

Final Report
ACS Interdisciplinary Mini-grant

Name of Person Submitting Report **Duane Cooper, Assoc. Professor of Mathematics** (*on behalf of co-PIs Hasan Crockett, Assoc. Professor of Political Science, and Gregory Hall, Assoc. Professor and Chair of Political Science*)

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Institution **Morehouse College**

Title of Project **Voting Analysis in Mathematics and Politics: Interdisciplinary
Research and Education**

Date(s) of Project **1/16-5/15/08**

Amount Awarded **\$8500**

1. Original Goals and objectives

From the 10/07 project proposal:

Our project, Voting Analysis in Mathematics and Politics: Interdisciplinary Research and Education, will launch collaborative research and teaching of faculty in the Departments of Mathematics and Political Science at Morehouse College, and the project will introduce interested students and faculty colleagues to interdisciplinary work—and possibilities for future work—in mathematical, statistical, and political analysis of voting. Towards these ends, the principal investigators (PIs) and ten invited scholars and political organizers will present a weekly one-credit seminar during the Spring 2008 semester.

By generating ideas and developing necessary foundations, the seminar sessions and visits will be precursors to subsequent research and curriculum development by the PIs at the intersection of the mathematical and political sciences. Additionally, participating students will engage in an Election Day field experience, and they will investigate one seminar topic in greater depth for an end-of-seminar poster presentation.

2. If goals/objectives changed during the course of the project, please state the revised goals/objectives.

We conducted the project primarily as proposed. The most significant difference was that the Election Day field experience of exit polling became a much more significant component of the seminar than originally intended. We provided students greater seminar exposure to data analysis than planned, and some student projects involved analysis of the exit polling data. In exchange, we invited four, rather than ten, guest seminar speakers. Lastly, instead of basing

projects on seminar topics, end-of-semester student projects were based on essays about Mathematics and Voting—fortuitously, the April, 2008, theme of Mathematics Awareness Month.

Thus, our revised goals and objectives can be restated as follows:

Our project, Voting Analysis in Mathematics and Politics: Interdisciplinary Research and Education, launches collaborative research and teaching of faculty in the Departments of Mathematics and Political Science at Morehouse College, and the project introduces interested students and faculty colleagues to interdisciplinary work—and possibilities for future work—in mathematical, statistical, and political analysis of voting. Towards these ends, the principal investigators (PIs) and four invited scholars and political organizers will present a weekly one-credit seminar during the Spring 2008 semester.

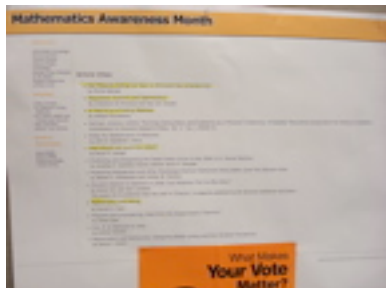

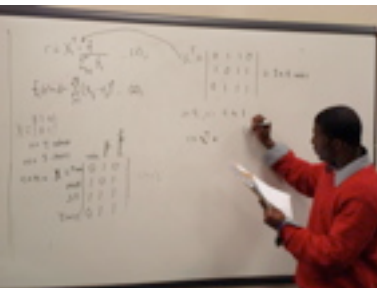






By generating ideas and developing necessary foundations, the seminar sessions and visits are precursors to subsequent research and curriculum development by the PIs at the intersection of the mathematical and political sciences. Additionally, participating students engage in an Election Day field experience, conducting exit polling of African American voters at precincts in Georgia, and they analyze data collected from more than 3000 presidential primary voters in Georgia, Louisiana, and Maryland. Each student teams with a student from another major to investigate a topic on the theme of mathematics and voting for an end-of-seminar interdisciplinary poster presentation.

3. In what ways were the goals/objectives met? Please give examples.

During the Spring 2008 semester, the Voting Analysis in Mathematics and Politics: Interdisciplinary Research and Education (VAMPIRE) seminar met most Fridays, 3 till 4:30 pm, in Morehouse College’s Leadership Center, Room 450. Thirteen students were regular participants, and we had occasional attendance and participation of other students, faculty, and staff. Most students enrolled for one credit hour of independent study, either Political Science 493 or Mathematics 398. Of the 13 students, 9 were political science majors, two of whom joined us from our sister institution, Spelman College; one of those two was a mathematics minor. The other 4 students were mathematics majors, one of whom did not enroll for credit but who was a regular and reliable participant and contributor. The detailed spring schedule is described in this table.

