

College of Science

Annual Report

Lay Nam Chang, Dean



2008-2009

Virginia Polytechnic Institute and State University

Annual Report

Lay Nam Chang, Dean

Introduction

The College of Science excelled in all areas of the university's missions, with outstanding accomplishments in learning, discovery, and engagement. The economic crisis has had several impacts on the college, but we have met our reduction targets without compromising our primary goals and objectives.

This annual report documents many accomplishments and contributions of our faculty, students, and staff to the university's goals. We summarize our activities by the domains of Learning, Discovery, and Engagement. Alumni Relations, Development, Communications, and Diversity reports are then detailed. Individual achievements are noted in the Spotlights section with the final section of the report updating the college's Scorecard for 2008-09.

Strategic Initiatives

Institute for Advanced Study

In the past year, Seong Ki Mun joined Richard Blankenbecler as a Fellow of the IAS. Dr. Mun is working on neuroscience and health informatics and Dr. Blankenbecler's research focus is on cancer therapeutics. The IAS served as the site for cluster committee meetings and research gatherings for faculty members associated with established clusters—nanoscience, computational science, infectious diseases, developmental science, and complex systems. The IAS continues to promote collaboration by faculty to plan and submit interdisciplinary grant proposals. The IAS also sponsored the Developmental Science Colloquium Series as well as the fourth annual Structural Biology Symposium in March 2009.

Department Reviews

The Department of Physics completed its external review during September 2008 with a visit from a distinguished panel of nationally renowned physicists. The reviewers identified numerous strengths within the department and made several suggestions for how even greater achievements may be facilitated.

Three departments—Chemistry, Economics, and Psychology—will conduct internal and external reviews during 2009-10. These reviews were delayed due to economic concerns during 2008-09.

Pre-Intellectual Property and Patent Law

The College of Science continued the development of the Pre-Intellectual Property and Patent Law program, building on an established relationship with the University of Richmond School of Law and initiating a new partnership with Washington and Lee School of Law. Michelle Mayberry, a partner in Latimer, Mayberry and Matthews IP Law, LLP, taught "Technology, Law, and Society" in fall 2008. Kimbley Muller, Senior Counsel of Shell Oil Company, taught "Introduction to Intellectual Property Law" in spring 2009. These courses will be taught in the coming year, along with a new course that will be taught by three professors from the Washington and Lee School of Law: Dean Rodney Smolla, Professor Sean Seymore, and Professor Joshua Fairfield. The course will focus on "Law, Science, and Technology: The Quest for Sustainability."

Virginia Tech Carilion School of Medicine

The College of Science, along with several other colleges at Virginia Tech, is a collaborating partner in the development of the Virginia Tech Carilion School of Medicine and the Virginia Tech Carilion Research Institute. Located in Roanoke, the school of medicine was recently provisionally accredited by the Liaison Committee on Medical Education and will recruit its first class of students for August 2010 admission. Virginia Tech faculty members continue to work with Carilion Clinic faculty members on collaborative

research proposals with the intention of serving as research mentors for medical students. Faculty members from the college were involved with curriculum and faculty affairs committees in preparation for the LCME review.

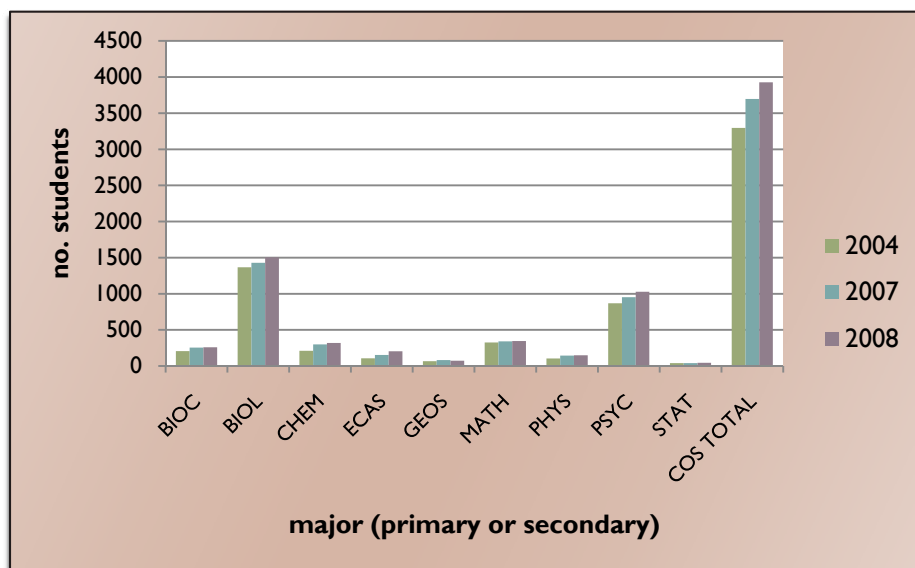
Capital Projects

Two major building projects, approved by the General Assembly, have made considerable progress in the initial design stages. The Davidson Hall Renovation will provide new teaching and research laboratories and is projected to be completed in 2011. The Science Research Laboratory I will house the Department of Geosciences. A completion date for this project is still pending.

Learning - Undergraduate Programs

The College of Science continues to deliver a substantial fraction of the undergraduate course offerings, in the Curriculum for Liberal Education (especially Areas 3, 4 and 5), as well as both lower and upper division courses in math, science, economics, and statistics that are required for majors in the Colleges of Science, Engineering, Agriculture and Life Sciences, Natural Resources, and Business. During the 2008-2009 academic year, the College of Science delivered 209,547 student credit hours (SCH), which was 33% of the total SCH for the university. This represents a 5% increase in SCH delivered from the previous academic year. The College of Science taught 58% of the large (>50 students) enrollment classes on campus. The college will continue to work with the university administration to garner resources for high enrollment classes and laboratories.

Enrollment of undergraduates in majors within the College of Science continues to rise. As shown in the figure below, nearly every department has experienced a steady increase since 2004, with college totals increased by 6% and 19% during the past one and five years, respectively. Notably, Biological Sciences has over 1,500 majors and Psychology over 1,000 majors. Susan Haymore continues to oversee undergraduate advising for the college and works closely with departmental advisors. While steadily increasing enrollments challenge the ability to provide high quality science instruction, the College of Science remains fully committed to the undergraduate teaching mission. College of Science faculty, instructors, and teaching assistants continue to be among the most highly rated teachers on campus. New undergraduate programming places science instruction into more global contexts that should position our students to be among the leaders in emerging, interdisciplinary areas of science. An increasing focus on career planning and research experiences should empower our students with the skills and perspectives they need to make meaningful contributions to society. Looking forward, the college seeks greater prominence in the development of new teaching pedagogies in the field of STEM (science, technology, engineering and math) education.



Successful students, successful teachers

Undergraduates in the College of Science have been the recipients of multiple honors and awards:

- In the spring of 2009, 1,293 College of Science undergraduates made the Dean's List. During the 2008-2009 academic year, 47 students from the College of Science were inducted into the Phi Beta Kappa honor society. This represented 41% of the total inductees from six colleges.



