

## **Integrating Undergraduate Research Across the Curriculum at The College of William and Mary: Report on First-Year Activities (March 2008)**

During the first year of this grant we have funded 30 separate initiatives that have built sustainable undergraduate research programs in 22 different academic departments. In our proposal we committed to contributing \$44,000 in William and Mary funds toward the cost of first-year projects; the College has actually contributed \$72,000 toward these costs. Most important, the early signs are that these initiatives are having a transformative impact on the undergraduate research program at the College.

In our grant proposal we identified bringing research “*into* the curriculum” as one of our two primary objectives. Undergraduate research at most institutions is largely a co-curricular initiative that is restricted to an academically select group of students working outside the credit-bearing curriculum. We have sought to bring research into the curriculum in order to better integrate the teaching and research missions of the College, and especially to reconcile research with the liberal arts traditions and aspirations that lie at the core of our undergraduate program.

A survey of the initiatives funded during the first year of this grant indicates that we have made significant headway toward achieving this goal. Almost all of the projects that we have funded, as you will see in the project summaries that appear at the end of this document, represent significant course revisions. For example, the European Studies program has used grant funding to add a 1-credit research seminar to its core course, Introduction to European Studies. This new research seminar will enrich the educational experience of introductory students and provide them with an opportunity to develop original papers for presentation at the annual Student-Faculty Conference in European Studies, which is held each year in April.

It has become clear that this project has an enormous potential to reinvigorate William and Mary’s curriculum, and especially the teaching methods with which this curriculum is delivered. As a result of this grant, we are presenting our students with many more opportunities to work with primary sources, and to formulate and test hypotheses, -- for active learning, problem solving, independent inquiry, persuasive communication, and all the other components of the research experience.

The second objective that we identified in our proposal was our intention to bring research “*across* the curriculum.” While undergraduate research has become something of a buzz word at American universities, it is almost always restricted primarily to science disciplines. This trend has persisted -- at William and Mary, as well -- despite the efforts of organizations such as the Council on Undergraduate Research to move beyond this traditional base. One reason, no doubt, is that the laboratory environment makes it possible to divide labor and include a range of co-investigators at different levels of preparation.

In an effort to overcome this trend, we conducted a range of information sessions and workshops for faculty in the social sciences, humanities, and arts. One particularly successful strategy has been to invite faculty in non-science fields who have successfully incorporated research into their teaching to do presentations to interested novices. As you will see, below, the results have been impressive: fully 10 of the funded projects are in humanities disciplines; 9 are in the social sciences; 4 are in the sciences; and 3 are in mathematics. We intend to build on this success with additional workshops in the future.

One example is Alexander Prokhorov’s grant-funded project that will bring humanities research into the curriculum in the context of a study-abroad course. After taking a preparatory course held during the spring term on the William and Mary campus, his students will travel to Russia with him to conduct research on the history of film viewing and screening patterns in Moscow.

Thanks to this funding from the Andrew Mellon Foundation, research is becoming fully integrated in the curriculum and intellectual culture of William and Mary. To support this, we have two exciting web projects that are underway, one with a Web 2.0, *Facebook*-type structure that will support *in progress* student research,

and a “digital repository” that will house finished projects, including individual papers, multi-media products, undergraduate research journals, etc. We also have had three campus-wide research presentation fairs this year. As a result, the curriculum transformations that are being accomplished with grant funding are taking place in a supportive and reinforcing campus environment.

### **Budget Report and Analysis**

William and Mary’s Faculty Assembly appointed a 10-person faculty committee to oversee and administer this grant. As described in the reports below, this committee invited faculty to submit proposals on 4 separate dates (or “rounds”) during the first year of the grant.

It quickly became clear to this committee that specific funding needs, as detailed in the proposals that the committee was receiving, corresponded at a *categorical level* but not at a line-for-line level with the budget breakdown in our original proposal. For example, while we forecast that over one-third of our funding would be used to hire graduate student teaching fellows, in practice we did not receive proposals that included budget lines for graduate students. Instead, we received many more requests than we anticipated for undergraduate student support, – both for our “Mellon Teaching Fellow” program and for summer research funding. So, on a categorical level – “student funding” – our first-year expenditures match our proposed budget reasonably well because we can aggregate graduates and undergraduates under a single “student” category.

