Academic Policies and Procedures Committee

PROPOSAL FORM---Part C (for General Education Courses ONLY)

NOTE: For courses that will be new to the catalog or those that require changes to the catalog copy, Academic Policies and Procedures Proposal Form, Parts A and B, should accompany this form.

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Proposal # CHE 2008-07
Effective Date (semester/year) Fall/2009

College  Arts & Sciences

Dean  Dr. Tony Calamai

Department/Program  Chemistry

My signature below indicates that this course will be offered at least one time, either fall and/or spring, for the next three years.

Department Chair/Program Director  Date

Course prefix, number, and title:

CHE 4620 Environmental Chemistry

1. General Education component for which the course is proposed:

   _____ Aesthetic Perspective
   _____ Historical and Social Perspective
   _____ Local to Global Perspective
   _____ Science Inquiry Perspective
   _____ Course Designation within a Perspective
   _____ Fine Arts
   _____ Literary Studies
   _____ Historical Studies
   _____ Quantitative Literacy
   _____ Wellness Literacy
   _____ First Year Writing
   _____ Second Year Writing
   _____ Writing in the Discipline
   __X__ Capstone Experience
2. Describe how this course will meet the criteria for the General Education component identified in item 1. (See the website www.generaleducation.appstate.edu for specific criteria for each component.)

CHE 4620 Environmental Chemistry is an existing course taken by chemistry majors with the environmental concentration, but enrollment is open to all students who meet the prerequisites. It meets the criteria for a capstone course in the following ways:

- **CHE 4620 is a senior-level four-credit course** which includes three hours of lecture and three hours of lab per week. Students work independently or in small teams on semester-long projects which address local environmental problems such as pesticide use in the Fraser fir tree farming industry and the impacts of different atmospheric aerosol sources on the regional climate. For the past three years, this course has been taught using service-learning pedagogy and students often submit their final reports to local environmental agencies such as the Agricultural Extension Office.

- **Students prepare written reports summarizing original lab-based research conducted on one or more local environmental issues.** Students must include a thorough review of the literature and write in a format suitable for submission to a peer-reviewed chemistry journal.

- **In the past, the course has been team-taught by two chemistry professors whose research interests focus on water quality (Babyak) and atmospheric chemistry (Taubman). This format provides students broad exposure to environmental issues while at the same time exposing them to focused and timely research in water and atmospheric chemistry.**

- **The junior writing in the discipline course (CHE 3303 Physical Chemistry I Lab) is a prerequisite.**

3. **Required attachments: Include representative syllabi and a biographical statement for 2-5 faculty members who will teach the course.**

*Spring 2009 syllabi (Babyak and Taubman)*

*Biographical Sketches (Babyak and Taubman)*

4. **Which goals and learning outcomes will be addressed in the course?**

**Goal 1: Thinking critically and creatively.**

- A. Recognize, differentiate, and effectively employ appropriate and increasingly sophisticated strategies to collect and interpret information.
- B. Successfully integrate disparate concepts and information when interpreting, solving problems, evaluating, creating, and making decisions.
- E. Apply theories from a variety of disciplines and advance convincing reasons to connect as well as differentiate theories from different domains of knowledge.

*These outcomes will be achieved as students work on their group projects. Students will consult a variety of sources in the literature to select and develop analytical methods to be used in their projects. They will use information from a variety of disciplines as they formulate sound research*
questions and develop plans to address them. They will also compare and contrast their findings to those reported in the literature.

Goal 2: Communicating Effectively
A. Articulate and comprehend effectively, using verbal or non-verbal communication suitable to topic, purpose, and audience.
E. Read actively and analytically at the college level and synthesize and apply information and ideas from their reading across disciplines.
F. Know, apply, and communicate college-level quantitative concepts and methods.

A well-written project report is evidence of this learning outcome. The report must include a review of the relevant literature, which will require students to read and comprehend the chemical literature. Students must explain how their data logically support their conclusions.