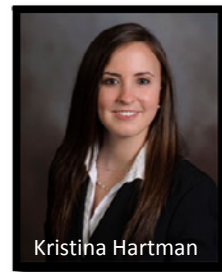
Kevin Finelli

- The College of Science Outstanding Senior for 2009 was Kevin Finelli (B.S. Physics and Mathematics). Kevin is a Goldwater Scholar who will be attending graduate school at Duke University.

- This year, David Abrams, who recently earned a B.S. in Physics and Computer Science, was awarded a prestigious National Science Foundation Graduate Research Fellowship. In the same competition, Annalisa Pawlowsky and Kevin Finelli, also Physics undergraduates, earned honorable mentions.
- Three teams of undergraduates from the Department of Mathematics participated in the Consortium for Mathematics and its Applications

Mathematical Contest in Modeling. Two of these teams earned Meritorious rankings in this international competition, the highest rankings ever for Virginia Tech.

- Kristina Hartman (Biological Sciences) has been selected as the Undergraduate Representative to the VT Board of Visitors for 2009-10.
- Sandra Hobson, an undergraduate in Chemistry, was one of seven students chosen to represent Virginia Tech at the 2008 ACC Meetings of the Minds conference in Raleigh, NC. The selection was based on the quality of her research in quantum chemistry with Professor Edward Valeev, which had already resulted in an article in *Molecular Physics*.
- Teacher Education Scholarships sponsored by the Virginia Space Grant Consortium were awarded to Kelly Baldwin, Jennifer Soldan and Angela Zanchi, all from Mathematics, and Alice Lee from Geosciences.



Kristina Hartman

The faculty members, instructors, and teaching assistants who teach in the College of Science continue to receive top awards for teaching:

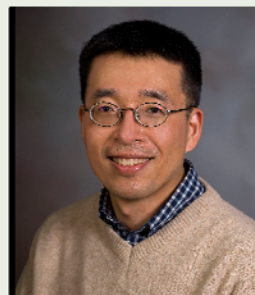
- Six of the 10 professors selected by the student branch of the Alumni Association for the 15th Annual Students' Choice Awards were College of

2009 Alumni Award for Excellence in Teaching



Ann Stevens
Biological Sciences

2009 Sporn Award for Excellence in Teaching Introductory Engineering Courses



T. S. Roger Chang
Physics

Science faculty members. They are Preston Durrill, Jeannine Eddleton, and Ketan Trivedi (Chemistry), Tsu Roger Chang (Physics), Scott Geller (Psychology), and George Simmons (Biological Sciences).


► Fred Read (Geosciences) was the 2009 recipient of the Grover Murray Outstanding Educator Award from the American Association of Petroleum Geologists.

► Jill Sible, Richard Walker, and Mary Lipscomb of Biological Sciences have been named 2009 National Academies Education Fellows in the Life Sciences.


► Renee Irvin (*second from right in photo below*), laboratory specialist with the Department of Biological Sciences, was selected as one of four staff members to receive the 2008 Outstanding Performance in a Lab Award.



College of Science Certificates of Teaching Excellence



Barbara Bekken
Geosciences



John Simonetti
Physics

John Simonetti was also awarded the **William E. Wine Award**, given each year to one faculty member who has a history of teaching excellence.

A changing curriculum for a changing world

The College of Science continues to revise its curriculum to prepare students for the practice of science in a global and interdisciplinary society.

Nicolaus Tideman has brought back Economics of Poverty (ECON 3014), a course that had not been taught in seven years. The course dealt with the concepts, facts, and the economics of proposed

solutions for human poverty. Among the possible causes of poverty that the class studied were family structure, unemployment, low wages, poor health, cultural differences, genetic differences, educational deficiencies, discrimination, and past injustice. Classes included many lively exchanges of views. The course was quite popular with the students, who performed quite well overall.

The Department of Statistics continues to offer its newly minted minor in Actuarial Sciences, with 24 students currently in the program. A career as an actuary was rated as the second best job in a 2002 survey conducted by the Wall Street Journal and among the best careers in 2007 by U.S. News and World Reports. Actuarial science is an interdisciplinary field that utilizes knowledge in statistics, mathematics, and economics to analyze financial risk.

The College of Science continues to build its program in pre-intellectual property and patent law. Our partnership with the University of Richmond School

of Law continues such that Virginia Tech students majoring in science or engineering can enter law school after their 3rd or 4th year as an undergraduate and complete their J.D. in another 3 years.

Our two IP pre-law courses offered to undergraduates have experienced record enrollments. Technology, Law and Society was taught in fall 2008 by Michele Mayberry, a partner with Latimer, Mayberry and Matthews. She had 15 students in the course – double past enrollments –



Professor Kimbley Muller with Dean Lay Nam Chang at the college's Spring Scholarship Celebration

and received outstanding teaching evaluations. Prof. Mayberry has agreed to teach the course again this fall. The spring Introduction to IP Law course continues to be taught by Alumni Roundtable member Kimbley Muller. Prof. Muller's course had a record

enrollment of 30 students this past semester. He has made frequent trips to VT to "power-teach" two back-to-back Friday afternoon classes and teaches the remaining classes by video broadcast.

An agreement with Washington and Lee School of Law is pending, and three professors from Washington and Lee will be offering a new course to our undergraduates in spring 2010. The course entitled "Law, Science, and Technology: The Quest for Sustainability," will be taught by Sean Seymore (who holds an adjunct appointment at Virginia Tech), Rodney Smolla (first amendment scholar and Dean of Washington and Lee School of Law) and Joshua Fairfield (an expert in the regulation of e-commerce and videogames). Professors Seymore, Smolla, and Fairfield will teach in a law school style format. Third

year law students from Washington and Lee will serve as the teaching assistants and work through cases with small groups of students.

Because the practice of science is a global enterprise, the College of Science continues to offer study abroad courses. The semester abroad in the Dominican Republic led by Associate Dean Jerry Via continues, where students earn 18 hours of credit studying topics that may include Medical Geography, Tropical Ornithology, Ecological Physiology, Spanish Language Skills, Latin American Culture and Civilization, World Forestry, and others. Additionally, a summer course was offered by Ignacio Moore where he takes students to study the ecology and culture of Ecuador and the Galapagos Islands. Although the fall semester in the Dominican Republic and the Ecuador course were fully enrolled, the spring course in the Dominican Republic and the usually popular "Botanizing the Alps" course had to be cancelled because too many students backed out at the last minute due to financial concerns. Identifying sources of support for these programs will be critical if study abroad is to be an option available to all students, regardless of financial situation.

Preparing students to invent the future

The College of Science continues to engage students in undergraduate research and to offer planning for life beyond their undergraduate years. The most recent data indicated that nearly half (45.2%) of our graduating seniors completed an undergraduate research course. This is a 4.4% increase over last year's numbers and does not capture students who volunteered as researchers or worked for pay rather than credit. Among the College of Science students engaged in undergraduate research this year were 11 MAOP (Multicultural Academic Opportunities Program), 7 McNair, and 13 VT-AMP (Virginia-North Carolina Alliance for Minority Participation @ Virginia Tech) scholars. These programs offer research experiences to underrepresented and first-generation college students.

