AdvanceVT Annual Report
Year 1: September 2003 – June 2004
National Science Foundation
Cooperative Agreement SBE-0244916

Program Overview

The overall goal of *AdvanceVT* is to contribute to the development of a national science and engineering academic workforce that includes the full participation of women at all levels of faculty and academic leadership, particularly at the senior academic ranks, through the transformation of institutional practices, policies, climate and culture at Virginia Tech. The program has four major elements: advancing women into faculty careers, increasing the representation of women faculty in science and engineering, empowering women as leaders and scholars, and institutionalizing change.

The *AdvanceVT* team began work in the summer of 2003, following notification of award but prior to receipt of funds. During the summer the Principal Investigator (PI) and Co-PIs identified two senior women faculty from the College of Science to serve as Advance Professors, obtained, renovated, and equipped office space in the central administration building of Virginia Tech, and hired a program coordinator, an administrative assistant, and four graduate assistants. In the fall, the *AdvanceVT* leadership team established and met with the Leadership Council to brief university administrators on the Advance program, and the Co-PIs and Advance Professors met with department heads and faculty in the colleges of science and engineering to provide an introduction to Advance. Members were recruited for four work groups to oversee the major work elements of the program. Since all aspects of *AdvanceVT* support the goal of institutionalizing change, the four work groups decided to focus on advancing women into faculty careers, increasing representation of women faculty, empowering women as leaders in academe, and review and revision of institutional policies.

Spring semester 2004 began with an inaugural workshop in January attended by 160 Virginia Tech faculty, administrators, and graduate students. As a result of discussions at the workshop about the need for additional child care options for the university community, the *AdvanceVT* team developed and fielded a survey of university faculty, staff, and graduate students to more clearly define the community's child care needs. The Advancing Women and Empowering Women work groups developed solicitations, advertised, and reviewed applications for graduate and post-doctoral fellowships, research seed grants, and leadership fellowships. The Policy Review work group reviewed university policies and based on input from the January workshop focused on developing guidelines for dual career hiring. The Increasing Representation work group collected recruitment resources, developed solicitations for a speaker series, and members participated in and led numerous search committees. *AdvanceVT* hosted or co-hosted three visiting speakers, a networking reception, and information gathering lunches with senior women faculty. Members of the *AdvanceVT* leadership team met with each of the 19 (male) department heads in the colleges of science and engineering to gain a better understanding of how the departments function and discuss how department heads can

better support faculty career development. An Advisory Committee of faculty and administrators from across the university was constituted and assisted the leadership team in setting priorities and conceptualizing how to track institutional change.

Throughout the year the *AdvanceVT* Assessment Team interviewed male and female faculty in science and engineering and prepared for a university-wide faculty survey planned for fall 2004. The PI and Program Coordinator worked with the Office of Institutional Research and Planning Analysis and the deans of the colleges of science and engineering to compile the indicator data required by NSF.

Summary of Program Activities

Participants

AdvanceVT Leadership Team

- Patricia Hyer, PI, Associate Provost for Academic Administration
- Nancy Love, Co-PI and Advance Professor, Associate Professor of Civil & Environmental Engineering
- Karen Thole, Co-PI and Advance Professor, Professor of Mechanical Engineering
- Catherine Eckel, Advance Professor, Professor of Economics
- Beate Schmittmann, Advance Professor, Professor of Physics
- Elizabeth Creamer, Assessment Director, Associate Professor of Educational Leadership & Policy Studies
- Margaret E. (Peggy) Layne, Program Coordinator
- Barbara Johnson, Administrative Assistant
- Anna F. LoMascolo, 2003-04 Program Graduate Assistant
- Teresa Wagner, 2003-04 Assessment Graduate Assistant

Project Management System and Infrastructure

Overall responsibility for allocation of project funds resides with the Principal Investigator, Dr. Patricia Hyer, Associate Provost for Academic Administration, with day-to-day oversight delegated to Project Coordinator Peggy Layne. The Co-PIs, Dr. Karen Thole and Dr. Nancy Love, are each responsible for overseeing the budget accounts allocated to two of the work groups implementing portions of the work elements described in the proposal. Dr. Love has primary responsibility for the work groups addressing policy review and advancing careers, and Dr. Thole has primary responsibility for the work groups addressing empowering leaders and increasing representation. Ms. Layne manages the budget accounts for assessment and project administration. All financial matters are conducted with the oversight of the university's Office of Sponsored Programs, in accordance with all appropriate policies and procedures. As part of assessing the first year of the *AdvanceVT* program and planning for the second year of the grant, the structure, roles and responsibilities of the *AdvanceVT* leadership team are currently under review, and may be adjusted to enhance program operations and effectiveness.

Leadership Council

Key institutional decision makers provide programmatic oversight and visible leadership support for the program.

- Hassan Aref, Dean, College of Engineering
- James B. Blair, Interim Vice Provost for Research
- Lay Nam Chang, Dean, College of Science
- Karen DePauw, Vice Provost for Graduate Studies and Dean of the Graduate School
- Benjamin Dixon, Vice President for Multicultural Affairs
- Mark McNamee, Provost and Vice President for Academic Affairs

External Advisors

Leaders from first round Advance institutions provide consulting on programmatic priorities and direction.

- Jane Ammons, Advance Professor of Industrial Engineering, Georgia Tech
- Denice Denton, Advance PI and Dean of the College of Engineering, University of Washington

Advisory Committee

Department heads, faculty members and administrators with relevant expertise in gender equity and institutional change help to coordinate activities across the work elements and provide advice on effective strategies to accomplish the program's goals.

- Katherine Allen, Professor, Human Development
- Carol Burger, Associate Professor, Center for Interdisciplinary Studies
- Toni Calasanti, Professor, Sociology
- Gary Downey, Professor, Science and Technology in Society
- Dan Inman, Professor, Mechanical Engineering
- Kylie Johnson, Development Director, College of Science
- Bill Knocke, Professor and Department Head, Civil and Environmental Engineering
- Lori Lewis, Development Director, College of Engineering
- Ellen Plummer, Director, Office for Equal Opportunity
- Susan Sumner, Professor and Department Head, Food Science and Technology
- Bevlee Watford, Associate Dean of Engineering for Academic Affairs and Director, Center for the Enhancement of Engineering Diversity
- Kim Forsten Williams, Associate Professor, Chemical Engineering
- Brenda Winkel, Professor, Biology
- Craig Woolsey, Assistant Professor, Aerospace and Ocean Engineering
- Royce Zia, Professor, Physics

Work Groups

Each work group is led by an Advance professor and is responsible for development, implementation, and oversight of a portion of the four major program elements.

Policy Review
Chair: Catherine Eckel
Vice Chair: Nancy Love

- Susanne Aref, Research Scientist, Statistics
- Mike Deisenroth, Acting Department Head, Industrial Systems Engineering
- Karen DePauw, Vice Provost for Graduate Studies & Dean of the Graduate School
- Sam Easterling, Professor, Civil and Environmental Engineering
- Jack Finney, Professor and Department Head, Psychology
- Carola Haas, Associate Professor, Fisheries and Wildlife Science
- Patricia Hyer, Associate Provost for Academic Administration
- Deborah Mayo, Professor, Philosophy
- Anya McGuirk, Associate Professor, Agriculture & Applied Economics
- Ann McNabb, Professor, Biology
- Shelly Nickols-Richardson, Associate Professor, Human Nutrition, Foods, and Exercise
- Deborah Olsen, Director, Institutional Research
- Ellen Plummer, Director, Equal Opportunity Office
- Anne Zajac, Associate Professor, Biomedical Science

The Policy Review work group is focusing on review of university level policies and procedures, with the intent of developing revised policies and procedures where appropriate and communicating those policies and procedures to the relevant constituencies to ensure equitable implementation. As a result of discussions at the January *AdvanceVT* workshop, during the spring of 2004 this work group collected and reviewed dual career accommodation policies from several other institutions, developed guidelines for dual career hiring at Virginia Tech and obtained the necessary reviews, input, and approval from relevant university administrators and committees. The work group is currently in the process of developing brochures to communicate the guidelines to search committees and faculty candidates. In the fall of 2004 the work group plans to address flexible work life policies.

Empowering Women as Leaders and Scholars
Chair: Karen Thole
Vice Chair: Catherine Eckel

- Roger Avery, Senior Associate Dean, Graduate School
- Andrea Dietrich, Associate Professor, Civil and Environmental Engineering
- Roseanne Foti, Associate Professor, Psychology

- Richard Goff, Associate Professor, Engineering Fundamentals
- Elizabeth Grabau, Associate Professor, Plant Pathology
- Bob Jones, Professor and Department Head, Biology
- Jeryl Jones, Associate Professor, Small Animal Clinical Sciences
- Don Leo, Professor, Mechanical Engineering and Associate Director, CIMSS
- Tim Long, Professor, Chemistry
- Sanjay Raman, Associate Professor, Electrical and Computer Engineering
- Janet Rankin, Professor, Human Nutrition, Foods, and Exercise
- Glenda Scales, Associate Dean, Distance Learning, Engineering

The focus for the Empowering Women work group in the first year of the grant was to establish procedures for awarding research seed grants and leadership fellowships. The work group generated a request for proposals and review criteria, solicited and reviewed proposals, and selected recipients. In all, five seed grants and two leadership fellowships were awarded. Discussions at the January workshop addressed "What challenges do women face in becoming administrative or technical leaders at Virginia Tech?" The top challenges identified were a lack of formal/informal training for administrative positions; a lack of women leader role models; a lack of attractiveness of administrative positions because the time demands require administrators to give up research; perception that the institutional culture does not promote women leaders; and lack of knowledge of critical leadership skills in academe. The work group considered the input from the January discussions in setting priorities for future activities. Dr. Roseanne Foti helped the work group to develop an understanding of various leadership styles. Informal lunches took place throughout the summer with the senior women faculty to identify their needs and help *AdvanceVT* plan activities to meet those needs. Next year's activities will include networking and skill development activities for the women faculty as well as workshops for department heads.

Increasing Representation of Women Faculty in Science and Engineering
Chair: Beate Schmittmann
Vice Chair: Karen Thole

- Amy Bell, Associate Professor, Electrical and Computer Engineering
- Martha Ann Bell, Associate Professor, Psychology
- Dushan Boroyevich, Professor of Electrical and Computer Engineering and Deputy Director, CPES
- Katherine Knowlton, Assistant Professor, Dairy Science
- Brian Love, Professor, Material Science and Engineering
- Lynn Nystrom, News and External Affairs Director, College of Engineering
- Kelly Oaks, Equity Manager, Equal Opportunity Office
- Nancy Ross, Professor, Geological Sciences, and Associate Dean of Research, Graduate Studies, and Outreach, College of Science
- John Rossi, Professor and Department Head, Mathematics
- Elaine Scott, Professor, Mechanical Engineering
- Aris Spanos, Professor and Department Head, Economics

- Tonya Smith-Jackson, Assistant Professor, Industrial Systems Engineering
- Bob Walters, Professor and Department Head, Aerospace and Ocean Engineering

The Increasing Representation work group is focusing on the review and improvement of faculty recruitment and retention practices at Virginia Tech. To support existing resources of the university's Equal Opportunity Office, discipline-specific recruitment resources (journals, websites, etc.) were compiled and made available. Criteria and solicitations for the Advance Scholar speaker series were developed and disseminated, to inform departments about the availability of *AdvanceVT* support to invite potential faculty candidates (junior or mid-career) for a first campus visit. Two speakers were hosted jointly with their departments: Caroline Lasser (Mathematics, TU München) and Leigh McCue (Aerospace and Ocean Engineering, University of Michigan). Both visits included a technical talk, a networking reception and informal interactions between speakers and interested women at Virginia Tech. Work group members were also intimately involved with numerous faculty searches across the colleges of science and engineering, including several searches conducted as "cluster hires" (searches targeting priority research areas for the university that may cross department and college lines).

Advancing Women into Faculty Careers
Chair: Nancy Love
Vice Chair: Beate Schmittmann

- Michael Alley, Instructor, Mechanical Engineering
- Sheryl Ball, Associate Professor, Economics, and Associate Dean of Curriculum, Instruction, and Advising, College of Science
- Rosemary Blieszner, Professor, Human Development
- Karen Brewer, Associate Professor, Chemistry
- Karen DePauw, Vice Provost for Graduate Studies & Dean of the Graduate School
- Kimberly Ellis, Assistant Professor, Industrial Systems Engineering
- Peter Haskell, Associate Professor, Mathematics
- Mike Hochella, Professor, Geological Sciences
- Scott Midkiff, Professor, Electrical & Computer Engineering
- Leslie Pendleton, Undergraduate Advisor, Electrical & Computer Engineering
- Eunice Santos, Associate Professor, Computer Science
- Ujwala Warek, Post-doctoral Associate, Biology
- Lisa Weiland, Research Associate, Mechanical Engineering/CIMSS
- Mary Leigh Wolfe, Associate Professor, Biological Systems Engineering
- Tess Wynn, Graduate Student, Biological Systems Engineering

The focus of the Advancing Women work group is on activities that empower female graduate students and post-doctoral research associates through fellowships with a significant mentoring component, focus groups, exposure to successful female faculty, and networking opportunities. The work group established and implemented procedures and criteria for *AdvanceVT* Ph.D. and post-doctoral research fellowship competitions.

Three Ph.D. fellowships and one post-doctoral fellowship were awarded for year two of the grant. The application process required submission of a mentoring plan to maximize the continued professional development of the awardees toward faculty careers. *AdvanceVT* also facilitated a grass roots effort to establish a post-doctoral research associate network at Virginia Tech. This program is in its infancy and it is anticipated to grow into a sustainable program supported by the office of the Vice President for Research. *AdvanceVT* conducted focus groups with a mixed gender group of graduate students from the Colleges of Science and Engineering to identify pressing issues according to the students. The findings will be used to develop programs for the graduate students, many in collaboration with the graduate school for sustainability, during year two and beyond. The Advancing Women work group also provided input to the graduate school that led to the development and implementation of work-life grants for graduate students. Three work group members participated in and presented at the Stanford School of Engineering Workshop on Mentoring in Engineering sponsored by the NSF's Presidential Mentoring Award for Science, Math, and Engineering Mentoring.

Activities and Findings

Research and Education Activities and Findings

Key First Year Assessment Activities (other than reported elsewhere of information required for routine reporting):

- Conducted, transcribed, and analyzed one-on-one interviews with new faculty in science and engineering (N=11).
- Conducted, transcribed, and analyzed one-on-one interviews with associate professors in science and engineering (N=21).
- Prepared a questionnaire to distribute to all instructional and research faculty in fall 2004, using feedback from all assessment activities to date.
- Contracted with the Virginia Tech Survey Research Center to oversee distribution of the faculty questionnaire.
- Distributed to all science and engineering department heads a handout summarizing interview findings and made it available as a Power Point presentation accessibly through the *AdvanceVT* web page.
- Shared key findings with 3 of 4 work groups and with the Leadership Council.
- Launched a "mini study" of dual career hires (summer 2004).
- Launched a "mini study" of faculty who have used the stop/extend the tenure clock (summer 2004).

Interviews with the 2004 New Faculty Cohort in Science and Engineering
AdvanceVT plans to interview this group of new faculty every year for the next four years. In the first year, the interview protocol focused on their experiences during the recruiting and hiring process. Participants were asked, for example, to describe what first attracted them to Virginia Tech, to describe their experiences during the interview process, and to identify issues that were critical to their negotiations and decision to accept a position at Virginia Tech.