Goal 3: Making Local to Global Connections
A. Analyze past and present relationships between humans and the natural and physical environment.
C. Demonstrate the ability to think critically and creatively about the relationship between local regions and global issues, processes, trends, and systems.

Most environmental issues are intimately tied with the past. In many cases, humans have learned from their mistakes and have supported government which regulates polluters. Students will encounter this link with the past as they work on their projects. They will also address the relationship between local and global environmental issues by studying concepts such as bioaccumulation, biomagnification, and pollutant transformation and transport.

Goal 4: Understanding Responsibilities of Community Membership
A. Identify potential consequences that personal choices as well as political, economic, and other social forces may have on individual, societal, and environmental health.
C. Collaborate effectively with others in shared processes of inquiry and problem solving.

Most student projects are developed in response to a community need. For example, past student projects have focused on the development of an analytical method to quantify pesticides used in the Frasir fir tree farming industry, because local residents who live near these farms are concerned about the safety of their well water. As students worked on this project, they addressed the advantages and disadvantages of pesticide use in this industry, and factors which motivate an industry to use pesticides. Most student projects are completed in small groups which teaches students teamwork and accountability. In rare cases, when only one student was enrolled, an independent project was performed.

5. How will the course be assessed for achievement of the general education goals and learning outcomes?

The primary product of this course is the student final project report. A scoring rubric will be developed and used to grade the reports to determine if the reports did in fact meet the above outcomes. In addition, students will be asked to complete a survey in which they discuss how the course addressed the general education learning goals and outcomes and how effectively the course incorporated other gen ed experiences.

6. Is this course being proposed as part of a theme?  

   X  No   ___  Yes (if yes, please respond to items a, b, and c)
a. List the perspective and approved theme for which this course is being proposed.

NA

b. What forms of integration will be employed for this course?

NA

c. Provide estimated costs for achieving integration (such as lecture series, field trips, writing consultants, etc.).

NA
CHE 4620
ENVIRONMENTAL CHEMISTRY
SPRING 2009

Instructor: Carol M. Babyak
Office: CAP 459
Phone: 262-2756
E-mail: babyakcm@appstate.edu

Office Hours: M 9-11 and 4-5; W 9-11; F 9-11; by appointment.

Meeting Times: Thursday, 1-4 minimum.

Course Description
A capstone course for students pursuing a concentration in Environmental Chemistry, this course will focus the wide diversity of subject matter required by this major. The course will involve discussions and applications of air, water and soil chemistry while giving the student an appreciation of the scientific, legal, political and economic issues inherent in Environmental Chemistry. Prerequisites: CHE 3301, CHE 4560, STT 2810. Lecture three hours, laboratory three hours.

Text
Reading materials will be provided by the instructor. You should be able to search the chemical literature for additional information.

Course Objectives
1. Problem-solving- apply chemical concepts to an environmental problem.
2. Communication- present your ideas, plans, and results effectively through written and oral means.
3. Service- provide a needed environmental service to a local agency.

Service-Learning
In this laboratory, a teaching method called service-learning will be used. In service-learning, students perform community service that relates to the course content. Students also reflect on the relationship between the service performed and the course material. Students learn by doing, and this type of learning is more permanent, as illustrated by the following quote:

"Tell me and I forget. Teach me and I may remember. Involve me and I will learn."
-Benjamin Franklin

In this laboratory, you will perform a semester-long service project. You will work directly with the NC Cooperative Extension Office located in Boone. You will provide a service to the Extension Office and the local community, while simultaneously gaining valuable technical skills and knowledge about a local environmental problem.

We are using the service-learning pedagogy, because it forces students to actually do things, and the knowledge gained from doing is more permanent than that gained from performing “cookbook” experiments. In addition, your services are actually needed by the Extension Office and the community; therefore, you should feel needed. You are an important member of the local community and can make a difference.