In addition to offering undergraduate research experiences, the College of Science continues to

prepare students for their professional careers, which the college believes begins their first day as undergraduates at Virginia Tech. Debbie Wilson, the College of Science career advisor and liaison to Career Services, engages with students during freshman/transfer orientation and maintains a relationship with weekly e-mail updates on career-related opportunities. This year, she met with over 200 students individually and held six seminars/workshops attended by 71 students. Although the number of employers participating in the Fall Focus and Directions Career Fairs was down by 21% (likely a consequence of the economic downturn), student attendance was up over 25% to nearly 2,000 students for the two fairs combined. Debbie Wilson has also initiated a job club for students, which will continue this year. She will also be piloting an advising program for transfer students to address their specific academic and career needs.

Our classrooms as learning laboratories

The College of Science has embraced technologies that promote active learning and provide nearly instantaneous formative assessment in the classroom. Beyond just implementing new technological tools, faculty members and instructors have received and provided training in the pedagogies supported by these technologies, and several have conducted scientific studies of the effectiveness of these tools.

Student response systems, also known as “clickers,” were introduced in several undergraduate courses in Biological Sciences and Economics, collectively seating over 2,000 students. In November 2008, Steve Trost (Economics) and Terri Bourdon (Mathematics) attended an iClicker training workshop in Nashville, TN. Gary Long (Chemistry) continues to offer clicker workshops through FDI at Virginia Tech as well as at other universities.

Sheryl Ball (Economics) continues her studies of the Wireless Interactive Teaching Systems (WITS) in her Macroeconomic Theory (ECON 3104) course. WITS involves hand-held devices with which students can conduct in-class simulations. Prof. Ball’s data indicate

increased learning gains among students using WITS compared to the control section of the course.

Faculty members in the College of Science currently hold over \$1.2 million in STEM education grants from the National Science Foundation. Anderson Norton (Mathematics) holds a grant focused on “serving mathematics students in need” and Jill Sible and Richard Walker (Biological Sciences), along with Karen Eley-Sanders, hold a grant to “prepare economically needy students for careers in biotechnology.” The College of Science will continue to support scholarship in the area of STEM education, with particular emphasis on serving underrepresented and financially needy students.

The College of Science and Physics department have hosted several experts in STEM education. Robert Beichner from North Carolina State University presented a CEUT workshop and Physics Colloquium where he introduced SCALE-UP (Student-Centered Active Learning Environment for Undergraduate Programs), specially designed classrooms that promote team-based interactive learning. The College of Science has put forward a proposal to create SCALE-UP classrooms at Virginia Tech. Physics also hosted Ruth Howes, from Marquette University, who was the deputy chair of the National Task Force on Undergraduate Physics. Dr. Howes discussed “enhancing undergraduate science majors: lessons from physics.” In addition, the Physics department initiated a series of “Teaching Brown Bag Lunches” in the spring semester. The College of Science also hosted Michelle Withers from West Virginia University who presented a seminar on scientific teaching and assessment in the classroom.

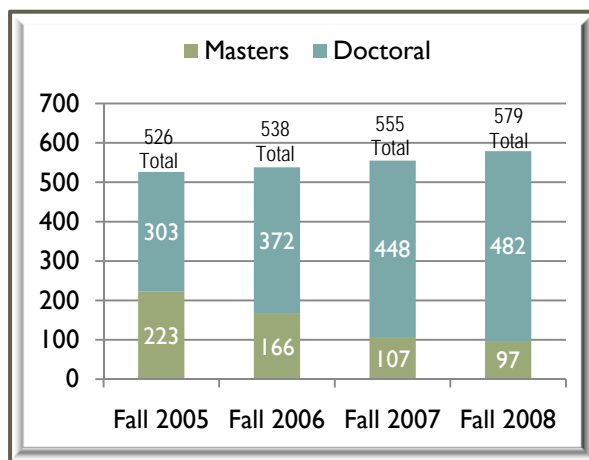
Learning - Graduate Programs

The achievements of the graduate students in the College of Science bring prestige to the departments and thus to the college and university as a whole. The College of Science is committed to:

- ❖ Expanding graduate enrollments, with the goal of increasing the number of M.S. and Ph.D students.

- ❖ Enhancing graduate and professional degree value through national and international partnerships, joint degrees and interdisciplinary programs.
- ❖ Enhancing recruitment of top quality graduate student prospects.
- ❖ Enhancing the quality of graduate training and increasing external support for graduate training.

Following university goals in graduate education, all departments are working to increase the number and quality of Ph.D. students. In fall 2008, there were 579 graduate students enrolled in the College of Science. Of these, 482 were Ph.D. students and 97 were M.S. students. There has been a remarkable 88% growth in the number of doctoral students from 2003 when 256 Ph.D. students were enrolled in the College of Science. The college has already exceeded the expectations set by the PhD2010 program to grow the number of Ph.D. students in the college by 120 by 2010.



Program enhancement

The College of Science is striving to enhance graduate and professional degrees through university programs, national and international partnerships, and joint degrees:

- Judy Riffle (Chemistry) is director of the Macromolecular Science and Engineering graduate degree (MACR), which is a university-based degree program spanning multiple departments and colleges to emphasize

fundamental and emerging technological areas in the field of macromolecular science and engineering.

- Biological Sciences entered the sixth year of the “preparing the future professoriate” project. Graduate students who wish to build a strong resume in teaching and in preparation for academic careers can participate in a graduate school certificate program that includes a course in pedagogy or teaching at the college level, and an opportunity to teach a lecture course in the department under the mentorship of a faculty member.

The College of Science is a leader in developing interdisciplinary graduate degree programs. Such programs span traditional departmental boundaries and allow students enrolled in a program to study with faculty from many departments and colleges.

- Faculty members from Biological Sciences are key members of the interdisciplinary Ph.D. program in *Genetics, Bioinformatics, and Computational Biology (GBCB)*. This exciting program of study encompasses applications of molecular biology, genomics, mathematics, statistics, and computer science to all areas of the life sciences.
- Biological Sciences is also involved in the *Molecular Cell Biology and Biotechnology (MCBB)* option to provide training in broad fundamentals that can then be applied to particular disciplines. On successful completion of the core curriculum in *MCBB*, students will be able to apply concepts of molecular cell biology directly to their own field of interest and research.
- Faculty members from the college have also been very successful in developing Integrative Graduate Education and Research Training (IGERT) grants funded by the NSF. The competition for these five-year programs is intense, with only a handful of programs selected from several hundred applications. Tim Long (Chemistry) is co-director of an IGERT awarded in 2003 that trains students in “Macromolecular Interfaces with Life Sciences” or *MILES* (<http://www.chem.vt.edu/milesigert/>). The IGERT

awarded in 2005 for “Exploring Interfaces through Graduate Education and Research” (*EIGER*) enables graduate students to pursue research of the interface of science and engineering in natural systems and the behavioral interfaces within scientific and engineering teams. *EIGER* is led by Michael Hochella (Geosciences) with participation from Biological Sciences, Physics, and Psychology. Each IGERT program sponsors 40 graduate student fellowships over a five-year period.