Key findings from interviews with the 2004 New Faculty Cohort are that:

- Employment opportunities for a spouse/partner were a consideration for the majority of new faculty.
- Women seemed every bit as savvy about the process of negotiations during hiring as men. Most consulted extensively with peers and mentor(s) during the hiring process.
- Meeting with members of this group on a face-to-face basis provided a good vehicle to share information about resources, policies, and the Advance Grant.

A summary of the key findings from the new faculty interviews is attached in the format of presentation slides that will be posted on the *AdvanceVT* web site.

Interviews with Male and Female Associate Professors in Science and Engineering

The interview protocol designed for the male and female associate professors dealt first with their own career plans, including what attracted them to a faculty career and if they had any interest in assuming leadership roles at the university or in their profession. Secondly, the interview focused on policies and practices in their department that impacted their productivity, whether they considered their department to be "family friendly," and actions that a department head or other administrator at Virginia Tech could take that would impact faculty research productivity in a positive way. The last question in the interview protocol asked participants to describe the characteristics of an "ideal" department head.

Key findings from interviews with associate professors:

- Most faculty described a policy of "not having anything written down" in their department.
- The top response to the question about ways their department head could promote their productivity was to communicate clearly about departmental policies, particularly regarding resource issues.
- The second most frequent response was to recognize and respect the responsibilities faculty members have outside of work.

A summary of the key findings related to how department heads can improve faculty productivity is attached in the format of presentation slides that will be posted on the *AdvanceVT* web site.

Lessons Learned from Year 1 Assessment Activities

- Academics find data persuasive, particularly when it is grounded in their own institution and/or provides a comparison to "peer" institutions.
- Men feel every bit as strongly as do women about work-life issues.
- In order to truly assess institutional change, assessment activities should not be restricted to faculty in science and engineering.
- Men are less responsive than women to requests to participate in assessment activities.
- Tokens, such as a bookstore voucher, are probably necessary to ensure adequate representation of male and female faculty.
- Men often expressed surprise at being invited to participate in assessment activities, saying they thought the project was only about women.

- One-on-one interviews are labor intensive. Under the proper circumstances, small group interviews may be a more effective way to collect data.
- Timely feedback from faculty interviews and other data collection activities is very valuable to work groups in prioritizing and planning *AdvanceVT* activities.

Training and Development Activities

Institutionalizing Change

- *AdvanceVT* had greater than expected participation in its inaugural workshop in January with over 160 faculty, administrators, graduate students, and guests, very positive feedback on the workshop, and great input on where the program should focus its efforts. Ninety-seven percent of participants who returned their evaluation forms indicated that the workshop increased their knowledge of issues affecting women in science and engineering somewhat or very much. An average of eighty-four percent of respondents rated six of seven workshop events as very or extremely valuable.
- The *AdvanceVT* policy work group drafted guidelines for dual career hires, obtained reviews and approvals from appropriate university committees, and the provost presented the guidelines to the university board of visitors.
- As part of Dr. Louise Kellogg's visit to campus, co-sponsored by *AdvanceVT* and the Department of Geosciences, Dr. Kellogg, chair of the geology department at the University of California at Davis, met informally with the (male) heads of 12 of the 19 departments in Virginia Tech's colleges of science and engineering to discuss recruitment, retention, and advancement of women faculty.
- The *AdvanceVT* assessment director provided preliminary data from faculty interviews to three of the four work groups to assist in planning and priority setting.
- The PI, a Co-PI (Thole), and the Program Coordinator visited the University of Washington in February and participated in one of their department chair development workshops, met with PIs from other Advance institutions and the NSF Program Officer, and attended a session on Advance at the annual AAAS conference.
- The PI, Co-PIs, Advance Professors, Program Coordinator, University Provost, and five work group and advisory committee members attended the Advance grantees meeting at Georgia Tech and Georgia Tech's annual Advance workshop in April.
- Indicators of institutional change:
    - During the College of Engineering's Promotion and Tenure Committee discussions, a candidate who had taken advantage of the university's "stop the clock" provisions was up for review after seven years instead of the usual six. One of the committee members commented that the candidate's productivity appeared low for seven years of effort. Another committee member pointed out that the candidate should be evaluated based on only six years of effort because of the "stop the clock" provision. The committee member attributed that new awareness to attending the

AdvanceVT workshop and having participated in a discussion of issues related to how to evaluate cases where the probationary period has been extended for childbirth. The candidate was eventually approved for promotion.

- Three child care initiatives are currently underway on campus, through the college of engineering, the graduate school, and the department of human development. All of these efforts are being supported by data on the need for child care in the university community collected by *AdvanceVT*.
- *AdvanceVT* has been invited to make presentations to the university-wide department heads' roundtable once a semester next year.

Empowering Women as Leaders and Scholars

- *AdvanceVT* obtained commitments from the deans of engineering and science to provide $50,000 in matching funds for research initiation support for women faculty, and awarded five research initiation grants to junior women faculty in science and engineering. These small grants are intended to assist faculty members to collect preliminary data or develop skills that will enable them to write a more competitive grant proposal to an outside funding agency. Grant recipients will be invited to present a seminar describing their research and how *AdvanceVT* support has impacted their careers. Recipients will also be tracked over the course of Virginia Tech's Advance program in order to identify longer term impacts on their careers. Grants were awarded to the following individuals:
  - **Julie Dunsmore**, Psychology, "Biobehavioral Correlates of Parents' Beliefs about Children's Emotions". *AdvanceVT* funding will support purchase of equipment, materials, and a graduate assistant for this project with the goal of submitting a proposal for additional research support to the NSF.
  - **Naira Hovakimyan**, Aero and Ocean Engineering, "Active Vision Control Systems". *AdvanceVT* funding will support the purchase of equipment, undergraduate students, and travel for the PI to develop collaborations and increase the understanding of image processing and active vision control systems for autonomous vehicles. Support from *AdvanceVT* will fill a funding gap enabling Dr. Hovakimyan's research to continue while proposals for additional funding are developed.
  - **Linsey Marr**, Civil and Environmental Engineering, "Measurement of Urban Air Pollutant Emissions". *AdvanceVT* funding will support the PI and her students to visit collaborators and fields sites measuring urban air pollution and to review existing data and literature. These activities will complement research proposed as part of Dr. Marr's NSF Career grant application as well as support the development of additional funding proposals.
  - **Kathleen Meehan** , Electrical and Computer Engineering, "Active Surface Plasmon Resonance Structures with Application in Biosensing and Optical Computing". *AdvanceVT* funding will support a graduate

student, materials, and travel for this project with the goal of preparing proposals for the NSF and the Semiconductor Research Corporation.
    - **Corina Sandu**, Mechanical Engineering, "Computational Tools for Advanced Modeling and Simulation of Off-Road Vehicles". *AdvanceVT* funding will support a graduate assistant and travel to visit collaborators to develop new mathematical models of the contact between pneumatic tires and soft, deformable soil, with applications for the performance of all-terrain vehicles. The work will strengthen proposals for additional funding to NSF, the Department of Defense, and NASA.
- *AdvanceVT* also awarded its first two leadership fellowships. Leadership fellowships are intended to provide senior women faculty with release from teaching and other financial support to enable them to develop skills necessary to take on leadership roles in either administration or research. The Fellows are given wide latitude to propose a development program that meets their needs, whether serving as an assistant department head or center director, working on a special project with a senior university administrator, or attending an outside leadership training program. Recipients of *AdvanceVT* Leadership Fellowships will be invited to present seminars discussing what they learned during their fellowship experience and how it has impacted their careers. Fellowships were awarded to the following individuals:
    - **Dr. Andrea Dietrich**, Associate Professor, Civil and Environmental Engineering. Dr. Dietrich will work with several faculty and administrators in the college of engineering to develop the skills necessary to start up and manage a center for drinking water taste and odor and infrastructure research. She will also participate in a leadership development program at the Center for Creative Leadership and visit a comparable research center at Montana State University. To further leverage *AdvanceVT* funding, nearly equal matching support will be provided by Dr. Dietrich's department head in Civil and Environmental Engineering.
    - **Dr. Brenda Winkel**, Professor, Biology, Fralin Biotechnology Center. Dr. Winkel will be appointed Associate Director of the Fralin Center for Biotechnology, working with the Director to provide leadership and vision for the Center. She will also lead an effort to establish a graduate program in plant sciences and organize a research symposium to discuss the future of research in this area and provide insights into successful graduate programs.
- The Co-PIs and Program Coordinator met with a female department head candidate in support of recruitment efforts by the College of Engineering. Unfortunately, the candidate ultimately decided to stay in her current position.
- The Co-PIs also met with other candidates for department head positions in the college of engineering to inform them about the Advance program.
- In the college of science, Advance Professors Eckel and Schmittmann hold key committee assignments on the Executive Search Committee and Personnel Committee, responsible for recruitment and promotion and tenure cases.

- The *AdvanceVT* program coordinator, co-PI, and another Advance professor met with each of the 19 (male) department heads in the colleges of engineering and science to discuss issues impacting the success of women faculty. During these meetings, the *AdvanceVT* team shared responses from faculty interviews to the question "What can department heads do to improve faculty productivity?" The input obtained from these meetings will be used to develop workshops and resource materials for department heads.
- *AdvanceVT* co-hosted a visit by Dr. Louise Kellogg, chair of the geology department at the University of California at Davis, in conjunction with the Virginia Tech geosciences department. In addition to presenting a technical seminar in geosciences, Dr. Kellogg presented a seminar on her experiences as a female department head in a science discipline and met informally with 12 of Virginia Tech's 19 (male) department heads from the colleges of science and engineering.
- *AdvanceVT* hosted a networking reception for women faculty during Women's Month in March.
- In May, the *AdvanceVT* program coordinator and one co-PI (Thole) attended the WELI Summit at the University of Connecticut. The *AdvanceVT* team recommended Prof. Roseanne Foti for one of the keynote talks at the conference on different styles of leadership.
- Advance Professor Eckel and the incoming department head in Engineering Science and Mechanics participated in a department head development workshop at the University of Washington in June.
- *AdvanceVT* hosted informal lunches during the summer with senior women faculty in science and engineering to build community and identify their needs. Input will be used in planning program activities for the coming year.
- Other indicators of institutional change:
    - In January, the Dean of Science announced two appointments to senior leadership positions in the newly restructured college: Nancy Ross, professor of geosciences, was appointed Associate Dean of Research, Graduate Studies, and Outreach, and Sheryl Ball, associate professor of economics, was appointed Associate Dean of Curriculum, Instruction, and Advising.
    - The Virginia Tech Dean of Engineering, Hassan Aref, was invited to write an editorial for the website Engineering Trends, and decided to focus the piece on women in engineering. Co-PIs Nancy Love and Karen Thole coauthored the editorial with Dean Aref, which was titled "Women Academic Leaders are Key to Transforming Engineering Colleges". (http://www.engtrends.com/Editorials/2004March/Default.asp)

Increasing Representation of Women in Science and Engineering

- *AdvanceVT* hosted its first two visiting scholars during the spring semester: Caroline Lasser, doctoral candidate at the Technical University of Munich, in conjunction with the Virginia Tech math department; and Leigh McCue, PhD candidate in Naval Architecture and Marine Engineering at the University of

Michigan, in conjunction with the Virginia Tech department of aerospace and ocean engineering.

- *AdvanceVT* identified and compiled listservs and websites for advertising of faculty positions and recruitment of women and minority candidates.
- *AdvanceVT* collected recruitment, retention and mentoring resources from other institutions and is currently reviewing them for implementation at Virginia Tech.
- Advance professors chaired and served on numerous faculty search committees in the colleges of science and engineering during the year, and met with many female candidates for faculty positions at Virginia Tech. Members of the *AdvanceVT* leadership team also participated in and monitored the university's new "cluster hiring" process that targets recruitment in priority research areas that may cross department or college lines.

Advancing Women into Faculty Careers

- *AdvanceVT* was able to award three graduate assistantships instead of two by reallocating funds within the program. In addition to technical achievement and professional promise, these fellowships were awarded based on a proposed mentoring plan developed with their faculty sponsor to help prepare the graduate student to successfully pursue a faculty career.
    - **Megan Elwood Madden**, Geosciences, Dr. Robert Bodnar. Madden will be a 4th year Ph.D. student, developing new isotopic methods to measure the nature of aqueous environments in the solar system, the impact of meteorites on fluid-bearing materials, and examining chemical weathering patterns on Mars. She has 1 peer-reviewed journal article and 6 international/national conference papers/presentations, has been a teaching assistant, and is an active member of the Graduate Student Association and graduate representative to a number of university commissions.
    - **Olga Pierrakos**, Mechanical Engineering/Biomedical Engineering Program, Dr. Pavlos Vlachos. Pierrakos will be a 4th year Ph.D. student. Her research involves characterizing the flow past mechanical heart valve prostheses and the left ventricle of the heart. She hopes the modeling effort will lead to a better understanding of prosthetic hardware and to help doctors improve their clinical procedures associated with these prosthetic devices. She has 1 peer-reviewed journal article and 9 national/international conference papers/presentations, has been a teaching assistant in math and mechanical engineering, and is a representative for the graduate honor system.
    - **Miriam Stewart**, Civil and Environmental Engineering, Dr. George Filz. Stewart will be a 4th year Ph.D. student. Her research involves looking at a new technology called columnar reinforcement practices for stabilizing roadway embankments. Use of columnar reinforcement speeds up the roadway construction process, and minimizes impact on society and the environment. She is using existing data sets from field applications to model these elements, and hopes the outcome of her research will result in the development of new and improved practical methods for designing

these systems. Miriam has 5 professional engineering reports and 2 international/national conference presentations/papers. She has taught courses at Virginia Tech as part of the Department of Education GAANN program and was adjunct instructor at Montana State University, teaching engineering courses. Through the GAANN program, she has been involved with programs that integrate engineering concepts to high school kids.

- *AdvanceVT* also awarded its first post-doctoral fellowship to Caroline Vanpeteghem. Dr. Vanpeteghem holds degrees in physics from universities in Belgium and the United Kingdom, and will be working with Dr. Ross Angel in Virginia Tech's department of geosciences to expand her skills to include x-ray crystallography. A second post-doctoral fellow was selected, but ultimately declined the offer. Like the graduate fellowships, these awards are also based in part on a mentoring plan to help prepare the fellows for successful faculty careers.
- *AdvanceVT* supported the development of a network of post-doctoral associates at Virginia Tech after discussions at the January *AdvanceVT* workshop indicated that few programs exist on campus to support this constituency.
- *AdvanceVT* conducted focus groups of graduate students in science and engineering to identify their needs and potential future *AdvanceVT* activities to meet those needs.
- Three members from *AdvanceVT*'s Advancing Women work group attended the PAESMEM/Stanford School of Engineering's Workshop on Mentoring in Engineering, which was attended by a range of women and men faculty, students and administrators (including women deans) from around the US. A recent Ph.D. graduate and new assistant professor (Dr. Tess Wynn) presented the report from Virginia Tech.
- Other indicators of institutional change:
    - *AdvanceVT* supported successful efforts by the graduate school to establish work-life grants that will provide six weeks paid leave to graduate students in the event of childbirth or medical or family emergency.
    - The *AdvanceVT* graduate assistant for assessment applied what she learned from interviewing Virginia Tech faculty to her own job search and as a result obtained a faculty position and good start-up package.

Outreach

- As a result of meeting with the chemistry department head, the *AdvanceVT* program coordinator was invited to speak to the Southeast Regional Chemistry Department Heads meeting about the Advance program.
- The *AdvanceVT* program coordinator also gave a presentation about women in engineering and participated in the Civil and Environmental Engineering Department's alumni advisory board retreat.
- *AdvanceVT* hired a graduate student and began development of a "portal website" for all Advance Institutional Transformation and Leadership program information.

