AdvanceVT Annual Report
Year 2: September 2004 – June 2005
National Science Foundation
Cooperative Agreement SBE-0244916

Contents

Program Overview **3**

Participants **4**

Activities and Findings **7**
- Research and Evaluation Activities and Findings 7
- Training and Development Activities 10
- Outreach 20

Products **21**
- Publications 21
- Websites 21

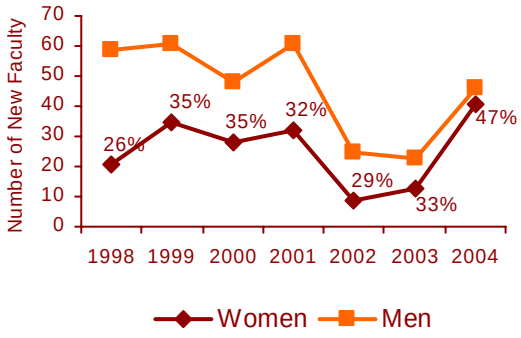
Attachments **22**
- Year Two Financial Report and Year Three Funding Request 23
- Quantitative Indicators of Activity and Progress 48
- Faculty Survey Questionnaire 69
- Leadership Fellow Reports 85
- Distinguished Scholar Visit Schedules 89
- Research Seed Grant Reports 93

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 through policy review.

Significant accomplishments during year two include increased visibility for gender issues campus wide through an annual workshop with nationally recognized speakers; intensive work with department heads including two presentations to the campus-wide department heads' breakfast roundtable, discussions at college level department head meetings on university policies, and a two-day orientation program for new department heads; education of search committees on unconscious bias; discussions with faculty focus groups on work/life issues; implementation of a campus-wide faculty survey; and initiation of an intensive leadership development program for women faculty.

Indicators of institutional change:



- Eight of the 21 new tenure-track faculty members hired in the College of Engineering in 2004 are female, or 38%. Women were 47% of the new, full-time, tenure-track faculty hires university wide.
- The *AdvanceVT* leadership team gave a presentation about the program to Virginia Tech's Board of Visitors Academic Affairs Committee. The presentation was well received and generated considerable discussion.
- One of last year's visiting scholars, Leigh McCue, was hired as an assistant professor in Aerospace and Ocean Engineering, the second female professor in that department.
- The College of Engineering entered into a contract with the premier local child care provider to reserve a certain number of slots for College of Engineering faculty. The availability of space at this facility was the deciding factor in recruiting a new faculty member.
- The Virginia Tech Child Development Center for Learning and Research converted its on campus part time child day care program in to a full-day, year round program in January 2005.

- *AdvanceVT* worked with Graduate Dean Karen DePauw and her staff to start integrating *AdvanceVT's* programs for graduate students into ongoing graduate school programming.
- *AdvanceVT* Professor Thole was appointed Assistant Department Head in the Department of Mechanical Engineering. In that role she developed and obtained approval for departmental policies on mentoring, teaching load, and measures of productivity, with the goal of increasing transparency in departmental decision making.

Participants

Project Management System and Infrastructure

At the beginning of the second year of the program, *AdvanceVT* developed and implemented a new leadership structure for project management, defining roles and responsibilities of project team members and converting the leadership council to an executive committee in order to facilitate increased interaction with key university administrators. Provost and Vice-President for Academic Affairs Mark McNamee became PI for the Advance program at Virginia Tech, and Associate Provost Pat Hyer became a Co-PI. Project Coordinator Peggy Layne was promoted to Project Director. Overall responsibility for allocation of project funds resides with the Principal Investigator, Provost Mark McNamee, with day-to-day oversight delegated to Project Director Peggy Layne. All financial matters are conducted with the oversight of the university's Office of Sponsored Programs, in accordance with all appropriate policies and procedures. Administrative Assistant Barbara Johnson processes financial paperwork and maintains all program files. Provost office bookkeeper Alva Phillips prepares monthly financial reports for review by Project Director Layne.

Executive Committee

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

- Mark McNamee, PI, Provost and Vice President for Academic Affairs
- Hassan Aref, Dean, College of Engineering (until June 1, 2005)
- Lay Nam Chang, Dean, College of Science
- Karen DePauw, Vice Provost for Graduate Studies and Dean of the Graduate School
- Karen Thole, Co-PI and Advance Professor, Professor of Mechanical Engineering
- Beate Schmittmann, Advance Professor, Professor of Physics
- Peggy Layne, Project Director

Dean Aref submitted his resignation as dean of the College of Engineering in January 2005 and stepped down from his position on June 1. A national search resulted in the selection of Richard Benson, chair of mechanical and nuclear engineering at Penn State, as the new dean of engineering. Dr. Benson will begin work at Virginia Tech in August, and *AdvanceVT* will invite him to join the executive committee.

Leadership Team

During year two, the leadership team met twice a month to review progress and plan activities.

- Patricia Hyer, Co-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
- Roseanne Foti, Advance Professor, Associate Professor of Psychology
- Beate Schmittmann, Advance Professor, Professor of Physics
- Elizabeth Creamer, Assessment Director, Associate Professor of Educational Leadership & Policy Studies
- Peggy Layne, Project Director

External Advisors

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

- Jane Ammons, Advance Professor of Industrial Engineering and Associate Dean for Faculty Affairs, Georgia Tech
- Denice Denton, Chancellor, University of California, Santa Cruz

Work Groups

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

Policy Review

Chair: Pat Hyer, Co-PI, Associate Provost for Academic Administration
Co-Chair: Anne Zajac, Associate Professor, Biomedical Science

- Susanne Aref, Research Scientist, Statistics
- Jim Blair, Associate Vice-President for Research
- 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
- Anne McNabb, Professor, Biology
- Carole Nickerson, College of Science Dean's Office
- Deborah Olsen, Director, Institutional Research
- Jim Thorp, Department Head, Electrical and Computer Engineering

Empowering Women as Leaders and Scholars

Chair: Karen Thole, Co-PI and Advance Professor, Professor of Mechanical Engineering

- Roger Avery, Senior Associate Dean, Graduate School
- Andrea Dietrich, Associate Professor, Civil and Environmental Engineering
- Stefan Duma, Associate Professor, Mechanical Engineering
- Roseanne Foti, Associate Professor, Psychology
- Elizabeth Grabau, Associate Professor, Plant Pathology
- Bob Jones, Professor and Department Head, Biology
- Don Leo, Professor, Mechanical Engineering and Associate Director, CIMSS
- Tim Long, Professor, Chemistry
- Ishwar Puri, Department Chair, Engineering Science and Mechanics
- Sanjay Raman, Associate Professor, Electrical and Computer Engineering
- Janet Rankin, Professor, Human Nutrition, Foods, and Exercise
- Glenda Scales, Associate Dean, Distance Learning, Engineering
- Wanda Smith, Associate Professor, Management
- Janis Terpenny, Associate Professor, Engineering Education

Increasing Representation of Women Faculty in Science and Engineering
Chair: Beate Schmittmann, Advance Professor, Professor of Physics

- 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
- Jessie Meltsner, Special Projects Coordinator, Women's Center
- Lynn Nystrom, News and External Affairs Director, College of Engineering
- Kelly Oaks, Equity Manager, Equal Opportunity Office
- Ellen Plummer, Director, Women's Center
- 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
- Bob Walters, Professor and Department Head, Aerospace and Ocean Engineering

Advancing Women into Faculty Careers
Chair: Nancy Love, Co-PI and Advance Professor, Associate Professor of Civil and Environmental Engineering

- Michael Alley, Associate Professor, Engineering Education
- 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
- Tonya Smith-Jackson, Assistant Professor, Industrial Systems Engineering
- Mary Leigh Wolfe, Associate Professor, Biological Systems Engineering
- Tess Wynn, Assistant Professor, Biological Systems Engineering

Activities and Findings

Research and Evaluation Activities and Findings

During year two the *Advance* assessment team continued work on a study of dual career hiring, expanding this effort to include other Advance institutions; continued to interview new faculty hires in the colleges of science and engineering; completed a university-wide faculty survey; and began work on a collaborative cross-institutional benchmarking study of Advance schools.

Study of Dual Career Hires
During summer 2004, telephone interviews were conducted with 20 faculty members at Virginia Tech who were identified as part of a dual-career hire. Assessment Director Creamer subsequently worked with contacts at several other ADVANCE institutions to secure Institutional Review Board approval and obtain names of additional people to interview for a cross-institutional study. Thirty participants were interviewed from three universities: Virginia Tech, University of Wisconsin, and New Mexico State University. Participants were asked about their initial experiences of negotiation of the dual career hire, the climate and atmosphere of dual career hires in general at their university, and personal reactions to their own living arrangement and the influence the process had on their life and career satisfaction. Transcripts of the interviews were shared with the home institution.

Key Findings:
- The perception of the university climate related to dual career hiring varies among participants and by department.
- The visibility of other prior dual career couples and the transparency of the process influence the perception of a positive climate.
- The more routine the process seemed to be, the less participants reported a sense of being stigmatized.
- Many participants endorsed the idea that the creation of a university-wide specific policy on dual career hiring was necessary.

Findings from the study were presented in several venues during 2004-2005:

- Co-PI Pat Hyer presented findings from the analysis of the data from dual-career hires at Virginia Tech with department heads in most of the colleges at Virginia Tech.
- Assessment Director Creamer presented findings to the Virginia Tech Board of Visitors Academic Affairs Committee.
- Assessment Director Creamer prepared and presented a research paper at the annual meeting of the Association for the Study of Higher Education (ASHE) about the findings from a pilot study conducted at Virginia Tech about the experience of dual-career hires. The paper is being revised for resubmission to the *Review of Research in Higher Education*.
- Project Director Layne presented the findings at the American Society for Engineering Education annual conference.

Science and Engineering New Hire Interviews
During fall 2004, a second round of one-on-one interviews was conducted with faculty in science and engineering who began employment with the university in fall 2003. The second round interviews were conducted to determine changes new faculty reported within a year of being hired. Issues related to spousal employment emerged as central concerns during both rounds of interviews.

Key findings:

- Many faculty members found departmental environment and research interest to be important factors in their satisfaction with their position.
- Participants were generally satisfied with negotiations and start up packages.
- Flexibility and freedom were noted as common reasons for satisfaction in current positions.
- Participants were satisfied with the location and surroundings of Blacksburg, but were less satisfied with the opportunities for their partners and their ability to balance their personal lives with their professional demands.
- Mentoring was noted as a positive addition to gaining comfort in the role of faculty and at Virginia Tech.

To add to the reliability of the findings from the 2003 entering cohort of faculty in science and engineering, during fall 2004 all new faculty entering positions in science and engineering were also interviewed regarding their hiring experience and why they chose to come to Virginia Tech.

Key findings:

- All respondents noted that spousal employment was a key critical factor for the majority of faculty at Virginia Tech.
- A majority of participants reported that the environment of their department was what attracted them to Virginia Tech.
- 70% felt that the initial start up package was acceptable, with equipment and lab being the key critical component to their start up package.

Faculty Climate Survey
Following 18 months of effort to refine the survey instrument and working with the Virginia Tech Survey Research Center, in January 2005 the *AdvanceVT* Faculty Work-Life Questionnaire was distributed to all instructional and research faculty at the university as an Internet link embedded in an email from University Provost and *AdvanceVT* PI Mark McNamee. Participants were asked 125+ questions related to work/life satisfaction, recruitment, job satisfaction, policy, administration, leadership, and general climate with regard to diversity. A copy of the survey instrument is attached.

- Nearly a 60% response rate was accomplished with four rounds of follow-ups and a personal endorsement by the provost.
- Preliminary findings:
  - General climate for women and minorities does seem to have an effect on women and minority faculty satisfaction and retention.
  - Among individuals who choose to stop the clock, many (69%) feel supported in their decision.
  - Women and men differ in their perceptions of women and minority leadership and representation.
  - More females (78.3%) than males (48.9%) feel that there are too few women and minorities in leadership positions at Virginia Tech
  - Forty-seven percent of women and 32.6% of men feel that recruitment of women and minorities is not made a top priority at Virginia Tech.
  - About 40% of participants feel that Virginia Tech does not support their home life or have felt that their home life has slowed their advancement at Virginia Tech.
  - The overall campus climate on a variety of factors is rated fairly favorably, but the departmental climates vary in extremes.

During summer 2005, member of the *AdvanceVT* Assessment Team are developing a series of reports, geared to the goals of each of the work elements. Reports are planned in the following areas: (1) recruitment, (2) leadership and mentoring, and (3) work life. These reports will integrate information from all data collected to date, including both the survey and the faculty interviews.

Advance Collaborative Benchmarking Study
During summer 2005, members of the assessment team will conduct interviews with PIs and key faculty at other Advance institutions as part of the institutional change element Advance Benchmarking Study. Work on this element is being conducted in collaboration with the University of Michigan, and will be shared with all Advance institutions.

Lessons Learned from Assessment during Year Two:
- For the first time, during the second year *AdvanceVT* offered a small incentive to faculty who participated in interviews. Although the incentive was a one in ten chance at a small bookstore voucher, we received overwhelmingly positive

feedback from faculty participants, particularly men. While faculty members reported they appreciated it because it recognized the value of their time, it is probably also likely that faculty in science and engineering are used to operating in an environment where they do little that does not have a monetary reward.
- The distribution of the Faculty Work-Life Questionnaire may have some unexpected consequences. Informal feedback suggests it may raise expectations for evidence of concrete outcomes from the *AdvanceVT* initiative.
- With the amount of interviewing to date and the widespread distribution of the Faculty Work-Life Questionnaire, *AdvanceVT* is probably approaching a point where we will have to be quite strategic in our future data collection activities. The focus will now shift to dissemination.
- Combining local data with data from other universities can strengthen the credibility of results.
- Collaboration with other universities can complicate and extend time lines due to differences in IRB requirements and accessing information.

Training and Development Activities

Institutionalizing Change

During year two the Policy Review work group focused on communicating the newly documented dual career hiring procedure and the university's existing "stop-the-clock" policy to the relevant constituencies to ensure equitable implementation. In the spring of 2005 the work group and the university's Commission on Faculty Affairs held a series of faculty discussion groups to identify areas of work/life stress in faculty careers in preparation for developing university policies to address these issues, including a possible modified duties policy. *AdvanceVT* professor Catherine Eckel stepped down as chair of the policy work group at the end of 2004 due to other commitments. Co-PI Pat Hyer, Associate Provost for Academic Administration, agreed to serve as chair of the policy work group. Dr. Anne Zajac, associate professor of biomedical science in the college of veterinary medicine, agreed to co-chair the *AdvanceVT* Policy Work Group.

Significant Accomplishments for Year Two:

- Supporting Dual Career Hires
    - A new web page for prospective faculty was created on the Provost's Office website, where the new dual career hiring procedure is posted along with information about family friendly policies and links to resources.
    - Collaboration with the Offices of Career Services and Personnel Services resulted in proposals to provide support services to dual career hires, to be implemented during 2005-06.
    - Numerous individual dual career hiring cases were dealt with, serving both newly recruited faculty and faculty already at Virginia Tech.
- Communicating Stop-the-Clock Policies
    - Although the university's stop-the-tenure-clock policy has been in place for years, faculty members report lack of awareness, inconsistent

implementation, and stigma associated with its use. These problems were the focus of attention during year two of the *AdvanceVT* program.
    - An analysis of use of the policy between 1997 and fall 2004 was prepared. 57 instances of probationary period extension have been approved; 20 for reasons of childbirth and 8 others for personal or family-health related concerns. The policy is used by both women (63%) and men (37%). As of fall 2004, no one who had requested that the clock be stopped for childbirth or family-related reasons had subsequently been denied tenure.
    - Meetings were held with department heads in seven of the eight colleges to review the policy, its use, and to encourage heads to initiate conversation with faculty members who are new parents or who may be facing other difficult life circumstances and to encourage them to request a probationary period extension if appropriate.
- Engaging the university community in discussion about family work/life issues
    - In the spring of 2005, the work group and the university's Commission on Faculty Affairs held a series of faculty discussion groups to identify areas of work/life stress in faculty careers in preparation for developing university policies to address these issues, including a possible modified duties policy. Five focus groups were held involving about 60 faculty members of all ranks and disciplines. A report is being prepared during summer 2005 to document the findings.

Empowering Women as Leaders and Scholars

The work group in consultation with the leadership team and executive committee decided to revise the leadership fellowship program for year three by creating a formal leadership development program for women faculty. Dr. Roseanne Foti, associate professor of psychology, agreed to lead this effort, and an initial cohort of eight women from across the university was selected based on interest and potential for assuming additional leadership roles. Each participant has completed an assessment of her current leadership skills with input from her colleagues, and Dr. Foti is working with the participants to prepare individualized development plans. Beginning in August 2005, *AdvanceVT* will offer a series of leadership skill workshops designed around the participants' strengths and weaknesses that will also be open to women faculty campus-wide.

Significant Accomplishments in Year Two:

- Initiating a formal Leadership Development Program for Women Faculty
  AdvanceVT recruited Roseanne Foti, Associate Professor of Psychology, to plan and implement a leadership development program for women faculty. *AdvanceVT* leadership team members Thole and Foti met with department heads in the colleges of engineering, science, and agriculture to present *AdvanceVT*'s new leadership development program and encourage them to nominate women faculty in their departments to participate in the first cohort. A work group subcommittee selected eight tenured women faculty members from across the

university to participate in a new leadership development program that will include individual assessment and coaching as well as workshops on specific leadership skills. The first cohort of participants includes women from five of the university's eight colleges:

- **Dr. Amy Bell**, Associate Professor, Department of Electrical and Computer Engineering. Dr. Bell is Director of the Digital Signal Processing and Communications Lab. Bell conducts research in wavelet image compression, embedded systems, signal and image processing for systems biology applications, and engineering education.
- **Dr. Virginia Ann Buechner-Maxwell,** Associate Professor, College of Veterinary Medicine. Dr. Buechner-Maxwell is the Section Chief of Large Animal Surgery and Medicine. Her clinical interests and expertise include equine neonatal medicine, respiratory disease and clinical nutrition. She continues to explore the pathogenesis of allergic airway disease in her research utilizing an equine model of human asthma called Equine Recurrent Airway Obstruction.
- **Dr. Elizabeth A. Grabau**, Associate Professor, Department of Plant Pathology, Physiology and Weed Science. Dr. Grabau's research area is plant biotechnology, with particular emphasis in crop improvement. Current projects include modifying plants for improved nutrient availability and enhanced disease resistance and their impact on human and animal nutrition as well as protecting natural resources and the environment.
- **Dr. Valerie Grey Hardcastle**, Professor and Chair, Department of Science and Technology in Society. Dr. Hardcastle is the Director of the Graduate Program in Science and Technology Studies. She has authored five books and numerous articles. Her research focuses on the theoretical and empirical interfaces between neuroscience, psychiatry, and psychology.
- **Dr. Mary Kasarda,** Associate Professor, Department of Mechanical Engineering. Dr. Kasarda specializes in magnetic bearing, rotor dynamic, and health monitoring research topics. She has six years of professional engineering experience and her background is in various aspects of turbomachinery engineering.
- **Dr. Ann Stevens,** Associate Professor, Department of Biology. Dr. Stevens' research interests are focused on environmental sensing and gene expression in bacteria. Much of the work in her laboratory involves studies of the process of bacterial cell-cell communication known as quorum sensing.
- **Dr. Janis P. Terpenny**, Associate Professor, Department of Engineering Education. Dr. Terpenny's research goal is to revolutionize how engineered products and systems are conceptualized and configured. Dr. Terpenny is one of the founding co-directors of the NSF Center for e-Design, a multi-university National Science Foundation industry-university cooperative research center.