Graduate student recruitment

Faculty members in the College of Science lead novel recruitment efforts to increase the quality, diversity, and reputation of research programs.

- Biological Sciences faculty maintained leadership in three university-wide graduate recruiting programs: (a) The Interdepartmental Microbiology Graduate Program (IMGP) (http://www.biol.vt.edu/vtmicro/g_study.html) includes over 40 faculty participants from across the university. Students who apply and are recruited spend their first semester rotating through laboratories before the decision is made on a major advisor; (b) The Graduate Program in Molecular Plant Sciences (MPS) <http://www.molplantsci.org.vt.edu/INDEX.HTM> involves 20 participating faculty from 7 departments – this coming year marks the fourth year of an aggressive recruiting effort at regional schools, followed by students rotating through labs before a decision is made on a major advisor; and (c) The Graduate Program in Cell and Developmental Biology (CDB) <http://www.biol.vt.edu/research/cdb/index.html> includes 11 participating faculty. Following the model of the Microbiology program, students in the CDB rotate among faculty mentors before being accepted into a particular lab.
- The college and departments support three ICTAS scholarships per year to recruit the best and brightest graduate students to Virginia Tech.
- Departments host “open days” and other such events to showcase the quality of their graduate

programs and to help recruit the best students. Physics held its annual on-campus Preview Weekend for prospective graduate students in February. The date was chosen to coincide with the Graduate School Preview Weekend in order to give our visitors a full picture of graduate student life at Virginia Tech.

- Departments also target professional meetings to recruit the best and brightest graduate students. Faculty members in the Department of Geosciences, for example, set up special student recruiting and information booths at the following professional meetings: Geological Society of America, Society of Exploration Geophysicists, and the American Geophysical Union.

Graduate student training

Departments in the College of Science are committed to enhancing the quality of graduate training:

- An important aspect of graduate training is to have students present their research results during “research days” and other such events. Biological Sciences presented their 6th Annual Research Day in February 2009. This program, directed by and for graduate students, is modeled after professional conferences with poster sessions, presentations, and a plenary talk. Geosciences held its 14th annual Geosciences Student Research Symposium in March 2009.
- As part of an effort to bring the mathematics education Ph.D. program to a new level, Andy Norton (Mathematics) started a seminar designed to provide Math and Education students a common introduction to research in math education.
- In Statistics, “research teams” comprised of faculty and graduate students are organized and work on common research problems or projects centered on research grants. Teams typically meet weekly or bi-weekly to keep members apprised of recent developments, to provide accountability for timely progress, and to share common expertise.

Connections external to academe are important in graduate training and build on successes in corporate sponsorships and internships for graduate programs.

- ▶ Graduate programs in Chemistry, Geosciences, Physics, and Statistics benefit from corporate affiliations. Statistics, through its Corporate Partners program, places interns with Eli Lilly, DuPont, Minitab, General Electric, Kraft, Pratt and Whitney, and SAS. Geosciences benefits from long-term relations with petroleum companies and endowments from loyal alumni.
- ▶ Psychology's required internship component relies on strong and abiding relations with institutions such as Brown University and the Medical University of South Carolina. Such internships place students in competitive positions for appointments after graduation.
- ▶ There are also opportunities for some graduate students to complete parts of their training at off-campus sites such as Oak Ridge National Laboratories, Georgetown University, the Howard Hughes Institute, and USGS. The National Capital Region (NCR) will provide new opportunities for graduate students by accommodating some of the off-campus training opportunities mentioned above.

Graduate student achievements

2009 Graduate Woman of the Year



Laura Freeman
Statistics

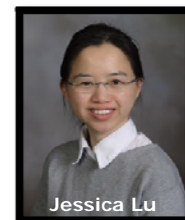
- ▶ Laura Freeman (Statistics) was selected as the 2009 Graduate Woman of the Year by the VT Graduate School. The recipient is chosen based on involvement in professional organizations, campus activities, contribution to knowledge through research, teaching, and scholarship,

contribution to the graduate community and commitment to diversity.

**College of Science
2009 Outstanding Graduate
Students**

Doctoral	Master's
	
Michael J. Kavic Physics	Theresa Detrie Geosciences

- ▶ Sunny Crawley (Biological Sciences) received one of two 2009 Graduate Teaching Assistant Excellence Awards sponsored by the VT Alumni Association.
- ▶ Zachary E. Lewis (Physics) received the 2009 Graduate Teaching Excellence Commendation Award sponsored by the VT Alumni Association.
- ▶ Russell Travis Belote (Biological Sciences) received the 2009 Dissertation Commendation Award for Science, Mathematics and Engineering sponsored by the VT Graduate School.
- ▶ Nicole West (Geosciences) received the William Preston Thesis Award. The William Preston Society presents this award to a student whose master's thesis presents the best original research with potential to benefit all people.
- ▶ Jessica Lu (Chemistry) received a Fulbright Scholarship to spend a full academic year at the Weizmann Institute in Israel.
- ▶ NSF Graduate Research Fellowships were awarded to Shiv Dutt Kale (Biochemistry and Biological Sciences); Laura

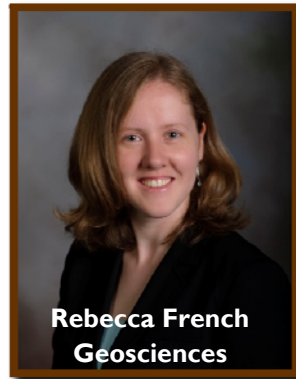


Jessica Lu

Hamm (Geosciences); Bradley Shapiro (Mathematics and Economics); and David Abrams (Physics and Computer Science).

- Rebecca French (Geosciences) was selected as the Graduate Student Representative to the Virginia Tech Board of Visitors for 2009-10 and also received one of four 2009 Roundtable Make a Difference Graduate Scholarships.
- Juliette Mammei (Physics) was awarded a Jefferson Sciences Associates Graduate Fellowship.
- Virginia Space Grant Consortium graduate research fellowships were awarded to Kathleen Craft (Geophysics); Laura Freeman (Statistics) and Ryan Fortenberry (Chemistry).

Graduate Student Representative to the Virginia Tech Board of Visitors for 2009-10



National ranking

The Psychology department ranked 33rd among clinical psychology programs, according to the "America's Best Graduate Schools 2010" survey conducted in 2009 by the U.S. News & World Report.

Discovery

The College of Science fully embraces the intrinsic value of research and creative scholarship. In the context of "discovery," cutting-edge research and innovative and creative scholarship not only provide the domains of learning and engagement with a sense of direction, but also foster collaborative learning that motivates engagement with the broader community. Since its inception, the College of Science has been a leader in launching a set of integrative initiatives for achieving world-class excellence in discovery. In FY09, the college expanded an initiative in the domain of energy and the environment and strengthened previous initiatives in nanoscience, computational science, infectious diseases, and developmental science across the lifespan. These focus areas provide a basis for innovative technologies and understanding complex systems that power the progress in all areas of discovery. The College of Science is creating an interdisciplinary research environment that is unique among top-tier research universities and establishing Virginia Tech as one of the premier universities in the country recognized for its research and scholarship.

