Updated Interim Report
Reform of Introductory Science Courses for Non-Majors
Spring 2006 Mini-Grants
June 5, 2007

Joseph Gindhart, Ph.D.
Email: jgindhar@richmond.edu Phone: 804-287-6892
Institution: University of Richmond
Title of Project: Development of a Nonmajors Biotechnology Course at the University of Richmond
Dates of Project: May 2006-August 2007
Amount Awarded: $6750

1) Original goals and objectives: The objective of the proposal is to develop a non-majors biotechnology course with laboratory at the University of Richmond. The grant award provides funds for an undergraduate assistant and I to identify, test, and develop laboratory modules, create course materials, and explore connections with the local biotechnology industry, the Pew Initiative on Food and Biotechnology, and the UR Career Development Center.

2) Changes to goals/objectives: There have been no changes to the goals and objectives of the proposal. Although the project is still underway, I do not foresee any major changes to the proposal.

3) Activities underway and/or completed to date:

   - Lab content: University of Richmond student Richard Thompson worked in my lab from May 23, 2006-July 17, 2006. He did background research to find relevant lab exercises and then try each experiment in the lab. As expected, some were easier than others, and had different success levels. Some of the experiments that work include making yogurt and kimchi, growing Wisconsin Fast Plants, transforming green fluorescent protein into *E. coli*, isolating coliform bacteria from water sources on the UR campus, making queso blanco cheese, DNA fingerprinting of different strains of *E. coli*, and growing insect-resistant transgenic corn plants. Some experiments were less successful, such as isolating green fluorescent protein from bacteria, the *Terror from* Paradise interactive forensic kit obtained from Ward's Natural Science, and making mozzarella cheese. A laboratory exercise using Wisconsin Fast Plants for bioremediation shows promising results, but is still under development.

   - **Summer 2007:** University of Richmond student Jordan Cox began working on the project May 29, 2007. He will continue working half time on the project until August 10, 2007. He will develop laboratory exercises related to cloning, genetic testing, forensic science, and bioterrorism. Jordan has done research in my laboratory since September 2006; I am confident Jordan and I will complete course development this summer.

- Textbook selection: I have reviewed *Understanding Biotechnology*, by Borem, Martin, and Santos (2003, Prentice Hall). It is a good introductory text, but I am concerned that it may become outdated before I teach the course in fall 2008. I will revisit this textbook selection in the future; selecting a different book will require no additional input of ACS resources.

- **Summer 2007:** Please see proposed syllabus attached to report for additional details about the course. I will submit the course for institutional approval during the fall semester, and submit a final report to Associated Colleges of the South before August 30, 2007.

- Travel: As outlined in the proposal, I plan to develop contacts in the local biotechnology industry, the Pew Initiative on Food and Biotechnology, and the University of Richmond Career Development Center; these efforts are underway.

4) Snags/unanticipated delays: The project is going well. I wish to explore the plant bioremediation lab in more detail, but the resources required for that lab will be procured before the end of the grant.

5) Approved budget:

    - Labor: $5000
    - Supplies: $1500
    - Travel: $250

6) Financial accounting of funds through October 15, 2006:

    - Labor: Funds expended-$3171.96. Available balance: $1828.04.
    - Supplies: Funds expended-$347.52. Available balance: $1152.48.
    - Travel: Funds expended-$0. Available balance: $250.

    Summer 2007:
    - Labor: Available balance: $2078.04. Expect to spend all available funds on student researcher.
    - Supplies: Available balance: $1152.48. Expect to spend available funds on supplies related to lab exercise development.
    - Travel: Transferred funds to Labor account; will use personal/departmental funds for travel. This transfer will enable the student researcher to work an additional week on the project.

Proposed Syllabus-Biology 1xx-Introduction to Biotechnology
Fall 2008

Instructor: Dr. Joseph Gindhart
Gottwald B-214 287-6892 jgindhar@richmond.edu

Lecture: Tuesday-Thursday 8:15-9:30

Labs: Section 1: Tuesday 1:35-3:30 Section 2: Thursday 1:35-3:30

Required Materials: Blackboard- access to course materials is available at blackboard.richmond.edu. I will use the course website to post the syllabus, reading list, and other handouts. The resources will be in pdf format, and can be downloaded and printed using Adobe Acrobat Reader. Text- *Understanding Biotechnology*, Borém, Santos, and Bowen, is available at the bookstore.

Office Hours: Monday 11:00a-12:00p, or by appointment.