- **Dr. Mary Leigh Wolfe**, Associate Professor, Department of Biological Systems Engineering. Dr. Wolfe teaches and conducts research in the areas of nonpoint source pollution control, hydrologic modeling, agricultural waste management, and watershed management.

- Supporting emerging women leaders at Virginia Tech
  - During year two, the *AdvanceVT* Leadership Fellowship provided release time to explore forming and directing an engineering research center for Associate Professor Andrea Dietrich from the Civil and Environmental Engineering Department. The main objective of her fellowship was to learn how to administer a research center and avoid pitfalls. A motivation for this approach was a quote from Rita Mae Brown: "Good judgment comes from experience, and often experience comes from bad judgment." Through the fellowship Dr. Dietrich gained university contacts and insights into administrative and fiscal processes, particularly from her "shadow dean" internship with the Assistant Dean for Administration in the College of Engineering and her conversations with administrators at all levels. Dr. Dietrich's fellowship is still in progress, but her semester of exploring centers produced insights deeper and quicker than if she had tried to mesh center exploration in addition to a full teaching and research schedule.
  - The focus of Professor Brenda Winkel's *AdvanceVT* Leadership Fellowship was on developing a new graduate program in the molecular plant sciences. What started as a small nugget of an idea last year blossomed into a full program with 18 participating faculty in seven departments and three colleges. The success of this program is owed largely to financial support from *AdvanceVT*, which provided relief from teaching and a month of salary for summer 2005. The considerable efforts of six other faculty members in the Fralin Biotechnology Center over the past year were also key to the success of this effort. Through Dr. Winkel's experience, together with work on a multi-college IGERT proposal and serving on the College of Science cluster hiring committee, she has had the chance to meet and work with many administrators at Virginia Tech. The jury is still out on whether Dr. Winkel will delve deeper into the world of administration or return to the world of research and teaching.

  Brief reports of Dr. Dietrich and Dr. Winkel's leadership fellowships are attached.

- Bringing role models to campus

  AdvanceVT hosted three distinguished lecturers in year two:
  - **Dr. Helen Boussalis**, chair of the department of electrical and computer engineering at California State University at Los Angeles on February 2, hosted by Dr. Naira Hovakimyan;
  - **Dr. Linda Katehi**, dean of engineering at Purdue University on March 4, hosted by Dr. Sanjay Raman; and
  - **Dr. Elaine Oran**, Senior Scientist, Naval Research Laboratory, on April 6, hosted by Dr. Ishwar Puri.

In addition to presenting their lectures, these visitors met with administrators, faculty, and graduate students to discuss advancing women in academic science and engineering careers. Schedules for the distinguished scholar visits are attached.

  - *AdvanceVT* also co-hosted a visit by **Dr. Debbie Niemeier**, former chair of the department of civil and environmental engineering at the University of California, Davis, who spoke to graduate students about preparing for a faculty career. Dr. Niemeier's visit was co-hosted with the Department of Civil and Environmental Engineering.

- Supporting career development of junior faculty with research seed grants
  - Year Two: Five junior women faculty members from the colleges of science and engineering received AdvanceVT research seed grants in year two. These $12,000 to $26,000 grants were matched by the recipients' college and/or departments, and provided support for five graduate students, a post-doctoral researcher, and an undergraduate student. Work funded by these grants resulted in five proposals submitted and several more in the works, three conference papers published, three conference papers pending, two journal papers pending, and numerous collaborations with other researchers at Virginia Tech, at other U.S. universities and research laboratories, and international researchers. Summary reports from the year two seed grant recipients are attached.
  - Year Three: *AdvanceVT* selected five junior women faculty members from the colleges of science and engineering as recipients of its second round of research seed grants (year three). The colleges of science and engineering continue to provide matching funds for this program. The selection process was coordinated by *AdvanceVT* Leadership Fellow Dr. Andrea Dietrich. Year three seed grant recipients are as follows:
    Dr. Maura Borrego, Assistant Professor, Department of Engineering Education, will research culture change in engineering education with a focus on increasing participation of women and minorities. Her research will identify agents of change that are most effective in promoting acceptance.
    Dr. Giti Khodaparast, Assistant Professor, Department of Physics, proposes to study unexplored spin dependent properties of magnetic and nonmagnetic narrow gap semiconductors, with an emphasis on dynamical aspects using magneto-optical techniques.
    Dr. Leigh McCue, Assistant Professor, Department of Aerospace and Ocean Engineering, will develop multi-dimensional Melnikov functions to accurately study capsize of ships in multiple degrees of freedom.
    Dr. Madeline Schreiber, Assistant Professor, Department of Geosciences, will utilize surface sensitive imaging and characterization techniques, including transmission electron microscopy, X-ray adsorption near-edge structure spectroscopy, and extended X-ray absorption fine structure spectroscopy, to probe complex interactions at arsenic-solution-mineral interfaces.

Dr. Tess Wynn, Assistant Professor, Department of Biological Systems Engineering, will develop of sensors for continuous sediment monitoring in streams to support field research on watershed, water quality, and stream management.

Increasing Representation of Women in Science and Engineering

During year two the Increasing Representation work group focused on the improvement of faculty recruitment practices at Virginia Tech through the education of department heads and search committee members on unconscious bias in the hiring process, developing relationships with potential faculty candidates, and participating in many faculty searches.

Significant Accomplishments in Year Two:

- Increasing awareness and effectiveness of search committees
    - *AdvanceVT* Professors Schmittmann and Thole led a discussion on successful faculty searches for the university-wide department heads' breakfast roundtable.
    - *AdvanceVT* Professor Schmittmann met with 11 search committees in the college of engineering, including the dean of engineering search committee, to discuss keys to successful faculty searches and sources of unintentional bias in the hiring process.
    - A brochure highlighting research on sources of unconscious bias and ways to overcome them is in preparation.
    - *AdvanceVT* Professor Love served on the search committee for a new dean of engineering at Virginia Tech.
    - *AdvanceVT* professors and work group members met with numerous faculty candidates as part of ongoing searches in the colleges of science and engineering.
- Co-hosting visits by young scholars and potential faculty candidates
    - **Dr. Laura Cadonati**, currently a physics post-doc at MIT (co-hosted with the physics department);
    - **Ms. Rafaella DeVita**, completing her PhD in mechanical engineering at the University of Pittsburg (mechanical engineering department);
    - **Ms. Eno Yliniemi**, completing her PhD in mechanical engineering at the University of Washington (mechanical engineering department);
    - **Dr. Xu Li**, a research associate in biomedical engineering at Northwestern University (electrical and computer engineering department);
    - **Dr. JoAnn Paul**, a research scientist at Carnegie Mellon University (electrical and computer engineering department);
    - **Ms. Nakhiah Goulbourne**, completing her PhD in mechanical engineering at Penn State (mechanical engineering department);
    - **Dr. Kembra Howdeshell**, a post-doctoral researcher at the U.S. Environmental Protection Agency (biology department);

- **Ms. Jill Nelson**, completing her PhD at the University of Illinois (electrical and computer engineering); and
- **Dr. Lynette Gelinas**, a senior research associate at Cornell University (electrical and computer engineering).

Visits included a technical talk, a networking lunch or reception, and informal interactions between speakers and interested women at Virginia Tech.

Advancing Women into Faculty Careers

The focus of the Advancing Women work group continues to be on activities that empower female graduate students and post-doctoral research associates through fellowships with a significant mentoring component, exposure to successful female faculty role models, and networking opportunities. A subcommittee of the work group began plans for a national career development conference for women graduate students and post-docs to be held at Virginia Tech in July 2006.

Significant Accomplishments in Year Two:

- Focusing on graduate students
  - *AdvanceVT* developed and distributed a book mark publicizing work/life resources for graduate students in collaboration with the graduate school. Grants to assist PIs to maintain research projects when graduate students become parents are made possible by the graduate school and the deans of the academic colleges.
  - *AdvanceVT* Professor Love helped Graduate Dean Karen DePauw to lead a working session on effective practices for advancing graduate students toward academic careers at the department heads' breakfast roundtable, which will result in the development of a good practices manual.
  - *AdvanceVT* hosted a series of informal lunches for graduate students to meet with visiting scholars and discuss career options.
  - Recruited Dr. Elisa Sotelino, professor of civil and environmental engineering, to take the lead on graduate student-targeted programming and be the faculty coordinator for the fellowship program.
- Focusing on postdoctoral research associates
  - *AdvanceVT*, the Graduate School, and the Research Division initiated a series of First Friday lunch discussions for post-doctoral and research associates. These individuals constitute an underserved group on campus, since neither programs designed for graduate students nor programs targeting tenure track faculty are designed to meet their needs.
- Mentoring the next generation of faculty
  - *AdvanceVT* hosted a lunchtime seminar for graduate students and post-docs with a presentation from Virginia Tech professors Mary Kasarda (mechanical engineering) and Madeline Schreiber (geosciences) on "Tips for Applying for an Academic Position".
  - *AdvanceVT* hosted a seminar for graduate students, post-docs, and junior faculty on preparing a curriculum vita, with guidance provided by

professors Bill Knocke (civil and environmental engineering) and Anne McNabb (biological sciences).
    - The *AdvanceVT* Pipeline Work Group coordinated teams of women faculty to meet with women Ph.D. candidates and post-doctoral associates who are preparing for academic interviews for one-on-one "mock interview" sessions and coaching on the faculty search process.
    - *AdvanceVT* co-hosted a lunch seminar for graduate students, post-docs, and junior women faculty on applying for an NSF Career grant with the Organization of Women Faculty.
    - *AdvanceVT* Professor Love and *AdvanceVT* project director Layne met with the year two PhD and Post-doctoral fellows funded by *AdvanceVT* and their mentors to discuss their career development and future plans and ways to improve the *AdvanceVT* fellowship program. Dr. Carine VanPeteghem will be continuing for a second year as a post-doctoral research associate at Virginia Tech (with other funding). Dr. Megan Elwood Madden will begin a post-doctoral appointment in the Environmental Sciences Division of Oak Ridge National Labs in July. Ms. Olga Pierrakos will be completing her degree during the summer and staying at Virginia Tech as a post-doctoral researcher. Ms. Miriam Stewart will also complete her degree during the summer and plans to stay at Virginia Tech as a post-doctoral researcher while pursuing faculty positions. Ms. Stewart interviewed for positions at two research universities this spring as a result of contacts made through the Advance program.
- Providing fellowships for Ph.D. candidates and post-doctoral research associates. Subcommittees of the work group reviewed the procedures and criteria for *AdvanceVT* Ph.D. and post-doctoral research fellowship competitions, and selected two Ph.D. candidates and two post-doctoral fellows for year three of the grant. The fellowship application process requires submission of a mentoring plan to maximize the continued professional development of the awardees toward faculty careers. Year three fellowship recipients are:
    - **Elena F. Burguera,** Postdoctoral Fellow, Materials Science and Engineering Department. Dr. Burguera obtained her Ph.D. in chemical engineering from the University of Santiago de Compostela. She worked in the Paffenbarger Research Center at the NIST campus in Gaithersburg MD. She is studying sedimentation profiles of aggregating proteins involved in the progression of several neurodegenerative diseases using a z-axis translating laser light scattering device (ZATLLS), with a goal of developing an *in vitro* screening test for chemicals with potential for inhibiting protein aggregation.
    - **Charlotte Wahl,** Postdoctoral Fellow, Mathematics Department. Dr. Wahl obtained her PhD at the Mathematical Institute in Göttingen, Germany, specializing in noncommutative geometry. She spent the academic year 1995/96 at the Ecolé Normale Supérieure in Paris and then continued her studies in Göttingen. Her first postdoctoral position

was in Paris at the Institut Henri Poincaré where she studied K-theory and noncommutative geometry.
    - **Sara Chiara Haden,** Ph.D. Fellow, Psychology Department. Ms. Haden is primarily interested in risk and protective factors involved in the development of aggressive behavior in children. She works on several research projects involving the effects of community violence exposure, physiological and neurochemical correlates of aggressive behavior, and treatment outcomes for children with specific phobias. She would like to continue research on the etiology and treatment of antisocial behavior and work with forensically-minded clinical psychologists in evaluating and treating offenders' risk for recidivism.
    - **Cortney V. Martin,** Ph.D. Fellow, Industrial and Systems Engineering Department. Ms. Martin researches the development of design guidelines and usability testing methods for procedural assembly instructions for children. She is an adjunct instructor in the Department of Engineering Education and previously worked with Virginia Tech's broadband wireless research testbed and as Assistant Director of the Blacksburg Electronic Village.
- Planning for national conference on preparing for faculty careers
    - Recruited Dr. Tonya Smith-Jackson, associate professor of industrial and systems engineering, to take the lead on planning the 2006 Graduate Student and Post-Doc Conference.
    - Recruited assistance from two teams of graduate students in Dr. Smith-Jackson's Human Information Processing class to collect information and help design a career preparation conference for women graduate students and post-docs in science and engineering planned for July 2006. The conference will include a special emphasis on women of color. One team of students conducted focus groups with women graduate students in science and engineering to identify their career development needs and prepared a proposed conference program. The other team conducted a nationwide survey of women graduate students in science and engineering and developed a web site for conference information, registration, and pre- and post-conference networking.

Other Year Two Activities and Accomplishments

- Child Care: Child care was identified very early as one of Virginia Tech's most pressing priorities. Several steps were taken during year two to advance this agenda.
    - *AdvanceVT* completed a report on its survey of child care needs at Virginia Tech. The report was announced on the Virginia Tech main web page and in the faculty/staff newspaper, and the *AdvanceVT* project director was interviewed by the local public radio station about the survey findings. Recommendations were sent to the provost and executive vice president for follow up actions. A committee, chaired by Assistant Vice-

President for Personnel Services Linda Woodard, has been charged with investigating alternatives and making recommendations.
    - The College of Engineering entered into a contract with the premier local child care provider to reserve a certain number of slots for College of Engineering faculty. The availability of space at this facility was the deciding factor in recruiting a new faculty member.
    - The Virginia Tech Child Development Center for Learning and Research converted its on campus part time child day care program in to a full-day, year round program in January 2005.
    - Through the efforts of *AdvanceVT* Professor Nancy Love, an 8th campus lactation space was created in Durham Hall, serving women faculty and staff in the College of Engineering.

- Building Community among Women
    - *AdvanceVT* co-hosted two successful networking receptions for women faculty, staff, and graduate students with the graduate school, women's center, women's studies program, organization of women faculty, and office of international research, education, and development. A fall welcome reception took place in September which attracted more than 150 participants, and a spring "connections" reception took place during March as part of women's month and graduate education week, attracting approximately 75 participants.
    - *AdvanceVT* leadership team members Hyer, Creamer, and Love discussed university policies on stopping the tenure clock and dual career couples at a meeting co-sponsored with the Organization of Women Faculty.

- Building Awareness and Understanding University-Wide
    - *AdvanceVT* hosted its second annual campus wide workshop on January 10, 2005, with keynote speakers Virginia Valian, distinguished professor of psychology and linguistics at Hunter College, and Denice Denton, dean of engineering at the University of Washington and chancellor designate at the University of California at Santa Cruz. More than 120 faculty members, administrators, and graduate students participated in the workshop. Valian's presentation was particularly important for audience members who had little knowledge of the literature on unintended bias. In addition to this keynote, Valian met with women faculty members to discuss creating personal advisory committees, and with department heads to discuss their role in encouraging institutional change. Denton's presentations focused on how to make the faculty search process yield more diverse outcomes and the necessity of changing the climate. Feedback on the conference was overwhelmingly positive.
    - The *AdvanceVT* leadership team gave a presentation about the program to Virginia Tech's Board of Visitors Academic Affairs Committee. The presentation was well received and generated considerable discussion.

- Developing More Aware and Effective Leaders
    - A new major initiative launched in summer 2004 was the offering of a two-day orientation program for new department heads. Twenty-seven academic department heads participated in this intensive program, introducing them to key institutional leaders; budgeting, personnel, and legal issues; diversity concerns; academic leadership; and perspectives on fundraising and external relations. Key "family-friendly" policies were addressed as well.
    - *AdvanceVT* professor Catherine Eckel and incoming Engineering Science and Mechanics Department Head Ishwar Puri attended the University of Washington Advance program's 2004 National Leadership Workshop for Science and Engineering Department Heads.
    - *AdvanceVT* conducted conflict resolution and communications training with the leadership team.

Outreach

In addition to launching the Advance portal web site and organizing an Advance engineering workshop for NSF, *AdvanceVT* team members gave several presentations about the program at other universities and professional conferences.

- *AdvanceVT* developed and launched the Advance portal web site, www.advance-portal.net.
- *AdvanceVT* received a grant from the Engineering Directorate at NSF to organize a workshop for Advance Institutional Transformation and Leadership principal investigators whose grants focus on women in engineering, engineering deans, and NSF engineering directorate program officers in Arlington, VA. Six "first round" and seven "second round" Institutional Transformation grant recipients, six Leadership grant recipients, and the Women in Engineering Leadership Institute were represented at the meeting. Representatives from 29 engineering schools that do not currently have an ADVANCE grant and National Science Foundation program officers and administrators also participated in the workshop.
- *AdvanceVT* project director Layne moderated a panel on Advance at the Society of Women Engineers annual conference.
- *AdvanceVT* project director Layne presented information on the development of a dual career hiring procedure at the American Society for Engineering Education conference.
- *AdvanceVT* assessment director Creamer presented findings from interviews of dual career hires at the Association for the Study of Higher Education annual conference.
- *AdvanceVT* professor Schmittmann presented talks about the Advance program at Bowdoin College and the University of Maine.
- *AdvanceVT* professor Thole organized the first women's networking luncheon at the American Society of Mechanical Engineers' International Gas Turbine Institute's Exhibition and Congress.

Products

Publications

In collaboration with the graduate school, *AdvanceVT* developed and printed a bookmark to communicate the availability of work/life resources for graduate students, including the new work/life grants that provide temporary financial assistance for new mothers as well as the availability of lactation rooms on campus and other work/life resources available through personnel services, the YMCA, and the Women's Center. The bookmarks were distributed to graduate students and faculty by the graduate school and at receptions, seminars, and other *AdvanceVT* events.

AdvanceVT also developed and distributed six newsletters highlighting activities during the fall semester 2004 and spring semester 2005, accomplishments of women faculty at Virginia Tech, and 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, www.advance.vt.edu .

AdvanceVT is in the process of developing a brochure on unrecognized biases and assumptions in the hiring, promotion, and tenure processes. This brochure summarizes and provides reference to research on unconscious biases that affect both women and men when they evaluate vitas and write letters of recommendation, and complements the presentations made by *AdvanceVT* to search committees.

Websites

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 are also posted on the *AdvanceVT* website.

AdvanceVT received supplemental funding from NSF to develop a portal website for the Advance program. The portal website, www.advance-portal.net, was launched in fall 2004 and is designed to serve as a center of communication among Advance project team members. It is organized to include links to important information based on pre-defined categories, includes a search engine and links to the 19 institutional host sites. Feature articles highlight events and activities of interest to the Advance community. Also to be included in the website will be information from other institutions and programs that have developed major initiatives in the advancement of women in academia.

