

COURSE SYLLABUS

Course Title:

- Chemical Oceanography

Course Prefix/Number:

- OCC 4002

Course Credit Hours:

- 3

Instructor Name and Contact Information:

- Mr. Jon Stewart
- jas76@students.uwf.edu

Prerequisites or Co-Requisites:

- CHM 2046, CHM 2046L

Course Description:

• The chemical composition of the oceans and the physical, chemical, and biological processes governing this composition in the past and present. Topics covered include cycling of carbon, nitrogen, phosphorus, silicon, and oxygen, and processes of primary production, export production, remineralization, diagenesis, and air-sea gas exchange.

Goals: Upon completion of the course, students will ...

1. Understand the major controls (i.e., sources and sinks) on the chemical composition of the ocean
2. Understand the concept of constant composition of ions in the ocean
3. Classify and describe patterns of distribution for dissolved constituents
4. Calculate residence times of dissolved constituents
5. Understand how the pH of the ocean is buffered
6. Describe the cycling of several major elements in the oceans, including carbon,
 1. nitrogen, phosphorus, and silicon
7. Describe organic matter cycling
8. Understand the importance of oxygen

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 may spend some additional time online during the first few weeks while you become acclimated to the online class format and you may feel overwhelmed. You should also be prepared to spend approximately 6 - 8 hours per week online completing lessons, activities, and participating in class discussions. Finally, you may want to incorporate these tips to help you get started:

- Set yourself a schedule -- check the course web site early in the class week to see what tasks you'll need to work on for the week.
- Become very familiar with the site and how to use it. It is a tool to help you learn!
- Team up with your classmates to discuss class assignments and questions you might have. Check the "Classlist" link ? for biography info and email addresses.

- Ask questions when you need answers. If you have problems, contact your instructor ASAP! I will help you come up with a solution!

Topics/ Student Learning Outcomes

- Topic 1: Physical Properties of Water
 - Know why water is unique
 - Understand how the properties of water control our environment
 - Understand how the properties of water facilitate life
- Topic 2: Salinity
 - Understand how salinity is measured and in what units
 - Understand "Constant Composition"
 - Describe variations in salinity at the surface and with depth
 - Know the average ocean salinity
- Topic 3: Temperature
 - Describe the distribution of surface temperatures
 - Describe the distribution of temperature with depth
 - Describe how temperature relates to water movement
- Topic 4: Density and Pressure
 - Know the definition of a water mass
 - Understand the concept of adiabatic temperature change
 - Understand T-S diagrams
 - Describe how the ocean is mixed
- Topic 5: Classification of Dissolved Constituents
 - Be able to classify dissolved constituents as conservative, non-conservative, recycled, or scavenged
 - Describe the distribution of dissolved constituents based on their classification
 - Be familiar with the periodic table of depth distribution
- Topic 6: Sources and Sinks
 - Identify and describe the major exchange boundaries
 - River input
 - Air-sea exchange
 - Hot rocks
 - Sediment-water exchange
- Topic 7: Sources and Sinks Continued
 - Be able to calculate residence times
- Topic 8: Carbon Dioxide
 - Understand the buffering capacity of seawater
 - Understand and be able to calculate alkalinity
 - Understand carbonate chemistry
 - Equations of dissolution of carbon dioxide in water
 - Define CCD
 - Understand how CCD affects preservation

- Topic 9: Nutrients
 - Define nutrient
 - Be able to describe the cycling of nitrogen
 - Be able to describe the cycling of phosphorus
 - Be able to describe the cycling of silicon
- Topic 10: Trace Elements
 - Understand how to measure trace elements
 - Describe the patterns and distribution of trace elements
 - Describe and understand the importance of IronEx experiments
- Topic 11: Organic Matter
 - Understand the concept of primary production
 - Know the major primary producers in the ocean
 - Describe the fate of primary production in the ocean
 - Understand Redfield Ratios and be able to use them in identifying limiting nutrients
- Topic 12: Importance of Oxygen
 - Understand how organic matter is degraded and why oxygen is important in this process
 - Know the general formula of organic matter degradation
 - Understand the concept of the oxygen minimum layer
 - Be able to calculate apparent oxygen utilization
 - Understand the process of diagenesis and be able to put the steps in order
 - Describe the ocean conveyor belt

Texts:

Required texts:

- *Marine Biogeochemical Cycles, 2nd Edition* by Rachel James for The Open University, ISBN: 0750667931
- *Seawater: Its Composition, Properties and Behavior, 2nd Edition* by The Open University, ISBN: 0750637153

Required Materials:

- Internet Access
- E-mail Account
- Others as required (special materials, software, access to specific web sites, etc.)

Grading / Evaluation:

- The course grade will be determined as follows:
 - Elements that make up the grade
 - Homework assignments (20%)
 - 2 lab exercises
 - 11 summary assignments of journal articles, audio clips, or videos
 - 12 short answer assignments
 - Discussion session participation (20%)
 - Weekly participation in “Muddiest Point” discussion
 - Participation in 7 lead discussions
 - Midterm exam (30%)
 - Covers course material during weeks 1-6
 - Exam should be completed during week of October 13

- Final exam (30%)
- Comprehensive final exam with more emphasis on course material covered during weeks 8-12
- Date of final exam TBA

Program Goals:

This is a required course for completion of a BS degree in Oceanography.

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:

- Adobe Acrobat Reader: <http://www.adobe.com/products/acrobat/readstep2.html>
- PowerPoint Viewer: <http://microsoft.com/downloads/details.aspx?FamilyId=D1649C22-B51F-4910-93FC-4CF2832D3342&displaylang=en>
- Windows Media Player: <http://www.microsoft.com/windows/windowsmedia/download/>
- Quicktime Player: <http://www.apple.com/quicktime/download/>
- RealPlayer: <http://forms.real.com/netzip/getrde601.html?h=207.188.7.150&f=windows/RealOnePlayerV2GOLD.exe&p=RealOne+Player&oem=dl&tagtype=ie&type=dl>
- Macromedia Flash Player: http://macromedia.com/shockwave/download/download.cgi?P1_Prod_Version=ShockwaveFlash

Expectations for Academic Conduct/Plagiarism Policy:

- Academic Conduct Policy: (Web Format) | (PDF Format) | (RTF Format)
- Plagiarism Policy: (Word Format) | (PDF Format) | (RTF Format)
- Student Handbook: (PDF Format)

ASSISTANCE:

Students with special needs who require specific examination-related or other course related accommodations should contact Disabled Student Services (DSS), uwf.edu/dss, (850) 474-2387. DSS will provide the student with a letter for the instructor that will specify any recommended accommodations.