Support from alumni

Endowments provided by loyal alumni are also providing scholarships that enhance the graduate programs in the college. The College of Science's alumni advisory group, the Roundtable, established the Make-a-Difference Scholarship for Graduate Study in the College of Science. Awards are awarded to graduate students who will make a significant difference to the College of Science and the world outside the university. This year's recipients were Brandi Echols (Biological Sciences), Rebecca French (Geosciences), Sven Dorosz (Physics), and Laura Freeman (Statistics).



Faculty members are the key to achieving these goals. Scholarship is a critical indicator of the college's success. In FY09, faculty from the College of Science published over 67 books and book chapters, 734 articles in peer-reviewed journals, and gave over 704 presentations at professional meetings.

Faculty awards and honors

- Russell T. Jones (Psychology) has been named to a new subcommittee in the Department of Health and Human Services.
- David Kingston (Chemistry) was honored with a special issue of the *Journal of Natural Products*, in recognition of his contributions to the chemistry of the anticancer drug paclitaxel (Taxol), and to the conservation of biodiversity through the isolation of possible drug compounds in rain forest botanicals.
- Reinhard Laubenbacher (Mathematics) was appointed Society for Industrial and Applied Mathematics' Vice President for Science Policy.
- Theresa Reineke (Chemistry) received a NSF CAREER Award, a Sloan Research Fellowship and a Cottrell Scholar Award.
- Edward Valeev (Chemistry) was awarded a NSF CAREER Award, a 2009 Sloan Research Fellowship and an ACS Division of Computers in Chemistry 2009 HP Outstanding Junior Faculty Award.
- The American Psychological



Foundation (APF) Board of Trustees has named E. Scott Geller as the recipient of the 2009 APF Gold Medal Award for Life Achievement in Psychology in the Public Interest.

- Louis A. Madsen (Chemistry) received a NSF CAREER Award.
- Robin Panneton (Psychology) received a Canadian-U.S. 2008 Fulbright Visiting Chair Award.
- Tom Ollendick (Psychology) was elected President of the Society for a Science of Clinical Psychology.
- Martha Ann Bell (Psychology) was appointed Editor of the *Journal Infancy*.
- Kirby Deater-Deckard (Psychology) was elected Fellow of the Association for Psychological Science.
- Robert B. Moore (Chemistry) was elected 2009 Vice-Chair (and 2010 Chair) of the American Chemical Society Polymer Division.
- Nancy Ross (Geosciences) was elected President of the Mineralogical Society of America.
- Kenneth Eriksson (Geosciences) was inducted as Fellow of the Geological Society of America and received an Honorary Doctorate from the University of Pretoria in South Africa.
- Richard Turner (Chemistry) was named the 2008 winner of the American Chemical Society Division of Polymer Chemistry's Industrial Polymer Scientist Award.

NSF CAREER Award Recipients



Lou Madsen
Chemistry



Theresa Reineke
Chemistry



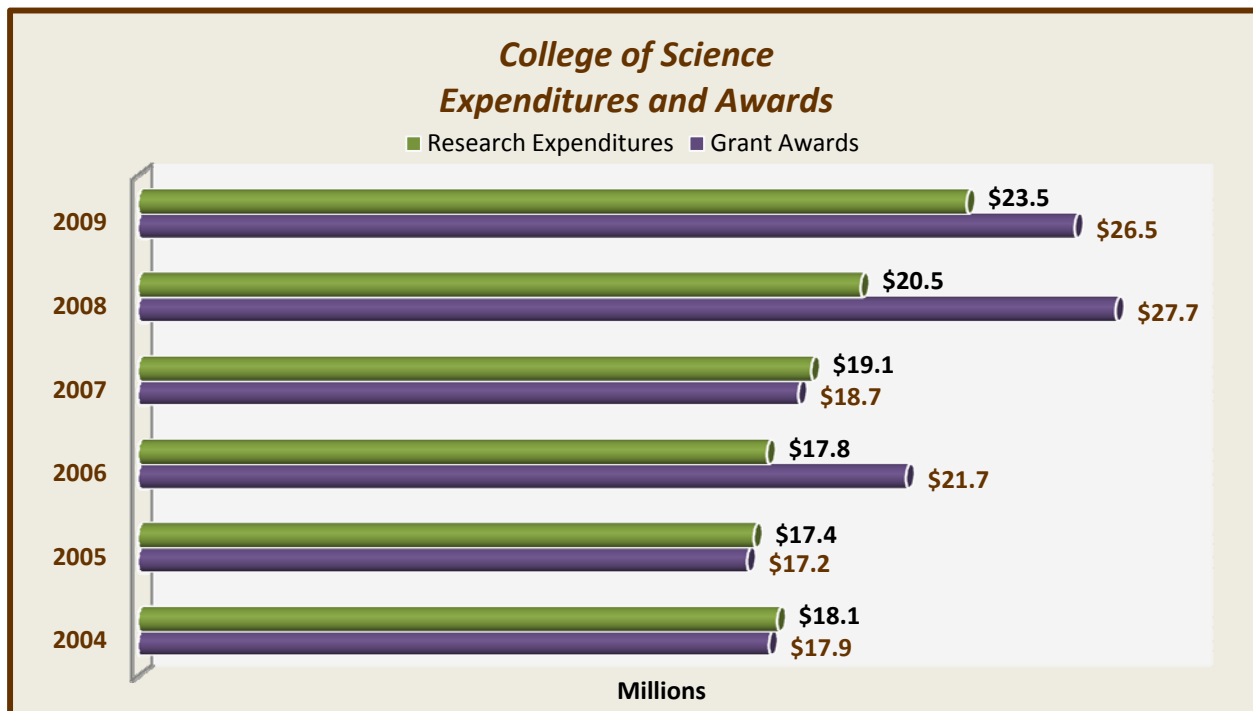
Edward Valeev
Chemistry

- John Tyson, University Distinguished Professor (Biological Sciences), was elected as an associate member of the Royal Academy of Belgium.

Research Productivity

The College of Science reached a record-high growth in research expenditures to \$23.5M in FY09, a 14.7% increase from FY08. The number of awards continues

to show a steady increase from 258 in FY08 and to 281 in FY09. Overall, the sponsored awards in the College of Science totaled \$26.5M, a slight drop from the record-high growth in FY08 of \$27.7M. The Department of Mathematics doubled its research funding in FY09 and the Department of Physics showed a 36% increase.



Notable research awards in FY09

- The NIH awarded a five-year research grant for a total of \$3.6 million to Paul Carlier (Chemistry) and a team of VT researchers to develop vector-specific, resistance-breaking insecticides to reduce malaria transmission.
- Michael Hochella (Geosciences) led a Virginia Tech team as part of a consortium of nine schools competing for a multi-million dollar grant to form a national Center for the Environmental Implications of Nanotechnology (CEIN). Total funding for the project is \$14 million over five years with an opportunity to review for another five. Virginia Tech's portion of the grant is \$1.75 million.