Attachments

Year Two Financial Report and Year Three Funding Request

Quantitative Indicators of Activity and Progress

Faculty Survey Questionnaire

Leadership Fellow Reports

Distinguished Scholar Visit Schedules

Research Seed Grant Reports

Attachment 1

Year Two Financial Report and Year Three Budget Request

AdvanceVT Year Two Financial Report and Year Three Budget Request

Budget Explanation for Current Year (Year Two)

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

A. Senior Personnel

Mark McNamee, Provost, served as Principal Investigator for year two of the grant and provides overall oversight of the program. Dr. McNamee will continue in this role during year three.

Patricia Hyer, Co-Principal Investigator, serves as a member of the leadership team and took on leadership of the policy review and implementation effort in January following the departure of Catherine Eckel. 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 second year of the grant, Dr. Love received two weeks of summer salary and two course buy-outs funded by the grant.

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

Catherine Eckel, Advance professor, led the policy review and implementation effort as part of the work element on institutional transformation in the fall semester 2004. During that semester, 25% of Dr. Eckel's salary was paid for by the grant.

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

Roseanne Foti, Advance professor and associate professor of psychology, joined the leadership team in January and is responsible for the leadership development program. Dr. Foti received a course buy-out during the spring semester and one month of summer salary funded by the grant.

Scott McCrickard, assistant professor of computer science, provided assistance in the development of the Advance portal web site and received two weeks of summer salary funded by the supplemental grant funds designated for the portal web site.

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

Peggy Layne, program coordinator, provides full time day-to-day management of *AdvanceVT* program activities. During the second year of the grant, her salary was paid for with returned overhead.

Total expenditures for senior personnel direct charged to the grant in year two are $141,067. This amount is slightly less than the NSF approved budget and considerably less than the requested budget for year two. *AdvanceVT* planned to reallocate funds budgeted for a second post-doctoral associate to support additional faculty participation, but was unable to recruit additional faculty to the program.

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
Jennifer Jebo was the graduate assistant for *AdvanceVT*'s assessment program during the second year of the grant. Her assistantship and tuition were paid for with grant funds. Dr. Jebo completed her Ph.D. and moved on to a full-time position this summer. Her work will be continued by another graduate assistant, Valerie Glass, for the third year of the grant.

Valerie Glass was *AdvanceVT*'s programmatic graduate assistant during the second 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. Glass will transfer to the assessment assistantship this summer, and her work will be continued by another graduate assistant, Ane Johnson, for the third year of the grant.

Jamie Smith was the web master for development of the Advance Portal web site. Her assistantship and tuition were paid for out of the supplemental grant for the portal web site. Ms. Smith completed her master's degree in computer science this spring and has accepted a position at Sandia National Laboratory. Her work will be continued by another graduate student in year three.

During the second year of Virginia Tech's Advance program, the graduate school provided support for two graduate assistants. These assistantships supported two graduate students, Olga Pierrakos in Mechanical Engineering, and Megan Elwood Madden in Geosciences. Their assistantships and tuition were cost shared by the graduate school. An additional graduate student, Miriam Stewart in Civil and Environmental Engineering, was funded directly by the grant using funds originally budgeted for a post-doctoral associate.

Post-doctoral associates
AdvanceVT funded one post-doctoral associate during the second year of the grant, Dr. Carine VanPeteghem in geosciences. A suitable candidate for a post-doctoral fellowship in engineering was not available (one candidate changed her plans and declined the fellowship and a second

suitable candidate was not available), so those funds were reprogrammed to support a third Ph.D. fellowship for Miriam Stewart in civil and environmental engineering.

Undergraduate students
An undergraduate student was employed on an hourly basis to transcribe tapes of interviews.

Total expenditures for other personnel directly charged to the grant in year two are $97,516. This amount is considerably less than the NSF approved budget, but very close to the year two budget request because a post-doctoral fellowship in engineering was not funded this year and those funds were reallocated within the program.

C. Fringes

During the second year of the grant, fringe benefits are calculated at 31.25% for faculty on calendar year appointments and 36.75% for staff. For faculty on academic year appointments, fringes are calculated at 31.25% during the academic year and 8.25% during the summer. Fringes for post-doctoral associates are calculated at 32.25%, and graduate assistants are calculated at 2.5%. In year two, $47,877 will be spent on fringes. This amount is slightly less than the approved and requested budgets because a lesser amount was spent on salaries.

D. Equipment

Computer equipment for development and support of the Advance portal website was purchased from the supplemental funding received for that purpose. Total expenditures for computer equipment were $3279. This is slightly below the approved and budget amount.

E. Travel

In 2005, members of the *AdvanceVT* leadership team and work groups traveled to participate in the annual Advance principal investigators' meeting at NSF in April. The project director and a faculty member attended the Association for Women in Science Conference in June. *AdvanceVT* also provided travel support for two individuals to attend the CIRTL Forum on diversity in STEM disciplines at the University of Wisconsin in May and for a department head to participate in a two-day workshop for department heads at the University of Washington in June. Several members of the *AdvanceVT* team attended conferences throughout the year and presented information about the program. In addition, *AdvanceVT* provided travel support for three distinguished lecturers and nine visiting scholars during the second year of the grant.

Total travel expenditures for year two are anticipated to be $17,148. This amount is considerably below both the approved and budgeted amounts. Faculty have not been available to make recruiting trips to conferences and other institutions as originally planned.

F. Participant Support

AdvanceVT hosted its second workshop for the Virginia Tech community in January 2005, with over 120 participants. Costs for this event were $6,130. This annual event is a very effective

way to reach a wide audience across campus. In year three of the grant, *AdvanceVT* will host another workshop for the university community. In year two, bookstore gift certificates were used as incentives for faculty participating in interviews and graduate students participating in focus groups, and those costs appear in this category ($250). This amount is close to the NSF approved budgeted amount and less than the year two budget request because the workshop was held at an on-campus facility this year, which was more cost effective than the off-site facility used in year one.

G. Other Direct Costs

G.1 Materials and supplies

AdvanceVT incurred expenses for the purchase of software and general office supplies. Grant funds were also expended for costs related to meetings of the work groups, executive committee, and seminars with visiting speakers. Total expenses for year two were $16,534. This amount is considerably less than both the NSF approved and the requested amounts primarily because work group meetings have incurred less expense than anticipated.

G.2 Publication costs

In the second year of the grant, *AdvanceVT* produced a bookmark publicizing the availability of work/life grants for graduate students and six newsletters giving updates on program activities for a total cost of $2,314. This is slightly above the approved and budgeted amounts because newsletters have proved a successful way to share information about the program across campus, so additional copies have been produced.

G.3 Consultants

AdvanceVT engaged the services of Virginia Valian as a keynote speaker and workshop leader for our January conference. *AdvanceVT* also employed a local facilitator for planning meetings with the leadership team. Costs for these services in the second year of the grant were $19,851. This amount is very close to the NSF approved budget and more than the year two budget request.

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 $145,624 were incurred in this

category for year two of the grant, including tuition waivers for four graduate assistants, research seed grants for five junior faculty members, two leadership fellowships for senior women faculty, and charges for telephone and data lines. This is very close to the NSF approved budget and slightly less than the year two budget request. Funds originally budgeted in this category for departmental incentive grants were not expended in year two.

H. Total direct

Total direct costs charged to the grant in year two were $497,590 vs. a budget of $601,078. Almost 70% of the difference is attributable to spending less than planned on salaries and fringes, with the remainder of the difference occurring in travel and materials and supplies.

I. Total indirect

Total indirect costs incurred in year two of the grant were $220,930. Indirect costs are incurred on all direct costs with the exception of tuition and equipment.

J. Total direct + indirect

Total direct and indirect costs direct charged to the grant in year two are $718,520 vs. a budget of $869,500.

K. Residual

Remaining unexpended funds of $150,980 are requested to be carried over to year three of the grant. Some of the funding will be used for its originally intended purpose, e.g. faculty salaries, speakers, events, meetings, and travel, while some may be reallocated following a review and evaluation of this year's activities and priority setting for year three.

L. Amount of request for year three

See the following section for the year three budget request and explanation.

M. Cost sharing

Cost sharing provided by the provost's office, the graduate school, and returned overhead in year two included PI, co-PI, project director, and administrative assistant salaries, and two graduate assistantships, and is projected to total $255,623.34 for the period 7/1/04-8/31/05 (the amount of cost sharing reported in the year one annual report was for the period 9/1/03-6/30/04).

Table 1
***AdvanceVT* Year Two Budget Analysis**
(Includes Advance Portal Website)

	Year 2 Approved Budget	Year 2 Budget Request	Year 2 Expenses (Estimated)	Variance from Approved	Variance from Request
A. Senior Personnel	$148,316	$173,964	$141,067	$7,249	$32,897
B. Other personnel					
B.1. Post-doctoral associates	$80,000	$30,000	$32,500	$47,500	($2,500)
B.2. Other professionals	$0	$0	$0		
B.3. Graduate students	$68,119	$67,738	$64,766	$3,353	$2,972
B.4. Secretarial/ Clerical	$0	$0	$0		
B.5. Undergraduate Students	$1,500	$3,100	$250	$1,250	$2,850
B.6. Other	$0	$0	$0		
Total salaries + wages	$297,935	$274,802	$238,583	$59,352	$36,219
C. Fringe benefits	$54,310	$58,568	$47,877	$6,433	$10,691
Total salaries, wages + fringe	$352,245	$333,370	$286,460	$65,785	$46,910
D. Permanent equipment	$4,000	$4000	$3279	$721	$721
E. Travel (domestic)	$32,000	$39,100	$17,148	$14,852	$21,952
F. Participant support	$8,750	$15,900	$6,380	$2,370	$9,520
G. Other direct costs					
G.1 Materials & supplies	$36,000	$36,000	$16,534	$19,466	$19,466
G.2 Publications	$2,000	$2,000	$2,314	($314)	($314)
G.3 Consultants	$20,500	$13,000	$19,851	$649	($6,851)
G.4 Computer services	$0	$0	$0		
G.5 Subcontracts	$0	$0	$0		
G.6 Other	$145,583	$157,701	$145,624	($41)	$12,077
Total other direct costs	$204,083	$208,701	$184,323	$19,760	$24,378
H. Total direct costs	$601,078	$601,071	$497,590	$103,488	$103,481
I. Total indirect costs (46.2% excluding tuition & equip.)	$268,422	$263,849	$220,930	$47,492	$42,919
J. Total direct + indirect	$869,500	$864,920	$718,520	$150,980	$146,400
K. Residual funds				$150,980	$146,400
L. Amount this request					
M. Cost sharing	$160,166	$251,704	$255,623		

AdvanceVT Year Three Budget Request

Budget Explanation for Year Three Request

Table 2 summarizes the budgeted costs for the third year of the grant and variations from the original proposal budget. Specific cost elements are explained below.

A. Senior Personnel

Provost Mark McNamee will continue to provide overall leadership to Virginia Tech's Advance project as principle investigator. Five percent of Dr. McNamee's salary is provided as a cost share to *AdvanceVT* from the provost's office.

Patricia Hyer will continue to serve as a Co-Principal Investigator and to lead the work element on institutional change, focusing on policy review and implementation. Twenty-five percent of Dr. Hyer's salary is provided as a cost share to *AdvanceVT* from the provost's office.

Nancy Love, Co-Principal Investigator and Advance professor, leads the work element on advancing women into faculty careers. In the third year of the grant, 10% 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 third year of the grant, 10% of Dr. Thole's salary is paid for by the grant.

Roseanne Foti, Advance professor, leads the leadership development program as part of the work element on empowering women. In the third year of the grant, 10% of Dr. Foti's salary is paid for by the grant.

Beate Schmittmann, Advance professor, will be on sabbatical during the 2005-2006 academic year. In the third year of the grant, another faculty member will be recruited to direct recruitment activities for *AdvanceVT*, and will receive approximately 10% of their salary paid for by the grant.

Elizabeth Creamer directs the assessment effort of Virginia Tech's Advance program. In the third 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.

Peggy Layne, program director, provides full time day-to-day management of *AdvanceVT* program activities. In the third year of the grant, Ms. Layne's salary will be cost shared through overhead return.

In order to increase the involvement of women faculty at Virginia Tech in the Advance project, we anticipate providing financial support in the form of course buy-outs, summer salary, or travel money for additional individuals who make significant contributions to

the project goals by taking the lead on a particular project or activity. These individuals will be identified in summer or fall 2005.

Proposed total expenditures for senior personnel direct charged to the grant in year three are $75,000. This is an increase of approximately $10,000 over the original proposal budget.

B. Other Personnel

Post-Doctoral Fellows
AdvanceVT has awarded two post-doctoral fellowships for year three of the grant.

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
Valerie Glass, a doctoral student in marriage and family therapy, will provide support for assessment activities during year three of the grant. Her assistantship, summer salary, and tuition will be paid with grant funds.

Ane Johnson, an incoming doctoral student in educational leadership and policy studies, will provide support to the program director during year three of the grant. Her assistantship, summer salary, and tuition will be paid for with grant funds.

During year three and subsequent years of the grant, the graduate school will provide cost sharing support for two female graduate students in science and/or engineering.

Undergraduate Students
An undergraduate student will be hired on an hourly basis to transcribe interview tapes.

Total expenditures for other personnel direct charged to the grant in year three are $120,759. This is a decrease of approximately $16,000 from the original proposal budget.

C. Fringes

During the third year of the grant, fringe benefits are calculated at 33.25% for faculty and 40.75% for staff. Fringes for graduate assistants are calculated at 6.5%, and fringes for research faculty, including post-docs are calculated at 34.25%. In year three, $52,822 will be spent on fringes. This is an increase of approximately $16,000 over the original proposal budget due to increases in the university's negotiated fringe rates.

D. Equipment

No permanent equipment will be purchased with grant funds.

E. Travel

In year three, members of the *AdvanceVT* leadership team and work groups will travel to participate in the Advance annual principal investigators' meeting. Members of the *AdvanceVT* team will also travel to other Advance institutions, other universities, and conferences to benchmark best practices, share lessons learned, and develop relationships with potential future faculty candidates. *AdvanceVT* also anticipates bringing a variety of speakers to Virginia Tech throughout the year for seminars and workshops, including external consultants, senior scholars, doctoral students and post-doctoral scholars for pre-recruitment visits. Total travel expenditures for year three are budgeted at $30,000.

F. Participant Support

In year three of the grant, *AdvanceVT* will host another workshop for Virginia Tech faculty with a high level outside speaker. *AdvanceVT* will also host a national conference for women graduate students and post-doctoral associates in science and engineering who are preparing for academic careers in year three. Also budgeted in this category are incentives for faculty to participate in interviews as part of *AdvanceVT*'s assessment program. Total budgeted participant support costs for year three are $29,250. The original proposal budget included costs for the graduate student conference under the category of "other direct costs", but they are more appropriately included here.

G. Other Direct Costs

G.1 Materials and supplies

In year three of the grant, *AdvanceVT* will again incur expenses for general office supplies and costs related to meetings of the work groups, leadership council, advisory committee, and seminars with visiting speakers. Total budgeted expenses for year three are $26,500. This amount is less than that in the original proposal based on experience in years one and two.

G.2 Publication costs

In the third year of the grant, *AdvanceVT* will produce additional newsletters and informational materials to publicize program activities and findings, including educational materials for search committees. The budgeted amount is $5,000.

G.3 Consultants

In year three of the grant, *AdvanceVT* will engage the services of outside advisors or gender equity experts for workshops and seminars and provide speaker honoraria for high level visiting scholars. The budgeted amount is $13,000. This amount is less than that in the original proposal budget based on experience in years one and two of the grant.

G.4 Computer services

No computer services costs are anticipated for the Advance program.

G.5 Subcontracts

No subcontracts are anticipated as part of the Advance program.

G.6 Other

AdvanceVT has awarded five research seed grants to junior women faculty to assist them in preparing grant proposals for external funding for year three of the grant. Instead of leadership fellowships for senior women faculty preparing for positions of higher responsibility in the university, *AdvanceVT* will redirect these funds for a structured leadership development program for a small cohort of eight women faculty. The program will include assessment, preparation of individualized development plans, and a series of informational and skill building workshops for participants and other women faculty. Also in this category are funds for departmental incentives to support participation in *AdvanceVT* or other gender equity related activities, tuition waivers for graduate assistants working on the project, and dedicated telephone and data lines for the *AdvanceVT* office. The total budgeted amount is $151,940.

H. Total direct

Total direct costs charged to the grant in year three are budgeted at $504,272.

I. Total indirect

Total indirect costs incurred in year three of the grant are budgeted at $226,602. Indirect costs are incurred on all direct costs with the exception of tuition.

J. Total direct + indirect

Total direct and indirect costs direct charged to the grant in year three are budgeted at $730,873.

K. Residual

AdvanceVT anticipates spending all of the requested funds on the activities described.

L. Amount of request for year three

AdvanceVT requests funding in the amount of $730,873 for year three of the grant.

M. Cost sharing

Cost sharing provided by the provost's office, the graduate school, and returned overhead in year three will include PI, Co-PI, program director, and administrative assistant salaries, and two graduate assistantships, totaling $270,647, exceeding the required amount of $146,165.

Table 2
***AdvanceVT* Year Three Budget Request**
(Does not include the Advance Portal Website)

	Original Year 3 Budget (Proposal)	Revised Year 3 Budget Request
A. Senior Personnel	65,282	75,000
B. Other personnel		
B.1. Post-doctoral associates	85,200	81,000
B.2. Other professionals	0	0
B.3. Graduate students	51,294	38,759
B.4. Secretarial/ Clerical	0	0
B.5. Undergraduate Students	0	1,000
B.6. Other	0	0
Total salaries + wages	201,776	195,759
C. Fringe benefits	36,063	52,822
Total salaries, wages + fringe	237,839	248,582
D. Permanent equipment	0	0
E. Travel (domestic)	24,500	30,000
F. Participant support	8,750	29,250
G. Other direct costs		
G.1 Materials & supplies	35,000	26,500
G.2 Publications	7,000	5,000
G.3 Consultants	20,500	13,000
G.4 Computer services	0	0
G.5 Subcontracts	0	0
G.6 Other	170,500	151,940
Total other direct costs	233,000	196,440
H. Total direct costs	504,089	504,272
I. Total indirect costs (46.2% excluding tuition & equip.)	226,738	226,602
J. Total direct + indirect	730,827	730,873
K. Residual funds	0	0
L. Amount this request	730,827	730,873
M. Cost sharing	146,165	270,647

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 1
Investigator: Mark McNamee

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

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title: Bridging the Gap Between New Materials, Fuel Cell Devices and Products: An Alliance of Virginia Universities (VT-VCU)

PI : James E. McGrath Co-PI: Mark McNamee
Source of Support: NSF
Total Award Amount: $ 600,000.00 Total Award Period Covered: May 1, 2004 – April 30, 2005 with an expectation to Fund in FY 2005 to an ending date of April 30, 2006
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:

Co-PIs:
Source of Support:
Total Award Amount: $ Total Award Period Covered:
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:

Co-PIs:
Source of Support:
Total Award Amount: $ Total Award Period Covered:
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:

Co-PIs:
Source of Support:
Total Award Amount: $ Total Award Period Covered:
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 preceding funding period.

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

55

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 1
Investigator: Patricia Hyer

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

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title: ADVANCE Institutional Transformation Award

PI: Mark McNamee Co-PIs: Karen Thole, Nancy Love
Source of Support: National Science Foundation
Total Award Amount: $ 3,499,558 Total Award Period Covered: 9/01/03 – 8/31/08
Location of Project: Virginia Tech (25% of Dr. Hyer's salary is provided by the university as cost sharing)
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: Karen Thole, Nancy Love
Source of Support: National Science Foundation
Total Award Amount: $ 94,671 Total Award Period Covered: 07/14/04 – 07/13/06
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:

Co-PIs:
Source of Support:
Total Award Amount: $ Total Award Period Covered:
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:

Co-PIs:
Source of Support:
Total Award Amount: $ Total Award Period Covered:
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:

Co-PIs:
Source of Support:
Total Award Amount: $ Total Award Period Covered:
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 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 proposal.

