

## MES PROGRAM, THE EVERGREEN STATE COLLEGE

### Draft Syllabus for The Global Carbon Cycle Spring 2013

**Faculty:** Erin Ellis, Lab I 3008, 867-5264, ellise@evergreen.edu  
**Class times:** Wed., 6 – 10 PM; Sem 2 B-3107  
**Credits:** 4

#### Office Hours

I am happy to meet with you as needed. Please email me to schedule an appointment.

#### Objectives

As a result of taking this program, students will:

- Develop an in-depth understanding of how the global carbon cycle regulates climate at different time scales (millions of years, 100,000 years, and decades (the latter being most relevant to human beings)).
- Determine the strengths and weaknesses of current solutions being posed to sequester carbon.
- Become familiar with some of the latest research addressing carbon cycling in terrestrial/aquatic/marine ecosystems (specifics depend on interest of class).
- Improve communication skills regarding an aspect the global carbon cycle. Students will develop an outreach activity, write a report, and deliver an oral presentation on selected topics.

#### Description

The global carbon cycle is fundamentally tied to many of the most important environmental issues of the twenty-first century, including climate change, energy consumption, ocean acidification, deforestation, and the pollution of freshwater ecosystems. As such, an accurate understanding of the carbon cycle is necessary to guide policy to work towards an effective solution to many of these complex issues. Accordingly, this program will explore the fundamentals of the global carbon cycle. We will specifically examine how the carbon cycle has regulated climate on different time scales (see objective 1 above). With this background, we will study how carbon is distributed between different reservoirs on Earth today (i.e. the atmosphere, the ocean, and the land), and then examine the sequence of processes that control the cycling of carbon between these reservoirs, using case studies of current hot research topics. Finally, we will examine the strengths of weaknesses of different technological solutions posed to sequester atmospheric carbon dioxide. Additional topics to be covered include the effects of elevated atmospheric carbon dioxide levels on terrestrial and aquatic organisms, the “missing sink” on land, ocean acidification, and deforestation. Student feedback will be solicited from those registered for the course to tailor certain aspects of the class towards the interest of the students. For example, if students are interested in carbon storage in wetlands, lecture/workshops/seminar readings could be developed for students to understand this in more detail.

We will use the text “The Global Carbon Cycle”, which is written for a general audience with an interest in science. We will follow up each chapter with articles chosen to examine certain

aspects covered in more depth. Seminar readings will therefore be based on these readings in addition to the required program text.

This elective provides a more in-depth exploration of the carbon cycle relative to that encountered in Ecological and Social Sustainability.

No prerequisites are required.

### Format

Students will participate in seminars, lectures, and workshops that focus on developing critical thinking, discussion, and presentation skills. Although lecture will be a component of this class, the emphasis will be on active-learning techniques to facilitate comprehension of the important topics discussed in class. Students will be responsible for:

- **Participation:** Completing the required reading and actively participating in all activities done in class.
- **Seminar Facilitation:** Leading at least one seminar discussion on the required seminar reading.
- **Writing a Report:** Writing a fully referenced report (8 to 10 pages) on an aspect of the global carbon cycle of interest to you. The report can be about policy, technological solutions, current research, etc.
- **Oral Presentation:** This will be a presentation of your report so that you can inform you classmates of your findings.
- **Outreach Project:** This activity is designed to improve your ability to communicate with a general audience. You will design an activity that is intended to enhance public understanding of some aspect of the carbon cycle. You will share your activity with your peers. This assignment is meant to allow you to explore your creative side and should be fun. Ideas include:
  - **Secondary school science activity:** Secondary schools often request graduate students to present activities at events like “Family Science Night”. We encourage you to come up with an activity to demonstrate a concept that you have learned about as a result of taking this elective that could be used at such an event.
  - **Write a newspaper article for the Evergreen newspaper (or another news source):** The Cooper Point Journal is actively trying to improve communication about scientific concepts, and will publish articles written by Evergreen students. Submitting it would be great, but not required.
  - **Creating/updating/editing a Wikipedia site.** Wikipedia sites are frequently used to as a source of information. However, some sites are inaccurate or do not exist. If there is a topic that you’d like to create a Wikipedia page about related to the C cycle, this is your chance!
  - **Whatever form of outreach you want:** Come talk to me about it.

### Text

*The Global Carbon Cycle.* David Archer. Princeton University Press, 2010. ISBN 978-0-691-14414-6.

*All other readings will be posted as pdf documents on Moodle.*

A weekly schedule with required readings and topics will be provided on the first day of class.

**WEEKLY SCHEDULE**

<b>Week 1</b>	<b>Introduction to class and The Global Carbon Cycle</b>  <i>Reading: Ch. 1: Carbon on Earth from “The Global Carbon Cycle”, TBA</i>
<b>Week 2</b>	
<b>Week 3</b>	
<b>Week 4</b>	
<b>Week 5</b>	
<b>Week 6</b>	
<b>Week 7</b>	
<b>Week 8</b>	
<b>Week 9</b>	
<b>Week 10</b>	