- The NIH renewed a five-year research grant for a total of \$2.5 million to an international biodiversity group led by David Kingston (Chemistry). The grant was accompanied by a companion award for the United States Department of Agriculture of \$1.25 million over the next five years.
- Roderick Jensen (Biological Sciences) was awarded \$630K in FY09 to analyze genomic regions associated with diabetes.
- John Hole (Geosciences) was awarded \$755K in FY09 to study the continental margin between eastern Oregon and western Idaho.

The College of Science continues to explore and foster new opportunities for collaborative and interdisciplinary research:

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- ▶ Harry Dorn (Chemistry) has developed a new area of fullerene chemistry that may be the backbone for development of molecular semiconductors and quantum computing applications. Dorn has figured out how to put atoms inside the 80-atom buckyball molecule, resulting in a new, more sensitive MRI material and a vehicle to deliver radioactive atoms for applications in nuclear medicine.
 - ▶ In energy-related research, Randy Heflin's (Physics) research contributes to the development of novel, non-silicon based solar cells. In Chemistry, Jim McGrath, Bob Moore, and Lou Madsen (Chemistry) are working on various aspects of fuel cell technology and Karen Brewer (Chemistry) is working on hydrogen production using sunlight and water. Vicki Soghomonian (Physics) is developing new materials for energy storage. Bruce Vogelaar (Physics) is leading an initiative to develop a new nuclear reactor design, GEM*STAR. If successful, this design would solve many serious problems, such as proliferation of weapons-grade fuel and nuclear waste disposal.
 - ▶ In computational research, Scott King and Ying Zhou of Geosciences have built a new computational cluster to study the Earth and planetary interiors. The High-Performance Earth Simulation System (HESS) consists of 96 Dell 1950 servers and is 1,000 times more powerful than a typical home PC. Scott King's research on Mars will be tested by gravity and topographic data from the MESSENGER (Mercury Surface, Space Environment, Geochemistry, and Ranging) mission of NASA.
 - ▶ Liwu Li (Biological Sciences) leads a research program on inflammation that focuses on system network analyses of human inflammatory processes using biological, chemical, computational, and structural approaches. Participating faculties across the campus include Biological Sciences and Chemistry, Virginia Tech-Wake Forest School of Biomedical Engineering, Human Nutrition and Health, Biomedical Sciences and Pathobiology, as well as the Virginia Bioinformatics Institute. With close ties with neighboring medical schools such as Wake Forest, Georgetown, Virginia College of Osteopathic Medicine, as well as the Carilion Clinic, research groups are performing translational investigations unraveling system networks underlying numerous human inflammatory diseases.
 - ▶ The Kimballton Underground Research Facility (KURF) continues to grow. Four universities (Duke, NCSU, UNC, and Virginia Tech) currently conduct experiments in KURF. Duke and UMD/NIST have requested additional space starting this fall. Princeton University has expressed interest in locating an Argon detector at KURF. A Users Group is being formed, and a shared cost structure to cover access, utilities, and a possible expansion of the facility is under discussion.
 - ▶ John Burns (Mathematics) is developing rigorous and practical computational algorithms for the design, control, and optimization of engineering and biological systems, ranging from large space structures to microscopic viruses. As Burns notes, "The mathematics used to predict how air flows over the wings of a tiny micro-airplane is similar to that needed to understand and control the immune response to cancer cells."
 - ▶ David W. Harrison and Joseph Carmona (Psychology) partnered with David B. Trinkle, VTC assistant dean for medical education and an associate clinical professor of psychiatric medicine, to investigate "Falling Risks in the Elderly: A Functional Cerebral Systems Approach to Vestibular Function." The neuroscience research project addresses how the body receives and processes information in order to maintain equilibrium or balance.
 - ▶ David Popham and Stephen Melville (Biological Sciences) partnered with Charles Schlepner, VTC professor of internal medicine and director of the Carilion Clinic infectious disease fellowship program, received funding from Carilion to develop "Improved Decontamination of *Clostridium difficile* spores." *C. difficile* can cause disease when antibiotics kill other bacteria of the gut that keep *C. difficile* in check. Spores
-

produced by *C. difficile* tolerate extreme conditions that most bacteria cannot tolerate. The research will determine optimum conditions for stimulating spore germination, which renders the bacteria sensitive to many antimicrobial treatments.

Institute for Advanced Study

The Institute for Advanced Study (IAS), established by the College of Science, is an initiative in the College of Science to foster an interdisciplinary research community. The IAS engages faculty at all levels to identify emerging opportunities at the frontier of science, to develop teams, and to catalyze new research activities.

Senior Research Fellows bring leadership in new areas to the College of Science:

- Richard Blankenbecler, Professor Emeritus, Stanford Linear Accelerator Center (SLAC) is working with John Robertson (College of Veterinary Medicine) to investigate a modified radiation treatment sequence in order to mitigate some of the deleterious effects of X-ray cancer radiation treatment.



Blankenbecler

- Seong Ki Mun, Professor of Physics, is leading a university-wide initiative in the field of neuroscience to develop a comprehensive, multidisciplinary approach to human neuro-performance that involves imaging, bioinformatics, nanotechnology, and supercomputing. Imaging reveals the structural and functional health of the nervous system and enables us to observe many pathways of neurological activities. Bioinformatics shows the proteins, genes, and networks which govern the actions of all living



Mun

cells. Nanotechnology forms the basis for advanced bio-implants which will be able to monitor performance, sense problems, and take corrective actions. Supercomputing ties all of these elements together.

The IAS also supports visiting fellows, seminars, workshops, and lecture series such as the Developmental Sciences Colloquium, the series of neuroscience lectures and the fourth annual Structural Biology Symposium.

Engagement

The College of Science is committed to engaging its intellectual assets to address economic and social needs of communities around the commonwealth, the nation, and the world. Faculty members and students in the College of Science are extensively involved in outreach and service. The involvement ranges from interactions with K-12, to short courses and workshops for students and professionals, to newsletters and media presentations, and to service in professional societies and governmental and non-governmental agencies. Faculty members in the college hold more than 100 editorships or associate editorships on professional journals and many serve on editorial boards. Faculty members also serve on numerous review panels at federal agencies and foundations for grant selection.

Economic vitality

The College of Science connects innovations in the scholarship of learning, discovery, and engagement to the economic well-being of individuals, families, businesses, and communities. Central to this goal are entrepreneurial initiatives advancing technology transfer, intellectual property, and the transfer of knowledge in domestic and international partnerships.

- Dow Water Solutions, a global leader in water purification, seawater desalination, contamination removal, and water reuse solutions, has reached a multi-year joint development partnership with a Virginia Tech team led by James McGrath (Chemistry) and the University of Texas at Austin on the research and development of

oxidation-resistant reverse osmosis (RO) membranes.