- Advance Professor Schmittmann received an invitation to visit the Institute for Gender Studies and the International Science Center (ISC) at the University of Essen, Germany, in November 2003. The ISC provides fellowships and mentoring for women scientists and engineers aspiring to faculty careers. Schmittmann served as a mentor and presented a talk: "The NSF ADVANCE Program: Supporting Women in Science and Engineering."
- Advance Professor Eckel led discussions with women faculty at Cal State Fullerton (March, 2004) and Vassar College (April, 2004) about Advance program opportunities at NSF and resources for women faculty that are being made available at various Advance sites.
- The Advance Professors, in their technical capacity, and *AdvanceVT* have been invited to contribute to numerous grant proposals across the colleges of science and engineering.
- Co-PIs and Advance Professors Love and Thole presented a summary of the *AdvanceVT* program to the College of Engineering's Visiting Board.
- Co-PIs and Advance Professors Love and Thole have been invited to participate as panelists in the Central Virginia Community College summer academy for Women in Science and Technology.

Products

Publications

AdvanceVT developed a folder-style brochure describing NSF's Advance program and Virginia Tech's Advance initiative, highlighting baseline statistics on women in science and engineering at Virginia Tech. The folders have a pocket for additional materials such as newsletters, agendas, and handouts, and so can be used for a variety of *AdvanceVT* activities throughout the life of the grant.

AdvanceVT also developed and distributed three newsletters highlighting activities during the spring semester 2004 and presenting statistics on women in science and engineering at Virginia Tech and nationwide. The newsletters are distribute in hard copy at *AdvanceVT* events as well as sent out by email to work group members and posted on the *AdvanceVT* website.

http://www.advance.vt.edu/newsletters/newsletter_1.pdf
http://www.advance.vt.edu/newsletters/newsletter_2.pdf
http://www.advance.vt.edu/newsletters/newsletter_3.pdf

Website

AdvanceVT's website, www.advance.vt.edu, includes information about the Virginia Tech Advance leadership team, funding opportunities, accomplishments of women scientists and engineers at Virginia Tech, upcoming activities, a description of *AdvanceVT*'s assessment plan and informational resources for women graduate students and faculty. The site includes a copy of Virginia Tech's Advance proposal to NSF and links to the NSF Advance website as well as websites belonging to the other NSF

Advance Institutional Transformation grant recipients. Annual reports and institutional data on women in science and engineering will also be posted on the *AdvanceVT* website.

A special feature on Virginia Tech's Advance website is "Ask Gail". Virginia Tech's Advance proposal describes the experiences of "Gail," a fictitious female junior faculty member in engineering, and how her relationships with male peers change as a result of Advance program activities. "Gail" has taken on a life of her own as a metaphor for the Advance program. Website visitors are invited to submit questions about women in science and engineering to AskGail@vt.edu. Comments and observations are also welcome.

AdvanceVT has recently received supplemental funding from NSF to develop a portal website for the Advance program. The portal website will serve as the center of communication among Advance project team members. It will be organized to include links to important information based on pre-defined categories, a search engine for the 19 institutional host sites, and an Advance-wide news listing and activities calendar for major events. Also included in the website will be information from institutions and programs that have developed major initiatives in the advancement of women in academia.

Attachments

Key Findings from New Faculty Interviews

Key Findings on the Role of Department Heads

Financial Report

Quantitative Indicators of Activity and Progress

AdvanceVT Year One Financial Report

Budget Explanation for Current Year

Table 1 summarizes the budgeted and actual costs for the first year of the grant. Specific cost elements are explained below.

A. Senior Personnel

Patricia Hyer, Principal Investigator, provides overall oversight for Virginia Tech's Advance program and serves as a member of the leadership team. Twenty-five percent of Dr. Hyer's salary is provided as a cost share to *AdvanceVT* from the provost's office for each year of the program.

Nancy Love, Co-Principal Investigator and Advance professor, leads the work element on advancing women into faculty careers. In the first and second years of the grant, 25% of Dr. Love's salary is paid for by the grant.

Karen Thole, Co-Principal Investigator and Advance professor, leads the work element on empowering women as leaders and scholars. In the first and second years of the grant, 25% of Dr. Thole's salary is paid for by the grant.

Catherine Eckel, Advance professor, leads the policy review and implementation effort as part of the work element on institutional transformation. In the first and second years of the grant, 25% of Dr. Eckel's salary is paid for by the grant.

Beate Schmittmann, Advance professor, leads the work element on increasing representation of women. In the first and second years of the grant, 25% of Dr. Schmittmann's salary is paid for by the grant.

Elizabeth Creamer directs the assessment effort of Virginia Tech's Advance program. In the first year of the grant, 10% of Dr. Creamer's time during the academic year and one month of summer salary are paid for by the grant. In the second year of the grant, 10% of Dr. Creamer's salary will be paid for by the grant.

Peggy Layne, program coordinator, provides full time day-to-day management of *AdvanceVT* program activities. During the first year of the grant, her salary was budgeted to be split between grant funds and returned overhead. Due to delays in earning overhead return, in the first year her salary was paid for entirely by the grant. In future years, her salary will be cost shared through overhead return.

Total expenditures for senior personnel direct charged to the grant in year one are $186,512. This amount is higher than budgeted due to a higher proportion of the program coordinator's salary being charged directly to the grant. In future years the program coordinator's salary will be cost shared through overhead return.

B. Other Personnel

Administrative Support
Barbara Johnson provides full-time administrative support to the *AdvanceVT* program. Her salary is cost shared by the provost's office.

Graduate Students
Teresa Wagner was the graduate assistant for *AdvanceVT*'s assessment program during the first year of the grant. Her assistantship, summer salary, and tuition were paid for with grant funds. Dr. Wagner completed her Ph.D. and moved on to a faculty position this summer. Her work will be continued by another graduate assistant, Jen Jebo, for the second year of the grant.

Anna Lomascolo was *AdvanceVT*'s programmatic graduate assistant during the first year of the grant, providing support to the program coordinator and the leadership team. Her assistantship, summer salary, and tuition were paid for with grant funds. Ms. Lomascolo has accepted a full time position at the Virginia Tech Women's Center, and her work will be continued by another graduate assistant, Valerie Glass, for the second year of the grant.

During the first year of Virginia Tech's Advance program, the graduate school provided support for two graduate assistants. These two graduate students, Corrie Whitmore and Sarah Rangos, provided support for the four Advance professors. Their assistantships and tuition were cost shared by the graduate school. During subsequent years of the grant, the graduate school will continue to provide cost sharing support for two female graduate students in science and/or engineering.

Total expenditures for other personnel directed charged to the grant in year one are $39,477. This amount is below budget due to the variation in graduate student stipends across departments and because tuition remission was erroneously included in this category in the budget. Requested budget for other personnel in year two of the grant will include two postdoctoral associates and two graduate students.

C. Fringes

During the first year of the grant, fringe benefits are calculated at 26% for faculty on calendar year appointments and 35% for staff. For faculty on academic year appointments, fringes are calculated at 26% during the academic year and 8% during the summer. Fringes for graduate assistants are calculated at 1%. In year one, $37,478 will be spent on fringes.

During the second year of the grant, fringe benefits will be calculated at 34.7% for faculty and staff, and 3% for graduate assistants.

D. Equipment

No permanent equipment was purchased with grant funds. Office space renovation and purchase of furniture were cost shared using funds generated by overhead return.

E. Travel

The *AdvanceVT* PI and Co-PIs traveled to Atlanta and Washington DC to meet with first round Advance grant recipients and the NSF program officer immediately following notification of the grant award in spring 2003. In 2004, members of the *AdvanceVT* leadership team and work groups traveled to participate in an Advance workshop and principal investigators' meeting at the University of Washington in February, and the Advance annual principal investigators' meeting and conference at Georgia Tech in April. *AdvanceVT* also provided travel support for two individuals to attend a mentoring workshop at Stanford in June and for two other individuals to participate in a two-day workshop for department heads at the University of Washington in July. In addition, *AdvanceVT* provided travel support for three seminar speakers during the first year of the grant.

Total travel expenditures for year one are anticipated to be $19,840. This amount is significantly less than budgeted, because due to start up activities *AdvanceVT* did not host as many visiting scholars or travel to other campuses for site visits and recruitment as anticipated. These funds will be carried over to year two of the grant and used for their originally intended purposes.

F. Participant Support

AdvanceVT hosted its inaugural workshop for the Virginia Tech community in January 2004, with over 150 attendees. Costs for this event were $18,256, significantly more than budgeted, since the number of participants was more than triple that originally anticipated. In year two of the grant, *AdvanceVT* will host another more focused workshop with participation estimated at 50 people.

G. Other Direct Costs

G.1 Materials and supplies

AdvanceVT incurred expenses for the purchase of two computers, data analysis software, and general office supplies. Grant funds were also expended for costs related to meetings of the work groups, leadership council, advisory committee, and seminars with visiting speakers. Total expenses for year one were $22,815, significantly less than budgeted. *AdvanceVT* was able to obtain computers from other university sources, so fewer computers were purchased than planned, and fewer visiting speakers and other events were held than originally anticipated.

G.2 Publication costs

In the first year of the grant, *AdvanceVT* produced a brochure providing an overview of the program and three newsletters giving updates on program activities for a total cost of $2,986. This amount is less than budgeted, and *AdvanceVT* will carry the remaining funds over into the second year of the program to supplement the originally budgeted amount of $2000, enabling the program to produce additional newsletters and informational materials.

G.3 Consultants

AdvanceVT engaged the services of the Conflict Resolution Center in Roanoke, Virginia, to work with the *AdvanceVT* leadership team on group process, communication, strategic planning, and conflict resolution issues. Anticipated costs for these services in the first year of the grant are $5,278. This amount is considerably less than budgeted, because *AdvanceVT* did not engage the services of outside advisors or gender equity experts during the first year of the grant, nor were expenses incurred for speaker honoraria. The remaining funds will be carried over to the second year of the grant.

G.4 Computer services

No computer services costs were incurred for the Advance program.

G.5 Subcontracts

No subcontracts were issues as part of the Advance program.

G.6 Other

Tuition waivers for graduate assistants are correctly reported in this category, even though they were originally budgeted under "Other Personnel". Total costs of $15,378 were incurred in this category for year one of the grant, including tuition waivers for two graduate assistants and charges for telephone and data lines. Funds originally budgeted in this category for departmental incentive grants were not expended in year one, and will be carried over to year two.

H. Total direct

Total direct costs charged to the grant in year one were $347,742 vs. a budget of $370,828.

I. Total indirect

Total indirect costs incurred in year one of the grant were $155,077. Indirect costs are incurred on all direct costs with the exception of tuition ($335,664).

J. Total direct + indirect

Total direct and indirect costs direct charged to the grant in year one are $502,819 vs. a budget of $536,571.

K. Residual

Remaining unexpended funds of $33,753 are requested to be carried over to year two of the grant. Some of the funding will be used for its originally intended purpose, e.g. speakers, events, meetings, while some may be reallocated following a review and evaluation of this year's activities and priority setting for year two.

L. Amount of request for year two

AdvanceVT is in the process of reviewing the first year of the grant and preparing a budget request for year two. Results of assessment activities and input from the January workshop discussions, meetings with department heads, and networking with senior women faculty will be used to define activities and set priorities. The review will also include an evaluation of the effectiveness of the organizational structure of the grant and the roles and responsibilities of *AdvanceVT* faculty, administrators, and staff, as well as setting the strategic vision for the coming year that will guide program activities designed to effect institutional transformation at Virginia Tech.

M. Cost sharing

Cost sharing provided by the provost's office, the graduate school, and returned overhead in year one included PI and administrative assistant salary, two graduate assistantships, and office space renovation and equipment, and totaled $138,511, considerably exceeding the required amount of $107,314.

Table 1

	Year 1 Budget	Year 1 Expense	Variance
A. Senior Personnel	$166,787	$186,512	($19,725)
B. Other personnel			
B.1. Post-doctoral associates	$0	$0	
B.2. Other professionals	$0	$0	
B.3. Graduate students	$47,876	$39,477	$8,399
B.4. Secretarial/ Clerical	$0	$0	
B.5. Undergraduate Students	$0	$0	
B.6. Other	$0	$0	
Total salaries + wages	$214,663	$225,989	($11,326)
C. Fringe benefits	$36,165	$37,478	($1,313)
Total salaries, wages + fringe	$250,828	$263,467	($12,639)
D. Permanent equipment	$0	$0	$0
E. Travel (domestic)	$35,250	$19,840	$15,410
F. Participant support	$8,750	$18,256	($9,506)
G. Other direct costs			
G.1 Materials & supplies	$40,500	$22,815	$17,685
G.2 Publications	$5,000	$2,986	$2,014
G.3 Consultants	$20,000	$5,278	$14,722
G.4 Computer services	$0	$0	$0
G.5 Subcontracts	$0	$0	$0
G.6 Other	$10,500	$15,378	($4,878)
Total other direct costs	$76,000	$46,179	$29,821
H. Total direct costs	$370,828	$347,742	$23,086
I. Total indirect costs (46.2% excluding tuition)	$165,743	$155,077	$10,667
J. Total direct + indirect	$536,571	$502,819	$33,753
K. Residual funds			$33,753
L. Amount this request	TBD		
M. Cost sharing	$107,314	$138,511	$31,197

Current and Pending Support

(See GPG Section II.D.8 for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consid-eration of this proposal.

Investigator: Catherine C. Eckel	Other agencies (including NSF) to which this proposal has been/will be submitted. None

Support: X Current Pending Submission Planned in Near Future *Transfer of Support

Project/Proposal Title:

Advance Institutional Transformation Award: Virginia Tech (Pat Hyer, PI)

Source of Support: National Science Foundation (Advance)

Total Award Amount: $3,499,558 Total Award Period Covered: 09/01/03 – 08/31/08

Location of Project: Virginia Polytechnic Institute and State University

Person-Months Per Year Committed to the Project. Cal: Acad: 25% Sumr: 1 (2004-5)

Support: X Current Pending Submission Planned in Near Future *Transfer of Support

Project/Proposal Title:

Collaborative Research on Trust, Race, Frames and Institutions

Source of Support: National Science Foundation (SES)

Total Award Amount: $169,722 Total Award Period Covered: 07/01/03 – 06/30/06

Location of Project: Virginia Polytechnic Institute and State University

Person-Months Per Year Committed to the Project. Cal: Acad: Sumr: 0.0

Support: X Current Pending Submission Planned in Near Future *Transfer of Support

Project/Proposal Title:

Doctoral Dissertation Research: The “Give” and “Take” on Restaurant Tipping

Source of Support: National Science Foundation (SES)

Total Award Amount: $11,860 Total Award Period Covered: 01/15/03 – 06/15/05

Location of Project: Virginia Polytechnic Institute and State University

Person-Months Per Year Committed to the Project. Cal: Acad: Sumr: 0.0

Support: X Current Pending Submission Planned in Near Future *Transfer of Support

Project/Proposal Title:

Game Theory and Social Interactions

Source of Support: National Science Foundation (Social Science Infrastructure SBR-0094800)

Total Award Amount: $220,000 (subaward) Total Award Period Covered: 06/01/01 – 05/31/06

Location of Project: University of Virginia (subaward to Virginia Polytechnic Institute and State University)

Person-Months Per Year Committed to the Project. Cal: Acad: Sumr: 0.5

Support: X Current Pending Submission Planned in Near Future *Transfer of Support

Project/Proposal Title:

Charitable Giving: A Field Test of Rebates and Matching Subsidies

Source of Support: National Science Foundation (SES)

Total Award Amount: $320,530 Total Award Period Covered: 06/01/02 – 05/31/05

Location of Project: St. Cloud State University (subaward to Virginia Tech, $44,343)

Person-Months Per Year Committed to the Project. Cal: Acad: Sumr: 0.0

*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.