One advantage of this categorical approach is that we might, for instance, receive funding requests for graduate student support in year 2 or 3 of the grant. As a result, unlike year one, graduate student funding might become a significant component of our “Student Support” expenditures in these years. For this reason we would like to leave the remaining budget at this categorical level.

In the first table, below, we list the nine “Original Budget Lines” down the left side and show how we translate this into 4 “Budget Lines, by Category” across the top. Our categories are “Faculty Costs,” “Student Costs,” “Materials and Other Project Costs,” and “General Administration.” Then the last table details year-one expenditures by these categories.

One goal of this budget presentation is to help us plan for the future. While many of the initiatives that will be funded with grant funds are sustainable without ongoing support, many will require at least some sustaining support. By breaking down first-year spending into these 4 categories, we can begin to forecast anticipated costs by category after the three years of this grant. William and Mary has initiated a private fund raising campaign that is intended in part to provide this post-grant support.

## Year 1 Summary

<b>Grant Total</b>	<b>\$300,000</b>
<b>Year 1 Interest</b>	<b>\$2,439.53</b>
<b>Total</b>	<b>\$302,439.53</b>
Year 1 Expenses (W&M)	\$72,089
Year 1 Expenses (Mellon)	\$102,666
<b>Total Expenses</b>	<b>\$174,755</b>
<b>Total Remaining Mellon</b>	
<b>Budget</b>	<b>\$199,773.53</b>

## Budgeted Year 1 Spending, by Line and Category

This budget translates the 9 lines on our original budget into our 4 primary budget categories

Original Budget Lines	Budget Lines, by Category									
			Faculty Costs		Student Costs		Materials and other Project Costs		General Administration	
	Mellon	W&M	Mellon	W&M	Mellon	W&M	Mellon	W&M	Mellon	W&M
1) Undergraduate Research Coordinator	\$27,000	\$8,000							\$27,000	\$8,000
2) Administrative Support		\$5,000								\$5,000
3) Faculty Stipends for Summer Research Courses	\$9,000	\$9,000	\$9,000	\$9,000						
4) Graduate Mellon Teaching Fellows	\$36,000				\$36,000					
5) Undergraduate Mellon Teaching Fellows	\$5,000				\$5,000					
6) Summer Student Stipends	\$10,000	\$10,000			\$10,000	\$10,000				
7) Adjuncts to Replace Faculty Teaching New Research-Based Courses	\$8,000	\$8,000	\$8,000	\$8,000						
8) Course Related Material	\$4,000	\$4,000					\$4,000	\$4,000		
9) Website Development	\$1,000								\$1,000	
<b>Total, by Category</b>	<b>\$100,000</b>	<b>\$44,000</b>	<b>\$17,000</b>	<b>\$17,000</b>	<b>\$51,000</b>	<b>\$10,000</b>	<b>\$4,000</b>	<b>\$4,000</b>	<b>\$28,000</b>	<b>\$13,000</b>
<b>% of Mellon and W&amp;M costs by category</b>			<b>17%</b>	<b>39%</b>	<b>51%</b>	<b>23%</b>	<b>4%</b>	<b>9%</b>	<b>28%</b>	<b>30%</b>

