Fall 2016
MSCI/BIOL 752 & MSCI 599 - Marine Biogeochemistry (3 credits)
SJMC 115, T, Th 4:25-5:40

Instructor: Prof. Ron Benner (Sumwalt 346; 777-9561; benner@mailbox.sc.edu)
Office Hours: T, Th 1:00-2:00 pm or by appointment

Course Description:
A study of the biological, chemical, geological, and physical processes that influence the cycling of major bioactive elements (C, O, N, P, S) in aquatic systems.

1. Course Objectives (stated as Learning Outcomes):
   Upon completion of the course, the student should be able to:
   • Students will be able to discuss current theories concerning the origin of oxygen in the Earth’s atmosphere and its impact on biogeochemical cycles.
   • Students will be able to explain the role of rock weathering in the long-term control of global atmospheric carbon dioxide concentrations.
   • Students will be able to identify the major pathways of carbon sequestration in the ocean and discuss their influences on ocean biogeochemistry.
   • Students will be able to describe the biological remineralization of organic matter under aerobic and anaerobic conditions.
   • Students will be able to summarize the stoichiometric linkages among major bioactive elements.
   • Students will be able to summarize the global carbon cycle and the fate of anthropogenic carbon dioxide.
   • Students will be able to analyze and evaluate articles published in major journals.


3. Instructional Delivery Strategy:
The course will include classroom lectures (60%), assigned reading and discussion (20%), graduate student presentations and discussion (10%), discussion of homework problems (5%), and exams (5%).

4. Course Requirements:
There will be two written exams, a midterm and final. The exams will consist of short-answer and essay questions, some of which require quantitative evaluations. Homework assignments will be given periodically during the semester and will focus on word problems that require quantitative responses. Graduate students (MSCI/BIOL 752) will give oral presentations in class on assigned topics. Undergraduate students (MSCI 599) will write summaries of assigned readings.
Final grades will be calculated using the following weighting:
40% midterm and final exam scores
20% homework assignment scores
20% class discussion of assigned readings
20% oral presentations (20 min. graduate students; 10 min. undergraduate students)

Graduate students will give 20 min. oral presentations, and Undergraduate students will give 10 min. oral presentations to the class on an assigned topic in marine biogeochemistry. Each graduate student will choose an article on the topic of their presentation for distribution to the class at least 4 days prior to their presentation. Presentations should focus on teaching the material to the class. Students are encouraged to ask questions during the presentations and to engage in classroom discussions following presentations. Material covered during presentations and discussions will be covered on the exams.

EXAM SCHEDULE: Mid-term exam-Sep 29 (TH), Final exam-Dec 8 (Th) at 4:00 pm

Grading scheme (90-100=A; 86-89=B+; 80-85=B, 76-79=C+; 70-75=C; 66-69=D+; 60-65=D; ≤59=F)

5. Outline of Topics to be Covered:
   - Linkages among cycles of bioactive elements
   - Origin of life and evolution Earth's atmosphere
   - Tracers and ocean transport
   - Organic matter production and composition
   - Organic matter remineralization
   - Organic matter export from the euphotic zone
   - Remineralization and burial in sediments
   - Overview of the major biogeochemical cycles (C, O, N, P, S)

6. Attendance Policy and Class Expectations:
   - attend every class period
   - come to class prepared to contribute and learn
   - do assigned readings before class and take notes during class
   - all cell phones should be turned off during classes

7. Office of Student Disability Services policy statement:
Any student with a documented disability should contact the Office of Student Disability Services at 803-777-6142 to make arrangements for appropriate accommodations.