NSF Form 1239 (10/99) USE ADDITIONAL SHEETS AS NECESSARY

Current and Pending Support

(See GPG Section II.D.8 for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this pro-posal.

Investigator: Catherine C. Eckel	Other agencies (including NSF) to which this proposal has been/will be submitted.

Support: X Current Pending Submission Planned in Near Future *Transfer of Support

Project/Proposal Title:
Using Simple Games to Measure Trust, Risky Behavior, Cooperativeness and Patience in High School Students

Source of Support: John D. and Catherine T. MacArthur Foundation
Total Award Amount: $165,396 Total Award Period Covered: 06/01/01 – 06/24/04
Location of Project: University of Massachusetts (subaward to Virginia Polytechnic Institute and State University)
Person-Months Per Year Committed to the Project. Cal: Acad: 1.0 Sumr:

Support: Current X Pending Submission Planned in Near Future *Transfer of Support

Project/Proposal Title: Cognition Across Networks for Sharing Access to Spectrum

Source of Support: National Science Foundation (ENG)
Total Award Amount: $ 4,634,676 Total Award Period Covered: 8/04-8/08
Location of Project: Virginia Tech Center for Wireless Technology
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr: 1

Support: Current X Pending Submission Planned in Near Future *Transfer of Support

Project/Proposal Title: Measuring preferences in socio-economic surveys

Source of Support: NIH/NICHD
Total Award Amount: $371,622 Total Award Period Covered: 6/05-5/07
Location of Project: UCLA
Person-Months Per Year Committed to the Project. Cal: Acad: 1.3 Sumr:

Support: Current X Pending Submission Planned in Near Future *Transfer of Support

Project/Proposal Title: WITS: Using Handheld Wireless Devices to Enhance Teaching Effectiveness

Source of Support: NSF/DUE
Total Award Amount: $499,204 Total Award Period Covered: 1/05-12/07
Location of Project:
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr: 1

Support: Current x Pending Submission Planned in Near Future *Transfer of Support

Project/Proposal Title: Experimental Measures of Preferences to Augment Survey Research

Source of Support: NSF
Total Award Amount: $93,907 Total Award Period Covered: 10/04-9/05
Location of Project: Virginia Tech
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

*If this project has previously been funded by another agency, please list and furnish information for immediately pre-ceding funding period.

NSF Form 1239 (10/99) USE ADDITIONAL SHEETS AS NECESSARY

Current and Pending Support
(See GPG Section II.D.8 for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.

PAGE 1 of 2
Investigator: Nancy G. Love

Other agencies (including NSF) to which this proposal has been/will be

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title: A Microfluidic Biosensor for Environmental Monitoring

Co-PIs: N. G. Love, K. A. Meehan and B. J. Love
Source of Support: Midwest Hazardous Substances Research Center, Environmental Protection Agency
Total Award Amount: $ $279,022 Total Award Period Covered: Oct 1, 2003 – September 30, 2006
Location of Project: Virginia Tech, NIST in Gaithersburg, MD
Person-Months Per Year Committed to the Project. Cal: Acad: 0.6 Sumr: 0.25

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title: Upset Early Warning Systems for Biological Wastewater Treatment Processes: Fundamental Studies On Source-Cause-Effect Relationships
Co-PIs: Nancy Love
Source of Support: Water Environment Research
Total Award Amount: $311,641 Total Award Period Covered: 1/31/01 – 12/31/04
Location of Project: : Virginia Tech
Person-Months Per Year Committed to the Project. Cal: Acad: 0.5 Sumr: 0.25

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title: WERF Project 03-CTS-7S: Feasibility Testing of Support Systems to Prevent Upsets

Co-PIs: Andrew Shaw and Nancy Love
Source of Support: Water Environment Research Foundation and Environmental Protection Agency
Total Award Amount: $150,000 Total Award Period Covered: 8/1/04 – 7/31/06
Location of Project: Charleston, SC, Black & Veatch and Virginia Tech
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr: 0.5

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title: GAANN: An Interdisciplinary Program in Environmental Biogeochemistry
Co-PIs: John Little, George Filz, Duane Berry, Matt Eick, Michael Hocella, Nancy Love, Malcolm Potts Madeline Schreiber, Mark Widdowson
Source of Support U.S. Department of Education
Total Award Amount: $432,855 Total Award Period Covered: 8/16/01 – 8/15/05
Location of Project: Virginia Tech
Person-Months Per Year Committed to the Project. Cal: Acad: 0.10 Sumr:

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title: Assessment of Seasonal Chlorination Practices and Impacts to Chloraminating Utilities
Co-PIs: P. Vikesland, N. G. Love and F. DiGiano

Source of Support: American Waterworks Research Foundation
Total Award Amount: $528,362 Total Award Period Covered 7/1/02 – 6/30/05
Location of Project: Virginia Tech and University of North Carolina Chapel Hill
Person-Months Per Year Committed to the Project. Cal: Acad: 0.5 Sumr: 0.25

Current and Pending Support
(See GPG Section II.D.8 for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.

PAGE 2 of 2
Investigator: Nancy G. Love

Other agencies (including NSF) to which this proposal has been/will be

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title: ADVANCE Institutional Transformation Award: Virginia Tech
Co-PIs: Patricia Hyer, Nancy Love, Karen Thole
Source of Support: National Science Foundation
Total Award Amount: $3,734,965 Total Award Period Covered: 5/15/03 – 5/14/08
Location of Project: Virginia Tech (N.G. Love has class buyout for this project to accommodate AY time commitment)
Person-Months Per Year Committed to the Project. Cal: Acad: 0.9 Sumr: 1

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title: Wastewater Treatment to Minimize Nutrient Delivery from Dairy Farms to Receiving Waters
Co-PIs: K.F. Knowlton, N. G. Love and G. L. Mullins
Source of Support: The Cooperative Institute for Coastal and Estuarine Environmental Toxicology
Total Award Amount: $278,934 Total Award Period Covered: 9/1/03-8/31/05
Location of Project: Virginia Tech and Chesapeake Bay (York River basin), Virginia
Person-Months Per Year Committed to the Project. Cal: Acad: 0.4 Sumr:

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title: Wastewater Treatment to Minimize Nitrogen Delivery from Dairy Farms to Receiving Waters
Co-PIs: N. G. Love, K. F. Knowlton and B. F. Smets
Source of Support: The Cooperative Institute for Coastal and Estuarine Environmental Toxicology
Total Award Amount: $214,200 Total Award Period Covered: 9/1/04-8/31/06
Location of Project: Virginia Tech and Winyah Bay, South Carolina
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title: Integrated Biotreatment Technology for Nitrogen-Rich Wastewaters in Advanced Life Support Systems
PI: N. G. Love
Source of Support: NASA
Total Award Amount: $538,718 Total Award Period Covered 8/1/04 – 7/31/07
Location of Project: Virginia Tech
Person-Months Per Year Committed to the Project. Cal: Acad: 0.5 Sumr: 0.75

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title: Treatability Evaluation of Three Chlorinated Organic Compounds (1,2-DCA, BCEE and BCEM)
Co-PIs: Peter Vikesland, Nancy G. Love
Source of Support: Parsons Engineering Science
Total Award Amount: $84,721 Total Award Period Covered 11/3/03 – 12/31/04
Location of Project: Virginia Tech
Person-Months Per Year Committed to the Project. Cal: Acad: 0.1 Sumr: 0

*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.

Current and Pending Support

(See GPG Section II.D.8 for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.

Investigator: Beate Schmittmann	Other agencies (including NSF) to which this proposal has been/will be

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title: Statistical Mechanics of Systems far from Equilibrium (PI)

Source of Support: National Science Foundation

Total Award Amount: $ 492,000 Total Award Period Covered: 01/01/01/ - 12/31/04

Location of Project: Virginia Tech

Person-Months Per Year Committed to the Project. Cal: Acad: 2.25 Sumr: 2.0

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title: Phase Transitions in Systems Driven into Non-Equilibrium Steady States (PI)

Source of Support: NATO

Total Award Amount: $ 6,300 Total Award Period Covered: 01/01/97 – 8/31/04

Location of Project: : Virginia Tech; Denmark; Hungary

Person-Months Per Year Committed to the Project. Cal: Acad: Sumr: 0.25

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title: Advance Institutional Transformation Award: Virginia Tech (Pat Hyer, PI)

Source of Support: National Science Foundation

Total Award Amount: $ 3,499,558 Total Award Period Covered: 9/1/03 – 8/31/08

Location of Project: Virginia Tech

Person-Months Per Year Committed to the Project. 25% AY Cal: Acad: Sumr:

Support: ☐ Current ☒ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title: EMSW21-MCTP: Discovering and Encouraging Students in Transition (Peter Haskell, Mathematics, PI; Schmittmann listed as Senior Personnel)

Source of Support: National Science Foundation

Total Award Amount: $ 1,842,267 Total Award Period Covered: 6/1/04 – 5/31/09

Location of Project: Virginia Tech

Person-Months Per Year Committed to the Project. TBD Cal: Acad: Sumr:

Support: ☐ Current ☒ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title: Biological Systems and Soft Materials: Future Directions in Statistical Physics

Source of Support: National Science Foundation

Total Award Amount: $ 8,001 Total Award Period Covered: 1/1/04 – 12/31/04

Location of Project: Virginia Tech

Person-Months Per Year Committed to the Project. Cal: Acad: 1.0 Sumr:

Current and Pending Support
(See GPG Section II.D.8 for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.

PAGE 1 of 2
Investigator: Karen A. Thole

Other agencies (including NSF) to which this proposal has been/will be

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title: Improved Film Cooling Performance for Vanes and Endwalls with Realistic Surfaces

Co-PIs:
Source of Support: Department of Energy
Total Award Amount: $ 572,385 Total Award Period Covered: 07/01/03 - 06/30/06
Location of Project: Virginia Tech
Person-Months Per Year Committed to the Project. Cal: 1 Acad: Sumr:

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title: Development of Microcircuit Cooling Technologies for Turbine Blades

Co-PIs:
Source of Support: United Technologies—Pratt & Whitney
Total Award Amount: $ 150,000 Total Award Period Covered: 03/01/03 - 12/31/03
Location of Project: Virginia Tech
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title: Measurements and Predictions of Heat Transfer for a First Vane Design

Co-PIs:
Source of Support: Siemens Westinghouse
Total Award Amount: $ 284,818 Total Award Period Covered: 03/01/02 -12/31/04
Location of Project: Virginia Tech
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title: GOALI Collaborative Research: Thermal And Flow Control For Airfoil-Endwall Junctures

Co-PIs:
Source of Support: National Science Foundation
Total Award Amount: $ 199,984 Total Award Period Covered: 3/1/04-2/28/07
Location of Project: Virginia Tech
Person-Months Per Year Committed to the Project. Cal: 0.083 Acad: Sumr:

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title: REU: INVESTIGATION OF RIB TURBULATED CHANNELS FOR GAS TURBINE HEAT TRANSFER

Co-PIs:
Source of Support: National Science Foundation
Total Award Amount: $ 6,000 Total Award Period Covered: 7/1/2004-12/31/2004
Location of Project: Virginia Tech
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Current and Pending Support
(See GPG Section II.D.8 for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.

PAGE 2 of 2
Investigator: Karen Thole

Other agencies (including NSF) to which this proposal has been/will be

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title: ADVANCE Institutional Transformation Award: Virginia Tech
Co-PIs: Patricia Hyer, Nancy Love, Karen Thole
Source of Support: National Science Foundation
Total Award Amount: $3,734,965 Total Award Period Covered: 5/15/03 – 5/14/08
Location of Project: Virginia Tech (K. Thole has class buyout for this project to accommodate AY time commitment)
Person-Months Per Year Committed to the Project. Cal: 0.9 Acad: Sumr: 1

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title: Development of Winglets for Louvered Fin Heat Exchangers
Co-PIs:
Source of Support: Modine Manufacturing
Total Award Amount: $ 144,462 Total Award Period Covered: 8/04-7/31/06
Location of Project: Virginia Tech
Person-Months Per Year Committed to the Project. Cal: 1 Acad: Sumr:

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title: Experimental Characterization of Thermals and Flow Patterns in the Vicinity of Dilution Holes with Swirl
Co-PIs:
Source of Support: United Technologies Corporation – Pratt & Whitney
Total Award Amount: $ 49,247 Total Award Period Covered: 1/04-12/04
Location of Project: Virginia Tech
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title: ADVANCE Institutional Transformation (supplement for website development)
Co-PIs: Pat Hyer and Nancy G. Love
Source of Support: National Science Foundation
Total Award Amount: $94,671 Total Award Period Covered 11/3/03 – 12/31/04
Location of Project: Virginia Tech
Person-Months Per Year Committed to the Project. Cal: 0.5 Acad: Sumr: 0

*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.

AdvanceVT Year One Quantitative Indicators of Activity and Progress

As part of the reporting requirements of Virginia Tech's Advance Institutional Transformation award, the National Science Foundation requires a set of quantitative and qualitative indicators of project performance and impact. Since Virginia Tech is just completing the first year of its Advance program, the indicators reported here will serve as a baseline for comparison with future years. Indicators presented below include numbers and percentages of women scientists and engineers in various categories at Virginia Tech and analyses of gender effects on faculty salaries, space allocation, and start-up packages. Virginia Tech is still in the process of collecting information on faculty promotion dates prior to 1997 and faculty space allocation in the College of Science. That information will be included in subsequent reports. *AdvanceVT* plans to use these data indicators internally for program planning and to share them with the university community in a variety of formats, including presentations to university administrators as well as in our newsletters and on the *AdvanceVT* web site.

Faculty by Appointment Type, Rank, and Gender

Table 1 shows the number and percent of women faculty in the Virginia Tech Colleges of Science and Engineering by department, the number and percent of women in tenure-line positions by rank and department, and the number of women in science and engineering who are in non-tenure-track positions.

Only faculty in the standard academic ranks of assistant, associate, or professor are eligible to earn tenure. Administrators cannot earn tenure in an administrative appointment, but retain their tenure if earned previously as part of an academic appointment. In fall 2003, there were 278 tenured and tenure-track faculty in the College of Engineering, of which 26 (9.4%) were women. Two engineering departments have no women faculty on the tenure track. The fall 2003 number is up from 21 women (7.4%) in both fall 2001 and fall 2002. The College of Science had 194 tenured and tenure-track faculty in fall 2003; 29 were women (15%). The number of women in the College of Science has decreased since fall 2001 (34) and fall 2002 (30), as has the total number of tenured and tenure-track faculty (217 in fall 2001, 202 in fall 2002, and 195 in fall 2003). The college is only beginning to recover from severe budget reductions experienced in recent years.

While low overall representation of women is a serious problem for both colleges, the scarcity of women at the senior-most ranks is even more acute. Only four women (3%) held the rank of professor in the College of Engineering and nine women (8%) in the College of Science in the fall of 2003. The low numbers of women at the senior ranks mean the pool of experienced women available for appointments to professorships and chairs and important policy making committees is very limited.

There are three other major categories of faculty appointments at Virginia Tech: administrative and professional (A/P), non-tenure track instructional, and special research faculty. A/P faculty in the two colleges are generally the deans and assistant/associate deans and professional staff for college-level functions. When A/P positions appear in departments, these individuals are typically professional fiscal officers or academic advisors. Both colleges have strong

representation of women on the dean's staff. The College of Engineering has an associate dean for academic affairs and an associate dean of distance learning and computing, both are African American women. The College of Science started the fall with only a partial administrative structure in place. In January, two new appointments were made for an associate dean of research, graduate studies, and outreach, and an associate dean of curriculum, instruction, and advising; both positions were filled by current women faculty members.