- ▶ AstraZeneca has licensed a portfolio of preclinical Triple Reuptake Inhibitor (TRI) compounds for depression. Paul Carlier (Chemistry) and the Mayo Clinic collaborated to discover the compounds. The agreement provides AstraZeneca with a global license for all uses of the compounds, as well as exclusive manufacturing and commercial rights. It also establishes a research collaboration that will focus on jointly generating additional novel TRI compounds.
- ▶ Oxford Diffraction Ltd. (ODL), now part of Varian Inc., installed a new state-of-the-art x-ray diffractometer, "SuperNova," worth \$500,000 in the VT Crystallography Laboratory. The lab has been the North American reference site for ODL since 2002 and ODL moved its corporate North American Headquarters to the CRC in 2006. The VT-ODL partnership has leveraged new instruments and upgrades from ODL worth \$2.2M with full service and warranty contracts and cash sponsorship totaling an additional \$100,000 per annum.
- ▶ The Statistics Department continued the very successful Corporate Partners program and added one new member bringing the total to ten members (BD, Capital One, DuPont, Eli Lilly and Company, General Electric, J.P. Research, Minitab, Pratt and Whitney, R.J. Reynolds, SAS).
- ▶ In 2008-09, Biological Sciences' new public-private partnership to advance biotech in the Mid-Atlantic region (VT BioSPIRE) developed formal relationships with four corporate partners.
- ▶ The Virginia Tech Seismological Observatory (VTSO) housed in the Department of Geosciences provides technical guidance to utilities and their consultants on issues of earthquake engineering and seismic hazard for sites in the eastern United States. Data from the VTSO seismic network operation is compiled and distributed for hazard assessment and mitigation. VTSO also provides information used by state and federal agencies such as MSHA, as

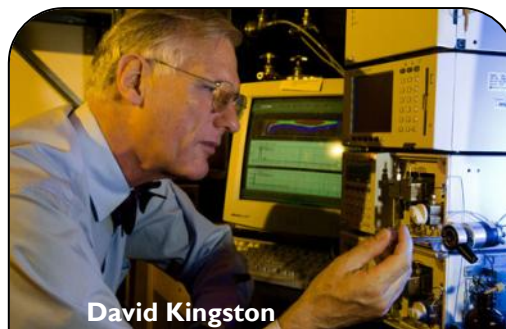
well as mining companies, such as Consolidated Coal, Inc.

- ▶ Richard Turner (Chemistry), Director of the Macromolecules and Interfaces Institute (MII) organized a successful one-day workshop on "Enabling Nanomaterials for Advanced Drug Delivery" to introduce Southwest Virginia medical, materials, and business communities to the potential and current practice of materials medicine.

International education and research

The College of Science is committed to fostering communities that value all cultures, languages, lands, and people. International collaborations will include the establishment of research and education centers and the expansion of study abroad.

- ▶ David Kingston (Chemistry) is known internationally for his work in biodiversity and development of naturally occurring cancer-fighting agents. Consistent with the *Convention on Biological Diversity*, he will share a portion of any royalties generated by sales of pharmaceuticals developed from this work with Madagascar, the country in which the research is taking place.



David Kingston

- ▶ Djavad Salehi-Isfahani (Economics) worked with the Middle East Youth Initiative combining elements of research, outreach and policy advice. The initiative aims to address the fact that countries of the Middle East share high unemployment rates among their youth and extremely long waiting times for permanent jobs, despite huge differences in economic prosperity. He was also invited as a participant in the Doha Summit, Young People and Employment in the Arab World, Doha, QATAR. This was the first

meeting of Silatech, an organization launched with a \$100 million grant from the government of Qatar to promote youth education and employment in the Arab World through research and training.

- Aris Spanos (Economics) was a visiting scholar at Nuffield College, Oxford, U.K.
- Tatsu Takeuchi (Physics) was invited by the newly-created *Institute for the Physics and Mathematics of the Universe* at the University of Tokyo. He learned about new cosmic ray data collected by the PAMELA and ATIC experiments which could be evidence for the existence of a heretofore unknown dark matter particle.
- Tetsuro Mizutani (Physics) was part of a team of US physicists invited to visit the University of Hue (Vietnam) in June 2009. He taught a course on quantum mechanics to Hue students.
- The Virginia Tech Crystallography Laboratory hosted a number of research visits by faculty from across Europe, including the Bayerisches Geoinstitut, Germany; University of Milan, Italy; University of Perugia, Italy; Universitaet Hamburg, Germany; and the University of Durham, England.
- The International Travel Grant Supplement (ITGS) program helped support nine faculty in the College of Science to travel and give presentations in China, India, Mexico, France, Germany, and the United Kingdom.

PK-12 Education in Science, Technology, Engineering, and Mathematics (STEM)

This goal is achieved through multi-disciplinary research partnerships, teacher preparation, professional development opportunities for PK-12 educators, and programs connecting PK-12 to STEM undergraduate programs.

- One of the most active K-12 programs in the college is led by Mike Rosenzweig (Biological Sciences) in collaboration with Llyn Sharp, Outreach Coordinator for Geosciences. They run a Science Outreach program (SOuP) that focuses on K-12 teacher training, and value added to sponsored research proposals

(<http://www.socm.vt.edu/>). Llyn is also a trainer for national earth and environmental science programs including GLOBE (www.globe.gov), Project WET (www.projectwet.org), and Save Our Streams (www.vasos.org).

- The fourteenth annual "Women in Mathematics: Career Day at Virginia Tech" attracted approximately 250 sixth graders from 23 schools for an intergenerational, multimedia, mathematical celebration.
- Reinhard Laubenbacher (VBI and Mathematics) spearheaded the initiative, Kids' Tech University (KTU), which is a groundbreaking program for kids between the ages of 8 and 12. The program gives children the opportunity to participate in a series of engaging scientific activities, including lectures presented by scientific researchers who also have a strong track record in communication and teaching science. The goal is to expose kids early to cutting-edge research in science, math, engineering, and technology in a setting designed so that children will be both engaged and entertained.
- The Museum of Geosciences provides special programs and exhibits to public school children, community organizations and the general public. Sarah Windes (*shown in the photo below*), who heads up tours, is the recipient of the 2009 Digman Award from the Eastern Section of the National Association of Geoscience Teachers (NAGT) for her excellence in presenting geosciences information to the public.



- The Massey Herbarium, under leadership of Curator Tom Wieboldt (Biological Sciences) provides access to visitors using the collection,

the majority from outside the university community. The museum helps document declines in plant collecting and concordant loss in biodiversity information.

- ▶ Chemistry's outreach to K-12 reached over 8,000 students in the past seven semesters and trained over sixty teachers in workshops.
- ▶ The College of Science and the College of Engineering organized Spring 2009 Science and Technology Series on "Energy and the Environment" for 50 students from the Johns Hopkins Center for Talented Youth (CTY).
- ▶ Wayne Patty (Mathematics) continued his outreach to in-service public school teachers through the National Science Foundation Local Systemic Change grant, "Systemic Reform of Mathematics K-5 for Virginia."
- ▶ The Virginia Tech Regional Mathematics Contest, in its thirtieth year, continued to grow, with participation by 398 students from 74 colleges. The contest is now international, with participants ranging from Harvey Mudd College to The University of Prince Edward Island.

Community and student engagement

The College of Science serves the local community through many outreach efforts. Undergraduate and graduate students have opportunities to engage in service-learning and civic activities. These opportunities amplify student learning and build professional skills to strengthen student academic careers and professional development.