PAGE 1 of 3
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: Advanced Cooling Technologies

Co-PIs:
Source of Support: United Technologies—Pratt & Whitney
Total Award Amount: $ 295,000 Total Award Period Covered: 01/01/05 - 6/30/07
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: Cooling Impacts of Combustor Performance and Associated Design Requirements

Co-PIs:
Source of Support: Pratt & Whitney
Total Award Amount: $ 37,300 Total Award Period Covered: 01/01/05 -12/31/05
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: 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: 1 Acad: Sumr:

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title: REU: GAS TURBINE HEAT TRANSFER STUDIES

Co-PIs:
Source of Support: National Science Foundation
Total Award Amount: $ 7,000 Total Award Period Covered: 5/1/2005-4/31/2006
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 3
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: ADVANCE Institutional Transformation Award: Virginia Tech
Co-PIs: Mark McNamee, Patricia Hyer, Nancy Love
Source of Support: National Science Foundation
Total Award Amount: $3,499,558 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: 1 Acad: Sumr:

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: Acad: Sumr:

Support: ☐ Current ☒ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title: Sand Effects on Combustor and Turbine Cooling
Co-PIs:
Source of Support: United Technologies Corporation – Pratt & Whitney
Total Award Amount: $ 100,000 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: Effects of Freestream Turbulence on the Heat Transfer of a Transonic Turbine Blade and Vane
Co-PIs: Wing Ng
Source of Support: Solar Turbines
Total Award Amount: $195,000 Total Award Period Covered 11/1/04-5/31/06
Location of Project: Virginia Tech
Person-Months Per Year Committed to the Project. Cal: 0.5 Acad: Sumr: 0

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title: Virginia Space Grant Graduate Fellowship for Steve Lynch
Co-PIs:
Source of Support: Virginia Space Grant
Total Award Amount: $5,000 Total Award Period Covered 6/05-5/06
Location of Project: Virginia Tech
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr: 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 proposal.

PAGE 3 of 3 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: Major Research Initiative: Development of a Spatiotemporal Velocimeter with Simultaneous Size Measurement for Polydispersed Multi-Phase Flows

Co-PIs: Pavlos Vlachos and Clint Dancey

Source of Support: National Science Foundation

Total Award Amount: $394,494 Total Award Period Covered: 6/1/05 – 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: Acad: Sumr: 1

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

Project/Proposal Title: Effects of Leading Edge Film-Cooling and Surface Roughness on Downstream Film-Cooling along a Transonic Turbine Blade for Low and High Freestream Turbulence
Low and High Free Stream Turbulence

Co-PIs: Wing Ng and Pavlos Vlachos

Source of Support: AFOSR

Total Award Amount: $482,143 Total Award Period Covered: 10/1/05 – 9/30/08

Location of Project: Virginia Tech

Person-Months Per Year Committed to the Project. Cal: 0.5 Acad: Sumr: 1

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 4
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 – 12/31/05
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, Madeline Schreiber, Mark Widdowson
Source of Support U.S. Department of Education
Total Award Amount: $806,454 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 4 Investigator: Nancy G. Love	Other agencies (including NSF) to which this proposal has been/will be submitted.

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title: ADVANCE Institutional Transformation Award: Virginia Tech (plus associated supplements)
Co-PIs: Mark McNamee, Patricia Hyer, Nancy Love, Karen Thole
Source of Support: National Science Foundation
Total Award Amount: $3,499,558 Total Award Period Covered: 9/15/03 – 8/31/08
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 (yrs 1&2)

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: 0.5

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: $575,357 Total Award Period Covered 9/28/04 – 9/27/07
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: $115,730 Total Award Period Covered 11/3/03 – 7/1/05
Location of Project: Virginia Tech
Person-Months Per Year Committed to the Project. Cal: Acad: 0.2 Sumr: 0

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 3 of 4
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: CLEANER: Collaborative Research: Collaborative Large-Scale Engineering Analysis Network for Environmental Research for the Coastal Margin

PI: J. Bonner, K. Jones, N. Love, T. Wentling, Ilya Zaslavsky
Source of Support: NSF

Total Award Amount: $6,740 ($85,326) Total Award Period Covered 8/1/2004 – 7/31/2005

Location of Project: Texas A&M, Howard University, Virginia Tech, University of Illinois, University of California-San Diego

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: COLLABORATIVE RESEARCH: The Biotransformation of Hydrophobic and Hydrophilic Pharmaceuticals and Their Metabolites by Nitrifying and Heterotrophic Cultures

Co-PIs: Nancy G. Love (VT), Diana Aga (SUNY-Buffalo) and Willie Harper (Auburn)
Source of Support: NSF

Total Award Amount: $410,000 Total Award Period Covered 6/1/05 – 5/31/08

Location of Project: Virginia Tech, University of Buffalo, Auburn University

Person-Months Per Year Committed to the Project. Cal: Acad: 0.5 Sumr: 1.0 (one summer)

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

Project/Proposal Title: Sentinel Biosensors for Detecting Toxins in Water Supplies

PI: N. G. Love
Source of Support: NIST

Total Award Amount: $75,000 Total Award Period Covered 8/1/05 – 7/31/06

Location of Project: Virginia Tech and NIST (Gaithersburg)

Person-Months Per Year Committed to the Project. Cal: Acad: 0.25 Sumr: 0

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

Project/Proposal Title: IMR: Acquisition of Inverted Confocal Microscope for Research and Education on Nanoscale Materials

PI: Giti Khodaparast, Jill Sible, Kathleen Meehan, Nancy Love
Source of Support: NSF

Total Award Amount: $272,677 Total Award Period Covered 8/1/05 – 7/31/06

Location of Project: Virginia Tech

Person-Months Per Year Committed to the Project. Cal: Acad: 0 Sumr: 0

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

Project/Proposal Title: Acquisition of an Inductively Coupled Plasma Emission Spectrometer and a Gas Chromatograph (GC-FID/ECD/SCD) for the Virginia Military Institute

PI: Charles Bott, Robert Humston, Robert Schneiter, Nancy Love, James Turner
Source of Support: NSF

Total Award Amount: $180,574 Total Award Period Covered 9/1/05 – 8/31/06

Location of Project: Virginia Military Institute, Virginia Tech

Person-Months Per Year Committed to the Project. Cal: Acad: 0 Sumr: 0

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 4 of 4 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: Development of Response Protocols for Wastewater Treatment Plants Exposed to CBR Contaminants

PI: Nancy Love, Andy Shaw (Black & Veatch), Leonard Casson (U Pittsburgh)
Source of Support: Water Environment Research Foundation

Total Award Amount: $300,000 Total Award Period Covered 7/1/05 – 6/30/08

Location of Project: Virginia Tech, University of Pittsburgh, Kansas City, and Charleston, SC

Person-Months Per Year Committed to the Project. Cal: Acad: 0.2 Sumr: 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 proposal.

PAGE 1 of 1 Investigator: B. Schmittmann	Other agencies (including NSF) to which this proposal has been/will be NSF

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title:
Statistical Mechanics of Systems far from Equilibrium
Co-PIs: R. K. P. Zia
Source of Support: NSF
Total Award Amount: $ 555,000 Total Award Period Covered: 6/1/04 – 5/31/07
Location of Project: Virginia Tech
Person-Months Per Year Committed to the Project. Cal: 0 Acad: 2.25 Sumr: 2.00

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title:
Phase Transitions in Systems Driven into Non-Equilibrium Steady States
Co-PIs: E. Praestgaard, Z. Racz
Source of Support: NATO
Total Award Amount: $ 6,300 Total Award Period Covered: 1/1/97 – 12/31/06
Location of Project: Virginia Tech, Roskilde (Denmark), Budapest (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:
Co-PIs:
Source of Support:
Total Award Amount: $ Total Award Period Covered:
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:
Co-PIs:
Source of Support:
Total Award Amount: $ Total Award Period Covered:
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:
Co-PIs:
Source of Support:
Total Award Amount: $ Total Award Period Covered:
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 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 proposal.

PAGE 1 of 1
Investigator: Roseanne J. Foti

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:
IGERT: Exploring interfaces through graduate education and research
Co-PIs: Mike Hochella, John Little, George Filz, Beate Schmittmann, Brenda Winkel
Source of Support: NSF
Total Award Amount: $ 3,398,801 Total Award Period Covered:
Location of Project: Virginia Tech
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr: .8

Support: ☐ Current ☒ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title:
Co-PIs:
Source of Support: American Honda Foundation
Total Award Amount: $ 75,452 Total Award Period Covered:
Location of Project: Virginia Tech
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr: 2

Support: ☐ Current ☒ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title:
The effects of experience on the content and structure of cognitive categories about leadership
Co-PIs:
Source of Support: Army Research Institute
Total Award Amount: $ 118,300 Total Award Period Covered: 10/1/05 – 9/30/06
Location of Project: Virginia Tech
Person-Months Per Year Committed to the Project. Cal: Acad: .25 Sumr:

Support: ☐ Current ☐ Pending ☒ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title:
A cost-benefit utility analysis of alternative treatment methods
Co-PIs: Robert Stephens, John Donovan
Source of Support: NIH
Total Award Amount: $ 500,000 Total Award Period Covered: 2 years
Location of Project: Virginia Tech
Person-Months Per Year Committed to the Project. Cal: Acad: .5 Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title:
Co-PIs:
Source of Support:
Total Award Amount: $ Total Award Period Covered:
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 1 of 1
Investigator: Elizabeth Creamer

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:
Investigating the Gender component: Cultures that Promote Equity in Undergraduate Engineering
Co-PIs: Carol Burger, Peggy Meszaros
Source of Support: NSF
Total Award Amount: $ 448,970 Total Award Period Covered: 10/01/05-09/30/08
Location of Project: Virginia Tech
Person-Months Per Year Committed to the Project. Cal: Acad: .5 Sumr: 2

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title:
Women in Information Technology: Pivotal Transitions from School to Careers
Co-PIs: Carol Burger, Peggy Meszaros
Source of Support: NSF
Total Award Amount: $ 655,849 Total Award Period Covered: 10/01/01-09/30/05
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:
GSE: Further Development of the IT Career Choice Model through Research and Dissemination
Co-PIs: Carol Burger, Peggy Meszaros
Source of Support: NSF
Total Award Amount: $ 194,456 Total Award Period Covered: 10/01/04-09/30/06
Location of Project: Virginia Tech
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr: 2

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support
Project/Proposal Title:
RES – Women in Information Technology: Pivotal Transition from School to Careers Supplement
Co-PIs: Carol Burger, Peggy Meszaros
Source of Support: NSF
Total Award Amount: $ 134, 250 Total Award Period Covered: 10/01/04-08/30/05
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:
Advance Institutional Transformation
Co-PIs: Mark McNamee, Patricia Hyer, Karen Thole, Nancy Love
Source of Support: NSF
Total Award Amount: $ 3,499,558 Total Award Period Covered: 9/01/03 – 8/31/08
Location of Project: Virginia Tech
Person-Months Per Year Committed to the Project. Cal: Acad: 0.9 Sumr: 1.0

*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

Attachment 2

Quantitative Indicators of Activity and Progress

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 on an annual basis. Virginia Tech is currently in the second year of its Advance program. Where possible, indicators are reported with data from prior years for comparative purposes. The format for this annual reporting was revised this year to reflect the suggestions presented in the *Proposed Toolkit for Reporting Progress toward NSF ADVANCE: Institutional Transformation Goals*. Additional detail on tenure, promotion, and time in rank is provided through continued reporting of the cohort analysis that was included in *AdvanceVT*'s first annual report.

Indicators presented below include numbers and percentages of women scientists and engineers in various categories at Virginia Tech and analyses of gender effects on promotion and tenure, recruitment, and start-up packages. *AdvanceVT* continues to use these data indicators internally for program planning and with the university community in a variety of formats, including presentations to university administrators as well as in newsletters and on the *AdvanceVT* web site.

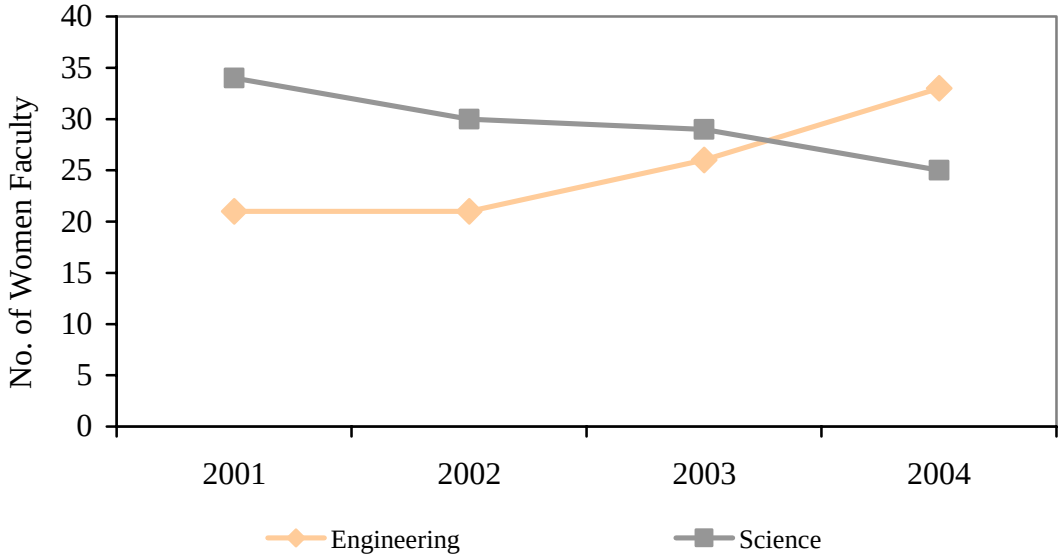
Faculty by Appointment Type, Rank, and Gender

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. Percentages from the previous year are included for comparison.

Only faculty in the standard academic ranks of assistant, associate, or professor are eligible to earn tenure at Virginia Tech. Administrators cannot earn tenure in an administrative appointment, but retain their tenure if earned previously as part of an academic appointment. In fall 2004, there were 282 tenured and tenure-track faculty in the College of Engineering, of which 33 (11.7%) were women. This is a significant increase from the fall of 2003 when there were 26 (9.4%) women. Nationwide, 10.4% of tenured and tenure track engineering faculty were women in 2004, according to the American Society for Engineering Education's Profiles of Engineering and Engineering Technology Colleges. Two engineering departments continue to have no women faculty on the tenure track.

The College of Science had 187 tenured and tenure-track faculty in fall 2004; 25 were women (13.3%). The number of women in the College of Science has decreased since fall 2001 when there were 34 (15.7%) women.

Tenured and Tenure-Track Women Faculty in the Colleges of Engineering and Science
Fall 2001 - 2004



Source: Virginia Tech Office of Institutional Research and Policy Analysis

The scarcity of women at the senior-most ranks remains an issue since low numbers of full professors mean the pool of experienced women available for appointments to professorships and chairs and important policy making committees is very limited. Only five women (4%) held the rank of professor in the College of Engineering at the start of the 2004 academic year, an increase of one woman professor since 2003. The College of Science has only eight women (7%) at the rank of professor, losing one woman professor since the fall of 2003.

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 has an associate dean of research, graduate studies, and outreach, and an associate dean of curriculum, instruction, and advising; both positions are filled by women faculty members.

Non-tenure-track instructional faculty include individuals on visiting appointments, lecturers, or those on short or long-term instructor appointments. The College of Science has far more such positions than the College of Engineering, teaching many sections of lower division mathematics and science courses; about half of the non-tenure

appointments in the College of Science are in the department of mathematics. Women fill a little over half of these appointments college wide.

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 professor, among others.

To put these college numbers within the perspective of the university as a whole, 2004 marks the first year a slight increase in tenure track faculty has been recorded with 1281 tenured and tenure track faculty university wide. Prior to 2004, the total tenured and tenure track faculty university wide decreased from 1418 in fall 2001, to 1331 in fall 2002, to 1262 in fall 2003; an 11% reduction. The reduction in administrative and professional faculty over the same period was 13.6%. Much of the loss was 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. (Source: IR website, www.irpa.vt.edu, file name: HC_trend_fa97-04_AllVT_final.xls)

Tenure and Promotion Outcomes by Gender

Due to low representation among women in the assistant, associate, and professor ranks in the College of Engineering and College of Science, few women are reviewed for tenure on a yearly basis. Table 2 summarizes the number of men and women in the College of Engineering and College of Science who have been reviewed for either a promotion, tenure, or simultaneously reviewed for promotion and tenure for one year prior to receiving the Advance grant (2002-2003) and two years following its inception. All female candidates from both colleges have successfully met the criteria for promotion and/or tenure over the past three years.

Years in Rank by Gender, Promotion to Associate Professor

Table 3 summarizes the current status of faculty hired at Virginia Tech as assistant professors in 1996, 1997, 1998, and 1999, including attrition and time to promotion. During those four years, a total of 27 assistant professors were hired in the College of Science (22 men and 5 women) and 42 assistant professors were hired in the College of Engineering (31 men and 11 women). Of those hired, 14 have subsequently left Virginia Tech (six scientists, all male, and eight engineers, three female and five male). Roughly equal proportions of male and female scientists (80% female, 72.7% male) and more than half of the engineers (54.5% of the women and 61.2% of the men) have been promoted to associate professor.

Men were more likely to be hired with prior experience and credit towards tenure than women. Two of the female assistant professors and two male professors hired during this time period extended the tenure clock for family reasons. Average time to promotion for

assistant professors hired between 1997 and 2000 in the College of Engineering was 4.5 years for women and 4.8 years for men. In the College of Science, average time to promotion for women in this group was 6.1 years and for men 5.0 years.

Years in Rank by Gender, Promotion to Professor

Table 4a summarizes time in rank by examining scientists and engineers hired during 1996-2000 as assistant professors who have been promoted to professors. Scientists and engineers hired as associate professors who have been promoted to professors are summarized in Table 4b. Among the 42 assistant professors hired (11 women, 31 men) between 1997 and 2000 in the College of Engineering, one male (3.2%) and one female (9%) engineer have been promoted to professor. The College of Science has hired 27 assistant professors during this same time period (five women, 22 men). Two male scientists (9.0%) hired as assistant professors have been promoted to professor. None of the women in the College of Science who were hired as assistant professors have been promoted to professor.

During 1996-2000 the College of Engineering hired two women and 14 men at the associate professor rank. Among those hired as associate professors in the College of Engineering, three males (21.4%) have been promoted to the rank of professor after four years in the associate professor rank. The College of Science has hired three women and four men at the associate professor rank. Among those hired, one male (25%) has been promoted to professor after spending four years in the rank of associate professor. None of the female scientists hired as associate professors have been promoted to professor as of June of 2005.

Time at Institution by Gender

Table 5 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 professors in engineering is 18.4 years versus women professors who have on average 11 years. In science, the average years of service for male professors is 23.9 years versus women who have on average 20 years. University wide, male full professors have been at Virginia Tech about 21.2 years versus females who have 18.4 years. Not surprisingly, these data show that women are relatively recent additions to the faculty ranks in engineering and science.