Non-tenure-track instructional faculty include individuals on visiting appointments, or those on short or long-term instructor appointments. The College of Science has far more such positions, teaching many sections of lower division mathematics and science courses; about half of the 41 non-tenure appointments in the college are in the department of mathematics. Women fill a little over half of these appointments college wide. There are fewer non-tenure track positions in the College of Engineering, a total of 19 in fall 2003, with 32% of these filled by women.

A growing category of employment at Virginia Tech is the special research faculty whose primary responsibility is sponsored research. There are a number of ranks used within the special research faculty category. These include postdoctoral associate, research or project associate, research scientist, and research assistant professor, among others. There are 83 research faculty appointments in engineering, about 16% are women. This is up from 64 research faculty in fall 2001, and 78 in fall 2002; the proportion of women has increased slightly as well. The College of Science has 55 research faculty, about 25% of whom are women. This number has not changed over the three-year period.

To put these college numbers within the perspective of the university as a whole, the total tenured and tenure track faculty university wide has DECREASED from 1418 in fall 2001, to 1331 in fall 2002, to 1262 in fall 2003; an 11% reduction. Much of the loss has been as a result of an early retirement program offered as part of the university's budget reduction strategies. In addition, there have been resignations as faculty have sought better opportunities and salaries elsewhere. A number of searches were conducted during spring 2004; rebuilding of the faculty has begun although it will take some time and substantial budget increases to recover. The reduction in administrative and professional faculty over the same period was 13.6%. The growth in research faculty, funded almost wholly from sponsored programs rather than state funding, has been 15.5% since fall 2001, from 413 to 477 in fall 2003. This reflects the strong commitment made by the university (and individual faculty members) to move forward with its plan to increase its stature as a major research university despite the reductions in state support.

Tenure and Promotion Outcomes by Gender

Table 2 summarizes the current status of faculty hired at Virginia Tech as assistant professors in 1997, 1998, and 1999, including attrition and time to promotion. During those three years, a total of 23 assistant professors were hired in the College of Science (19 men and four women) and 30 assistant professors were hired in the College of Engineering (20 men and 10 women). Of those hired, nine have subsequently left Virginia Tech (four scientists, all male, and five engineers, three female and two male). Three-quarters of the scientists (equal proportions male and female) and half of the engineers (40% of the women and 55% of the men) have been promoted to associate professor.

Some assistant professors were hired with prior experience and credit towards tenure, and four (three men and one woman) have been promoted twice, to the rank of professor, since joining the university, so it is difficult to make a direct comparison of time to promotion. Men were more likely to be hired with prior experience and credit towards tenure than women. Two of the female assistant professors hired during this time period extended the tenure clock for family reasons. Average time to promotion for assistant professors hired between 1997 and 1999 in the College of Engineering was 4.8 years for women (N=4) and 4.9 years for men (N=11). In the college of science, average time to promotion for women in this group was 6.4 years (N=3) and for men 4.9 years (N=14).

Years in Rank by Gender

Virginia Tech's faculty database does not include promotion dates prior to 1997, when the current computer system was implemented, and therefore it is not possible to compute time in rank for all faculty. *AdvanceVT* is working with the deans and department heads to compile promotion dates for faculty in the colleges of science and engineering, and will conduct an analysis of years in rank by gender during year two of the grant.

Time at Institution by Gender

Table 3 shows average years at Virginia Tech for tenure-track faculty in the Colleges of Science and Engineering by rank and gender, as well as for the university as a whole. The average length of service at Virginia Tech for male full professors in engineering is almost half again longer than that for female full professors (18.7 years vs. 12.7 years). In science, the years of service for male full professors average about one third longer than women full professors (23.5 years vs. 17.3 years). University wide, male full professors have been at Virginia Tech about 17% longer than female full professors (20.7 years vs. 17.6 years). Not surprisingly, these data show that women are relatively recent additions to the faculty ranks in engineering and science.

Number and Percent of Women Scientists and Engineers in Administrative Positions

Table 4 summarizes numbers and percentages of women in various administrative leadership positions at Virginia Tech. Of the eight academic deans, one (Agriculture) is a woman. In addition, the Dean of Libraries is a woman. Twenty-six percent of the assistant and associate deans in the academic colleges are women (7 of 27). Only 9 of the 67 (13.4%) academic department heads are women; 6 of the 9 women heads are in the College of Liberal Arts and Human Sciences. Women are also scarce in senior-level leadership positions at the university. The three most senior positions (president, provost, executive vice president) are held by men. There are two women among the other vice presidents and vice provosts. Three women (15%) are directors of university-level research centers. All three are social scientists.

Professorships and Chairs

Table 5 presents data on the gender of holders of endowed professorships and chairs at the college and university level at Virginia Tech. Endowed professorships and chair positions at

Virginia Tech are a fairly recent phenomenon, dating back to the first capital campaign in the mid-1980s. Prior to that the university had established a rank for the most distinguished faculty using state funds; these were called University Distinguished Professors (UDP). UDP appointments are restricted to no more than 1% of the full-time faculty, and they remain the most prestigious faculty appointment for outstanding researchers. The Alumni Distinguished Professor (ADP) is also a coveted university-wide appointment which recognizes those whose contributions have been especially strong in teaching and service, although the selected faculty also have very substantial research records. Unlike the University Distinguished Professorships, the ADP appointments are endowed by donations from alumni. They are currently being awarded for a ten-year period. Both types of distinguished professor appointments are made on the basis of a call for nominations university-wide; a university-level committee makes recommendations for appointments to the provost and president.

Faculty members selected for an endowed professorship or chair position receive a stipend and sometimes a small operating account. The amount of the stipend varies greatly, based in part on the value of the endowment and other factors. Typically these appointments are for life, although a number are rotating or renewable term appointments. Virtually all of the current endowed professors and chairs hold the rank of full professor. Recommendations for appointment are typically made by department or college honorifics committee, approved by the dean, and submitted to the Board of Visitors for ratification.

Professorships are often restricted to a particular specialty, department, or college, depending on the donor's intent. The number of endowed professors varies greatly by college, depending on the capacity of donors associated with private giving to the college, and the historical success of the deans in attracting such gifts. The Colleges of Business and Engineering have the highest proportion of their faculty members recognized through endowed professorships (29% and 20% of their tenured faculty respectively). Thirteen faculty members in the College of Science have endowed professorship appointments, or 7.6% of the tenured faculty. Given the distribution of women by rank at Virginia Tech, particularly in science and engineering, it is no surprise that women would be so poorly represented in the eminent scholar ranks – only one woman in either college holds an endowed professorship, which she shares with her husband and research collaborator. There are only 9 women at the professor rank in science and 4 in engineering, and many of these have only recently been promoted to professor.

Women hold only seven honorific titles out of the total of 122 filled positions at Virginia Tech as of June 2004, approximately 5.7% of the total. University-wide, women are best represented among the Alumni Distinguished Professors, where three women have been appointed in recent years (33% of the total 9 ADP appointments). Six of the eight academic colleges have no women in department or college-based endowed professorships or chairs.

Promotion and Tenure Committees

Table 6 shows the gender composition of department and college promotion and tenure committees in the Colleges of Science and Engineering, as well as the university level promotion and tenure committee.

Review for promotion and tenure takes place at three levels at Virginia Tech. Department-level committee structures vary in size and membership. In small departments, it is common for all tenured associate and full professors to participate. In larger departments, committee members may be elected, or some elected and some appointed. Of the 11 departments in the College of Engineering, 3 have at least 1 woman member on the P&T committee; 7 departmental committees had no female members for the 2003-04 cycle. In the College of Science, half of the 8 departments included women members on the P&T committee.

College-level promotion and tenure committees also vary in their membership. The College of Engineering P&T committee includes faculty representatives and all department heads, a total of 23 members during 2003-04. One member was a woman. The College of Science had a nine-member P&T committee with three women (33%) members.

The University Promotion and Tenure Committee includes nine faculty representatives (one from each college and one additional) and the eight academic college deans. The Provost serves as non-voting chair. During the 2003-04 cycle, the majority of the faculty representatives (5 of 9) were women. One of the 8 academic deans is female.

Salary of Science and Engineering Faculty by Gender

Virginia Tech conducted a salary equity study this year in order to assess the impact, if any, of gender on faculty salaries across the university. Multiple models to assess salary equity were constructed by the university's Office of Institutional Research using data available in the university's database and multiple regression techniques. The methodology followed was that developed by the American Association of University Professors and described in *Paychecks: A Guide to Conducting Salary Equity Studies for Higher Education Faculty*, by Lois Haignere (AAUP, 2002). A more detailed discussion of the study and accompanying data tables are included as Attachment A.

All tenured and tenure-track teaching and research faculty at Virginia Tech were included in the analysis, and administrative faculty were excluded. Faculty were classified into the academic ranks of assistant professor, associate professor, professor, and eminent scholar (holder of an endowed professorship or chair). Factors evaluated for their impact on salary included academic unit (department), academic rank, gender, tenure status, citizenship, ethnicity, time in rank, time at Virginia Tech, and experience prior to joining Virginia Tech. Because promotion dates prior to 1997 are missing from the Virginia Tech faculty database as explained above, time in rank was treated as categorical variable with three possible values: less than three years, three to six years, and greater than six years.

Nearly 80% of the variation in salaries was accounted for by the above factors. Factors that were significant in explaining the variation in salaries included academic unit, academic rank, time at Virginia Tech, experience prior to Virginia Tech, tenure status, and time in rank. Gender was not statistically significant in explaining differences in salaries, with women earning on average about $100 per year less than men with comparable rank, time in rank, and prior work experience in the same discipline. Since women are more likely to be found at the lower academic ranks and tend to have less time in rank than their male colleagues, additional models were developed

to attempt to disentangle the effects of gender and rank. When rank and time in rank were removed from the model, the explanatory power of the model decreased to about 60%, but gender was still not statistically significant in explaining salary differences.

Space Allocation of Science and Engineering Faculty by Gender

Data on space allocation at the individual level is not available university-wide at Virginia Tech. The associate dean of engineering for administration collected data on space allocation at the level of individual faculty in the College of Engineering in the summer of 2003, and shared that information as well as his analysis of the factors influencing space allocation with *AdvanceVT*. In summary, male faculty members in Virginia Tech's College of Engineering are allocated an average of almost 1500 square feet of space each compared with only about 700 square feet for female faculty. While that difference is substantial, it is not statistically significant at generally accepted levels, due in part to the small number of female engineering faculty (24 women vs. 223 men) and the wide variation in space allocation between individuals, even in the same department (standard deviation of 648 for women and 2184 for men).

Testing the significance of the difference in space allocation between male and female engineering faculty yields a p-value of 0.077, above the generally accepted values of 0.05 or 0.01, indicating that the probability of variation being due to chance is 7.7%. Single variable regression indicates that gender explains only 1.3% of the difference in space allocation between male and female engineering faculty. Additional tests were performed to evaluate the impact of years since receipt of the Ph.D., academic rank, academic discipline (at the department level), and value of sponsored research on space allocation. Results of the analysis indicate that the value of a faculty member's sponsored research explains 16.8% of the variance in space allocation, and is significant at the p=0.001 level. Faculty rank (whether or not the faculty member is at the rank of assistant professor) also has a statistically significant effect on space allocation, but a model incorporating rank and value of sponsored research accounts for only 18.9% of the variation in space allocation. The contribution of gender to the model was not statistically significant.

Some of the many challenges of conducting an analysis of this type include accounting for allocation of space that is shared among several colleagues and measures of the "quality" of the space, or how well it meets the needs of an individual faculty member's research program. *AdvanceVT* will continue to work with the College of Engineering to ensure equitable allocation of space to women faculty, and will begin to work with the college of science to collect and analyze space allocation information.

Start-up Packages of Newly Hired Science and Engineering Faculty by Gender

Virginia Tech has a fairly complete database of start-up packages for new faculty hired in the fall of 2003. Data for previous years is less complete. Because the number of faculty (especially women faculty) hired in any single department in a given year is small, specific data are not reported here in order to protect individual confidentiality. A more rigorous analysis of possible gender effects controlling for academic discipline (at the department level) may require aggregating data across several years.

During the 2003-04 academic year, the Virginia Tech College of Engineering hired 20 new faculty in seven different departments. Five were at the associate professor level (two women and three men) and 15 at the assistant professor level (three women and 12 men). The average start-up package (exclusive of salary) for female associate professors was $83,400, while the average startup package for male associate professors was $148,547. The high average for the male associate professors is driven by one individual who was hired with tenure and received the highest start-up package offered in the college of engineering this year ($285,000). The average start-up package for female assistant professors was $71,503, while the average for male assistant professors was $81,971. The value of start-up packages for assistant professors in the College of Engineering ranged from a low of $13,000 in engineering fundamentals, a department that does not have a strong history of sponsored research, to a high of $162,000 in mechanical engineering. The value of start-up packages also ranged considerably within some departments with multiple hires. The mechanical engineering department hired four assistant professors with start-up packages ranging in value from $62,000 to $162,000, and the computer science department hired three assistant professors with start-up packages ranging from $28,375 to $158,875.

The College of Science hired five assistant professors during the 2003-04 academic year, two female and three male. The average start-up package for the female assistant professors was $173,905, and the average for the male assistant professors was $153,272. The average for the male assistant professors includes a mathematician who received a start-up package considerably lower in value than that of the new hires in laboratory science departments. The department of biology hired two assistant professors, one male and one female, and their start-up packages were identical in value.