Course Goals: Our objective in Introduction to Biotechnology is to understand what biotechnology is and what it is not. We have a vested interest in how modern agricultural practices affect the food we eat, the progress of efforts to develop new drugs, the ethics and benefits of cloning, forensic science, bioterrorism, and how we can improve the environment. The laboratory section of the course will include topics such as recombinant DNA technology, fermentation, protein engineering and purification, biosensors, and natural products.

Attendance policy: Regular attendance is expected at lectures, and required at lab. Lab requirements will be discussed in more detail during the first week of lab.

Exams: There will be 3 hourly exams (100 points each, 300 points total) and a final exam (150 points). Exams will cover material presented in lecture and class readings, with emphasis on lecture material. THERE WILL BE NO MAKE-UP EXAMS. YOU MUST NOTIFY ME IN ADVANCE IF YOU CANNOT TAKE AN EXAM AT THE ASSIGNED TIME.

Grading: The lecture section of the course is worth 450 points (75%), while the lab section is worth 150 points (25%).

Extra credit: There will be an opportunity to earn up to 15 points of extra credit during the semester; stay tuned for more details!

Honor Code: You must abide by the University Honor Code Statute, as described in the Undergraduate Catalog.

"The School of Arts and Sciences, the Jepson School of Leadership Studies, and The Robins School of Business each operate under the University Honor Code Statute. Breaches of the code are cheating, plagiarism, lying, academic theft, disclosing honor council information, registration irregularity, and failure to report an Honor Code Statute violation. Any person who violates these standards shall be subject to disciplinary action ranging from reprimand up to and including expulsion from the University. Determination of guilt or innocence and imposition of sanctions, when necessary, will be effected according to established procedures, with procedural fairness observed, and with appropriate appeal procedures available."

Incidents of alleged violation of the Honor Code Statute will be submitted to the Honor Council.

You must also sign the honor pledge on any work you hand in for course credit: "*I pledge that I have neither given nor received unauthorized assistance during the completion of this work*." I encourage you to discuss course assignments with your colleagues, but all assignments handed in for course credit must be your own work.

Course Schedule (subject to change):

Date	**Topic**	**Readings**
T 8/26	Introduction	
R 8/28	History of Biotechnology	Chapter 1
T 9/2	Genetic Engineering	Chapter 2
R 9/4	Genetic Transformation	Chapter 3
T 9/9	Biotechnology Products	Chapter 4
R 9/11	Biotechnology Products II	
T 9/16	**Exam 1: Chapters 1-4**	
R 9/18	Biosafety	Chapter 5
T 9/23	Cloning	Chapter 6
R 9/25	Gene Therapy	Chapter 7
T 9/30		
R 10/2	**Exam 2: Chapters 5-7**	
T 10/7	Pharmacogenomics	Chapter 8
R 10/9		
T 10/14	**Fall Break**	
R 10/16	Molecular Markers	Chapter 9
T 10/21	Forensic DNA	Chapter 10
R 10/23		
T 10/28	**Exam 3: Chapters 8-10**	
R 10/30	Bioremediation	Chapter 11
T 11/4		
R 11/6	Biodiversity	Chapter 12
T 11/11		

R 11/13	Bioterrorism	Chapter 13
T 11/18		
R 11/20		
T 11/25	Bioethics	Chapter 14
R 11/27	**Thanksgiving Break**	
T 12/2		
R 12/4		
TBA	**Final Exam: Chapters 11-14**	

Lab Schedule

Date	**Topic**	
Week of 8/26	Old School Biotechnology Project*	Kool-Aid Pickles
Week of 9/2	Green Fluorescent Protein	pGREEN *E. coli*, transgenic *Drosophila**
Week of 9/9	Transgenic Corn	Bt corn vs. the European Corn Borer*
Week of 9/16	Transgenic Corn II	
Week of 9/23	Cloning	Related to Chapter 5-7 content¡
Week of 9/30	Cloning II	
Week of 10/7	Genetic Testing	Related to Chapter 8 content¡
Week of 10/14	**Fall Break**	
Week of 10/21	CSI: Richmond	Related to Chapter 9-10 content¡
Week of 10/28	CSI: Richmond II	
Week of 11/4	Bacteria of UR	Detection of coliforms with Coliscan Easygel*
T 11/11	Bacteria of UR II	
T 11/18	Bioterrorism	Related to Chapter 13 content¡
T 11/25	**Thanksgiving Break**	
T 12/2	Bioterrorism II	

*Richard developed these labs last summer
¡Jordan will develop these labs this summer