Attrition

Table 6 summarizes the number of voluntary non-retirement departures by rank and gender for the College of Science and the College of Engineering from 1997-2003. Male scientists and engineers were more likely than females to leave the university. Departures are more evident among male professors than other ranks. Departures among female scientists and engineers, regardless of rank, during the initial year of the Advance grant (2003-04) appears to be consistent with years prior to the grant's inception.

Leadership Positions

Table 7 summarizes the number of women faculty in various administrative and leadership positions in each college. Data for the 2003-04 academic year are presented followed by data for the 2004-05 academic year. Leadership positions include administrative positions, professorships, and membership on promotion and tenure committees.

Women in Administrative Positions

Of the eight academic deans, one (Agriculture) is a woman. In addition, the Dean of Libraries is a woman. This has remained consistent for the past three academic years. Seven (30.7%) of the associate deans in the academic colleges are women, plus one woman associate dean in the Graduate School (31%). Only 8 of the 68 (12%) academic department heads are women; 6 of the 8 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; one woman serves as Vice President for Development and University Relations, another serves as Vice Provost for Graduate Studies and Dean of the Graduate School. Two women (10%) are directors of university-level research centers.

Professorships

Table 7 also presents data on the gender of endowed professors or eminent scholars at the college and university level at Virginia Tech. Endowed professorships 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. One of 13 (8%) UDPs is female; 3 of 11 (27%) ADPs are female.

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 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. Given the distribution of women by rank at Virginia Tech, particularly in science and engineering, it is no surprise that women are not represented among either UDPs or ADPs from these two colleges. There are only 8 women at the professor rank in science and 5 in engineering, and many of these have only recently been promoted to professor.

Among Eminent Scholars (holder of an endowed professorship or chair) only one woman mathematician is represented out of 101 total positions in the University during 2004-05. Two other women are identified as eminent scholars, both in the College of Liberal Arts and Human Sciences.

Promotion and Tenure Committees

The University Promotion and Tenure Committee includes nine faculty representatives (one from each college and one at-large) and the eight academic college deans. The Provost serves as non-voting chair. During the 2003-04 and 2004-05 cycle, the majority of the faculty representatives (5 of 9) were women. One of the 8 academic deans is female, as shown in Table 7.

Review for promotion and tenure (P&T) 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. Table 8 shows the gender composition of department and college promotion and tenure committees in the Colleges of Science and Engineering.

During the 2004-05 academic year, 6 of the 11 departments in the College of Engineering have at least 1 woman member on the P&T committee. This represents an increase from the representation of women on P&T committees during 2003-04. In the College of Science, half of the 8 departments included women members on the P&T committee during the 2003-04 and 2004-05 academic years.

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, with a total of 23 members during 2004-05. One member was a woman, the same number as in 2003-04. During the 2004-05 academic year, the College of Science had a nine-member P&T committee with one woman member.

Recruitment and Start-up Packages

Significant attention has been given to the recruitment of women in the College of Engineering and College of Science over the past two years.

Recruitment

Table 9 summarizes the number and percent of new hires in the College of Engineering and the College of Science from fall 1998 to September 30, 2004. Recruitment of female scientists and engineers has improved following the inception of the Advance grant in 2003. Thirty-six percent (36%) of assistant professors hired during the 2003-04 academic year in the College of Engineering were women. Forty percent (40%) of hires at the assistant professor rank in the College of Science were female in this same year. At the associate professor rank, 50% of new hires were female in the College of Engineering. This trend continued in the 2004-05 academic year. Fewer females were hired at the professor rank; only 16.6% of professors hired in the College of Engineering were female during the 2003-04 academic year.

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 2004. 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 2004-05 academic year, the Virginia Tech College of Engineering provided an average start-up package (exclusive of salary) for female assistant professors of $227,372, while the average startup package for male assistant professors was $145,702. The average start-up package for female associate professors was $114,500, while the average for male associate professors was $103,027. Among professors who were hired, the female professor did not receive a start-up package. This was also true for one male professor who was hired. The value of start-up packages for assistant professors in the College of Engineering ranged from a low of $97,340 in Materials and Science Engineering, to a high of $240,000 in Computer Science.

The College of Science provided an average start-up package for all assistant professors of $395,000 during 2004-05. This figure is driven significantly by the start-up package one female assistant professor received.

Salary

A complete salary equity study was conducted during year one of Virginia Tech's Advance program and included with the first annual report. Multiple regression

techniques following the *Paychecks* methodology were used to assess the impact of gender on faculty salaries across the university. Virginia Tech continues to monitor faculty salaries but did not repeat the salary regression analysis this year. Table 10 presents average, minimum, and maximum salary by gender and years in rank for the Colleges of Engineering and Science. Detailed information has been removed from cells where N=1 in order to protect the confidentiality of individual faculty members. A date of January 31, 2005, was chosen for reporting purposes to reflect salary increases that took effect November 25, 2004. Based on the suggestions provided in the *Proposed Toolkit for Reporting Progress toward NSF ADVANCE: Institutional Transformation Goals*, a complete salary equity analysis will be repeated during year three and included with next year's annual report.

Table 1. Number and Percent of Women in Science/Engineering by Rank and Department

Tenured and Tenure Track Faculty

	Women			Men			% Women 2004-2005 Within Rank			% Women 2003-2004 Within Rank		
	Prof.	Assoc.	Asst.	Prof.	Assoc.	Asst.	Prof.	Assoc.	Asst.	Prof.	Assoc.	Asst.
College of Engineering	**5**	**14**	**14**	**124**	**80**	**45**	**4%**	**15%**	**24%**	**3%**	**11%**	**19%**
Aerospace and Ocean Eng	-	1	-	11	2	3	-	33%	-	-	25%	-
Biomedical Engineering	-	-	-	-	-	1	-	-	-			
Chemical Engineering	-	2	-	4	2	2	-	50%	-	-	40%	-
Civil & Env. Engineering	-	3	2	20	13	1	-	19%	67%	-	11%	67%
COE Northern Virginia	-	-	-	5	5	3	-	-	-	-	-	-
Computer Science	-	2	2	7	7	9	-	22%	18%			
Electrical Engineering	1	1	1	27	15	12	4%	6%	8%	3%	-	11%
Engineering Fundamentals	-	2	3	1	6	2	-	25%	60%	-	-	50%
Eng. Science & Mechanics	-	-	-	17	7	3	-	-	-	-	-	-
Industrial & Systems Eng.	-	2	4	7	7	1	-	22%	80%	-	20%	67%
Materials Engineering	2	-	1	5	3	1	29%	-	50%	25%	-	-
Mechanical Engineering	2	1	1	15	12	5	12%	8%	17%	13%	8%	20%
Mining & Minerals Eng.	-	-	-	5	1	2	-	-	-	-	-	-
College of Science	**8**	**11**	**6**	**100**	**50**	**12**	**7%**	**18%**	**33%**	**8%**	**20%**	**36%**
Biology	3	2	2	18	7	2	14%	22%	50%	15%	11%	80%
Chemistry	1	2	-	15	7	3	6%	22%	-	6%	22%	-
Economics	1	-	-	5	3	1	17%	-	-	14%	20%	-
Geosciences	-	1	1	10	5	-	-	17%	100%	9%	25%	33%
Mathematics	1	2	-	32	7	3	3%	22%	-	3%	22%	-
Physics	1	-	1	7	9	2	12%	-	33%	10%	-	50%
Psychology	1	4	1	6	8	-	14%	33%	100%	14%	36%	50%
Statistics	-	-	1	7	4	1	-	-	50%	-	20%	50%

Table 1 continued: Other Faculty

	Women			Men			% Women 2004-2005 Within Rank			% Women 2003-2004 Within Rank		
	Admin/ Prof.	Non-TT Instruc.	Research	Admin/ Prof	Non-TT Instruc.	Research	Admin/ Prof	Non-TT Instruc.	Research	Admin/ Prof	Non-TT Instruc.	Research
College of Engineering	7	6	12	6	13	69	53%	32%	15%	45%	31%	15%
Aerospace and Ocean Eng	-	-	-	-	-	5	-	-	-	-	-	-
COE Northern Virginia	-	-	-	1	2	1	-	-	-	-	-	-
Chemical Engineering	-	-	1	-	-	4	-	-	20%	-	-	25%
Civil & Env. Engineering	-	1	2	-	1	6	-	50%	25%	-	-	20%
Computer Science	-	2	-	-	3	5	-	40%	-	-	33%	-
Dean – Engineering	6	-	3	4	2	7	60%	-	30%	50%	-	18%
Electrical Engineering	1	1	1	-	2	11	100%	33%	8%	100%	33%	14%
Engineering Fundamentals	-	1	-	-	1	-	-	50%	-	-	100%	-
Eng. Science & Mechanics	-	-	-	-	1	4	-	-	-	-	-	-
Industrial & Systems Eng.	-	-	1	-	-	16	-	-	6%	-	-	7%
Materials Engineering	-	1	2	-	1	3	-	50%	40%	-	100%	50%
Mechanical Engineering	-	-	1	1	-	4	-	-	20%	-	-	14%
Mining & Minerals Eng.	-	-	-	-	-	3	-	-	-	-	-	-
Center for Intell. Mat.-CIMSS	-	-	1	-	-	-	-	-	100%	-	-	100%
College of Science	2	22	13	2	20	43	50%	53%	23%	-	56%	25%
Biology	-	1	4	-	2	8	-	33%	33%	-	20%	50%
Chemistry	-	4	4	-	2	14	-	67%	22%	-	57%	20%
Dean of Science	2	-	-	2	-	-	50%	-	-	-	-	-
Economics	-	1	-	-	4	-	-	20%	-	-	50%	-
Geosciences	-	-	1	-	2	8	-	-	11%	-	50%	20%
Mathematics	-	15	-	-	6	2	-	71%	-	-	71%	-
Physics	-	-	-	-	-	9	-	-	-	-	-	-
Psychology	-	-	3	-	2	1	-	-	75%	-	-	75%
Statistics	-	1	1	-	2	1	-	33%	50%	-	50%	50%

Note: The “COE Northern Virginia” is a satellite office for the College of Engineering and is not considered a separate department. Nor is the Biomedical Engineering program a traditional department. Traditional departments, responsible for tenure decisions, for each center are based on the Virginia Tech, Blacksburg campus.
Source: CoE_CoS_Faculty_093004.xls, R. Giles

Table 2. Tenure or Promotion Only Review Outcomes by Gender

Promotion and/or Tenure Review Outcomes by Gender: Assistant to Associate Professor

	# Reviews		# Approvals		# Denials	
	Women	**Men**	**Women**	**Men**	**Women**	**Men**
2002-2003						
College of Engineering	3	8	3	7	-	1
College of Science	-	7	-	7	-	-
2003-2004						
College of Engineering	2	10	2	8	-	2
College of Science	2	5	2	5	-	-
2004-2005						
College of Engineering	3	7	3	7	-	-
College of Science	1	5	1	5	-	-

Promotion and/or Tenure Review Outcomes by Gender: Associate to Full Professor

	# Reviews		# Approvals		# Denials	
	Women	**Men**	**Women**	**Men**	**Women**	**Men**
2002-2003						
College of Engineering	2	10	2	10	-	-
College of Science	-	5	-	5	-	-
2003-2004						
College of Engineering	-	7	-	7	-	-
College of Science	-	2	-	2	-	-
2004-2005						
College of Engineering	3	3	3	3	-	-
College of Science	2	5	2	3	-	2

Notes: Faculty hired at the rank of associate professor, but without tenure, who are then considered for tenure are included in the upper table. Faculty hired at the professor level, but without tenure, who are then considered for tenure, are included in the lower table. Data provided by S. Karlin as of May 2005.

Table 3: Tenure and Promotion Outcomes as of May 2005, New Assistant Professor Cohorts 1996-1999

College of Science Year Hired	# in Cohort		Promoted to Associate		Average Time to Promotion (years)		Left Institution		Not Yet Tenured	
	F	M	F	M	F	M	F	M	F	M
1996/97	2	6	2	4	6.5 (1)	5.3 (2)	0	2	0	0
1997/98	1	5	1	5	6.0	5.0 (3)	0	0	0	0
1998/99	1	8	1	6	6.0	4.8 (4)	0	2	0	0
1999/00	1	3	-	1	-	5.0	0	2	1	0
Total Number of New Hires ('96-'00)	5	22	4	16	--	--	0	6	1	0
College Total Percentage ('96-'00)	18.5%	81.5%	80.0%	72.7%	--	--	0.0%	27.2%	20.0%	-
College Average Time to Tenure					6.1	5.0				

College of Engineering Year Hired	# in Cohort		Promoted to Associate		Average Time to Promotion (years)		Left Institution		Not Yet Tenured	
	F	M	F	M	F	M	F	M	F	M
1996/97	3	6	2	4	6.8 (5)	4.6 (6)	1	2	0	0
1997/98	2	8	1	6	6.0	5.7 (7)	1	2	0	0
1998/99	5	9	3	7	4.3 (8)	5.6 (9)	1	0	1	2
1999/00	1	8	-	2	-	3.3 (10)	0	1	1	5
Total Number of New Hires ('96-'00)	11	31	6	19	--	--	3	5	2	7
College Total Percentage (96-'00)	26.1%	73.8%	54.5%	61.2%	--	--	27.2%	16.1%	18.1%	22.5%
College Average Time to Tenure					4.5	4.8				

Note: Percentages are within column/sex, except for the column '# in Cohort;' these 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.

(10) One male was hired with prior credit towards tenure.

Source: data source advance_asstprofs_9697to04.html plus each additional year; number in cohort may not match number of new hires due to changes of status

Table 4: Promotion to Professor

Table 4a: Years in Rank at the Associate Professor Level for COE and COS Faculty Hired as Assistant Professors 1996/97-1999/00

	College of Engineering				College of Science			
Years in Rank	Women N=11		Men N=31		Women N=5		Men N=22	
	Number	% of Women	Number	% of Men	Number	% of Women	Number	% of Men
0-2	1	9.0%	-	-	-	-	-	-
3-5	-	-	1	3.2%	-	-	2	9.0%
6-8	-	-	-	-	-	-	-	-
9-11	-	-	-	-	-	-	-	-
12-14	-	-	-	-	-	-	-	-
15 or more	-	-	-	-	-	-	-	-

Table 4b: Years in Rank at the Associate Professor Level for COE and COS Faculty Hired as Associate Professors

	College of Engineering				College of Science			
Years in Rank	Women N= 2		Men N=14		Women N=3		Men N=4	
	Number	% of Women	Number	% of Men	Number	% of Women	Number	% of Men
0-2	-	-	-	-	-	-	-	-
3-5	-	-	3	21.4%	-	-	25%	1
6-8	-	-	-	-	-	-	-	-
9-11	-	-	-	-	-	-	-	-
12-14	-	-	-	-	-	-	-	-
15 or more	-	-	-	-	-	-	-	-

Source: Removed any departing faculty, data source advance_assocprofs_9697to04.html plus each additional year for cohorts; advance_asstprofs_9697to04.html plus each additional year

Table 5: Average Time at Institution by College, Rank, and Gender
Virginia Tech Tenure-Track Faculty
Fall 2004

College of Engineering

Rank	Gender				Total N
	M		F		
	N	Average Years	N	Average Years	
Professor	124	18.4	5	11.0	129
Associate Professor	80	11.3	14	6.9	94
Assistant Professor	45	2.8	14	2.7	59
Total	**249**	**13.3**	**33**	**5.8**	**282**

College of Science

Rank	Gender				Total N
	M		F		
	N	Average Years	N	Average Years	
Professor	100	23.9	8	20.0	108
Associate Professor	50	15.0	11	9.1	61
Assistant Professor	12	2.2	6	2.6	18
Total	**162**	**19.1**	**25**	**10.5**	**187**

University Total

Rank	Gender				Total N
	M		F		
	N	Average Years	N	Average Years	
Professor	504	21.2	65	18.4	569
Associate Professor	323	13.7	118	11.4	441
Assistant Professor	148	3.3	107	2.9	255
Instructor	2	13.2	-	-	2
Total	**977**	**15.7**	**290**	**10.2**	**1267**

Source:
advance_time_at_vt_061605.sas,
Tenured and Tenure-Track Faculty only
(Defined as Tenure Codes T, P, C, and E) and Academic Colleges only
Census date, September 30, 2004

Table 6. Voluntary, Non-Retirement Attrition, by Rank and Gender, 1997-2003

	Assistant		Associate		Professor		Total Attrition	
	Women	Men	Women	Men	Women	Men	Women	Men
1997-1998								
College of Engineering	-	1	-	-	-	2	-	3
College of Science	-	3	-	-	-	-	-	3
1998-1999								
College of Engineering	-	1	-	-	1	2	1	3
College of Science	1	3	1	1	-	-	2	4
1999-2000								
College of Engineering	-	1	-	4	-	3	-	8
College of Science	-	-	-	1	-	3	-	4
2000-2001								
College of Engineering	2	1	-	2	-	2	2	5
College of Science	-	3	-	-	-	1	-	4
2001-2002								
College of Engineering	-	1	-	1	-	1	-	3
College of Science	-	-	1	2	-	1	1	3
2002-2003								
College of Engineering	1	-	1	-	-	3	2	3
College of Science	1	-	-	-	-	-	1	-
2003-2004								
College of Engineering	-	4	-	2	-	5	-	11
College of Science	2	1	-	1	1	-	3	2

Source: September 30, 2004 census date, includes tenured and tenure track faculty who have departed, excludes any faculty who retired; departures_details_involuntary_14JUN05.html and departures_detail_voluntary_14JUN05.html

Table 7. Faculty Leadership Positions

2003-2004 Academic Year by College

	All Faculty	Number of Women										
		Total	% Women	Univ. Admn.	CALS	CAUS	COB	COE	COS	LAHS	NR	VM
Full Professors*	575	65	11%	-	9	4	4	4	10	30	-	4
Dept. Heads	67	9	13%	-	1	1	-	-	-	6	-	1
Academic Deans	8	1	13%	-	1	-	-	-	-	-	-	-
Assoc. Deans	26	7	27%	-	-	-	1	2	2	2		
University Center Directors	20	3	15%	-	-	-	-	-	-	3	-	-
President, VPs, Provost, Vice-Provosts	13	2	15%	2	-	-	-	-	-	-	-	-
University Promotion & Tenure Committees	9	5	56%	-	-	1	-	-	1	2	-	1
University Distinguished Professors	13	1	8%	-	-	-	-	-	-	1	-	-
Alumni Distinguished Professors	9	3	33%	-	-	-	-	-	-	3	-	-
Eminent Scholars	100	3	3%	-	-	-	-	-	1	2	-	-

2004-2005 Academic Year by College

	All Faculty	Number of Women										
		Total	% Women	Univ. Admn.	CALS	CAUS	COB	COE	COS	LAHS	NR	VM
Full Professors*	572	65	11%	-	10	4	4	5	8	30	-	4
Dept. Heads	68	8	12%	-	1	-	-	-	-	6	-	1
Academic Deans	8	1	13%	-	1	-	-	-	-	-	-	-
Assoc. Deans	26	8	31%	1	-	-	1	2	2	2	-	-
University Center Directors	20	2	10%	-	1	1	-	-	-	1	-	-
President, VPs, Provost, Vice-Provosts	14	2	14%	2	-	-	-	-	-	-	-	-
University Promotion & Tenure Committees**	9	5	56%	-	-	-	1	-	1	1	-	1
University Distinguished Professors	13	1	8%	-	-	-	-	-	-	1	-	-
Alumni Distinguished Professors	11	3	27%	-	-	-	-	-	-	3	-	-
Eminent Scholars	101	3	3%	-	-	-	-	-	1	2	-	-