Table 1
Virginia Tech College of Science Faculty
Gender by Type and Department, Fall 2003

College of Science Tenured & Tenure-track Instructional Faculty	Tenured and Tenure Track Instructional Faculty																				
	Professor					Associate					Assistant					Total Tenure Track				
	F		M		All	F		M		All	F		M		All	F		M		All
Department	#	%	#	%	#	#	%	#	%	#	#	%	#	%	#	#	%	#	%	#
Biology	3	15.0	17	85	20	1	11.1	8	88.9	9	4	80	1	20	5	8	23.5	26	76.5	34
Chemistry	1	6.3	15	93.8	16	2	22.2	7	77.8	9	0	0	3	100	3	3	10.7	25	89.3	28
Dean of Science	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0.0	0
Economics	1	14.3	6	85.7	7	1	20	4	80	5	0	0	2	100	2	2	14.3	12	85.7	14
Geosciences	1	9.1	10	90.9	11	1	25	3	75	4	1	33	2	67	3	3	16.7	15	83.3	18
Mathematics	1	3.0	32	97	33	2	22.2	7	77.8	9	0	0	3	100	3	3	6.7	42	93.3	45
Physics	1	10.0	9	90	10	0	0	9	100	9	1	50	1	50	2	2	9.5	19	90.5	21
Psychology	1	14.3	6	85.7	7	4	36.4	7	63.6	11	1	50	1	50	2	6	30.0	14	70.0	20
Statistics	0	0.0	7	100	7	1	20	4	80	5	1	50	1	50	2	2	14.3	12	85.7	14
College Total	9	8%	102	92%	111	12	20%	49	80%	61	8	36%	14	64%	22	29	14.9%	165	85.1%	194

College of Science Other Faculty	Other Faculty																				
	Administrative/Professional					Non-Tenure Track Instructional					Research					Total Other Faculty				
	F		M		All	F		M		All	F		M		All	F		M		All
Department	#	%	#	%	#	#	%	#	%	#	#	%	#	%	#	#	%	#	%	#
Biology	0	0	0	0	0	1	20	4	80	5	4	50	4	50	8	5	38.5	8	61.5	13
Chemistry	0	0	0	0	0	4	57.1	3	42.9	7	4	20	16	80	20	8	29.6	19	70.4	27
Dean of Science	0	0	2	100	2	0	0	0	0	0	0	0	0	0	0	0	0.0	2	100.0	2
Economics	0	0	0	0	0	1	50	1	50	2	0	0	0	0	0	1	50.0	1	50.0	2
Geosciences	0	0	0	0	0	1	50	1	50	2	2	20	8	80	10	3	25.0	9	75.0	12
Mathematics	0	0	0	0	0	15	71.4	6	28.6	21	0	0	1	100	1	15	68.2	7	31.8	22
Physics	0	0	0	0	0	0	0	0	0	0	0	0	10	100	10	0	0.0	10	100.0	10
Psychology	0	0	0	0	0	0	0	2	100	2	3	75	1	25	4	3	50.0	3	50.0	6
Statistics	0	0	0	0	0	1	50	1	50	2	1	50	1	50	2	2	50.0	2	50.0	4
College Total	0	0	2	100%	2	23	56.1%	18	43.9 %	41	14	25.5%	41	74.5 %	55	37	37.8%	61	62.2%	98

Table 1 - continued
Virginia Tech College of Engineering Faculty
Gender by Type and Department, Fall 2003

College of Engineering Tenured & Tenure-track Instructional Faculty	Tenured and Tenure Track Instructional Faculty																			
	Professor					Associate					Assistant					Total Tenure Track				
Department	F #	F %	M #	M %	All #	F #	F %	M #	M %	All #	F #	F %	M #	M %	All #	F #	F %	M #	M %	All #
Aerospace and Ocean Eng	0	0	11	100	11	1	25	3	75	4	0	0	4	100	4	1	5.3	18	94.7	19
COE Northern Virginia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0.0	0
Chemical Engineering	0	0	4	100	4	2	40	3	60	5	0	0	2	100	2	2	18.2	9	81.8	11
Civil & Env. Engineering	0	0	21	100	21	2	11	16	89	18	2	66.7	1	33.3	3	4	9.5	38	90.5	42
Computer Science	0	0	7	100	7	2	17	10	83	12	0	0	10	100	10	2	6.9	27	93.1	29
Ctr for Intelligent Materials	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0.0	0
Dean – Engineering	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0.0	0
Electrical Engineering	1	3	30	97	31	0	0	15	100	15	2	11	17	89	19	3	4.6	62	95.4	65
Engineering Fundamentals	0	0	1	100	1	0	0	5	100	5	3	50	3	50	6	3	25.0	9	75.0	12
Eng. Science & Mechanics	0	0	18	100	18	0	0	6	100	6	0	0	4	100	4	0	0.0	28	100.0	28
Industrial & Systems Eng.	0	0	7	100	7	2	20	8	80	10	4	67	2	33	6	6	26.1	17	73.9	23
Materials Engineering	1	25	3	75	4	0	0	3	100	3	0	0	1	100	1	1	12.5	7	87.5	8
Mechanical Engineering	2	13	13	87	15	1	8	12	92	13	1	20	4	80	5	4	12.1	29	87.9	33
Mining & Minerals Eng.	0	0	5	100	5	0	0	1	100	1	0	0	2	100	2	0	0.0	8	100.0	8
College Total	4	3%	120	97%	124	10	11%	82	89%	92	12	19%	50	81%	62	26	9.4%	252	90.6%	278

College of Engineering Other Faculty	Other Faculty																			
	Administrative/Professional					Non-Tenure Track Instructional					Research					Total Other Faculty				
Department	F #	F %	M #	M %	All #	F #	F %	M #	M %	All #	F #	F %	M #	M %	All #	F #	F %	M #	M %	All #
Aerospace and Ocean Eng	0	0	0	0	0	0	0	0	0	0	0	0	1	100	1	0	0.0	1	100.0	1
COE Northern Virginia	0	0	1	100	1	0	0	0	0	0	0	0	1	100	1	0	0.0	2	100.0	2
Chemical Engineering	0	0	0	100	0	0	0	1	100	1	1	25	3	75	4	1	20.0	4	80.0	5
Civil & Env. Engineering	0	0	0	0	0	0	0	1	100	1	1	20	4	80	5	1	16.7	5	83.3	6
Computer Science	0	0	0	0	0	2	33.3	4	66.7	6	0	0	2	100	2	2	25.0	6	75.0	8
Ctr for Intelligent Materials	0	0	0	0	0	0	0	0	0	0	1	100	0	0	1	1	100.0	0	0.0	1
Dean – Engineering	4	50	4	50	8	0	0	2	100	2	3	18.8	13	81.3	16	7	26.9	19	73.1	26
Electrical Engineering	1	100	0	0	1	1	33.3	2	66.7	3	3	14.3	18	85.7	21	5	20.0	20	80.0	25
Engineering Fundamentals	0	0	0	0	0	2	100	0	0	2	0	0	0	0	0	2	100.0	0	0.0	2
Eng. Science & Mechanics	0	0	0	0	0	0	0	1	100	1	0	0	7	100	7	0	0.0	8	100.0	8
Industrial & Systems Eng.	0	0	0	0	0	0	0	1	100	1	1	7.7	12	92.3	13	1	7.1	13	92.9	14
Materials Engineering	0	0	0	0	0	1	100	0	0	1	2	50	2	50	4	3	60.0	2	40.0	5
Mechanical Engineering	0	0	1	100	1	0	0	1	100	1	1	14.3	6	85.7	7	1	11.1	8	88.9	9
Mining & Minerals Eng.	0	0	0	0	0	0	0	0	0	0	0	0	1	100	1	0	0.0	1	100.0	1
College Total	5	45.5%	6	54.5%	11	6	31.6%	13	68.4%	19	13	15.7%	70	84.3%	83	24	21.2%	89	78.8%	113

Table 2
Tenure and Promotion Outcomes as of July 2004
Virginia Tech Colleges of Science and Engineering
Newly Hired Assistant Professor Cohorts 1996-1999

College of Science	# in Cohort		Promoted to Associate		Average Time to Promotion (years)		Left Institution		Not Yet Tenured	
Year Hired	F	M	F	M	F	M	F	M	F	M
1996/97	2	6	2	4	6.8 (1)	5.6 (2)	0	2	0	0
1997/98	1	5	1	5	6	5 (3)	0	0	0	0
1998/99	1	8	0	5	--	4.1 (4)	0	2	1	1
College Total Number of New Hires (1996-99)	4	19	3	14	--	--	0	4	1	1
College Total Percentage (1996-99)	17.4%	82.6%	75.0%	73.7%	--	--	0.0%	21.1%	25.0%	5.3%
College Average Time to Tenure					6.4	4.9				

College of Engineering	# in Cohort		Promoted to Associate		Average Time to Promotion (years)		Left Institution		Not Yet Tenured	
Year Hired	F	M	F	M	F	M	F	M	F	M
1996/97	3	5	2	3	6.8 (5)	4 (6)	1	2	0	0
1997/98	2	8	1	7	6	5.9 (7)	1	0	0	1
1998/99	5	7	1	1	1.6 (8)	4.9 (9)	1	0	3	6
College Total Number of New Hires (1996-99)	10	20	4	11	--	--	3	2	3	7
College Total Percentage (1996-99)	33.3%	66.7%	40.0%	55.0%	--	--	30.0%	10.0%	30.0%	35.0%
College Average Time to Tenure					4.8	4.9				

Note: Percentages are within sex, except # in Cohort which are percents male and female of total incoming cohort

(1) One female extended the tenure clock
(2) Two males were hired with 1 year credit towards tenure; one male was hired with 2 years credit towards tenure
(3) Three males were hired with 1, 2, or 3 years credit towards tenure. One was also promoted to full professor
(4) One male was hired with significant prior experience and has also been promoted to full professor.
(5) One female extended the tenure clock.
(6) Two males were hired with 3 years credit towards tenure
(7) Three males were hired with prior experience. One male was also promoted to full professor.
(8) One female was hired with prior experience and has also been promoted to full professor.
(9) Two males were hired with prior credit towards tenure.

Table 3
Average Time at Institution by College, Rank,and Gender
Virginia Tech Tenure-Track Faculty
Fall 2003

College of Engineering

	Gender				
	M		F		
Rank	N	Average Years	N	Average Years	Total N
Professor	120	18.7	4	12.7	124
Associate Professor	82	10.7	10	7.3	92
Assistant Professor	50	2.9	12	3.2	62
Total	**252**	**13**	**26**	**6.2**	**278**

College of Science

	Gender				
	M		F		
Rank	N	Average Years	N	Average Years	Total N
Professor	102	23.5	9	17.3	111
Associate Professor	49	14.5	12	10.1	61
Assistant Professor	14	3	8	3.4	22
Total	**165**	**19.1**	**29**	**10.5**	**194**

University Total

	Gender				
	M		F		
Rank	N	Average Years	N	Average Years	Total N
Professor	509	20.7	65	17.6	574
Associate Professor	323	13.5	113	11.4	436
Assistant Professor	151	3.5	92	3.6	234
Instructor	2	12.2	1	2.8	3
Total	**985**	**15.7**	**271**	**10.2**	**1256**

Tenured and Tenure-Track Faculty only
(Defined as Tenure Codes T, P, C, and E) and Academic Colleges only

Table 4
Virginia Tech Administrative Leadership Positions
July 2004

Academic Colleges	Academic Deans M	Academic Deans F	Assoc/Asst Deans M	Assoc/Asst Deans F	Department Heads M	Department Heads F
Agriculture	0	1	5	0	11	1
Architecture	1	0	2	0	6	1
Business	1	0	2	1	6	0
Engineering	1	0	2	2	11	0
Liberal Arts & Human Sciences	1	0	2	2	10	6
Natural Resources	1	0	3	0	4	0
Science	1	0	2	2	8	0
Veterinary Medicine	1	0	2	0	2	1
Total Academic Colleges	7	1	20	7	58	9
		12.5%		25.9%		13.4%

University-Level Administrators	**M**	F	% Women
President, Provost, Exec VP & CBO	3	0	0.0%
Vice Presidents & Vice Provosts	9	2	18.2%
University Center Directors	17	3	15.0%

These tables exclude the Dean of Libraries, a senior university administrative position. The incumbent is a woman.

Table 5
Virginia Tech Endowed Professorships and Chairs
June 2004

	College/Dept Endowed Professorships and Chairs				Alumni Distinguished Professors (University-wide)				University Distinguished Professors (University-wide)				All
	F		M		F		M		F		M		
	#	%	#	%	#	%	#	%	#	%	#	%	#
Agriculture & Life Sciences	0	0	7	100	0	0	1	100	0	0	1	100	9
Architecture & Urban Studies	0	0	6	100	0	0	0	0	0	0	1	100	7
Business	0	0	23	100	0	0	0	0	0	0	0	100	23
Engineering	0	0	36	100	0	0	2	100	0	0	3	100	41
Liberal Arts & Human Sciences	2	33.3	4	66.7	3	50	3	50	1	50	1	50	14
Natural Resources	0	0	6	100	0	0	0	0	0	0	1	100	7
Sciences	1	9.1	10	90.9	0	0	0	0	0	0	5	100	16
Veterinary Medicine	0	0	5	100	0	0	0	0	0	0	0	0	5
University Total	3	3.0	97	97.0	3	33.3	6	66.7	1	7.7	12	92.3	122

Two male faculty members in the College of Science and one male faculty in Natural Resources hold both an endowed professorship and a University Distinguished Professorship (not endowed). These three individuals are counted in both categories. Otherwise, faculty members may not hold more than one ENDOWED professorship at a time.

Alumni Distinguished Professor is a preeminent rank which recognizes extraordinary academic citizenship and distinguished service within Virginia Tech. The recognition is accorded faculty members "who have, over time, made outstanding contributions to the instructional program of the university and, in so doing, have touched the lives of generations of Virginia Tech alumni."

University Distinguished Professor is a preeminent rank bestowed on faculty members whose scholarly attainments have attracted national and/or international recognition. The professorship is limited to no more than one percent of the total full-time faculty at any time.

Table 6
Virginia Tech Promotion and Tenure Committees, 2003-04

College of Science	Departmental Committee				
	F		M		All
	#	%	#	%	#
Biology	2	25	6	75	8
Chemistry	0	0	7	100	7
Economics	0	0	4	100	4
Geosciences	2	33.3	4	66.7	6
Mathematics	0	0	8	100	8
Physics	1	12.5	7	87.5	8
Psychology	3	50	3	50	6
Statistics	0	0	4	100	4
College Total	8	15.7%	43	84.3%	51

College of Engineering	Departmental Committee				
	F		M		All
	#	%	#	%	#
Aerospace and Ocean Engineering	0	0	8	100	8
Chemical Engineering	0	0	4	100	4
Civil & Environmental Engineering	0	0	6	100	6
Computer Science	0	0	4	100	4
Electrical Engineering	0	0	8	100	8
Engineering Fundamentals	0	0	5	100	5
Engineering Science & Mechanics	0	0	7	100	7
Industrial & Systems Engineering	3	15.8	16	84.2	19
Materials Engineering	1	11.1	8	88.9	9
Mechanical Engineering	2	20	8	80	10
Mining & Minerals Engineering	0	0	4	100	4
College Total	6	7.1%	78	92.9%	84

College-Level P&T Committees	College Committees				
	F		M		All
	#	%	#	%	#
SCIENCE	3	33.3	6	66.7	9
ENGINEERING	1	4.3	22	95.7	23
S&E COMBINED TOTAL	4	12.5%	28	87.5%	32

University-Level P&T Committee	University Committee				
	F		M		All
	#	%	#	%	#
FACULTY REPRESENTATIVES	5	55.6	4	44.4	9
DEANS + PROVOST (NON-VOTING CHAIR)	1	11.1	8	88.9	9
TOTAL	6	33.3%	12	66.7%	18

Salary Equity Study
Virginia Tech
Spring 2004
Prepared by the Office of Institutional Research
Advance Institutional Transformation Program

Introduction

Virginia Tech recently received funding from NSF under the auspices of Advance to promote the participation of women faculty in science and engineering. As a grant recipient, the university is required to investigate equity issues and, in particular, salary equity, as evaluated here. Models to assess salary equity were constructed by the Office of Institutional Research using data available in the University's database and multiple regression techniques. Regressions followed a methodology recommended by NSF and developed by AAUP (Paychecks: A Guide to Conducting Salary Equity Studies for Higher Education Faculty, by Lois Haignere, AAUP, 2002). This report summarizes the findings of the study conducted and discusses which factors significantly affected the salary of tenured and tenure-track faculty in January, 2004, at Virginia Tech.

The report proceeds with an explanation of the variables considered in the analysis, a description of the population involved in the study, a summary of the models generated in the analysis, an interpretation of the results, and some known short-comings of the report dealing with data quality issues.

Factors

In the Paychecks' methodology, a number of variables are identified as likely predictors of faculty salary: gender, race/ethnicity, academic discipline, academic rank category, time in rank (the length of time the faculty member held that particular rank), tenure status, US citizenship status, time at the University (length of time since the faculty member's most recent hire date), and prior experience (calculated as the length of time between the date a faculty member was awarded his/her highest degree and that faculty member's most recent hire date at Virginia Tech). Additional information regarding each of these factors is given in Appendix 1. The outcome variable was academic year (9-month) salary. Faculty on calendar year appointments had their salaries converted to a 9-month base so that salaries would be comparable.

