgia College over the summer. However, the Department of Biological & Environmental Sciences does not currently have any online courses to offer. The purpose of this teaching circle was to serve as the catalyst for developing a new, 3-credit Environmental Science course for non-science majors in Area D with the intention of it being taught online over the summer. The course will support the liberal arts
mission of Georgia College by providing non-science majors with an additional course choice for their Area D requirement.

We developed a new Environmental Science (ENSC) course for non-science majors, *ENSC 1050: Sustainability and the World Population*. This course was approved by the CoAS C&I and the GC SoCC committees this past spring and we are planning on offering this course online in summer 2015. This new ENSC course explores the relationship between human beings and the natural environment. Students in this course will examine sustainable solutions to local, regional and global environmental issues. This course does not have any prerequisites and this course has been designed in a way that students could potentially take both ENSC 1000 and ENSC 1050. Course topics will include: human populations (growth, population policies, demography, age structure diagrams), connections between the human population and air pollution, connections between the human population and food/agriculture, resource use / extraction including timber, fossil fuels, mining, or water, climate change, evaluation and use of the scientific method and sustainable lifestyles.

**Student learning outcomes for ENSC 1050: Sustainability & the World Population**

As a result of this course, students will be able to:

- Evaluate the diverse responses of peoples, groups, and cultures to environmental issues, themes and topics.
- Use critical observation and analysis to predict outcomes associated with environmental modifications.
- Use appropriate technology to analyze solutions to environmental problems.
• Demonstrate knowledge of the causes & consequences of climate change.
• Interpret data in figures and graphs.
• Explain connections between human population growth and resource use.
• Describe ways that societies and individuals can contribute to sustainable solutions.
• Describe connections between humans and the environment.

In addition to fulfilling the requirements for a 3-credit course in Area D, this course also satisfies the Global Overlay requirements. In ENSC 1050, Students will be asked to compare different regions/countries and their responses to environmental issues through written assignments, group presentations, posters, debates, town hall meetings or case studies.

Specific global environmental science issues will include:

• Comparison of human population growth rates and age structures (and the associated societal and environmental impacts associated with these different demographics) in rapidly growing countries (ex: Nigeria, India), ‘stable’ countries (US, Sweden) and countries with declining populations (Japan, Italy). We will also spend time specifically focused on China and their one-child policy.
• Response to climate change (policy, investments in renewable energy) US, China and EU
• Dealing with the consequences of climate change: Bangladesh, Maldives, US (New Orleans, Miami).
• Air pollution in China
• Mining in Africa (specifically Zambia).
In addition to developing this new ENSC course, we also used this teaching circle as an opportunity to examine online teaching strategies. We discussed the challenges and benefits associated with delivering content in this new framework – specifically that students will be able to work at their own pace, but students will also have to independently manage their time and study efforts in a way that many of them may not be used to. Additionally, we discussed activities that we could use in both online and face-to-face classroom settings. For example, students could use Google Earth to examine the impacts of climate change on different regions of the world and then use this information to create a public service announcement for different regions or students could examine temperature data (terrestrial and/or marine) and then make predictions on how changes in temperature will affect natural phenomena such as agriculture production, rates of malaria infection, and sea ice coverage. Finally, we discussed a concern that is voiced by many critics of online teaching – making connections with students in the online environment and how this compares to face-to-face teaching. We are hoping to use this new course to empirically examine this idea.

We also used this teaching circle as an opportunity discuss best practices, challenges and methods for teaching science to non-science majors. We spent a lot of time discussing the benefits of and drawbacks associated with using a traditional textbook in general ENSC courses. Whenever any of us teach ENSC 1000, we regularly supplement the required textbook chapters with news articles, videos and other online information source. Our students respond positively to these direct connections between the scientific content and what is happening in the world around them. Our teaching circle discussions also highlighted two major drawbacks associated with Environmental Science textbooks 1) the books are out of date as soon as they are printed because Environmental Science is such a rapidly advancing field and 2) the books are too broad
and include many chapters that we cannot cover in a semester long course. Based on these discussions and our feedback from students, we are going to examine dropping the required textbook from our general, introductory ENSC courses (ENSC 1000 and ENSC 1050) and replacing the textbook with freely available articles and material that we develop ourselves. This idea will likely be the topic for a teaching circle next year.