College Abbreviations: CALS (College of Agriculture and Life Sciences), CAUS (College of Architecture and Urban Studies), COB (College of Business), COE (College of Engineering), COS (College of Science), LAHS (College of Liberal Arts and Human Sciences), NR (College of Natural Resources), VM (College of Veterinary Medicine)
Source: S. Karlin's files on ADPs, UDPS, Eminent Scholar listings, DDD list, IR data for full professors
* September census date used, other rows represent June data, 65 total excludes any found among university administration
** Includes faculty member participants only

Table 8. Virginia Tech Promotion and Tenure Committees

Departmental Committees by Gender for 2003-2005

College of Engineering	Departmental Committee 2003-2004					Departmental Committee 2004-2005				
	F		M		All	F		M		All
	#	%	#	%	#	#	%	#	%	#
Aerospace and Ocean Engineering	0	0	8	100%	8	0	0	9	100%	9
Chemical Engineering	0	0	4	100%	4	0	0	4	100%	4
Civil & Environmental Engineering	0	0	6	100%	6	1	17%	5	83%	6
Computer Science	0	0	4	100%	4	0	0	6	100%	6
Electrical Engineering	0	0	8	100%	8	1	10%	9	90%	10
Engineering Fundamentals	0	0	5	100%	5	1	20%	4	80%	5
Engineering Science & Mechanics	0	0	7	100%	7	0	0	7	100%	7
Industrial & Systems Engineering	3	16%	16	84%	19	2	12%	15	88%	17
Materials Engineering	1	11%	8	89%	9	1	20%	4	80%	5
Mechanical Engineering	2	20%	8	80%	10	3	30%	7	70%	10
Mining & Minerals Engineering	0	0	4	100%	4	0	0	5	100%	5
College Total	**6**	**7%**	78	93%	84	**9**	**11%**	75	89%	84
College of Science	**Departmental Committee 2003-2004**					**Departmental Committee 2004-2005**				
	F		M		All	F		M		All
	#	%	#	%	#	#	%	#	%	#
Biology	2	25%	6	75	8	3	33.3%	6	66.6%	9
Chemistry	0	-	7	100	7	0	-	5	100%	5
Economics	0	-	4	100	4	0	-	4	100%	4
Geosciences	2	33.3%	4	66.7	6	1	17%	5	83%	6
Mathematics	0	-	8	100	8	1	14%	6	86%	7
Physics	1	13%	7	87.5	8	0	-	5	100%	5
Psychology	3	50%	3	50	6	3	50%	3	50%	6
Statistics	0	-	4	100	4	0	-	4	100%	4
College Total	**8**	**16%**	43	84%	51	**8**	**17%**	38	83%	46

College-Level P&T Committees

	College Committees 2003-2004					College Committees 2004-2005				
	F		M		All	F		M		All
	#	%	#	%		#	%	#	%	
Engineering	1	4%	22	95%	23	1	4%	22	95%	23
Science	3	33.3%	6	66%	9	1	11%	8	88%	9
Total	**4**	**12%**	28	87%	32	**2**	**6%**	30	94%	32

Source: Data provided by respective colleges

Table 9. New-Hires in College of Engineering and College of Science 1997-2003

	Total New Female Hires	Total New Hires	Assistant			Associate			Full		
			Men	Women	% W	Men	Women	% W	Men	Women	% W
Fall 1998											
Engineering	**2**	20	12	2	**14%**	1	-	**0%**	5	-	**0%**
Science	**2**	11	5	1	**17%**	2	1	**33%**	2	-	**0%**
Fall 1999											
Engineering	**6**	23	9	6	**40%**	6	-	**0%**	2	-	**0%**
Science	**1**	11	8	1	**11%**	1	-	**0%**	1	-	**0%**
Fall 2000											
Engineering	**2**	15	9	1	**10%**	2	1	**33%**	2	-	**0%**
Science	**4**	13	3	1	**25%**	3	2	**40%**	3	1	**25%**
Fall 2001											
Engineering	**0**	20	9	-	**0%**	7	-	**0%**	4	-	**0%**
Science	**4**	10	2	3	**60%**	4	1	**20%**	-	-	**0%**
Fall 2002											
Engineering	**3**	11	8	1	**11%**	2	-	**0%**	-	-	**0%**
Science	**0**	4	4	-	**0%**	-	-	**0%**	-	-	**0%**
Fall 2003											
Engineering	**6**	19	10	4	**29%**	3	2	**40%**	-	-	**0%**
Science	**1**	2	1	1	**50%**	-	-	**0%**	-	-	**0%**
Fall 2004											
Engineering	**7**	21	7	4	**36%**	2	2	**50%**	5	1	**17%**
Science	**2**	6	3	2	**40%**	-	-	**0%**	1	-	**0%**

Source: Data from bov_hiring_061605_leanne5.sas. Census date of September 30, 2004

Table 10. Average Salary by Rank and Gender, January 2005

College of Engineering

Faculty Rank	Years in Rank	Gender	N	Minimum Salary	Average Salary	Maximum Salary	S.D.
Professor, ES	0-3	Male	3	151,348.50	168,528.60	193,071.60	21,814.30
	3-5	Male	1	*	*	*	.
	> 5	Male	36	100,900.00	144,548.40	219,371.10	26,701.74
Professor	0-3	Female	2	105,000.00	118,766.10	132,532.20	19,468.21
		Male	8	83,100.00	109,311.10	155,439.00	26,572.48
	3-5	Male	6	83,200.00	104,159.60	140,713.20	20,240.64
	> 5	Female	4	92,000.00	101,742.80	110,100.00	7,616.06
		Male	71	78,400.00	102,348.30	147,258.00	14,448.24
Associate Professor	0-3	Female	5	80,000.00	82,020.00	86,000.00	2,629.07
		Male	11	52,000.00	82,686.76	109,163.20	15,277.61
	3-5	Female	1	*	*	*	.
		Male	13	75,400.00	87,820.17	99,480.96	7,615.85
	> 5	Female	7	64,900.00	79,257.14	90,000.00	8,433.04
		Male	57	68,000.00	82,423.06	95,200.00	6,962.03
Assistant Professor	0-3	Female	10	52,000.00	70,030.00	85,800.00	10,256.17
		Male	22	67,500.00	74,259.09	85,000.00	5,402.70
	3-5	Female	2	58,000.00	61,550.00	65,100.00	5,020.46
		Male	16	56,700.00	73,593.75	83,000.00	7,346.15
	> 5	Female	4	60,400.00	69,850.00	75,000.00	6,660.08
		Male	8	60,100.00	73,537.50	95,400.00	10,766.34

Table 10. Average Salary by Rank and Gender, January 2005 - Continued

College of Science

Faculty Rank	Years in Rank	Gender	N	Minimum Salary	Average Salary	Maximum Salary	S.D.
Professor, ES	> 5	Female	1	*	*	*	.
		Male	13	102,600.00	144,591.50	201,657.60	29,784.50
Professor	0-3	Male	3	79,500.00	101,405.00	122,715.00	21,613.64
	3-5	Female	1	*	*	*	.
		Male	4	78,500.00	113,500.00	160,500.00	35,795.72
	> 5	Female	6	77,100.00	87,340.79	106,000.00	10,133.82
		Male	79	68,700.00	92,936.89	140,700.00	17,024.36
Associate Professor	0-3	*	*	*	*	*	.
	3-5	Female	2	70,000.00	70,750.00	71,500.00	1,060.66
		Male	4	61,400.00	70,575.00	84,500.00	10,429.88
	> 5	Female	8	66,000.00	68,000.00	73,000.00	2,299.07
		Male	46	45,500.00	68,432.86	111,261.60	10,585.88
Assistant Professor	0-3	Female	3	56,000.00	58,666.67	63,500.00	4,193.25
		Male	8	51,500.00	60,928.95	75,000.00	7,788.26
	3-5	Female	1	*	*	*	.
		Male	4	58,000.00	62,125.00	65,000.00	3,010.40
	> 5	Female	2	56,500.00	56,750.00	57,000.00	353.55
		Male	1	*	*	*	.

NOTES:
ES indicates Eminent Scholar, i.e. holds an endowed chair or professorship
Data omitted where N=1
Includes full-time, tenured and tenure-track faculty only, excludes faculty on leave without pay
All faculty salaries normalized to academic year; salaries of faculty on leave with part pay adjusted to full AY salary
Data Source: IR census of HR Warehouse as of 1/31/05
X:\IRData2\dept\rgile\Faculty\ADVANCE VT\salary stats_rank_gender_CoE_CoS_013105data.xls

Attachment 3

Faculty Survey Instrument

Faculty Work-Life Survey

Administered By The Virginia Tech Center for Survey Research

Virginia Tech is committed to maintaining a work environment in which all faculty members can succeed. In order to assist the university in achieving this goal, it is important to receive input from all faculty members at the university. This survey takes about 15 minutes to complete. You may leave any item on the survey unanswered if you choose, including those that you feel do not apply to you. Your responses will be kept strictly confidential and will never be disaggregated in a way that would reveal your identity. Thank you for your help.

Section 1. Please indicate your level of agreement with the statements below about your employment with Virginia Tech in general.

		Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree	Don't Know
a.	**Virginia Tech is a good place to work.**	**1**	**2**	**3**	**4**	**5**
b.	**I am treated with respect at Virginia Tech.**	**1**	**2**	**3**	**4**	**5**
c.	**I receive fair treatment at Virginia Tech.**	**1**	**2**	**3**	**4**	**5**
d.	**Overall, it seems the morale among faculty members at Virginia Tech is good.**	**1**	**2**	**3**	**4**	**5**
e.	**I receive positive feedback about my work from colleagues outside of Virginia Tech.**	**1**	**2**	**3**	**4**	**5**
f.	**In general, the Virginia Tech campus is free of intimidation, harassment, and discrimination.**	**1**	**2**	**3**	**4**	**5**
g.	**I feel I "fit in" at Virginia Tech.**	**1**	**2**	**3**	**4**	**5**
h.	**In general, the process for hiring faculty at Virginia Tech is conducted fairly.**	**1**	**2**	**3**	**4**	**5**

		Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree	Don't Know
i.	**Policies at Virginia Tech are generally applied in a uniform and equitable manner.**	**1**	**2**	**3**	**4**	**5**
j.	**There is a good quality of life in the geographic area where I am employed.**	**1**	**2**	**3**	**4**	**5**
k.	**I have the opportunity to collaborate with colleagues at Virginia Tech who share my interests.**	**1**	**2**	**3**	**4**	**5**
l.	**I have the equipment and supplies I need to do my job at Virginia Tech.**	**1**	**2**	**3**	**4**	**5**
m.	**I have the lab or office space I need to do my job at Virginia Tech.**	**1**	**2**	**3**	**4**	**5**
n.	**Policies that facilitate the hiring of faculty spouses/partners strengthen the success of the university's efforts to recruit the most highly qualified faculty.**	**1**	**2**	**3**	**4**	**5**
o.	**Virginia Tech provides the support that faculty members need to garner funded research projects.**	**1**	**2**	**3**	**4**	**5**
p.	**Faculty members at Virginia Tech are provided adequate opportunities to participate in university governance.**	**1**	**2**	**3**	**4**	**5**
q.	**My field of study is not valued at Virginia Tech.**	**1**	**2**	**3**	**4**	**5**
r.	**Virginia Tech welcomes free and open input from faculty members.**	**1**	**2**	**3**	**4**	**5**
s.	**Virginia Tech cares about the family/home life of its faculty.**	**1**	**2**	**3**	**4**	**5**

		Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree	Don't Know
t.	**It is difficult to have a personal life and be promoted or earn tenure at Virginia Tech.**	**1**	**2**	**3**	**4**	**5**
u.	**My personal or family responsibilities have slowed my advancement at Virginia Tech.**	**1**	**2**	**3**	**4**	**5**
v.	**I have seriously considered leaving my current job in order to achieve a better balance between my personal and professional life.**	**1**	**2**	**3**	**4**	**5**
w.	**I have read, heard and/or seen insensitive or disparaging comments or materials in the workplace that were offensive to me.**	**1**	**2**	**3**	**4**	**5**
x.	**I would be interested in working in a part-time faculty position if benefits like health care were available.**	**1**	**2**	**3**	**4**	**5**
y.	**Virginia Tech is a good place to develop the skills and knowledge needed to be a top researcher in my field.**	**1**	**2**	**3**	**4**	**5**
z.	**I have confidence in the university's leadership.**	**1**	**2**	**3**	**4**	**5**
aa.	**There are too few women and minorities in leadership positions at Virginia Tech.**	**1**	**2**	**3**	**4**	**5**
bb.	**Faculty members are treated fairly at Virginia Tech regardless of their race or ethnicity.**	**1**	**2**	**3**	**4**	**5**
cc.	**Faculty members are treated fairly at Virginia Tech regardless of their gender.**	**1**	**2**	**3**	**4**	**5**
dd.	**Faculty members are treated fairly at Virginia Tech regardless of their sexual orientation.**	**1**	**2**	**3**	**4**	**5**
ee.	**Faculty members with disabilities are treated fairly at Virginia Tech.**	**1**	**2**	**3**	**4**	**5**

		Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree	Don't Know
ff.	**I have participated in activities that promote diversity at Virginia Tech in the past year.**	**1**	**2**	**3**	**4**	**5**
gg.	**There is accountability at Virginia Tech for racist behavior.**	**1**	**2**	**3**	**4**	**5**
hh.	**There is accountability at Virginia Tech for sexist behavior.**	**1**	**2**	**3**	**4**	**5**
ii.	**The recruitment of women and minority faculty members <u>should be</u> a top priority at Virginia Tech.**	**1**	**2**	**3**	**4**	**5**
jj.	**The recruitment of women and minority faculty members <u>is</u> a top priority at Virginia Tech.**	**1**	**2**	**3**	**4**	**5**
kk.	**Virginia Tech rewards the efforts of faculty members who do outstanding work.**	**1**	**2**	**3**	**4**	**5**
ll.	**Faculty members at Virginia Tech are usually promoted or given opportunities based on good performance.**	**1**	**2**	**3**	**4**	**5**
mm.	**I aspire to a leadership position at Virginia Tech beyond my current position (e.g. department chair, center director, dean, etc.).**	**1**	**2**	**3**	**4**	**5**
nn.	**If I chose to pursue them, I believe that significant leadership opportunities would be available to me at Virginia Tech.**	**1**	**2**	**3**	**4**	**5**
oo.	**It is possible to hold a leadership position at Virginia Tech while maintaining an active research agenda.**	**1**	**2**	**3**	**4**	**5**

		Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree	Don't Know
pp.	**It is possible to hold a leadership position at Virginia Tech while balancing work and personal responsibilities.**	**1**	**2**	**3**	**4**	**5**
qq.	**I am interested in opportunities to develop my leadership skills.**	**1**	**2**	**3**	**4**	**5**
rr.	**There are administrators at Virginia Tech who model effective leadership.**	**1**	**2**	**3**	**4**	**5**
ss.	**I have sufficient opportunities to interact with leaders in the Virginia Tech community.**	**1**	**2**	**3**	**4**	**5**
tt.	**There should be an office at Virginia Tech to assist with spousal/partner hiring.**	**1**	**2**	**3**	**4**	**5**

Section 2. Please indicate your level of agreement with the statements below about the primary department, program, or unit in which you are employed at Virginia Tech.

		Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree	Don't Know
a.	**My department at Virginia Tech is a good place to work.**	**1**	**2**	**3**	**4**	**5**
b.	**I am satisfied with the amount of input I have about major policy decisions in my department.**	**1**	**2**	**3**	**4**	**5**
c.	**Overall, I am expected to do more work than other members of my department.**	**1**	**2**	**3**	**4**	**5**
d.	**I have a voice in hiring new faculty members in my department.**	**1**	**2**	**3**	**4**	**5**

		Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree	Don't Know
e.	**The process for hiring new faculty is managed effectively in my department.**	**1**	**2**	**3**	**4**	**5**
f.	**I have received effective mentoring in my department.**	**1**	**2**	**3**	**4**	**5**
g.	**I am treated with respect by other faculty members in my department.**	**1**	**2**	**3**	**4**	**5**
h.	**I am treated with respect by the classified staff in my department.**	**1**	**2**	**3**	**4**	**5**
i.	**My field or area of study is valued by colleagues in my department.**	**1**	**2**	**3**	**4**	**5**
j.	**Part-time and non-tenure track faculty are treated as second class citizens in my department.**	**1**	**2**	**3**	**4**	**5**
k.	**I am able to balance the teaching, research and outreach activities expected of me.**	**1**	**2**	**3**	**4**	**5**
l.	**I am expected to serve on more committees and/or provide more assistance to students than others in my department.**	**1**	**2**	**3**	**4**	**5**
m.	**Other faculty in my department seem to know about policies or opportunities of which I am unaware.**	**1**	**2**	**3**	**4**	**5**
n.	**I am treated fairly by the administration in my department.**	**1**	**2**	**3**	**4**	**5**
o.	**Collaboration is rewarded in my department.**	**1**	**2**	**3**	**4**	**5**
p.	**Professional/job demands force me to make unreasonable compromises about personal or family responsibilities and interests.**	**1**	**2**	**3**	**4**	**5**

		Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree	Don't Know
q.	**Salary decisions are made fairly in my department.**	**1**	**2**	**3**	**4**	**5**
r.	**The leadership of my department can be trusted.**	**1**	**2**	**3**	**4**	**5**
s.	**Staff support and resources are allocated fairly in my department.**	**1**	**2**	**3**	**4**	**5**
t.	**The requirements for tenure or promotion are clearly articulated in my department.**	**1**	**2**	**3**	**4**	**5**
u.	**The administration in my department is approachable when faculty members have job-related issues/concerns.**	**1**	**2**	**3**	**4**	**5**
v.	**I am recognized for the contributions I make to the department.**	**1**	**2**	**3**	**4**	**5**
w.	**Performance expectations for faculty are communicated clearly in my department.**	**1**	**2**	**3**	**4**	**5**
x.	**I have good relationships with my co-workers.**	**1**	**2**	**3**	**4**	**5**
y.	**My job performance is reviewed in person with me at least once a year.**	**1**	**2**	**3**	**4**	**5**
z.	**My performance reviews are based on how well I perform my job.**	**1**	**2**	**3**	**4**	**5**
aa.	**I receive useful recommendations on how I can improve my job performance from my department.**	**1**	**2**	**3**	**4**	**5**
bb.	**Overall, my department is well managed.**	**1**	**2**	**3**	**4**	**5**
cc.	**My department is supportive of the success of women faculty.**	**1**	**2**	**3**	**4**	**5**

		Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree	Don't Know
dd.	**My department is supportive of the success of faculty members of all races and ethnicities.**	**1**	**2**	**3**	**4**	**5**
ee.	**I feel free to express my opinions in my job without worrying about negative results.**	**1**	**2**	**3**	**4**	**5**
ff.	**My salary is comparable to colleagues in my department who have similar years of service and productivity.**	**1**	**2**	**3**	**4**	**5**
gg.	**In my department, faculty who have children are considered less committed to their careers.**	**1**	**2**	**3**	**4**	**5**
hh.	**Faculty in my department respect the roles and responsibilities I have outside of work.**	**1**	**2**	**3**	**4**	**5**
ii.	**Meetings in my department are often scheduled at times that conflict with my family responsibilities.**	**1**	**2**	**3**	**4**	**5**
jj.	**The administration in my department keeps the faculty informed about key issues.**	**1**	**2**	**3**	**4**	**5**
kk.	**The administration in my department has been proactive about recruiting women and minorities to the faculty.**	**1**	**2**	**3**	**4**	**5**
ll.	**My department's administration values my contributions to the department.**	**1**	**2**	**3**	**4**	**5**
mm.	**My department's administration would be unlikely to intervene if racist or sexist behavior occurred.**	**1**	**2**	**3**	**4**	**5**
nn.	**My department periodically reviews salaries to ensure equity.**	**1**	**2**	**3**	**4**	**5**
oo.	**There are policies in place in my department about course loads and course releases.**	**1**	**2**	**3**	**4**	**5**

		Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree	Don't Know
pp.	**The administration in my department is knowledgeable about university policies.**	**1**	**2**	**3**	**4**	**5**
qq.	**Faculty in my department receive accurate and timely information about their progress toward tenure or promotion.**	**1**	**2**	**3**	**4**	**5**
rr.	**There is a lot of conflict in my department.**	**1**	**2**	**3**	**4**	**5**
ss.	**Departmental politics interfere with my ability to get my work done.**	**1**	**2**	**3**	**4**	**5**
tt.	**Sexual harassment is a problem in my department.**	**1**	**2**	**3**	**4**	**5**
uu.	**There is a lot of racial tension in my department.**	**1**	**2**	**3**	**4**	**5**
vv.	**Women and minorities are well-represented among those in my department who are nominated for awards and honors.**	**1**	**2**	**3**	**4**	**5**
ww.	**Faculty in my department are asked to document their participation in diversity initiatives as part of regular merit reviews.**	**1**	**2**	**3**	**4**	**5**

Section 3. Please answer the final general questions about you below.