Fri., Jan. 18	The faculty hosts an organizational meeting of enrolled and interested students with introductions of one another and expectations for the semester.
Fri., Jan. 25	Prof. Hall delivers seminar presentation, The Statistical Analysis of Voting: The Intersection of Mathematics and Politics.
Fri., Feb. 1	Prof. Crockett leads the seminar in preparation of exit polling on Super Tuesday.
Mon., Feb. 4	Prof. Crockett leads the seminar participants and others in evening preparation for the following day’s exit polling.
Tues., Feb. 5	Students conduct exit polling of voters at various precincts, coordinated by

	Prof. Crockett.
Fri., Feb. 8	Students and faculty debrief about the exit polling experience, and Prof. Cooper begins a seminar presentation, Mathematical Analysis of Voting and Representation: Cumulative Voting, Part 1.
Mon., Feb. 11 and afterwards	Seminar students participate in entry of exit polling raw data in preparation for analysis assisted by statistical computing software.
Fri., Feb. 22	Prof. Cooper continues seminar presentation, Mathematical Analysis of Voting and Representation: Cumulative Voting, Part 1.
Fri., Feb. 29	Prof. Hall delivers seminar presentation, Report on Preliminary Research Results: Data Coding, Input, and Analysis, sharing initial findings of exit polling data analysis.
Fri., Mar. 28	Prof. Cooper delivers seminar presentation, Mathematical Analysis of Voting and Representation: Cumulative Voting, Part 2.
Fri., Apr. 4	Dr. Russell Benjamin, Associate Professor, Northeastern Illinois University (and Visiting Professor, Univ. of Texas at Austin), delivers seminar presentation, Race and the 2008 Presidential Election: Policy Implications for African Americans.
Fri., Apr. 11	Mr. Robert Woods, Statewide Coordinator, Georgia Vote Connection Center, delivers seminar presentation on strategies for significantly increasing civic participation of low- and moderate-income Georgia voters.
Mon., Apr. 14	Prof. Hall meets with enrolled political science majors to prepare them for assigned research report of analysis of exit polling data sets. Students meet later with Prof. Hall again or with student assistant Justin Scurlock for review of exploratory questions and hypotheses and for instruction on use of SPSS computer software.
Fri., Apr. 18	Dr. Richard Engstrom, Visiting Scholar, Duke University (and University Research Professor Emeritus, Univ. of New Orleans), delivers seminar presentation, The Gerrymandering Problem in the United States: Judicial Protection or Redistricting Commissions or Alternative Election Systems?
Fri., Apr. 25	Dr. Walter Mebane, Professor, University of Michigan, delivers seminar presentation, Election Forensics, the development of statistical tools to diagnose election anomalies and detect possibilities of election fraud
Tues., May 6	Students prepare posters and deliver oral presentations of end-of-semester projects. Beforehand, students were paired, a mathematics major with a political science major, and charged to read an essay (and any necessary background supplements) from the Mathematics Awareness Month website (http://www.mathaware.org/mam/08/) on this year's theme of Mathematics and Voting. The team mathematician would understand and be able to describe the mathematical content of the essay and convey those ideas to the political scientist. The team political scientist would investigate and bring additional information regarding the political context of the essay. Snapshots follow.

		
		
		
<p>After semester's end</p>	<p>Books and memorabilia are distributed to seminar participants to facilitate their continuing interest in exploring themes of mathematical, statistical, and political analysis of voting.</p>	

- Describe the evaluation/assessment process used. Summarize the results of this process? Include any instruments used to evaluate/assess your project.

At the semester's opening Voting Analysis in Mathematics and Politics: Interdisciplinary Research and Education (VAMPIRE) seminar, we inquired orally about the students' motivations for participating and of their knowledge of the other discipline. Except for one political science major who satisfied a mathematics minor and another who expressed appreciation for and some knowledge of quantitative methods, the political science students had largely taken the minimum college mathematics requirement, expressing neither great affinity nor great aptitude for the subject. But they were intrigued by and interested in what they might encounter and learn in the VAMPIRE seminar.

None of the four mathematics majors had taken any college political science coursework, although one of them expressed extreme interest in politics and plans to take some courses. All

of the math majors were sufficiently interested in learning about connections of mathematics to political science.

Near the end of the semester, we asked our students to complete a brief instrument of free response prompts. Two mathematics majors and five political science majors completed the questionnaire. Other than major, we asked no identifying information of the respondents. The four prompts were these:

- What was the most memorable or valuable moment to you from this semester's experience (from speaker, project, or otherwise)?
- Did the VAMPIRE seminar raise your awareness or appreciation of relationship between the mathematical and political sciences? Please describe how, if so.
- Please describe how, if at all, you envision this awareness or appreciation may be useful to you in your future.
- Please share any additional comments you may have.

To the first question, six of the seven students identified seminar speakers (either individually or collectively) as most memorable or valuable, though the range of presenters who resonated with the students was broad. The seventh student identified the opportunity to conduct exit polling as most memorable.