# Actual Year 1 Spending, by Category

Project numbers (1-30) correspond with the project descriptions below

		Project Total	Faculty Costs		Student Costs		Materials and other Project Costs		General Administration	
			Mellon	W&M	Mellon	W&M	Mellon	W&M	Mellon	W&M
Round 1	1	\$8,512	\$2,000				\$6,512			
	2	\$7,000			\$7,000					
	3	\$2,500			\$2,500					
	4	\$5,000	\$2,500		\$2,500					
Round 2	5	\$8,000			\$8,000					
	6	\$8,955	\$8,455				\$500			
	7	\$4,160			\$4,160					
	8	\$12,750			\$6,000		\$6,750			
	9	\$9,000	\$9,000							
	10	\$10,000	\$5,400		\$500					
Round 3	11	\$4,700						\$4,700		
	12	\$7,215				\$7,215				
	13	\$4,600						\$4,600		
	14	\$10,375						\$10,375		
	15	\$6,580		\$3,500		\$2,080		\$1,000		
	16	\$7,700		\$7,700						
	17	\$10,200		\$4,450		\$2,000		\$3,750		
Mellon Teaching Fellows	18	\$2,000		\$500		\$1,500				
	19	\$1,500		\$500		\$1,000				
	20	\$1,500		\$500		\$1,000				
	21	\$2,000		\$500		\$1,500				
	22	\$2,000		\$500		\$1,500				
	23	\$1,000		\$500		\$500				
	24	\$1,000		\$500		\$500				
	25	\$1,500		\$500		\$1,000				
	26	\$1,500		\$500		\$1,000				
	1st Yr General Student and Admin. Support	27	\$11,502			\$11,502				
28		\$4,956			\$4,956					
29		\$20,158						\$13,431	\$6,719	
30		\$1,000						\$1,000		
<b>Total, by Category</b>		<b>\$178,863</b>	<b>\$27,355</b>	<b>\$20,150</b>	<b>\$47,118</b>	<b>\$20,795</b>	<b>\$13,762</b>	<b>\$24,425</b>	<b>\$14,431</b>	<b>\$6,719</b>
<b>% of Mellon and W&amp;M Costs, by Category</b>			<b>27%</b>	<b>28%</b>	<b>46%</b>	<b>29%</b>	<b>13%</b>	<b>34%</b>	<b>14%</b>	<b>9%</b>

**HISTORY OF QEP/MELLON FUNDED PROJECTS  
Funded in Calendar 2007**

**Round 1, June, 2007**

**For Summer, 2007 and Fall, 2007 Projects**

The first round of applications were due on June 1, 2007. The selection committee received 9 applications. It funded 4 and tabled the remaining 5. The authors of the proposals that were not funded were invited to make appropriate clarifications and changes and resubmit at a later time.

**1. Seth Aubin, Physics**

**Class Projects in Physics 351 Using Integrated Field Programmable Gate Array Chips (FPGAs)**

Research projects that draw on the capacity of FPGAs to support complex, high speed, circuits will be integrated into Physics 351, Digital Electronics. These chips support circuits with hundreds, or even thousands, of circuit elements. Working in teams during the last month of the course, students will be required to develop imaginative solutions to challenging research problems.

**2. Maria Ivanova, Government and Environmental Studies**

**Policy Research on Global Environmental Governance**

Professor Ivanova plans to create an ongoing year-around research program that incorporates undergraduates. Working with primary materials, students taking Global Environmental Governance complete research projects on the behavior and effectiveness of international organizations that are active in environmental governance. In the summer, students add data from these projects to a growing GIS-based data base, which, in turn, creates the starting place for the research of students in the course in the following school year.

**3. Xipeng Shen, Computer Science**

**The Development of a Digest Extractor for Use in Inquiry-Based Learning Projects in Computer Science 420/520**

Computer Science 420/520, "Mathematical Foundations of Artificial Intelligence" is often taught with simple "toy" problems that do not give students a deep understanding of the pros and cons of different techniques. This project will replace these toys with a digest extractor that allows students to do Machine Learning (article digesting) projects, some elementary and some that still challenge scholars.

**4. Berhanu Abegaz, Economics**

**Course-based Research on De-Centralization and Post-Conflict Transitions**

Three faculty wish to incorporate undergraduate students in their collaborative research on the strategy of decentralization that has been adopted by several fragile, post-conflict states: Berhanu Abegaz, Economics (Horn of Africa); Rani Mullen, Government (South Asia); and Paula Pickering, Government (Eurasia). This groups seeks summer funding to develop a bibliography and data sets that will form the basis on a co-taught research course to be taught during the 2007-08 academic year.

**Round 2, July, 2007**

**For 2007-2008 Projects**

The Committee received 13 proposals and funded the following 6.