The present analysis does not include a number of factors likely to influence salary differences—especially those related to individual job performance. These data are not available on institutional data bases and were beyond the scope of this effort to collect from departmental files or elsewhere. The models presented here can be seen as a first step in the analysis process and, in fact, do explain a large amount of the variance in faculty salaries. Further examination of data will depend upon institutional interests and needs which can be better assessed in light of the findings reported here.

Population

One-thousand two-hundred thirty-eight tenured and tenure-track teaching and research faculty were included in the analysis; tenured or tenure-track administrative faculty were excluded. Faculty members were classified into one of four academic rank categories (assistant professor, associate professor, professor, Eminent Scholars). While "Eminent Scholars" is not a true academic rank, it was created to distinguish those professors with Eminent Scholars' status from other full professors. University Distinguished Professors were included in the Eminent Scholars category.

Twenty-one percent of the population were female and 79% were male (Table 1). Just over 20% of the population held the rank of assistant professor; 35% were associate professors; and 36% were categorized as professors, with another 9% of faculty falling into the Eminent Scholars category. While 51% of the men in the population were considered either professors or Eminent Scholars, only 23 % of the women in the population fell into these categories.

Just over three-quarters of the population had been awarded tenure at Virginia Tech with the remaining members of the population considered tenure-track faculty (Table 1). Eighty-one percent of the men and 65% of the women in the population had been awarded tenure.

The majority of the population (84%) was white (Table 1). This was consistent for men and women. Asians accounted for 8% of the population; African-Americans comprised 3%; and non-resident aliens accounted for 3%. The remaining 2% of faculty were of other ethnicities. Interestingly, nearly 6% of the women in the study were African-American, compared to 2% of the men. Nearly 90% of the population held US citizenship.

Table 1. Basic demographics of the study's population.

			Women		Men	
	Number in Population	**Percentage of Population**	**Number in Population**	**Percentage of Women**	**Number in Population**	**Percentage of Men**
Gender						
Men	972	78.5%	0	0.0%	972	100.0%
Women	266	21.5%	266	100.0%	0	0.0%
Total	1238	100.0%	266	100.0%	972	100.0%
Academic Rank						
Assistant Professor	250	20.2%	91	34.2%	159	16.4%
Associate Professor	431	34.8%	113	42.5%	318	32.7%
Professor	450	36.4%	55	20.7%	395	40.6%
Eminent Scholars	107	8.6%	7	2.6%	100	10.3%
Total	1238	100.0%	266	100.0%	972	100.0%
Tenure Status						
Tenure-track	278	22.5%	94	35.3%	184	18.9%
Tenured	960	77.5%	172	64.7%	788	81.1%
Total	1238	100.0%	266	100.0%	972	100.0%
Ethnicity						
White	1043	84.2%	227	85.3%	816	83.9%
Asian	94	7.6%	13	4.9%	81	8.3%
African-American	38	3.1%	15	5.6%	23	2.4%
Non-Resident Alien	36	2.9%	4	1.5%	32	3.3%
Latino/Native American	27	2.2%	7	2.6%	20	2.1%
Total	1238	100.0%	266	100.0%	972	100.0%
Citizenship Status						
US Citizen	1110	89.7%	252	94.7%	858	88.3%
Non-US Citizen	128	10.3%	14	5.3%	114	11.7%
Total	1238	100.0%	266	100.0%	972	100.0%

Women in the study, on average, had earned their highest degrees more recently than men in the study (Table 2). The average length of time since earning their highest degrees for the female faculty was 13 years. For the male faculty, the average was 20 years. Not surprisingly, then, the average length of time at Virginia Tech was longer for men (16 years) than for women (11 years).

Table 2. Descriptive measures for work experience variables by gender.

	Women		**Men**	
	Number*	**Average number of years**	**Number***	**Average number of years**
Time Since Earning Highest Degree	266	13.2	971**	19.9
Time at VT	266	10.6	972	15.8

*Number of observations used in calculation of mean
**Degree data were unavailable for one male faculty member

At the lower academic ranks, male and female faculty members have similar patterns in terms of time in rank. Female assistant professors have spent proportionally slightly more time in rank than male assistant professors (Table 3). Fifty-six percent of female assistant professors have spent 3 or more years as assistant professors compared with 49% of male assistant professors. At the associate professor level, 73% of female associate professors have spent 3 or more years at this rank compared to 78% of male associate professors. The major differences occur at the professor rank. Female professors were more likely to have been awarded the rank of professor within the last 6 years (58%) than were male professors (37%). Nearly two-thirds of male professors have been full-professors for more than six years.

The average academic year salary for the 1,238 faculty members in the study was $78,282. At first glance, salaries for female faculty members appeared to lag behind those for male faculty members in the same academic rank and with the same amount of time in rank (Table 3). However, these summary statistics do not take into account disciplinary differences in salary unit.[1] In order to determine if there is *systemic* gender bias in salaries at Virginia Tech, the data were further analyzed.

[1] For example, the Electrical Engineering faculty would be likely to earn higher salaries than the English faculty regardless of the gender composition of either faculty. This effect is compounded by the fact that some disciplines, particularly in science and engineering, have many more male than female faculty.

Table 3. Mean salaries of study population by rank and time in rank

Rank	Time in Rank	Women		Men	
		Number*	Average Salary**	Number*	Average Salary**
Assistant Professor	Less than 3 years	40	$57,250	81	$62,557
	At least 3 years, but less than 6 years	48	$55,741	70	$60,358
	6 years or more	3	$60,703	8	$63,184
	Total	91	$56,568	159	$61,620
Associate Professor	Less than 3 years	31	$68,633	70	$68,288
	At least 3 years, but less than 6 years	29	$67,596	72	$69,757
	6 years or more	53	$66,448	176	$70,247
	Total	113	$67,342	318	$69,705
Professor	Less than 3 years	15	$75,640	74	$83,784
	At least 3 years, but less than 6 years	17	$78,343	73	$83,421
	6 years or more	23	$82,472	248	$89,107
	Total	55	$79,332	395	$87,059
Eminent Scholars	Total	7	$104,956	100	$127,054

*Number in population

**Average *academic year* salary of faculty members of the designated gender within the designated rank

Analysis

In standard salary equity study methodology, developing multiple models for predicting salaries is recommended.[2] If the models produce similar results with respect to which variables have significant effects on salaries, then a certain measure of validity is afforded all of the models. In that vein, multiple models were developed for the Virginia Tech data. However, this discussion is focused on two particular models developed. The first model used multiple regression to analyze the effects of academic unit, academic rank, gender, tenure status, US citizenship, ethnicity, time in rank, time at Virginia Tech, and experience prior to joining VT on academic year salary. The second model employed multiple regression as well, but academic rank and time in rank factors were removed from the analysis.

Model 1 – Full Model

As outlined in the Paychecks' methodology, a multiple regression model was developed with academic year salary as the predicted value (i.e., outcome variable). Academic unit was included in the model as a set of dummy or indicator variables with the statistics department being the "reference" unit or the academic unit to which all other academic units are compared. Statistics was chosen because its mean was very close to the total University mean, so comparisons are roughly the same as comparing to the overall University average. Ethnicity was coded as a set of 4 dummy variables with Asian, African-American, nonresident alien, Latino/Native American/other and white, with "white" being the reference ethnicity. Differences in academic rank were tested using 3 dummy variables; the rank of assistant professor was the reference rank. Time in rank comprised 2 dummy variables with "less than 3 years" being the reference time in rank. Binary variables included gender (reference gender was male), tenure status (reference status was tenured), and US citizenship (reference citizenship was US). Using the SAS® statistics package, a regression model was generated and the program's output is provided in Appendix 2. Nearly 80% of the variation in salaries was accounted for by the factors in the model (adjusted $R^2 = 0.79$). Factors that were significant in explaining the variation in salaries included academic unit ($p < 0.0001$),

[2] Haignere, L., (2002). Paychecks: A Guide to Conducting Salary-Equity Studies for Higher Education Faculty. Washington, D.C.: American Association of University Professors, p. 43.

academic rank ($p < 0.0001$), time at VT ($p < 0.0001$), experience prior to joining VT ($p < 0.0001$), tenure status ($p < 0.0169$) and time in rank ($p = 0.0333$). Gender was *not* significant in explaining differences in salaries, with women, on average making about $100 less than men with comparable rank, time in rank, and prior work experience in the same discipline.

There were few surprises in terms of which factors exercised a significant effect on salary. Work experience, tenure status and rank were all positively associated with salary. Work experience prior to joining Virginia Tech had a positive effect on salary, as did time working at Tech, especially for those who had worked here more than six years. Untenured faculty earned significantly less than tenured faculty. Finally, Eminent Scholars and full professors had significantly higher salaries than did assistant professors. However, associate and assistant professors did not demonstrate a significant difference—an indicator of salary compression. An interaction between gender and rank was included in a subsequent model to see whether rank might have a differential impact in male and female faculty groups. The interaction was not significant and so dropped from the model.

Disciplinary effects, while once again predictable, are still telling. Disciplinary comparisons were with Statistics, as that department's mean salary was close to the overall University mean. Salaries within Agriculture, Natural Resources and Architecture, tended to be lower than the comparison group/University mean, although differences did not always reach significance. Salaries within Engineering and especially Business were well above the mean. Humanities salaries were relatively low and those in educational fields were approximately equal to the campus mean. Disciplines within the College of Science varied, with, for example, Biology and Physics below the University mean, Geosciences, Math and Statistics (the reference group for this comparison) roughly at the mean and Economics and Chemistry roughly above the mean ('roughly' indicating that some of the differences are borderline in terms of significance.) Interestingly, Biology-based disciplines (Biochemistry, Biology, Biomedical Sciences, Biological Systems Engineering) tended to be significantly below the campus mean or just about equal to the mean. This pattern may reflect market factors, but combined with low to moderate salaries in agriculture and animal sciences, may also warrant further consideration in light of current aspirations to enhance NIH funding.

A general gender by discipline interaction was tested by adding a gender by college interaction to the model to examine whether gender might exercise differential effects by college. The interaction was not significant indicating compensation practices vis-à-vis gender are relatively similar across campus, and the interaction was removed from the model. Despite this, there were some differences in the direction of gender effects in several of the colleges, including science and engineering. Overall models carried out did not suggest any type of significant gender effects, but the lower parameter estimates and lower salary figures for women in a subset of colleges warrant further investigation which we can pursue over the next academic year.

Other variations of the model were undertaken to improve the explanatory power of the model and to enhance its accuracy. For example, an additional model included quadratic terms for the work experience variables to accommodate a possible non-linear relationship between experience and salary. Another model allowing for an interaction between academic rank and time in rank was developed because it seemed possible that full professors and Eminent Scholars who had been in rank for more than 6 years would receive larger salary increases than assistant or associate professors who had been in rank for more than 6 years. In both cases, the amount of salary variance explained was about the same or slightly less than in the original model, as was the pattern of significance for the individual factor effects, so we opted to stay with the simpler model for predicting academic year salaries.

Model 2 – Reduced Model

Prior research on salary equity has raised the question of whether men and women have different promotion patterns, with men being promoted to higher ranks more frequently and more quickly than women. If so, gender and rank variables are confounded and will mask at least part of the effect of gender in the model. Concerned about this issue, colleagues at the University of Michigan developed a model that omits academic rank and time in rank as factors. In this way, all the variance attributable to the overlap in rank/time in rank and gender would accrue to gender and help uncover any effect that gender might exercise. We decided to try the same approach and the output from the resulting model, model 2, is presented in Appendix 3.

Again, multiple regression techniques were used to develop a model that predicts academic year salary. Once again, academic unit was included in the model as a set of dummy or indicator variables with the Statistics department being the "reference" unit or the academic unit to which all other academic units are compared. Ethnicity was also included as a set of 4 dummy variables with "white" being the reference ethnicity. Binary variables included gender (reference gender was male), tenure status (reference status was tenured), and US citizenship (reference citizenship was US). As with Model 1, the SAS® statistics package was used to generate the regression.

Using the reduced list of factors, only 60% of the variation in salaries was accounted for by the factors in the model (adjusted $R^2 = 0.60$). Thus the model's explanatory power decreased markedly when rank and time in rank were not in the model, indicating the importance of seniority in determining salary level. Factors that were significant in explaining the variation in salaries included academic unit ($p < 0.0001$), time at VT ($p < 0.0001$), experience prior to joining VT ($p < 0.0001$), and tenure status ($p < 0.0001$). Gender, however, remained non-significant even when controlling for rank and time in rank. Thus model 2 simply proved to be a less acceptable version of model 1, not revealing any indication of gender effects in the absence of rank variables and explaining less variance overall.

Data Quality Issues

In this context it is appropriate to discuss one of the major limitations of the data used in the study. "Time in rank" was coded as a categorical variable with three possible levels: less than 3 years, at least 3 years but less than 6 years, and 6 or more years. This is in contrast to simply recording data as a continuous variable e.g., of 1 to 30 years. The three data categories were created to accommodate the loss of data that occurred with Administrative Information Systems' the conversion of the IMS computer system to the Banner data management system. When a faculty member has a change in rank, the date of that change is recorded in the Banner system. However, during the conversion to Banner, changes in ranks that occurred prior to January 1, 1997, were recorded as January 1, 1997. Therefore, a person who achieved professor rank in 1996 fell into the same category as a person who achieved professor rank in 1986. Data efforts are underway to collect data to remedy this problem and future analyses will incorporate more fine-grained, accurate data on years in rank.

Conclusions

Using a fairly restricted set of variables, two models of faculty salary were developed. Both models explained much of the variation in faculty salaries with adjusted R^2 values of 0.79 and 0.60. The Paychecks volume notes that, "most analyses of faculty salaries have adjusted R^2 values greater than .50, and values above .70 are common" (p.6). Therefore, the models developed in this analysis were considered adequate, at least as a starting point for the investigation. Importantly, gender effects on faculty salaries did not reach statistical significance despite several different statistical approaches to test gender as an individual effect and in interaction with other key factors like college and rank. Future work will examine the suggestion that some colleges may have more deeply–embedded gender-based

salary differentials. More accurate years in rank data may help sharpen data patterns and clarify trends.

Women's compensation appears to be less the issue at this juncture than female representation in tenure-track ranks. Women have constituted about 20% to 22% of all full-time tenure-track/tenured faculty positions for the past five years at Virginia Tech. Thus, while women seem to be doing better at achieving parity with their male colleagues in pay, the relatively slow progress made in improving numbers of female faculty somewhat offsets this gain. As encouraging as current findings may be, they do suggest that parity in salary must now be combined with parity in opportunity, with greater efforts to attract and retain female faculty.

Appendix 1.
Variables and Levels of Factors in Equity Study.

Variable	Variable Name in Models	Number	Levels
Academic Rank Category	RANK	250	Assistant Professor
		431	Associate Professor
		450	Professor
		107	Eminent Scholar*
Gender	GENDER	266	Female
		972	Male
Race/ethnicity	MINORITY	94	Asian
		38	African-American
		36	Non-Resident Alien
		1043	White
		27	Other including Latino or Native American
Tenure Status	TENCODE	278	Pending Tenure
		960	Tenured
US Citizenship Status	CITIZEN	128	Non-US Citizen
		1110	US Citizen
Time in Rank**	YEARS_RANK_CAT	313	Less than 3 years
		321	At least 3 years, but less than 6 years
		604	6 years or more
Academic Discipline	DEPT	1238	66 unique department identifiers
Experience prior to VT	YEARS_PRE_VT	1238	Time between date of highest degree and hire date at VT
Time at VT	YEARS_AT_VT	1238	Time since most recent hire date at VT
Academic year salary	AY_SALARY	1238	Nine month salary

*The Eminent Scholars Rank is not a true academic rank. All faculty members in the Eminent Scholars category held the rank of (full) professor.