The service-learning project that you will perform this semester is pesticide analysis of water samples collected from high-risk wells in Watauga County. The Extension Office receives calls on an almost daily basis from people in Watauga County who are concerned about their well water, especially if they
live below a farm. The Extension Office will help you identify the high-risk wells and target pesticides, but you are responsible for doing everything else. The following is a list of things to consider as you plan your work:

Sampling:
- How is well water sampled?
- How often should it be sampled?
- What kind of container should be used?
- Should a preservative be added?
- How should the sample be stored and for how long?

Sample Prep:
- Should the sample be filtered?
- How should the analytes be extracted from the sample?
- How long can the extract be stored?

Sample Analysis:
- What instrument should be used?
- What are the optimum parameters for the analysis?

Another very important factor to consider is QUALITY ASSURANCE and QUALITY CONTROL. Please read the separate handout on these topics. In short, you need a good quality assurance plan to prove to the client that your results are accurate and reproducible.

Service-Learning Responsibilities
1. Attend the one-hour service-learning orientation in the Student Union during the second or third week of class. The orientation will introduce you to service-learning and provide you with tips on how to make the most of your service-learning experience. Specific dates and times for the orientation sessions are as follows:

**Week 2**
- Wednesday, January 23 (Table Rock Room, 2nd Floor)
  2 Sessions: 9-10am and 10:30-11:30am
- Thursday, January 24 (Price Lake Room, 2nd Floor)
  3 Sessions: 9:30-10:30am, 11am-12noon, and 12:30-1:30pm
- Friday, January 25 (Price Lake Room, 2nd Floor)
  2 sessions: 12-1pm and 1:30-2:30pm

**Week 3**
- Monday, January 28 (Price Lake Room, 2nd Floor)
  2 Sessions: 11am-12noon and 12:30-1:30pm
- Tuesday, January 29 (Price Lake Room, 2nd Floor)
  3 Sessions: 1:30-2:30pm, 3-4pm, and 4:30-5:30pm
- Wednesday, January 30 (Price Lake Room, 2nd Floor)
  2 Sessions: 2-3pm and 3:30-4:30pm

2. Prepare a final written and/or oral report which will be submitted to the Extension Office and me. Both the Extension Office and I will evaluate the report. Your final report will be technical and will
contain all the components of a formal lab report (abstract, introduction, experimental, results and discussion, conclusion, and references). However, as you write the report, reflect on the following:

a. How has your work impacted the needs of the community?
b. Has your work revealed any other needs?
c. What were the biggest challenges facing you as you worked on the project?
d. What would you have done differently?
e. Have you discovered anything new about yourself and/or the community through working on your project?

**Senior Capstone Experience**
This course will also address the following general education learning outcomes:

**Goal 1: Thinking critically and creatively.**
A. Recognize, differentiate, and effectively employ appropriate and increasingly sophisticated strategies to collect and interpret information.
B. Successfully integrate disparate concepts and information when interpreting, solving problems, evaluating, creating, and making decisions.
E. Apply theories from a variety of disciplines and advance convincing reasons to connect as well as differentiate theories from different domains of knowledge.

These outcomes will be achieved as you work on your group projects. You will consult a variety of sources in the literature to select and develop analytical methods. You will use information from a variety of disciplines as you formulate sound research questions and develop plans to address them. You will also compare and contrast their findings to those reported in the literature.

**Goal 2: Communicating Effectively.**
A. Articulate and comprehend effectively, using verbal or non-verbal communication suitable to topic, purpose, and audience.
E. Read actively and analytically at the college level and synthesize and apply information and ideas from their reading across disciplines.
F. Know, apply, and communicate college-level quantitative concepts and methods.

**Goal 3: Making Local to Global Connections**
A. Analyze past and present relationships between humans and the natural and physical environment.
C. Demonstrate the ability to think critically and creatively about the relationship between local regions and global issues, processes, trends, and systems.

Most environmental issues are intimately tied with the past. In many cases, humans have learned from their mistakes and have supported government which regulates polluters. You will encounter this link with the past as they work on their projects. You will also address the relationship between local and global environmental issues by studying concepts such as bioaccumulation, biomagnification, and pollutant transformation and transport.