1. Is your current position a tenure track faculty position? (Please Click One Response Option)

± Yes
± No [GO TO #3.4]
± Don't know [GO TO #3.4]

2. Have you ever stopped or extended the tenure clock during your employment with Virginia Tech? (Please Click One Response Option)

± Yes (Please specify why: _____)
± No [GO TO #3.4]
± Don't know [GO TO #3.4]

3. How supportive are the faculty members in your department of faculty members who extend the tenure clock? (Please Click One Response Option)

- ± Very supportive
- ± Somewhat supportive
- ± Somewhat unsupportive
- ± Not at all supportive
- ± Don't know

4. Compared to faculty members nationally at similar stages in their careers, how would you rate your research productivity? (Please Click One Response Option)

- ± Top 10 percent
- ± Top 11-20 percent
- ± Top 21-40 percent
- ± Top 41-59 percent
- ± Top 60 percent or above
- ± Don't know

5. Please indicate the number of hours of time you spend on each of the activities below in a <u>typical week during the academic year</u>. Please include hours you spend <u>at your workplace and at home</u> on these activities. Please leave the space blank if you spend no time in a typical week on the activity listed.

	Hours of Time Spent
a. Teaching and advising undergraduate students.	
b Teaching and advising graduate or professional students.	
c. Research and scholarship.	
d University service (such as committee work at the department, college, and university levels).	
e. Administration.	
f. Non-teaching professional activities (such as editorial reviews or professional organization duties).	

	Hours of Time Spent
g. Outside consulting.	
h **Personal and family responsibilities.**	

6. During a typical week in the academic year, how many hours do you spend at home on activities related to your job at Virginia Tech? ____

7. What is your marital/partner status currently? (Please Click One Response Option)

- ± Live with spouse/partner in same location
- ± Have spouse/partner but live in different locations most of the year
- ± No spouse/partner currently [GO TO #3.10]

8. Please indicate the current employment status of your spouse/partner. (Please Click All Responses That Apply)

- ± Spouse/partner currently seeking full-time academic job
- ± spouse/partner seeking part-time academic job
- ± spouse/partner currently employed full-time at Virginia Tech
- ± spouse/partner currently employed part-time at Virginia Tech
- ± spouse/partner currently employed at another college/university
- ± spouse/partner employed but not at a college or university
- ± spouse/partner not employed

9. Please indicate your level of agreement with the statements below.

	Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree	Don't Know
a. My spouse/partner is satisfied with the quality of life in the geographic area where I am employed.	**1**	**2**	**3**	**4**	**5**
b. I am satisfied with the assistance offered by Virginia Tech in finding employment for the partners/spouses of its faculty members.	**1**	**2**	**3**	**4**	**5**
c. My spouse's/partner's career aspirations are as important as mine.	**1**	**2**	**3**	**4**	**5**

d. I have modified my career aspirations in order to accommodate the interests and needs of my spouse/partner or family.	**1**	**2**	**3**	**4**	**5**
e. I have seriously considered leaving Virginia Tech in order to improve the employment opportunities of my spouse/partner.	**1**	**2**	**3**	**4**	**5**

10. During your employment with Virginia Tech, have you ever had children under the age of 18 living with you?
(Please Click One Response Option)

± Yes
± No [GO TO #3.15]

11. Do you currently have children under the age of 18 living with you? (Please Click One Response Option)

± Yes
± No [GO TO #3.13]

12. Please type in how many children in each category below live with you currently. If you have no children in a category, please leave the category blank.

___ 0-2 years of age
___ 3-4 years of age
___ 5-12 years of age
___ 13-17 years of age

13. How satisfied have you been with the childcare available in the Blacksburg area? (Please Click One Response Option)

± Have not needed childcare [GO TO #3.14]
± Very satisfied
± Somewhat satisfied
± Somewhat dissatisfied
± Not at all satisfied
± Don't know

14. Please indicate your level of agreement regarding the coordination of the Virginia Tech calendar with the calendars of the local K-12 schools. (Please Click One Response Option)

± Strongly agree with coordination of the calendars
± Somewhat agree with coordination of the calendars
± Somewhat disagree with coordination of the calendars
± Strongly disagree with coordination of the calendars
± Don't know

15. Have you served as a member of a search committee for any faculty or administrative position at Virginia Tech at any point during the past two years? (Please Click One Response Option)

± Yes
± No [GO TO #3.19]

16. Please indicate any of the strategies below you engaged in as part of a search committee you were on during the past two years. (Please Click All Responses That Apply)

± Contacted a colleague outside of Virginia Tech asking for nominations
± Contacted a colleague outside of Virginia Tech for help identifying women and minority candidates
± Identified a woman or minority candidate for the position at a conference or in another professional setting
± Encouraged a woman or minority candidate to apply for the position
± Invited a woman or minority scholar to Virginia Tech to give a talk as a pre-recruitment effort
± Asked to meet women or minority doctoral students or postdocs when visiting or lecturing at other campuses
± Engaged in another strategy to recruit women or minority faculty member for position
Please describe strategy: _____

17. Please indicate what effect you feel the cluster hiring process will have on the national status of Virginia Tech as a research university. (Please Click One Response Option)

± Not familiar with cluster hiring, unable to respond [GO TO #3.19]
± Will strengthen Virginia Tech's status a great deal
± Will strengthen Virginia Tech's status somewhat
± Cluster hiring will have no effect on Virginia Tech's national status
± Will hinder Virginia Tech's status somewhat
± Will hinder Virginia Tech's status a great deal
± Don't know

18. Please indicate what effect you feel the cluster hiring process will have on promoting diversity at Virginia Tech.
(Please Click One Response Option)

± Not familiar with cluster hiring, unable to respond [GO TO #3.19]
± Will strengthen diversity at Virginia Tech a great deal
± Will strengthen diversity at Virginia Tech somewhat
± Cluster hiring will have no effect on Virginia Tech's diversity
± Will hinder diversity at Virginia Tech somewhat
± Will hinder diversity at Virginia Tech a great deal
± Don't know

19. Are there any graduate students affiliated with your department at Virginia Tech?

± Yes
± No [GO TO #21]
± Don't know [GO TO #21]

20. Please indicate your level of agreement with the statements below regarding graduate students in your department.

	Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree	Don't Know
a. Graduate students are treated with respect in my department.	**1**	**2**	**3**	**4**	**5**
b. Faculty members in my department help prepare graduate students to assume a faculty role in the future.	**1**	**2**	**3**	**4**	**5**
c. Graduate students are treated fairly in my department regardless of their gender.	**1**	**2**	**3**	**4**	**5**

21. Please indicate your satisfaction with each aspect of your job at Virginia Tech below.

	Very Satisfied	Somewhat Satisfied	Somewhat Dissatisfied	Very Dissatisfied	Don't Know
a. Work load.	**1**	**2**	**3**	**4**	**5**
b. Job security.	**1**	**2**	**3**	**4**	**5**
c. Opportunity for advancement in rank at Virginia Tech.	**1**	**2**	**3**	**4**	**5**
d. Salary.	**1**	**2**	**3**	**4**	**5**
e. [IF #3.7=3, GO TO #21f] Spouse or partner employment opportunities in the geographic area where you are employed.	**1**	**2**	**3**	**4**	**5**
f. Job at Virginia Tech overall.	**1**	**2**	**3**	**4**	**5**

22. How likely are you to leave your position at Virginia Tech at some point in the next two years?

± Very likely
± Somewhat likely
± Somewhat unlikely
± Very unlikely
± Don't know

23. Have you heard of the Advance Grant at Virginia Tech (a project supported by the National Science Foundation to promote and enhance the careers of women in science and engineering)? (Please Click One Response Option)

- Yes
- No
- Don't Know/Can't Remember

24. Please provide any additional information you feel would help in improving the employment climate for faculty members at Virginia Tech.

_____

_____

_____

Thank you for your help with our study. Please click "submit" to end the survey.

Project Sponsored By *advance*VT

Attachment 4

AdvanceVT Leadership Fellowship Reports

AdvanceVT Year Two Leadership Fellowship Report

Andrea M. Dietrich, Ph.D.
Associate Professor, Environmental and Civil Engineering
413 Durham Hall
Virginia Tech
Blacksburg, VA 24061-0246
Tel: 540-231-5773
Fax: 540-231-7916
andread@vt.edu

The ADVANCE Leadership Fellowship opportunity appeared at a good time in my career. I am at a stage where I desire to build upon my solid research and teaching reputation and consider taking on a greater leadership role as a center director. I designed my Leadership Fellowship to provide time and resources to learn from the experiences of others, both the good and the bad. A motivation for this approach was a quote from the author and activist, Rita Mae Brown: "Good judgment comes from experience, and often experience comes from bad judgment."

The individuals whom I selected with "good judgment" steered me on a smoother course for center directing. Among the many individuals who are contribution to my fellowship, I will mention the three key individual with whom I worked in spring 2005:

- Paul Torgersen, former Dean of Engineering and former President of Virginia Tech. Through informal discussions and my attendance in his Organizational Behavior class, I gained great insight to the roles of individuals, the structures, and challenges of organizations, and took away four necessities for my center or any institution. These are: loyalty, togetherness, responsibility, and communication.
- To gain financial and administrative expertise, I was a "shadow dean" with the Assistant Deans for Administration in the College of Engineering – Mr. Rodd Hall and Dr. Edward Nelson. They provided me the opportunity to have an inside look at the financial and administrative structure of the college. It was a privilege to work along side two such honest and capable individuals, and I learned more from participation and watching than from formal instruction. I appreciated their candor in explaining situations and providing me with the perspective on why a particular action was appropriate giving timing and resources.

My fellowship will continue through interviews with more mentors and individuals, attendance at a national leadership-training program, and a brief shadowing of the Associate Dean for Research at another university.

The fellowship experience thus far has been more insightful and rewarding than I expected. The personal interactions and connections which I have been able to make will enhance my ability to direct a center should I decide to do so.

AdvanceVT Year Two Leadership Fellowship Report

Brenda Winkel
Professor, Biology
110A Fralin Biotechnology Ctr.
Mail Code 0346
Blacksburg, VA 24061
E-mail: winkel@vt.edu
Office: (540) 231-3013

The focus of my fellowship has been to serve as Associate Director of the Fralin Center for Biotechnology. My major activity has been to provide leadership for the establishment of a new graduate program in the Molecular Plant Sciences. What started as a small nugget of an idea last year has blossomed into a full-blown program with 18 participating faculty in 7 departments and 3 colleges and an inaugural cohort of 5 (and possibly 6) graduate students accepted into the first year of the program. The success is owed largely to financial support from the Advance Program (which provided relief from teaching for me over the past nine months as well as a month of salary this summer), $20K provided by Fralin Director, Dennis Dean, from the Fralin Foundation (half of which supported a recruiting weekend last fall and the remainder of which we'll using this in 2005-2006), eight one-semester Graduate Research Assistantships from the College of Agriculture (thanks to Agriculture and Life Sciences Dean Sharron Quisenberry and Associate Dean Craig Nessler), and 4 one-semester Graduate Teaching Assistantships from the Department of Biology (thanks to Department Head Bob Jones). The considerable efforts of six other faculty members in the Fralin Center over the past year were also key to the success of this effort.

Additional information on the program is available on our web site, http://www.lifesciences.grads.vt.edu/mps.php (created by Dr. Boris Vinatzer in PPWS), which incidentally has received more hits than any other program site at the grad school (445 vs. 55 for the next most-visited site by the end of March). We have been approved by the graduate school to go forward with the paperwork to establish a new degree-granting program and will be working with the participating departments this summer to determine whether this is feasible. Graduate Dean Karen DePauw has provided substantial input and has offered to pave the way by finding a mechanism by which Departments still receive credit for students trained in this program. Additional major challenges for the remaining two months of my fellowship are to 1) develop a Police and Procedures document for the incoming graduate student group, 2) organize orientation activities for the week preceding the start of Fall semester, including help with setting up rotation schedules and assigning temporary mentors, and 3) plan the second recruiting weekend, scheduled for Oct. 22nd.

Most relevant for the ADVANCE program is that this experience, together with my work on a multi-college IGERT proposal and the College of Science Cluster Committee, has provided me with the opportunity to meet and work with a group of wonderful administrators this year, including Fralin Director Dennis Dean, Graduate Dean Karen

DePauw, Agriculture and Life Sciences Dean Sharron Quisenberry, Science Dean Lay Nam Chang, Natural Resources Dean Mike Kelly, and also Provost Mark McNamee. As part of my role as Associate Director of the Fralin Center, I also helped institute a bi-monthly meeting of Fralin faculty with key individuals on campus, including Vice-President for Research Brad Fenwick, Dean DePauw, Dean Quisenberry, and Provost McNamee. These have been extremely productive meetings and helped to launch the graduate program, among other things. The fellowship experience has reinforced my sense that this is a wonderful time to be at Virginia Tech. I have also had a heavy service load this year outside the University as a member of the North American Arabidopsis Steering Committee, helping organize the program for a 900+ attendee conference that takes place this month, serving on the Arabidopsis Biological Resources Center advisory board, giving a number of invited research seminars at other institutions, and participating in a NSF grant review panel and an NSF-sponsored workshop on "Leading Edge Technologies in Biological Systems."

The jury is still out on whether I will delve deeper into the world of administration or retreat back to focusing more on research and teaching when the fellowship is over. Besides the gratification of seeing the graduate program come to fruition, another nice outcome of this year is that the NSF funding that has supported my lab since the start of my academic career was renewed for another 3 years and several manuscripts were published. Thus my research program is sustaining good momentum at this stage of my career. In addition, the molecular plant science faculty, myself included, will be moving to a new building at the end of 2005, ending our formal affiliation with the Fralin Center; thus I will step down as Associate Director at that time. The long-term future of the program is a complex issue that concerns all of the participating faculty. I will continue to serve as the coordinator for the coming year, but will increasingly hand over responsibility to other faculty members. I believe there will be other opportunities for leadership in the future, however, it is clear that I have to continue to work on balancing service with research and teaching; it is just much too easy to commit to doing more that you are truly capable of, especially when a family with two small children is also part of the mix. This year's experience has certainly underscored the importance of setting appropriate priorities and limits and then sticking to them, something that I will continue working on.

Attachment 5

AdvanceVT Distinguished Scholar Visit Schedules

Virginia Tech
VIRGINIA POLYTECHNIC INSTITUTE
AND STATE UNIVERSITY

AdvanceVT
236 Burruss Hall (0180)
Blacksburg, Virginia 24061
540-231-7682
http://www.advance.vt.edu

Schedule
Dr. Helen Boussalis
Chair, Electrical and Computer Engineering
California State University, Los Angeles
February 1-3, 2005
Host: Dr. Naira Hovakimyan

Tuesday, February 1

6:15 pm Host Naira Hovakimyan pick up at Roanoke airport
Room reserved at DBHCC

Wednesday, February 2

8:30 am Breakfast with AdvanceVT Leadership Team – Donaldson Brown
Layne, Schmittmann, Thole, Foti

10:00 am Meeting with Provost Mark McNamee – 210 Burruss

10:30 am Meeting with Engineering Education Dept. Head Hayden Griffin
236 Burruss

11:30 am Break

Noon Lunch with graduate students – DBHCC Private Dining Room

2:00 pm Meeting with science and engineering department heads – 236 Burruss
Knocke, Taylor, Walters, Puri

3:00 pm Break

3:30 pm Distinguished Lecture – 1045 Pamplin
"Sponsored Research in Engineering for Underrepresented Minority Students"

4:30 pm Reception – Pamplin Atrium

6:00 pm Return to airport (Hovakimyan)

Virginia Tech
VIRGINIA POLYTECHNIC INSTITUTE
AND STATE UNIVERSITY

AdvanceVT

236 Burruss Hall (0180)
Blacksburg, Virginia 24061
540-231-7682
http://www.advance.vt.edu

Schedule
Dr. Linda Katehi
Dean of Engineering
Purdue University
March 4-5, 2005
Host: Dr. Sanjay Raman

Friday, March 4

8:51 am	Arrive Roanoke airport on United 3749 from Charlotte (pick up by Layne)
12:00 pm	Lunch with junior faculty (assistant professors and post-docs) DBHCC Appalachian/Blue Ridge Rooms (confirmed)
1:30 pm	Meeting with Vice-Provost David Ford and Associate Provost Pat Hyer 330 Burruss (confirmed)
2:00 pm	Meeting with Engineering Education Dept. Head Hayden Griffen 236 Burruss (confirmed)
3:30 pm	Distinguished Lecture – 3100 Torgersen (introduction by Raman) *"Advancing Women Leaders in Engineering"*
4:30 pm	Reception – Torgersen Museum (confirmed)
7:00 pm	Dinner with Raman, Layne, Thole, Alley, Foti (Room reserved at DBHCC for Dr. Katehi)

Saturday, March 5

6:30 am	Depart DBHCC for ROA Roanoke Limo Service 1-800-288-1958
8:20 am	Depart Roanoke airport for Detroit

Virginia Tech
VIRGINIA POLYTECHNIC INSTITUTE
AND STATE UNIVERSITY

AdvanceVT
236 Burruss Hall (0180)
Blacksburg, Virginia 24061
540-231-7682
http://www.advance.vt.edu

Schedule
Dr. Elaine Oran
Senior Scientist, Naval Research Lab
April 5-7, 2005
Host: Dr. Ishwar Puri

Tuesday, April 5

6:30 pm Dinner with ESM faculty (Ishwar Puri to arrange and host)

Wednesday, April 6

8:30 am Breakfast with AdvanceVT Leadership Team

9:30 am Meet Vice Provost for Academic Affairs David Ford – 330 Burruss

10:00 am Meet Engineering Science and Mechanics Department Head Ishwar Puri – 223 Norris

11:00 am Meet AIAA Journal Editors Wing Ng, Mehdi Ahmadian, Dean Mook – 236 Burruss

Noon Lunch with women graduate students – DBHCC Private Dining Room

1:30 pm Meet Ocean Engineering Fred D. Durham Chair Joseph Schetz – 219D Randolph

2:30 pm Meet Mechanical Engineering Department Head Ken Ball – 100S Randolph

3:30pm Break

4:00 pm Distinguished Lecture – 1045 Pamplin Hall
"Matchsticks, Scramjets, and Black Holes: Numerical Simulation Faces Reality"

5:00 pm Reception – Pamplin Atrium

6:30 pm Dinner with women faculty (Karen Thole, Amy Bell, Sue Tolin)

Thursday, April 7 Depart Blacksburg

Attachment 6

AdvanceVT Research Seed Grant Reports

AdvanceVT Research Seed Grant Report

Julie Dunsmore
Assistant Professor, Psychology
323 Williams Hall
Blacksburg, VA 24061
E-mail: jdunsmor@vt.edu
Office: (540) 231-4201

Bio-behavioral Correlates of Parents' Beliefs about Children's Emotions

Parents' emotional arousal in emotion-laden situations plays a crucial theoretical role in the connections between parents' beliefs, parenting behaviors, and children's outcomes. However, the relationships between parental beliefs and parents' emotional arousal in emotion-laden situations remained unexamined in extant literature. Understanding these relationships is important in shaping further understanding of how parental emotional socialization influences children's development, and in developing intervention and prevention strategies to optimize children's development. Through this AdvanceVT seed grant, I examine the relationships among parents' beliefs about emotions, parents' emotional arousal when viewing emotion-laden films, and parents' behaviors in parent-child discussions of positive emotional events. Children's responses to their parents' emotional expressions and parenting behaviors are also measured so that reciprocal child-parent influences may be included. Participants will be 40 parents (20 mothers, 20 fathers) and their 9 – 10 year old children. To date, 19 parent-child dyads have completed participation.