**The data base does not have an accurate record of time in rank prior to 1997 when data was transferred from the IMS mainframe computer systems to Banner.

Appendix 2.
Regression Predicting Academic Year Faculty Salary

Analysis for Untransformed AY Salary Values
MODEL 1 (All time variables entered as linear components)

The GLM Procedure
Dependent Variable: AY_SALARY

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	79	553340278770.0	7004307326	60.47	<.0001
Error	1158	134125623314.0	115825236		
Corrected Total	1237	687465902084.0			

Adjusted R-Square	Coeff Var	Root MSE	AY_SALARY Mean
0.79177	13.74806	10762.21	78281.69

Source	DF	Type III SS	Mean Square	F Value	Pr > F
DEPT	65	139030100075.0	2138924617	18.47	<.0001
RANK	3	121925055770.0	40641685257	350.89	<.0001
GENDER	1	1689463.0	1689463	0.01	0.9039
MINORITY	4	433571048.2	108392762	0.94	0.4423
TENCODE	1	663085619.1	663085619	5.72	0.0169
CITIZEN	1	30881786.0	30881786	0.27	0.6057
YEARS_RANK_CAT	2	790412492.6	395206246	3.41	0.0333
YEARS_PRE_VT	1	20297840978.0	20297840978	175.25	<.0001
YEARS_AT_VT	1	3561045775.5	3561045776	30.74	<.0001

Parameter	Estimate		Standard Error	t Value	Pr > |t|
Intercept	59278.77	B	3465.68	17.1	<.0001
DEPT ARECS - Combined	-12524.93	B	3623.54	-3.46	0.0006
DEPT Accounting & Inf	32257.19	B	3813.41	8.46	<.0001
DEPT Aerospace and Oc	11257.21	B	3805.63	2.96	0.0032
DEPT Agricultural & A	-7242.42	B	3952.75	-1.83	0.0672
DEPT Agricultural & E	-11671.65	B	4810.80	-2.43	0.0154
DEPT Animal and Poult	-9346.30	B	3722.20	-2.51	0.0122
DEPT Apparel, Housing	-10313.60	B	4208.89	-2.45	0.0144
DEPT Architecture	-8570.86	B	3333.90	-2.57	0.0103
DEPT Art	-14362.96	B	4505.33	-3.19	0.0015
DEPT Biochemistry	-9067.92	B	3900.33	-2.32	0.0202
DEPT Biological Syste	3816.29	B	4167.51	0.92	0.3600
DEPT Biology	-7598.69	B	3405.79	-2.23	0.0259
DEPT Biomedical Scien	484.94	B	3465.09	0.14	0.8887
DEPT Building Constru	-4312.99	B	5327.73	-0.81	0.4184
DEPT Business Informa	23660.35	B	3694.47	6.4	<.0001
DEPT COE Northern Vir	14784.65	B	3969.26	3.72	0.0002
DEPT Chemical Enginee	11115.51	B	4364.36	2.55	0.0110

DEPT Chemistry	6121.30	B	3554.86	1.72	0.0853
DEPT Civil & Environm	10537.29	B	3377.14	3.12	0.0019
DEPT Communication St	-11704.39	B	4246.87	-2.76	0.0059
DEPT Computer Science	14750.01	B	3701.19	3.99	<.0001
DEPT Crop & Soil Envi	-11720.80	B	3661.50	-3.2	0.0014
DEPT Ctr. for Interdi	-7907.18	B	3964.99	-1.99	0.0464
DEPT Dairy Science	-9801.47	B	4347.99	-2.25	0.0244
DEPT Economics	6864.14	B	4251.31	1.61	0.1067
DEPT Educational Lead	-415.84	B	3773.94	-0.11	0.9123
DEPT Electrical and C	10735.86	B	3222.48	3.33	0.0009
DEPT Engineering Fund	-7119.62	B	4269.52	-1.67	0.0957
DEPT Engineering Scie	9637.67	B	3580.64	2.69	0.0072
DEPT English	-13791.49	B	3413.91	-4.04	<.0001
DEPT Entomology	-13777.25	B	4156.62	-3.31	0.0009
DEPT Finance, Insuran	28847.12	B	3877.15	7.44	<.0001
DEPT Fisheries and Wi	-8284.48	B	4241.27	-1.95	0.0510
DEPT Food Science and	1137.73	B	4479.39	0.25	0.7995
DEPT Foreign Language	-13403.73	B	3922.84	-3.42	0.0007
DEPT Forestry	-5455.18	B	3739.22	-1.46	0.1449
DEPT Geography	-6761.40	B	5619.78	-1.2	0.2292
DEPT Geosciences	1934.69	B	3897.08	0.5	0.6197
DEPT History	-11938.21	B	3733.21	-3.2	0.0014
DEPT Horticulture	-11372.66	B	4004.68	-2.84	0.0046
DEPT Hospitality and	3737.21	B	4795.84	0.78	0.4360
DEPT Human Developmen	-5189.69	B	3693.11	-1.41	0.1602
DEPT Human Nutrition,	-1304.79	B	3871.16	-0.34	0.7361
DEPT Industrial and S	10565.57	B	3706.68	2.85	0.0044
DEPT Landscape Archit	-9580.65	B	4791.08	-2	0.0458
DEPT Large Animal Cli	-1164.08	B	3727.15	-0.31	0.7549
DEPT Management	16437.34	B	3906.57	4.21	<.0001
DEPT Marketing	23543.84	B	4163.85	5.65	<.0001
DEPT Materials Engine	11762.57	B	4793.95	2.45	0.0143
DEPT Mathematics	1618.99	B	3296.92	0.49	0.6235
DEPT Mechanical Engin	8706.33	B	3438.87	2.53	0.0115
DEPT Mining and Miner	15287.52	B	4790.82	3.19	0.0015
DEPT Music	-16514.76	B	4173.70	-3.96	<.0001
DEPT Philosophy	-6259.54	B	4481.68	-1.4	0.1628
DEPT Physics	-6177.84	B	3809.13	-1.62	0.1051
DEPT Plant Pathology,	-12991.24	B	4080.71	-3.18	0.0015
DEPT Political Scienc	-8626.50	B	4246.07	-2.03	0.0424
DEPT Psychology	-5888.85	B	3769.26	-1.56	0.1185
DEPT School of Pub &	-148.16	B	3692.95	-0.04	0.9680
DEPT Science and Tech	-12670.68	B	4797.45	-2.64	0.0084
DEPT Small Animal Cli	-4134.49	B	3735.72	-1.11	0.2686
DEPT Sociology	-9085.54	B	4025.29	-2.26	0.0242
DEPT Teaching and Lea	-2081.74	B	3437.02	-0.61	0.5448
DEPT Theatre Arts	-18344.44	B	4806.57	-3.82	0.0001
DEPT Wood Science & F	-4480.45	B	4257.19	-1.05	0.2928

DEPT Statistics	0.00	B	.	.	.
RANK 1 - Professor ES	43766.47	B	2311.51	18.93	<.0001
RANK 2 - Professor	13880.93	B	2051.48	6.77	<.0001
RANK 3 - Associate Pr	170.41	B	1791.87	0.1	0.9242
RANK 4 - Assistant Pr	0.00	B	.	.	.
GENDER F	-103.42	B	856.31	-0.12	0.9039
GENDER M	0.00	B	.	.	.
MINORITY Asian	-615.16	B	1276.99	-0.48	0.6301
MINORITY Black	1897.41	B	1872.01	1.01	0.3110
MINORITY NR Alien	2363.64	B	2262.53	1.04	0.2964
MINORITY Other	-2228.10	B	2170.90	-1.03	0.3049
MINORITY White	0.00	B	.	.	.
TENCODE P	-4135.40	B	1728.36	-2.39	0.0169
TENCODE T	0.00	B	.	.	.
CITIZEN N	674.01	B	1305.32	0.52	0.6057
CITIZEN Y	0.00	B	.	.	.
YEARS_RANK_CAT 1 -- > 6 yrs	2046.09	B	1095.62	1.87	0.0621
YEARS_RANK_CAT 2 -- 3-6 yrs	-469.67	B	906.27	-0.52	0.6044
YEARS_RANK_CAT 3 -- < 3 yrs	0.00	B	.	.	.
YEARS_PRE_VT	945.45		71.42	13.24	<.0001
YEARS_AT_VT	373.49		67.36	5.54	<.0001

Appendix 3.
Regression Predicting Academic Year Faculty Salary:
Rank and Time in Rank Deleted from Model

Analysis for Untransformed AY Salary values

Model 2 (All time variables entered as linear components)

The GLM Procedure
Dependent Variable: AY_SALARY

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	74	431076046266.0	5825351977	26.42	<.0001
Error	1163	256389855818.0	220455594		
Corrected Total	1237	687465902084.0			

Adjusted R-Square	Coeff Var	Root MSE	AY_SALARY Mean
0.60366	18.96708	14847.75	78281.69

Source	DF	Type III SS	Mean Square	F Value	Pr > F
DEPT	65	216225189489.0	3326541377	15.09	<.0001
GENDER	1	180531271.4	180531271	0.82	0.3657
MINORITY	4	1975944803.5	493986201	2.24	0.0627
TENCODE	1	3985556160.9	3985556161	18.08	<.0001
CITIZEN	1	19235628.2	19235628	0.09	0.7678
YEARS_PRE_VT	1	76555798228.0	76555798228	347.26	<.0001
YEARS_AT_VT	1	67183196177.0	67183196177	304.75	<.0001

Parameter	Estimate		Standard Error	t Value	Pr > |t|
Intercept	51731.79	B	4234.52	12.22	<.0001
DEPT ARECS - Combined	-11726.12	B	4997.30	-2.35	0.0191
DEPT Accounting & Inf	37608.06	B	5243.33	7.17	<.0001
DEPT Aerospace and Oc	17902.08	B	5239.23	3.42	0.0007
DEPT Agricultural & A	-2798.68	B	5442.45	-0.51	0.6072
DEPT Agricultural & E	-12314.82	B	6600.53	-1.87	0.0623
DEPT Animal and Poult	-6642.70	B	5130.32	-1.29	0.1956
DEPT Apparel, Housing	-4435.05	B	5788.66	-0.77	0.4437
DEPT Architecture	-7118.15	B	4590.47	-1.55	0.1213
DEPT Art	-11035.12	B	6190.82	-1.78	0.0749
DEPT Biochemistry	-11664.06	B	5374.77	-2.17	0.0302
DEPT Biological Syste	7409.13	B	5741.32	1.29	0.1971
DEPT Biology	-5455.92	B	4690.59	-1.16	0.2450
DEPT Biomedical Scien	1651.03	B	4769.02	0.35	0.7293
DEPT Building Constru	9366.46	B	7315.13	1.28	0.2007
DEPT Business Informa	37436.48	B	5054.66	7.41	<.0001
DEPT COE Northern Vir	15890.57	B	5471.32	2.9	0.0037
DEPT Chemical Enginee	18363.76	B	5999.79	3.06	0.0023
DEPT Chemistry	10475.70	B	4897.75	2.14	0.0327

DEPT Civil & Environm	17468.33	B	4640.74	3.76	0.0002
DEPT Communication St	-8763.04	B	5852.00	-1.5	0.1345
DEPT Computer Science	17495.41	B	5101.51	3.43	0.0006
DEPT Crop & Soil Envi	-6960.88	B	5043.59	-1.38	0.1678
DEPT Ctr. for Interdi	-7922.07	B	5460.51	-1.45	0.1471
DEPT Dairy Science	-7386.70	B	5989.59	-1.23	0.2177
DEPT Economics	11004.47	B	5857.98	1.88	0.0606
DEPT Educational Lead	-630.79	B	5199.26	-0.12	0.9035
DEPT Electrical and C	15508.70	B	4436.35	3.5	0.0005
DEPT Engineering Fund	-9846.84	B	5875.49	-1.68	0.0940
DEPT Engineering Scie	15156.98	B	4926.40	3.08	0.0021
DEPT English	-8871.02	B	4702.30	-1.89	0.0595
DEPT Entomology	-11838.45	B	5730.38	-2.07	0.0391
DEPT Finance, Insuran	42016.50	B	5308.71	7.91	<.0001
DEPT Fisheries and Wi	-3557.04	B	5841.80	-0.61	0.5427
DEPT Food Science and	5477.99	B	6164.95	0.89	0.3744
DEPT Foreign Language	-11469.03	B	5404.12	-2.12	0.0340
DEPT Forestry	2801.98	B	5137.78	0.55	0.5856
DEPT Geography	-1834.66	B	7742.50	-0.24	0.8127
DEPT Geosciences	5929.25	B	5371.02	1.1	0.2698
DEPT History	-13675.49	B	5140.57	-2.66	0.0079
DEPT Horticulture	-9056.04	B	5522.23	-1.64	0.1013
DEPT Hospitality and	8625.58	B	6594.90	1.31	0.1912
DEPT Human Developmen	641.43	B	5083.69	0.13	0.8996
DEPT Human Nutrition,	-414.82	B	5324.44	-0.08	0.9379
DEPT Industrial and S	17090.44	B	5097.37	3.35	0.0008
DEPT Landscape Archit	-10744.17	B	6601.42	-1.63	0.1039
DEPT Large Animal Cli	305.04	B	5130.38	0.06	0.9526
DEPT Management	20277.60	B	5366.89	3.78	0.0002
DEPT Marketing	31229.20	B	5727.24	5.45	<.0001
DEPT Materials Engine	14472.48	B	6603.35	2.19	0.0286
DEPT Mathematics	3022.89	B	4544.70	0.67	0.5061
DEPT Mechanical Engin	15419.84	B	4729.72	3.26	0.0011
DEPT Mining and Miner	26515.05	B	6586.41	4.03	<.0001
DEPT Music	-23242.89	B	5736.78	-4.05	<.0001
DEPT Philosophy	-2191.24	B	6172.44	-0.36	0.7227
DEPT Physics	-8350.70	B	5248.32	-1.59	0.1119
DEPT Plant Pathology,	-12706.65	B	5627.54	-2.26	0.0241
DEPT Political Scienc	-5936.43	B	5850.84	-1.01	0.3105
DEPT Psychology	-4654.83	B	5185.36	-0.9	0.3695
DEPT School of Pub &	3187.04	B	5086.07	0.63	0.5310
DEPT Science and Tech	-10259.86	B	6610.11	-1.55	0.1209
DEPT Small Animal Cli	-218.74	B	5146.20	-0.04	0.9661
DEPT Sociology	-9779.55	B	5550.13	-1.76	0.0783
DEPT Teaching and Lea	-2358.25	B	4732.76	-0.5	0.6184
DEPT Theatre Arts	-25828.98	B	6599.66	-3.91	<.0001
DEPT Wood Science & F	2687.55	B	5862.10	0.46	0.6467
DEPT Statistics	0.00	B	.	.	.

GENDER F	-1066.21	B	1178.22	-0.9	0.3657
GENDER M	0.00	B	.	.	.
MINORITY Asian	3684.03	B	1744.82	2.11	0.0349
MINORITY Black	2000.03	B	2579.70	0.78	0.4383
MINORITY NR Alien	5190.75	B	3089.33	1.68	0.0932
MINORITY Other	-4018.26	B	2990.64	-1.34	0.1793
MINORITY White	0.00	B	.	.	.
TENCODE P	-5825.36	B	1370.06	-4.25	<.0001
TENCODE T	0.00	B	.	.	.
CITIZEN N	531.21	B	1798.36	0.3	0.7678
CITIZEN Y	0.00	B	.	.	.
YEARS_PRE_VT	1593.21		85.50	18.63	<.0001
YEARS_AT_VT	1122.42		64.30	17.46	<.0001