**5. Francis Tanglao-Aguas, Theatre and Speech**

He will divide students in Theatre 200, a large introductory course with about 80 students, into 16 "theatre companies" that will all develop and perform for the public in the College's Lab Theatre. Funding will support 8 advanced undergraduate students who will do much of the hands-on work with these "companies. Research objectives include learning techniques for analyzing live and taped performances, experimenting with different styles of directing, acting, staging, stage and sound design, etc.

## **6. David Lutzer, Mathematics**

Mathematics majors who do not do senior honors theses will be able to take a section of Math 490, which is intended to enhance student abilities to read, write, and speak mathematics, and to conduct research using known material not found elsewhere in the curriculum. Funding will allow the Department to experiment with introducing students to the research process by integrating guided research experiences into these sections. Initially, about three students likely will participate in this honors-like research. Over the next year, the Department expects as many as half-a-dozen senior students to be engaged.

## **7. James Harris, Philosophy**

He is developing a website with a comprehensive set of primary (mainly, historical) and secondary materials on the topic of “the separation of church and state.” The audience will be AP high school students, undergraduates, graduates, and scholars in the areas of religious studies, history, American studies, and philosophy. Funding will compensate 2 students who will help gather materials and each conduct an individual research project during the 2007-08 academic year using materials that they have helped gather.

## **8. Maria Ivanova, Government**

Students will work with original sources and conduct interviews with officials to analyze policy-making in environmental governance. They will also consolidate and disseminate these projects through a project website, and lay a foundation for subsequent student research. Students develop and update databases and do research using the accumulating information.

## **9. Paul Manna, Government**

The Government Department will institute a two-semester senior seminar for majors who are conducting honors thesis research. In the past, these students have only worked one-on-one with their advisers. This seminar, which will be supervised by Professor Manna provide students an opportunity to present their work and receive critiques at various times during the year, as well as to learn about strategies for conducting literature reviews, analyzing data, presenting visual materials, etc.

## **10. Tuska Benes, History**

The Global Studies concentration in European Studies will link a 1-credit research seminar to the core course *GBST 201: Introduction to European Studies*. With a graduate student instructor, students will pursue inquiry-based learning to develop original papers for conference presentation.

### **Round 3, October, 2007 For 2007-2008 and Summer 2009 Projects**

The committee received 29 proposals and funded 16.

## **11. Eric Engstrom, Biology**

He will develop a new kind of laboratory where students in Plant Development and Physiology conduct research on significant unanswered questions in the instructor’s research area.

## **12. Brian Hulse, Music**

Professor Hulse will bring 3 students to the Soundscape Festival in Italy. They will apply what they learn to compose music that will be performed by William and Mary students at a new music concert on campus in the following year.

\$7,215            Each of the 3 students will receive \$2,405, \$1,000 for airfare and \$1,405 for tuition.

## **13. Heather Macdonald, Geology**

The Geology Department as a whole will expand undergraduate research opportunities by instituting senior-led field trips to their research sites and requiring them to each develop a web site presenting their research. Juniors and other lower-class students will attend these field trips. In addition, GPS research projects will be initiated in several mid-level Geology courses. These exercises will enable students to learn about map

projections and coordinate systems, as well as the rapid production of field maps to map rock and other boundaries.

**14. John Nezek, Psychology**

Funding will support the planning and set-up of a “Cognitive Science Laboratory” that will support course-based and faculty-student research on cognitive process.

**15. Alexander Prokhorov, Russian**

He will initiate a “Moscow Theatre Project” which will provide students who are studying Russian cinema on campus and abroad in Russia the opportunity to conduct research on the history of screening and viewing patterns in Moscow.

**16. Ann Marie Stock, Hispanic Studies**

Funding is for two new research courses. The first will give 15 students the opportunity to create three volumes of Cuban documentaries organized by topics, such as “youth culture” and “sports,” including documentation and sub-titling. The second will be a “New media Research Workshop” that will give students the opportunity to make a documentary with raw footage shot by the instructor.

**17. Silvia Tandeciarz, Hispanic Studies**

Five Hispanic Studies professors will found *La pena: Cultural Studies Research Forum*, which will include a new 1-credit research course where they develop projects that have been initiated in other courses and prepare them for presentation in public fora and on the new research website.