Expenditures to Date

Category	Total spent to date
Wage employee, 20 hours/week, $11.60/hour + fringe • coordinates lab activities • supervises undergraduate students • assists with data collection • assists with video coding • assists with dissemination of results	$6767.27
James Long dyadic psychophysiology system • acquisition of parents' ECG while viewing emotion-eliciting film clips • acquisition of children's ratings of parents' emotional expressions using continuous rating dial • synchronization of the above records	$11,806.93
Acquisition fees for children's questionnaires	$95.00
Supplies for collection of parents' salivary cortisol samples	$107.46
TOTAL	$18,776.66

Planned Future Expenditures

Category	Total expected remaining
Wage employee, 20 hours/week, $11.60/hour + fringe	$3570.12
Analysis of parents' salivary cortisol samples	$1429.15
TOTAL	$4999.27

External Funding Submitted and Planned as a Result of this Seed Grant

Submitted
R01 submitted to NICHD on June 1, 2005, *Parental Beliefs about Emotion and Children's Affective Social Competence* (subcontracting to North Carolina State University; total direct and indirect costs for my subcontract budget across five years = $334,636)

Planned
Submission to the Children's Research Initiative program at NSF by July 15, 2005

Impact on Career Development

The AdvanceVT seed grant has had the following concrete beneficial effects on my career development:

- acquisition of psychophysiological equipment that will be used for years to come,
- collection of pilot data for external funding submissions,
- demonstration of my competence in working with psychophysiological measures, which again is highly useful for my external funding submissions,
- extension of fruitful collaborative relationships with Amy G. Halberstadt of North Carolina State University and Alfred Bryant, Jr., of the University of North Carolina at Pembroke,
- beginning development of new collaborative relationships here at Virginia Tech with Frank Gwazdauskas of the Dairy Science Department and colleagues in the Psychology Department who work with similar psychophysiological constructs, such as Drs. Angela Scarpa, Bruce Friedman, and Tom Ollendick, and
- attraction of graduate students and a VTPrep student, many from underrepresented groups.

How my AdvanceVT Seed Grant Activity Supports the Goals of AdvanceVT

The research program supported by my AdvanceVT seed grant has yielded the following in relation to the AdvanceVT goals:

- ❖ Leadership Element: Empowering Women as Leaders and Scholars in S&E
  - ➢ Enabled expansion of my research competencies and focus
  - ➢ Enhanced the fundability of my external grant submissions
  - ➢ Increased my visibility within the developmental psychology community

- Pipeline Element: Advancing Women into Faculty Careers
  - Recruited two female graduate students who are members of underrepresented groups
    - Pa Her (entered VT Fall, 2004)
    - Marie Perez-Rivera (entering VT Fall, 2005)
  - Recruited a VTPrep student, again through the content of the research program and evidence of funding
    - Sheena Horsford (entering VT Fall, 2005)

AdvanceVT Research Seed Grant Report

Naira Hovakimyan
Associate Professor, Aerospace and Ocean Engineering
Virginia Tech
224B Randolph Hall
Blacksburg, VA 24061
E-mail: nhovakim@vt.edu
Office: (540) 231-7989

Active Vision Control Systems

The funding from the ADVANCE research grant has supported the PI in establishing a joint facility "Nonlinear Systems Laboratory" with Prof. Craig Woolsey. The laboratory provides a facility for a broad spectrum of research projects. The main thrusts of the facility are

a) nonlinear control theory and methods;
b) adaptive control;
c) control with visual sensors.

The PI has recruited a female graduate student, who is using this facility as her main office. Except for the equipment purchased with the ADVANCE funds, the PI has spent some of the funds to initiate international collaboration with Prof. Arik Melikyan from the Institute of Problems in Mechanics from Russian Academy of Sciences, Moscow, Russia, by providing partial support for his visit to Virginia Tech. A joint proposal has been submitted upon this visit to NSF, titled "Singular Characteristics for First Order Partial Differential Equations with Non-regular Boundary Conditions". This proposal has been declined by NSF with three "good" reviews. However, that first attempt led to another white paper to DARPA "Singular Characteristics for First Order Partial Differential Equations with Non-Regular Boundary Conditions in Problems of Image Processing" in response to DARPA BAA05-19 in Advanced Mathematics: *Signal and Image Processing*, which is currently at the stage of review. It is anticipated that more work will be done in this direction. The PI has also submitted a proposal to ONR "Adaptive Algorithms for Vision-Aided Guidance, Navigation and Control", which is currently under review.

The PI has used some of the funds to provide partial support for the postdoctoral fellow, including his travel to a conference.

The ADVANCE funding was essential to bridge a gap in federal funding from AFOSR due to a Congressional funding recision. This is how its impact can be measured on the PI's career.

AdvanceVT Research Seed Grant Report

Linsey C. Marr
Assistant Professor, Via Department of Civil and Environmental Engineering
Virginia Tech
Blacksburg VA 24061
E-mail: lmarr@vt.edu
Office: (540) 231-6071

Measurement of Urban Air Pollutant Emissions

Over one-third of the U.S. population lives in areas with harmful levels of air pollution. Obtaining more accurate estimates of air pollutant emissions is the largest barrier to developing effective plans to improve air quality. This AdvanceVT seed grant has enabled me to develop a highly competitive National Science Foundation (NSF) CAREER proposal, which aims to adopt a science-based method known as "eddy covariance" for the direct measurement of air pollutant emissions. This research will be a significant improvement upon existing methods, which rely on highly uncertain models of activities and laboratory-based measurements, for quantifying emissions and ultimately, for improving air quality.

The key benefits of the grant include my (1) visiting, learning from, and establishing a collaboration with the world's leading expert on application of eddy covariance in urban areas, (2) gaining assistance from students with literature review and figure development for the proposal, and (3) acquiring preliminary data through rental of equipment and hiring of a graduate research assistant to conduct the experiments. These benefits will impact my career development by helping me, a female assistant professor in engineering, submit a much more highly competitive CAREER proposal than would have been possible without the grant. As a result of the grant, I have also guided the research and academic development of three students, including two females in engineering, and have provided support for their studies.

Research Status

1. Visit world's leading expert on urban flux measurements

Using the cost-sharing portion of my ADVANCE seed grant, I visited Dr. Sue Grimmond at the University of Indiana in June 2004. She has implemented the method in numerous areas to measure energy balances. We spoke for several hours about my idea, and I gained valuable technical advice for applying the method in urban areas and for improving a draft of my CAREER proposal. She offered a collaborative measurement site at NSF's Long-Term Ecological Research (LTER) site in Baltimore and provided a letter of support for the collaboration. This visit was extremely useful for me to learn more about eddy covariance, to leverage an existing measurement site with pre-existing NSF ties, and to gain extra legitimacy through the letter of support.

2. Review literature

During 2004, I hired one graduate student and one undergraduate student to assist with proposal preparation. Lenn Roberts, a M.S. student in Civil and Environmental Engineering, conducted a literature review about quality assurance and quality control protocols for eddy covariance, gathered detailed information on equipment models and costs, developed a technical diagram of the proposed experimental setup, and employed his GIS skills to develop a sample figure showing land use in a hypothetical measurement location. Rebecca Alston, an undergraduate student in Chemical Engineering, reviewed historical air quality at sites in Virginia to help identify those with the greatest potential, i.e. dirtiest air, for experiments.

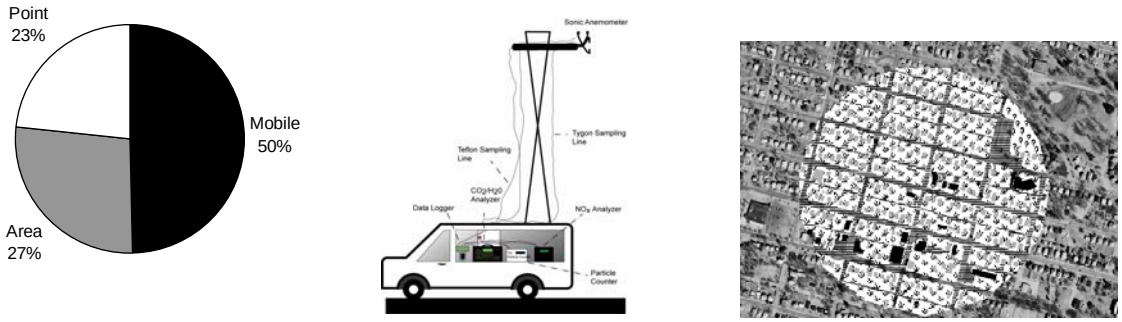


Figure 1. These figures, developed by graduate and undergraduate researchers as part of this seed grant, show (left to right) the sources of nitrogen oxides emissions in Richmond; a diagram of our planned instrumental design; and an overhead view and assignment of land use types in Roanoke.

3. Visit and characterize potential measurement sites

We visited and photographed measurement sites in Roanoke and Knoxville. Through these visits, I also established contacts at the Virginia Department of Environmental Quality (DEQ) and Oak Ridge National Laboratory (ORNL).

Figure 2. The Virginia DEQ's air monitoring site in Roanoke.

Figure 3. ORNL's Watt Road research facility in Knoxville for emissions from heavy-duty diesel trucks.

4. Collect preliminary data

Figure 4. Christy Kull adjusts the flux measurement system on top of the roof of Durham Hall.

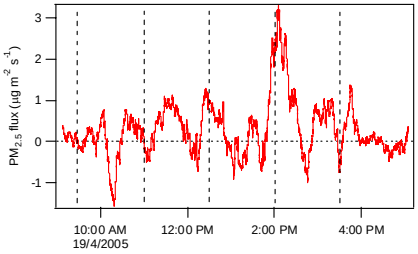


Figure 5. Preliminary data showing particulate matter ($PM_{2.5}$) flux above the parking lot on 19 April 2005. Positive values indicate upward fluxes, and negative values indicate downward fluxes.

During the spring of 2005, I hired a full-time graduate research assistant, Christy Kull, to collect preliminary data demonstrating the significance of the proposal idea. We rented a sonic anemometer from Applied Technologies, Inc. to measure wind velocity and borrowed an aerosol photometer from VT Health and Safety to measure particulate matter concentrations. Christy collected four days' worth of data from the rooftop of Durham Hall. The results demonstrate the successful application of the method to measure emissions of particles near a Virginia Tech parking lot and will greatly strengthen my proposal. Additionally, the rental cost (~$1000) can be applied as credit to a future purchase of a sonic anemometer.

Future Plans

As a result of this ADVANCE grant, I submitted a CAREER proposal entitled "Direct Measurement of Urban Air Pollutant Emissions," in July 2004 and will be resubmitting a much improved and highly competitive version of it in July 2005. The grant has also enabled me to establish collaborative relationships with Dr. Sue Grimmond at the University of Indiana, Dr. John Storey at Oak Ridge National Laboratory, and technicians at the Virginia Department of Environmental Quality. Remaining funding is being used to establish collaborative work and preliminary data with Dr. Harry Dorn (Chemistry) and Luna Innovations on manufactured nanoparticles. This work will lead to another proposal submission to NSF and/or the National Institutes of Health.

AdvanceVT Research Seed Grant Report

Kathleen Meehan
Assistant Professor, Electrical & Computer Engineering
470 Whittemore Hall
Blacksburg, VA 24061-0111
kameehan@vt.edu
Office: (540) 231-4442

Active Spin-SPR Structures

This project was initiated in January 2005 and will run for six months. The goal of the research is to develop techniques to fabricate magnetic nanoparticles and thin films, which will be used in the fabrication of a sensor for biochemical detection. The concept of this sensor ("Active Spin-SPR Structures") was first outlined by Dr. Meehan and Dr. Dessy in a patent disclosure in 2003. A provisional patent was awarded to the university on these structures and a full patent application was recently submitted. The biosensor incorporates a magnetic layer beneath the active sensing layer. The surface plasmon resonance frequency is modified by the injection of spin polarized electrons into the active sensing layer. This will enable the tuning of the surface plasmon peak as a function of injected current. This is important in order to transform the sensor from what is now a proven biochemical sensor in the laboratory to one that can be employed in the field and can detect specific compounds in a complex and unknown matrix.

Mr. Nicholas Tracy was hired as a graduate research assistant in January 2005. He began to synthesis and characterize several magnetic materials, concentrating on CrSe and CoSe. These two materials are relatively unexplored. Recent theoretical studies have indicated that these two materials may be half metals; the properties of half metals are extremely different for spin up versus spin down electrons. Expectations are that CrSe and other half-metals will enable a host of spintronic devices that have been limited by the physical properties of metals, in which conduction is only through one type of spin carrier, and dilute magnetic semiconductors, which require the presence of an external magnetic field to be used in spintronics.

Concurrent to this work, I was also able to involve two undergraduate students on independent research projects, the results of which can be applied to the fabrication of this sensor. The students received course credit (ECE 4984), which could be used as a technical elective towards their degrees. Aaron Kaluszka, a senior in the Electrical and Computer Engineering Department, studied the synthesis of iron oxide nanoparticles. Diego Guevara, a junior in the ECE Department, fabricated indium tin oxide films using a sol-gel synthesis technique.

The results of these three projects have been impressive. Mr. Tracy has developed two different techniques to synthesize the CrSe and CoSe nanoparticles. He has demonstrated that these nanoparticles are magnetic (Fig. 1). Through transmission electron

microscopic studies (assisted by Dr. Steve McCartney), he has determined that the CrSe nanoparticles are ~25nm in diameter while the CoSe nanoparticles are ~10nm. A preliminary study by Dr. Christopher Wyatt has shown that these nanoparticles may also have application as contrast agents in magnetic resonance imaging (MRI). We have contacted an expert in magnetic materials characterization at NIST to assist us in determining the magnetism of the individual nanoparticles. We are also in the process of locating expertise in powder x-ray so that we can determine the crystalline structure of these nanoparticles. As this expertise does not presently exist at Virginia Tech, we are looking for this outside of the university. We will have at least one publication resulting from this work as soon as we have the x-ray data. Mr. Kaluszka evaluated the effect of pH on the formation of iron oxide and iron/iron oxide nanoparticles. He also discovered a simple method to fabricate a two-dimensional network of iron oxide nanoparticles. Continuation of this work will be pursued this summer with the expectation that a paper will result. The synthesis of the indium tin oxide films was much more complicated than one would have expected from the publications. Mr. Diego Guevara identified some processing issues that affect the quality of the indium tin oxide films. This work will be continued in the fall.

Overall, the *AdvanceVT* grant has meant a great deal to my ability to conduct research at Virginia Tech. Since the university decided to cancel the building of a new cleanroom and then has been slow in funding the remodeling of a teaching lab into a fabrication facility, I have had to modify my area of research from optoelectronic device design and fabrication to an area that was less equipment intensive. I chose to move into the synthesis of semiconductor and metallic nanoparticles and investigate their use in biomedical and biotechnology applications. The *AdvanceVT* research seed funding provided necessary funding to enable me to conduct the experimental work that I need to demonstrate that I can conduct leading edge research in this area. It has enablee me to develop several unique nanoparticle synthesis techniques that have the potential for significant impact on the field of spintronics and biomedical imaging. The preliminary data that we will have collected by the end of the grant will greatly increase my chances of receiving funding from NSF and NIH. Proposals to both agencies on the CrSe and CoSe nanoparticles are planned for early Fall. I will build upon this research and on the iron oxide nanoparticles and indium tin oxide films so that I can pursue the implementation of this sensor next year.

Figure 1. CoSe nanoparticles (brown) and CrSe nanoparticles (red) in an aqueous solution. The nanoparticles are accumulating to one side of the vial, close to the white magnet (center) – demonstrating that they are influenced by a magnetic field.

AdvanceVT Research Seed Grant Report

Corina Sandu
Assistant Professor, Mechanical Engineering
101 Randolph Hall
Blacksburg, VA 24061
E-mail: csandu@vt.edu
Office: (540) 231-7467

Computational Tools for Advanced Modeling and Simulation of Off-Road Vehicles

Objectives

This study was envisioned as a preliminary step in the direction of performing advanced modeling and simulation for off-road vehicles. The goal of the project was to develop proof of concepts and computational tools to serve as foundation blocks for future research studies, and to increase the competitiveness of future proposals. Two main aspects of terramechanics were addressed in this study:

1. Modeling the dynamic contact between a pneumatic tire and soft soil;
2. Efficient treatment of uncertainties due to tire and suspension parameters, and due to soil characteristics and terrain geometry.

Outcomes

- Technical Aspects

Research results obtained so far:

  - Two-dimensional analytical off-road tire and tire-soil contact models.
  - Half and full car stochastic models using a polynomial chaos approach.

- Scholarly Work

The research performed was incorporated in:

  - 2 ASME and 1 SAE papers published in conference proceedings
  - 1 ASME, 1 SAE, and 1 ISTVS conference paper pending
  - 2 journal papers pending, and 2 journal papers in work

- Increase of PIs Competitiveness for External Sponsored Competitions

The research results were incorporated in:

  - 1 NSF proposal pending
  - Technical presentations given to TACOM and Goodyear

Future proposals to be submitted that will benefit from the outcomes of this grant:

  - NSF CAREER proposal to be submitted July 2005
  - DoD YIP, Goodyear, NASA, TACOM

- Development of Collaborative Activities

I started to cooperate with Professor Harry Dankowicz in the area of modeling of tire-terrain contact. I also had discussions with Dr. Mihai Anitescu from Argonne National Laboratory, and plan to pursue future research together.

- Enhancement of PIs Research Skills and Abilities

I expended my horizon and increased my skills in the areas of tire-terrain modeling and treatment of uncertainties. The financial support allowed me to hire a graduate research

assistant for one year, which accelerated the pace at which I could have obtained relevant research and scholarly results.

- Contribution to Achieving the Goals of the *AdvanceVT* Program

Receiving the *AdvanceVT* grant increased my confidence, my competitiveness, and helped me launch two important research directions.