Students were unanimous on the second question that, yes, their awareness or appreciation of the relationship between the mathematical and political sciences was raised, and several commented that it was significantly raised (“vast”; “amazing”; “I had a very simplistic view ... but now I know more”).

To the third prompt, all students suggested that their increased awareness may be useful in their futures. Most were what might be considered “polite” responses of agreement. A couple felt the knowledge gained would be helpful in their graduate school pursuits. One student, though, was particularly strident: “This course will be tremendously useful in my future. The more knowledge I gain about the present political system, the more flaws I find. ... This course has made me very aware of obstacles to fair representation.”

The additional comments of the fourth prompt were supportive of the seminar, the guests, and the faculty, with hopes that we would continue the seminar in future semesters and even that we make it a regular course offering. One student referred to the only drawback, the Friday afternoon time slot. One student reflected wrote that our seminar presented “a different realm of education, not common to the AUC.” The AUC is the Atlanta University Center consortium, of which Morehouse and Spelman Colleges are part.

In summary, it seems accurate to say that our students found the VAMPIRE seminar interesting and illuminating.

5. If you were to redesign your project, what would you do differently and why? (What are the “lessons learned?”)

Primarily, we would hope to find some way to ease the difficulty of administering the seminar on top of our usual full slates of teaching and other responsibilities. Decisions were often made hurriedly, and some project activities that were adequate could have enjoyed greater success with greater forethought. Although the originally-proposed ten guest speakers may have been too ambitious, in hindsight it would have been good to have more than four. Maybe seven. Lastly, after the final speaker, Dr. Mebane, completed his presentation, a small group of students accompanied us to dinner with the speaker. The students really seemed to enjoy and benefit from the informal dialogue of the mealtime. Consequently, it would be worthwhile and worth the expense to arrange a post-seminar dinner with *every* available guest.

6. What are the next steps (follow-up) in your project?

The PIs have continued the work of the VAMPIRE project beyond the end of the spring seminar. We are engaging in discussions about various possibilities for continued collaboration and to apply for substantial funding from larger agencies to support the work we might conduct. We are also considering other colleagues who might be invited to participate in the expanded interdisciplinary project. Additionally, Prof. Cooper continues work towards a Spring 2009 implementation of Mathematics and Fairness: Application to Political and Economic Systems. This is conceived as a junior-level mathematics course which would be interdisciplinary in its content and attractive to students in majors other than mathematics.

7. A complete financial statement, showing original budget (the breakdown of the amount awarded) and expenditures.

Roundtrip airfare for three speakers (R. Benjamin, R. Engstrom, W. Mebane)	\$1242.
Lodging for two speakers (Benjamin, Engstrom)	189. ³⁴
Honoraria (\$500 ea.) for four speakers (Benjamin, Engstrom, Mebane, R. Woods)	2000.
Lunch for one speaker (Mebane) and faculty	16. ⁵⁰
Dinner for one speaker (Mebane) and seminar students	125. ⁷³
Refreshments for end-of-semester poster session	171.
Books and resources for 13 students	779. ³⁵
Postage for mail to departed VAMPIRE students	77. ⁷⁰
Undergraduate assistant (Alex DeLeon)	240.
Undergraduate assistant (J. Scurlock)	900.
Stipends (\$750 ea.) for project faculty (D. Cooper, H. Crockett, G. Hall)	2250.
Books and resources for faculty and VAMPIRE project library	508. ³⁸
<i>Total</i>	<u>\$8500.</u>

8. Where did you publish and/ or at which meetings did you present your work? How did you disseminate information at your institution and within ACS?

Before and during the Spring 2008 semester, we advertised the existence of our VAMPIRE seminar and our guest speakers at Morehouse and nearby campuses via fliers, email announcements, and one printed announcement in our campus newsletter, *Inside Morehouse*.

Though not yet complete, we expect to describe activities of our just-ended Spring 2008 project on a website, which will be hosted at <http://www.morehouse.edu/facstaff/dcooper/vampire/>; we hope this site will be available sometime in July, 2008, and we also expect that the public will be able to link to our site from the Mathematics Awareness Month website, <http://www.mathaware.org/mam/08/>, by clicking on their “View Activities” menu selection, on which we would appear as one of the “Outreach Activities at Institutions Nationwide”.

Additionally, led by Prof. Crockett, we have had a proposal accepted to present the work of the VAMPIRE project at the Fifteenth National HBCU Faculty Development Symposium, October 23-25, 2008, in Washington, D.C.

9. Please include a statement that you give ACS permission to post your original proposal and a summary of your work on the ACS Interdisciplinary website <http://www.colleges.org/newmodels/interdisciplinary/index.html>.

Yes, the ACS may post our proposal and a summary of our work on the ACS Interdisciplinary website.