Course Prefix / Number:  OCC4414

Course Title:  Global Biogeochemical Cycles

Course Credit Hours:  3

Instructor Name and Contact Information:  Dr. Matthew Schwartz (mschwartz@uwf.edu)

Prerequisites or Co-Requisites:  Chemistry II and lab (CHM 2046, CHM 2046L)

Recommended:  OCC 4002, OCE/OCG 4002, OCP 4002, BSC 4263

Course Description:

The biogeochemical cycles of water, carbon, nitrogen, and sulfur; the atmosphere and oceans as reservoirs and reaction media; the fate of natural and artificial sources of carbon, nitrogen, and sulfur compounds; the interactions among the major biogeochemical cycles and global change; anthropogenic perturbation of the global carbon cycle and climate, greenhouse gases, acid rain and ozone depletion.

Course Goals:

Upon completion of the course, students will be able to:

1. Describe the global biogeochemical cycles of carbon, nitrogen, phosphorus, and sulfur
2. Describe the small scale processes involved in these global cycles
3. Understand the interaction between the ocean and atmosphere
4. Describe how ecosystem differences influence biogeochemical cycling
5. Speculate on possible consequences of anthropogenic perturbation of biogeochemical cycles
Program Goals:

Global Biogeochemical Cycles is a required upper-level course in the UWF online Ocean Sciences BS degree program

About this Course:

This course is delivered completely online. You must have consistent access to the Internet. Learning at a distance may be a very different environment for many of you. You will generally set your own schedules, participate in class activities at your convenience, and work at your own pace. You will require some additional time online during the first few weeks while you become acclimated to the online format and you may even feel overwhelmed at times. It will get better. **You should be prepared to spend approximately 6 - 8 hours per week online completing lessons, activities, and participating in class discussions for this course alone.** Finally, you may want to incorporate these tips to help you get started:

- Set a time each week (schedule) to:
  - Check the course web site to determine your tasks for the week.
  - Check the course web site frequently throughout the week for updates.
- Within the first week, become familiar with the site and how to use it.
  - View this eLearning Demo.
- Team up with your classmates to discuss class assignments and questions you might have.
  - Check the “Classlist” link “?” for fellow student biography information and email addresses.
- Ask questions when you need answers.
  - If you have problems, contact your instructor early.

Topics:

- **Topic 1: Introduction**
  - Define biogeochemistry
  - Understand the origin of Earth, the ocean, and the atmosphere
  - Have a general understanding of how biology, chemistry, and geology work together to define biogeochemical cycles
- **Topic 2: The Atmosphere**
  - Know the major gases in the atmosphere
  - Understand the basic structure and circulation patterns of the atmosphere
  - Know the major biogeochemical reactions that occur in the atmosphere
  - Understand the process of atmospheric deposition
- **Topic 3: Rivers and Estuaries**
  - Understand the importance of rivers and estuaries in global biogeochemical cycling
  - Understand the biogeochemical transformations that occur within rivers and estuaries
  - Understand the biological, physical, and chemical forces that drive these transformations
- **Topic 4: The Ocean**
  - Understand the role of the oceans in global biogeochemical cycles
  - Know the biogeochemical transformation that occur within oceans
  - Understand the biological, physical, and chemical forces that drive these transformations
  - Understand how different oceanic “zones” participate in biogeochemical cycling
- **Topic 5: Water Cycle**
  - Understand the importance of water
  - Describe the pathways and reservoirs in the global water cycle
  - Know the relative importance of pathways and reservoirs of water
  - Understand the interaction between climate and the global cycling of water
- **Topic 6: Carbon**
  - Describe the major pathways and reservoirs of carbon
  - Understand the importance of carbon
  - Understand the scale of carbon fluctuations in geologic history
  - Understand the potential anthropogenic alteration of carbon cycling
- **Topic 7: Nitrogen**
  - Know the major microbial nitrogen transformations
  - Understand the controlling forces of these transformations
- **Topic 8: Phosphorus**
  - Understand the controlling forces on the phosphorus cycle
  - Understand the major pathways and reservoirs of phosphorus
- **Topic 9: Linking Carbon, Nitrogen, and Phosphorus**
  - Understand the quantitative relationships between carbon, nitrogen, and phosphorus
  - Understand how the cycling of these elements are inter-linked
- **Topic 10: Sulfur**
  - Understand the major pathways and reservoirs of sulfur
  - Understand the controlling forces on the sulfur cycle
- **Topic 11: Comparative Marine Ecosystems**
  - Be able to compare and contrast the cycling of carbon, nitrogen, and phosphorus in different marine ecosystems
  - Understand how the cycling of these elements influences the biology and vice versa
- **Topic 12: Anthropogenic Perturbation**
  - Describe the perceived impact of human activities on global biogeochemical cycles
  - Understand how time scales alter the interpretation of potential human impacts
  - Understand potential future consequences of human activities

**Student Learning Outcomes: (SLOs):**

Upon completion of the course, students will be able to:

1. Describe the global biogeochemical cycles of carbon, nitrogen, phosphorus, and sulfur
2. Describe the small scale processes involved in these global cycles
3. Understand the interaction between the ocean and atmosphere
4. Describe how ecosystem differences influence biogeochemical cycling
5. Speculate on possible consequences of anthropogenic perturbation of biogeochemical cycles
**Texts / Materials:**


**Recommended texts:** none assigned

**Required Materials:**

- Internet Access (broadband is recommended)
- Activated UWF ArgoNet E-mail Account
- Adobe Reader (available online at http://get.adobe.com/reader/)

**Grading / Evaluation:**

The course grade will be determined as follows:

- Eleven (11) quizzes are worth a total of 10% of the final grade
- A two-part case study is worth a total of 25% of the final grade
  - Part 1 is worth 15% of the final grade
  - Part 2 is worth 10% of the final grade
- Two (2) Directed Discussions are worth a total of 10% toward the final grade
- Weekly Muddiest Point Discussions are worth a total of 5% of the final grade
- Three (3) exams are worth a total of 50% of the final grade
  - Exams 1 and 2 are each worth 15% of the final grade
  - The Final Exam is worth 20% of the final grade

All assignments are due on the date specified. Late assignments will be accepted with a penalty of one letter grade (10 percentage points) per day (or portion thereof) after the due date. An assignment submitted one hour after the due date will be assessed an immediate 10-point penalty, prior to actual grading.

I will try to work with you, if you need to take an exam early or have a valid (and verifiable) excuse for turning in an assignment late; however, I do not guarantee that you can take an exam early (or late).

Letter grades will be assigned as follows:

<table>
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<th>Grade Description</th>
<th>94% or better</th>
<th>90% to 93%</th>
<th>87% to 89%</th>
<th>83% to 86%</th>
<th>80% to 82%</th>
<th>77% to 79%</th>
<th>73% to 76%</th>
<th>70% to 72%</th>
<th>67% to 69%</th>
<th>60% to 66%</th>
<th>50% or less</th>
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<td>Letter</td>
<td>A</td>
<td>A -</td>
<td>B +</td>
<td>B</td>
<td>B -</td>
<td>C +</td>
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<td>D+</td>
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**Attendance Policy:**

All students are required to contribute to course discussions on a weekly basis. Such discussions may be Muddiest Point Discussions, which are student-led reviews and questions of the week's topics or Directed Discussions, which are assigned by the instructor. As stipulated above, these discussions constitute a significant portion of your course grade. **I strongly suggest that you engage in these discussions early in the session (i.e., Wednesday through Friday).** Waiting until the end of the session to contribute to these discussions is likely to result in fewer points awarded.

**Minimum Technical Skills and Special Technology Utilized by Students:**

This course is totally online. All instructional content and interaction takes place over the WWW. In addition to baseline word processing skills and sending/receiving email with attachments, students will be expected to search the internet and upload / download files. In addition, students may need one or more of the following plug-ins:

- For students' using Screen Readers: Download Elluminate's Java Bridge: [https://www.elluminate.com/Support/Other_Resources/Java_Accessibility_Bridge/?id=368](https://www.elluminate.com/Support/Other_Resources/Java_Accessibility_Bridge/?id=368)
- eLearning's Accessibilty Resource Guides for users: [http://www.desire2learn.com/access/resources/](http://www.desire2learn.com/access/resources/)

**Expectations for Academic Conduct / Plagiarism Policy:**

Academic Conduct Policy: ([Web Site](http://www.uwf.edu)) | ([PDF Format](http://www.uwf.edu))

Plagiarism Policy: ([WORD Format](http://www.uwf.edu)) | UWF Library Online Tutorial: Plagiarism | Student Handbook: ([PDF Format](http://www.uwf.edu))

**Assistance for Students with Disabilities:**

The Student Disability Resource Center (SDRC) at the University of West Florida supports an inclusive learning environment for all students. If there are aspects of the instruction or design of this course that hinder your full participation, such as time-limited exams, inaccessible web content, or the use of non-captioned videos and podcasts, please notify the instructor or the SDRC as soon as possible. You may contact the SDRC office by e-mail at sdrc@uwf.edu or by phone at (850) 474-2387. Appropriate academic accommodations will be determined based on the documented needs of the individual.
**Weather Emergency Information:**

In the case of severe weather or other emergency, the campus might be closed and classes cancelled. Official closures and delays are announced on the UWF website and broadcast on WUWF-FM.

- WUWF-FM (88.1MHz) is the official information source for the university. Any pertinent information regarding closings, cancellations, and the re-opening of campus will be broadcast.
- In the event that hurricane preparation procedures are initiated, the UWF Home Web Page and Argus will both provide current information regarding hurricane preparation procedures, the status of classes and the closing of the university.

Emergency plans for the University of West Florida related to weather or other emergencies are available on the following UWF web pages:

- Information about hurricane preparedness plans is available on the UWF web site: [http://uwfemergency.org/hurricaneprep.cfm](http://uwfemergency.org/hurricaneprep.cfm)
- Information about other emergency procedures is available on the UWF web site: [http://uwfemergency.org/](http://uwfemergency.org/)