**Mellon Teaching Fellows for 2007-2008 Academic Year**

Mellon Teaching Fellows are advanced undergraduates who serve as assistants in lower-level undergraduate courses to help administer research projects. Some of the project, above, include the undergraduate teaching fellow concept in a mix with other funded activities. Each teaching fellow receives \$500 for one semester, as does the supervising faculty member (and the faculty member only receives one stipend if he or she has more than one fellow).

**18. Maria Ivanova, Government**

Global Environmental Governance

3 fellows, one for each 40-student section, to assist students conducting research, using primary documents, on the effectiveness of international environmental institutions.

**19. Chi-Kwong Li, Mathematics**

Abstract Algebra

2 fellows to support research projects in computational group theory, including problems in cryptography.

**20. Chris Nemacheck, Government**

Civil Liberties

2 fellows, one for each section, to facilitate a Supreme Court simulation that students may elect to do for 50% of their grade. These students must complete a 20-page research paper.

**21. Deborah Morse, English**

Victorian Novel

3 fellows to supervise primary research projects on topics in Victorian morality, including the rights of children, animal rights, and the rights of immigrants.

**22. Suzanne Raitt, English and Women’s Studies**

Introduction to Women’s Studies

3 fellows will implement research projects in each of the 6 sections of this course, including studies of women’s

non-profits in the local community.

**23. Anne Rasmussen, Music**

Middle Eastern Ensemble

1 Fellow will help students in the ensemble conduct research on instruments, compositions, and playing styles.

**24. Timmons Roberts, Sociology and Environmental Science and Studies**

Environmental Sociology

1 Fellow will help coordinate a class project telephone survey of people's attitudes toward environmental issues.

**25. Yanfang Tang, Chinese**

East Asian Culture Through Film

2 fellows with advanced Chinese skills will coordinate research projects on cultural topics explored in Chinese films.

**26. Paul Tian, Mathematics**

Ordinary Differential Equations

2 fellows will coordinate research applications of course topics in the fields of biology, physics, and chemistry.

**27. Undergraduate Student Research Support**

Funding for research-related expenses, including travel, surveys, copying and other materials and supplies (\$11,502 total).

Funded students/disciplines: Karl Lang, Geology (\$100); Alexis Maxwell, Geology (\$100); Patty Nelson, Women's Studies (\$500); Elizabeth Prella, Music and Anthropology (\$3,000); Brandon Stewart, Theatre (\$1,000); Marine Ecology course field trip to Eastern Shore, Biology (\$191), Emily Geizhals, Holocaust Studies (\$425); Caryne Eskridge, Music (\$400); Manisha Reuben, Public Health (\$1,886); Sarah Erb, Psychology (\$1,500); Mexican Politics election study (\$2,400).

**28. Undergraduate Student Research Conference Travel**

Funding for undergraduates participating in academic conferences (\$4,956 total).

Funded students/disciplines: Nissa Perryman, Geology (\$300); Melissa Devane, Linguistics (\$300); Sarah Gauche, History (\$193); Jennifer Wilson, Linguistics (\$250); Melissa Devane, Linguistics (\$250); GURT-Linguistics Conference, Linguistics (\$480); Matt Hanson, Economics (\$300); Larry Evans' Congressional politics research group (\$1,700); Tina Ho, Neuroscience \$1,183.

**First-Year Administrative Support**

**29. Undergraduate Research Coordinator**

Tim Barnard, Ph.D in American Studies, filled this position. His job was to organize faculty development workshops to help humanities faculty integrate research into their courses, as well as to prepare proposals for our Mellon Grant competition. He worked in particular with film studies faculty in English, American Studies, Modern Languages (etc.) to integrate film-related research into courses and to plan a 3-day film conference/festival that held in February, 2008.

\$20,158 was his total compensation through January, 2008, when he went off the payroll to take a Fulbright Fellowship. \$11,339 of this compensation came from Mellon, and \$8,819 came from William and Mary.

**30. Website Development**

We are developing two ambitious web projects to support this project, a site to support in-progress research (the process of research) and one to support the outcomes of research (the products).

\$1,000 for web development and maintenance. The College (Information Technology and Swem Library) is also supporting this effort with substantial contributions of web development time.