

Final Report
Reform of Introductory Science Courses for Non-majors
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June 28, 2006

Project Title: **Key Figures in Modern Physics**

Date of Project: June 2005 - June 2006

Amount Awarded: \$3000

1. Original Goals and Objectives:

This proposal will adapt the current course to make it more engaging to non-science majors by presenting scientific material in a context that is already familiar to them. Specifically it would add five modules to the existing course, each one focusing on a single individual who made outstanding contributions not only to science but also to history. The scientific achievements made by each of these individuals will be discussed within the context of the historical, political, religious and logistical struggles of their time. The five individuals selected for the modules are Thomas Jefferson, Benjamin Franklin, James Clerk Maxwell, Albert Einstein and Robert Oppenheimer.

The goal is to stimulate good discussion (both in class and in writing assignments) of scientific discovery as viewed through the eyes of both the scientists and their contemporaries. In some cases appropriate lab activities that reproduce important discoveries will be conducted.

2. Changes-none

3. The Meeting of Goals

While the course associated with this grant will not be taught until Winter 2007, plans are in place to use the materials developed with the grant.

The lab activities associated with Maxwell are a good example. Using circuits developed with the grant, each lab group will be able to produce and detect radio waves in a fashion similar to that used by Maxwell. It is easy for the students to show that the waves produced have the properties predicted by electromagnetic field theory. The scientific proof offered by this exercise changed physics and gives real insight into the nature of the scientific method.

The module on Oppenheimer, enhanced by links to a web site at the Berkley campus, shows clearly the relationship between science and society, both in technical and political terms. While the articles show Oppenheimer was essential to the success of the original atomic bomb project, the module also shows that the removal of his dissenting voice from the H bomb discussion was an important political decision of the day.

4. Evaluation/Assessment

Students will evaluate the impact of the grant in the next offering of the associated course in the winter of 2007. The instrument to be used is shown below.

Evaluation Questions
“Key Figures in Modern Physics”

1. From which of the key figures did you learn the most? Why was the study of this individual helpful?
2. Did the study of key figures improve your understanding of the scientific method? Give specific answers if possible.
3. Did the study of key figures improve your understanding of the relationship between science and society? If possible list examples you found interesting of the political involvement of the key figures.
4. What was the most interesting aspect of the modules:
Franklin:

Jefferson:

Oppenheimer:

Maxwell:

Einstein:
5. Should the key figures modules be used in future offerings of the course?
6. What could be done to make the modules more useful in promoting discussion?
7. Did the discussion in this course help in your understanding of science and the scientific method?

5. Lessons Learned

A very positive lesson was learned from the visit to the Franklin Institute. Science building lobbies offer an opportunity to invite interest in the curriculum with effective displays. The Franklin Institute has many fine demonstrations that were photographed and documented as part of the grant activities. With the construction of new science facilities here at Furman it would have been wise to have included more of this kind of activity in the grant.

The most interesting lesson learned may have to do with future curriculum development. The richness of the lives of key figures brings out clearly the inter-connected nature of science and politics. Based on the experiences offered by this grant I plan to develop a freshman seminar course that explores science and politics as seen through the eyes of key figures.

6. Sharing of Results

Results were shared with ACS members at the fall meeting at Furman in September.

7. Next Steps

The next steps are clear. First, the changes in the course associated with the grant will be made in February, and the evaluations will be reviewed.

The most interesting outcome of this grant may well be a freshman seminar course that will be developed next year for the new curriculum that has been established at Furman. This grant allowed activities that will be of great help in developing the new curriculum.

8. Financial Statement

Item	amount funded	amount paid to date
Stipend	\$2500	\$2500
Film/processing	\$100	\$110
Travel to Monticello	\$200	\$200
Books/publications	\$200	\$108
FICA Expense		\$ 82
	Total	\$3000

Appropriate receipts are on file in the Furman grants office.

9. Permission to post

ACS has my permission to post my original proposal and results on the ACS Science Reform Website.

