

Adding a Major Environmental Modeling Component to the Applied Calculus Class at Rhodes College

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1. Introduction

Math 115: Applied Calculus is a class that is offered as an alternative to the traditional Math 121: Calculus I course, intended for students that require introductory Calculus but will not be taking higher mathematics. It that does not satisfy the requirements of a mathematics major; rather, it satisfies requirements for Biology, Business, Economics, Biochemistry and Molecular Biology, and Neuroscience majors, as well as satisfying a “F6” requirement (the mathematics general requirement) for students of any major. Currently, two sections of this course are offered each semester, enrolling over 100 students per year.

During the summer of 2006, the Math 115: Applied Calculus course at Rhodes College was substantially revised by Professors Dunwell and Seaton to include a major modeling component, computer applications, and substantial group work. Students complete three major modeling projects in groups of five or six resulting in a paper, a presentation, and a poster presentation. Currently, some of these modeling projects involve environmental science applications. The funds from this grant will be used to create additional projects, all involving environmental applications, so that two of the three projects will involve environmental applications based on actual data collected during environmental studies.

a. Goals

Our goal is to develop learning materials to be used in Math 115: Applied Calculus that will expose the students at Rhodes College and, in particular, the students pursuing the environmental science minor, to the mathematical techniques used in environmental science. The specific objectives are:

- I. Each student taking Math 115: Applied Calculus should work on environmentally oriented projects.
- II. Students pursuing an environmental science minor at Rhodes College should be encouraged to take Math 115: Applied Calculus.

b. Justification

Math modeling and computing is a major component of environmental science, and in particular the study of climate change. Therefore, environmental science students should be exposed to and have direct experience with mathematical modeling in the context of environmental science. Currently, an environmental science student looking for this exposure has no clear options at Rhodes.

Environmental science and climate change are becoming dominant fields of study and major issues. Students with a liberal arts education should be aware of these issues and have experience that allows them to relate to the methods used to study these issues. Due to its emphasis on modeling and applied mathematics, the Applied Calculus course is the appropriate place in the mathematics curriculum at Rhodes College for this material to be introduced.

c. Match with Listed Priorities

This proposal matches the priorities listed for Curriculum Development Grants in the following ways: The funds will be used to support faculty in revising an existing course in order to incorporate environmental themes. Although Math 115: Applied Calculus, the course to be revised, does not currently satisfy a requirement for the environmental science minor, one of our intentions is that the revised course will be among a list of courses students can take to satisfy a requirement for this program. The revised course will incorporate population model analyses and environmental mathematics.

2. Project Description

a. Activities

Professors Dunwell and Seaton will spend the funded period of this project researching and collecting data from environmental studies and, in particular, climate change modeling. This data will be used to write six to ten projects for the Math 115: Applied Calculus course, so that every student taking the course will be involved in at least two modeling projects involving environmental sciences.

b. Timetable

Dates	Activity
May 12 th through May 14 th , 2008 (funded period)	Professors Dunwell and Seaton will, in consultation with one another, research and collect data to be used in the projects.
May 15 th through May 21 st , 2008 (funded period)	Professors Dunwell and Seaton will write the projects.
May 22 nd through 23 rd , 2008 (funded period)	Professors Dunwell and Seaton will align the projects and incorporate them in the Math 115 course.
June, 2008 (unfunded period)	Course revisions will continue pending funding from other sources
August 4 th , 2008 (unfunded period)	Revised course will be submitted to the Environmental science Committee at Rhodes College for review and so that the course can be considered for satisfying a requirement of the Environmental science Minor at Rhodes College. Revised Course materials will be made available to the ACS for posting on the CFD web site.
August 27 th through December 17 th , 2008 (unfunded period)	The revised course will be offered through the Mathematics and Computer Science department at Rhodes College.

c. Budget and Justification for Each Line Item

Item	Cost	Justification
Stipend for Rachel Dunwell	\$550.17	Stipend for May 12 th through May 23 rd , 2008
Fringe Benefits for Rachel Dunwell	\$154.05	Fringe Benefits, based on 28% of stipend as stipulated

		in the Rhodes College Handbook
Stipend for Christopher Seaton	\$550.17	Stipend for May 12 th through May 23 rd , 2008
Fringe Benefits for Christopher Seaton	\$154.05	Fringe Benefits, based on 28% of stipend as stipulated in the Rhodes College Handbook
Total Direct Costs	\$1408.44	
Indirect Costs	\$591.55	42% of Direct Costs as stipulated in the Rhodes College Handbook
Total Costs	\$1999.99	

d. Syllabus

The most recent syllabus of Math 115: Applied Calculus is attached.

3. Evaluation and Dissemination

a. How the Success of the Project will be Evaluated

This initiative will be evaluated both by peer review and student surveys. The Environmental Science Committee, a faculty committee that oversees the environmental science minor, has volunteered to review these revisions. Based on this review, we will request that this course satisfy one of the requirements for the environmental science Minor. Math 115 already involves a number of student surveys designed to assess student learning, and we will add questions to these surveys involving environmental awareness.

b. How the Project Will Be Publicized Within the ACS

The complete course materials for Math 115: Applied Calculus, including the recent and proposed revisions, will be made available to the ACS for posting on the CFD web page. Additionally, Professor Dunwell and Seaton will post these materials on their personal web pages. A CD-Rom containing the complete course materials will be filed in the department at Rhodes for future use of other faculty, and, in the event that the course materials are too large for posting on the CFD web page, copies of this CD-Rom will be given to the ACS to be made available to other departments.

4. Institutional Approval (attached)

5. Disclosure Statement

Currently, Professors Dunwell and Seaton are pursuing additional funding from Hill Fund for Curricular Development and Pedagogical Initiative of Rhodes College for expanding this project to other introductory mathematics courses. The Hill proposal, if funded, will support time after the funded period of this proposal. Although the efforts involved in these two initiatives will be applied and evaluated simultaneously, the funded periods of the two grants will not overlap.

6. Curriculum Vitae (attached)