**Goal 4: Understanding Responsibilities of Community Membership**
A. Identify potential consequences that personal choices as well as political, economic, and other social forces may have on individual, societal, and environmental health.
C. Collaborate effectively with others in shared processes of inquiry and problem solving.

**Evaluation**
Your grade (for the first half of the semester) will be determined as shown below:

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<th>Component</th>
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<tr>
<td>Service-learning orientation</td>
<td>10%</td>
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<tr>
<td>Weekly meetings</td>
<td>40%</td>
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<tr>
<td>Final Written Report</td>
<td>50%</td>
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**Important Dates:**
- Wed., March 26- last day to drop a class
- Thurs., May 1- Reading day
Meeting Times
We will meet at least once per week. Meeting times will vary and depend on the activity (literature search, sampling, sample prep, etc.) being performed.

Course Description
A capstone course for students pursuing a concentration in Environmental Chemistry, this course will focus on the wide diversity of subject matter required by this major. The course will involve discussions and applications of air, water and soil chemistry while giving the student an appreciation of the scientific, legal, political and economic issues inherent in Environmental Chemistry. Prerequisites: CHE 3301, CHE 4560, STT 2810. Lecture three hours, laboratory three hours.

Text

Other materials will be provided by the instructor as needed. You will be expected to search the chemical literature for relevant information.

Course Objectives
1. Problem-solving: To apply concepts learned in the accompanying lecture and other courses to an environmental problem which is important to the local community.
2. Teamwork: To work with a group of students from a number of departments.
3. Communication: To present your experimental plan and/or results effectively.
4. Service: To provide a needed environmental service to the community.

Evaluation
Your grade will be determined from your performance on written and oral progress reports as well as a final written report, prepared in the style of a peer-reviewed scientific manuscript. The overall grade for the course will be evaluated as follows:

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<tr>
<td>Progress reports</td>
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<tr>
<td>Final Written Report</td>
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Academic Dishonesty
Cheating of any kind will not be tolerated and will be prosecuted at my discretion. You can find the Academic Integrity Code at http://www.academicaffairs.appstate.edu/resources/integrity/ and the code of student conduct at http://www.studentconduct.appstate.edu/. These policies will be enforced.

Accommodations
Should you need accommodations based on the impact of a disability (physical or learning), please contact the Office of Disability Services on campus to discuss your specific needs. Learning disabilities have to be documented before accommodations can be made.

Office of Disability Services
Appalachian State University is committed to making reasonable accommodations for individuals with documented qualifying disabilities in accordance with the Americans with Disabilities Act of 1990, and Section 504 of the Rehabilitation Act of 1973. Those seeking accommodations based on a substantially limiting disability must contact and register with The Office of Disability Services (ODS) at www.ods.appstate.edu or 828-262-3056. Once registration is complete, individuals will meet with ODS staff to discuss eligibility and appropriate accommodations.

Good Luck!
Biographical Sketches

Carol M. Babyak received her Ph.D. in Chemistry from West Virginia University in 2004 and has been at Appalachian since 2004. Her research interests include water quality, metal speciation, and detection of environmental endocrine disruptors. She has been a PI on a CCLI grant from the NSF and a co-PI on grants from NC Biotechnology and Merck-AAAS. Her research students typically present at national and regional meetings of the American Chemical Society.

Brett Taubman received his Ph.D. in Chemistry from the University of Maryland in 2004 and was a Post-doctoral Research Associate in the Meteorology Department at the Pennsylvania State University before coming to Appalachian in 2007. His research interests include regional air quality and climate issues. Specifically, he is investigating the effects of both anthropogenic (sulfate, nitrate, and soot particles from industrial and combustion processes) and natural (organic particles from biogenic emissions and wildfire) aerosols on the solar radiation budget in the Southern Appalachian region. He is a founding co-director of AppalAIR (Appalachian Atmospheric Interdisciplinary Research), a cross-disciplinary research program focused on understanding the atmospheric properties and processes and their associated impacts on terrestrial ecosystems in the southern Appalachian Mountains.