- ▶ The Psychological Services Center and Child Study Center, graduate training clinics for doctoral psychology students, provided psychological assessment and treatment services to more than 100 community residents.
- ▶ The Physics Outreach team continues to thrive. Participating undergraduates in the team return to their studies with more enthusiasm and motivation. The "Outreach Team" is frequently invited to support on-campus outreach events, such as the Johns Hopkins "Center for Talented Youth" programs, the College of Engineering

"Engineering Camp," and the "Higher Achievement" initiative.

- ▶ Graduate students from the Department of Biological Sciences volunteered their time to act as judges for the 7th Annual Science Fair at Gilbert Linkous Elementary School in Blacksburg. They also shared their knowledge with the nearly seventy students from grades K through 5.
- ▶ Jean Heremans and Vicki Soghomonian (Physics) are developing a collaboration with Salem High School on cross-departmental as well as scientific outreach to high school students. They are also building an outreach pipeline to the Southwest Virginia Higher Education Center in Abingdon, Va. These activities are part of a partnership with the VT-STEM group and a MRSEC/STC proposal initiative to create a Center for Design and Delivery of Macromolecular Therapeutics.
- ▶ Oil and gas as well as precious and base metal companies continue to recruit in the Department of Geosciences. Among the companies that visited the department in fall 2008 include: Exxon Mobil, BP, Cabot Oil and Gas, Chevron, Conoco Phillips, Hess, Stillwater Mining, Riotinto Mining, Baker Hughes, and Schlumberger.
- ▶ The Laboratory for Interdisciplinary Statistical Analysis (LISA), part of the Department of Statistics, is directed by Eric Vance. The statistical consultants of LISA, mostly graduate students, provide assistance with experimental design, data analysis, interpretation of results and statistical software to university faculty, staff and fellow graduate students on academic research projects.

Outreach Award

John Simonetti (Physics) received the 2009 College of Science Outreach Excellence award for his engagement with the general public, through the media, the internet, community organizations, and the school system to make astronomy the most



fascinating subject in the world. Some of John's activities reach far beyond Blacksburg and Virginia Tech. He constantly upgrades his *Sky Image Processor*, *SIP* (<http://www.phys.vt.edu/~jhs/SIP>), which is a unique web-based astronomical image processing and analysis system. Written for students, the program has been used in research, teaching, and outreach. Visitors to the website include nearly all major universities in the United States, many major international universities, observatories, and national research institutions. SIP is also used in outreach/teaching programs at national observatories.

Alumni Relations

The College of Science (COS) Alumni Relations office serves as the primary linkage to the 25,000+ college alumni and promotes the welfare of the college by cultivating a mutually beneficial relationship between the college and its family of alumni. Planning, implementing, and promoting college and departmental programs and events locally, regionally, and nationally, achieves our goal of enabling our alumni to communicate and interact with the COS faculty, administration, students, and friends of the college. In addition, the COS Alumni Relations team represents the college and assists the Virginia Tech (VT) Alumni Association at various Alumni Association functions throughout the year thus broadening our alumni connections.

Activities, Events, and Involvement

September 2008

- College of Science Homecoming – September 6, 2008
- Fall Focus Career Fair and Reception – September 10, 2008
- Department of Statistics – Alumni Visit (Gibbons) – September 27, 2008

October 2008

- College of Science Pre-Game Tailgate – October 4, 2008
- College of Science Fall Roundtable Meeting – October 24 – 26, 2008



Fall 2008 Roundtable Pig Pickin' held at the College of Science's Institute for Advanced Study

November 2008

- Department of Geosciences Alumni Dinner – November 8, 2008

December 2008

- College of Science Commencement Breakfast – December 19, 2008

February 2009

- Seniors Movin' On – February 11, 2009
- Biological Sciences Board Meeting and Research Day – February 21, 2009
- VT Alumni Association Faculty Appreciation Reception – February 26, 2009

March 2009

- "Fun with Physics," Northern Virginia Center – March 1, 2009
- Directions Career Fair – March 17, 2009
- Department of Physics Alumni Reception, Pittsburgh, PA - March 17, 2009
- Virginia Tech Day, Richmond VA – March 28, 2009

April 2009

- Virginia Tech Day, Southside, Tidewater, Falls Church VA – April 4 – 5, 2009
- Department of Physics Award Ceremony – April 10, 2009

- ▶ College of Science Spring Roundtable Meeting – April 17 – 29, 2009
- ▶ College of Science Spring Scholarship Celebration – April 18, 2009

May 2009

- ▶ College of Science Commencement Reception – May 15, 2009
- ▶ College of Science Departmental Commencement Ceremonies – May 16, 2009
- ▶ Old Guard College of Science Breakfast – May 21, 2009

June 2009

- ▶ Caldwell March – Phase II – June 6, 2009
- ▶ Virginia Tech Wine Festival – June 13, 2009

Activities and Involvement in Planning for 2009–2010

- ▶ New Student Orientation – July 14, 2009
- ▶ Department of Chemistry Polymer Symposium – July 16 – 18, 2009
- ▶ Department of Statistics 60th Anniversary Dinner, Washington DC – August 2, 2009
- ▶ Bringing Science to Market – fall 2009/spring 2010
- ▶ College of Science Pre-Game Hospitality Tents – September 19, 2009
- ▶ Fall Focus Career Fair and Reception – October 1, 2009
- ▶ Hahn Hall North Dedication and Celebration Ceremony – October 16, 2009
- ▶ College of Science Fall Roundtable Meeting – October 16 – 19, 2009
- ▶ College of Science Homecoming – October 29, 2009
- ▶ Department of Geosciences Alumni Dinner – November 2009
- ▶ College of Science Commencement Breakfast – December 18, 2009
- ▶ Directions Career Fair – spring 2010
- ▶ “Fun with Physics” – spring 2010
- ▶ Seniors Movin’ On – spring 2010
- ▶ College of Science Spring Roundtable Meeting – April 15 – 18, 2010

- ▶ College of Science Scholarship Celebration – April 18, 2010
- ▶ Department of Physics Awards Ceremony – April 2010
- ▶ College of Science Commencement Reception – May 14, 2010
- ▶ College of Science Commencement Departmental Ceremonies – May 15, 2010
- ▶ Old Guard College of Science Breakfast – May 20, 2010
- ▶ Department of Biological Sciences Alumni Advisory Board – spring 2010
- ▶ Local, regional, and national Development/Alumni events – Dates TBD

Alumni Honors and Awards

Each year the Alumni Association honors recent alumni from each academic college who have graduated in the past ten years. The College of Science selected Dr. Kevin M. Rosso (Geosciences '98) and Dr. John F. Berry (Chemistry '00) as our 2008 – 2009 College of Science Outstanding Recent Graduate Alumnus and College of Science Outstanding Recent Undergraduate Alumnus, respectively.

Two longstanding members of the COS Dean’s Roundtable Advisory Board, Marni Byrum (Political Science '76) and Patricia Caldwell (Mathematics '71), were both honored at the May Commencement with one of the university’s most eminent distinctions, the 2009 Alumni Distinguished Service Award. The annual awards recognize outstanding service to the university and the Virginia Tech Alumni Association.

2009 Alumni Distinguished Service Awards



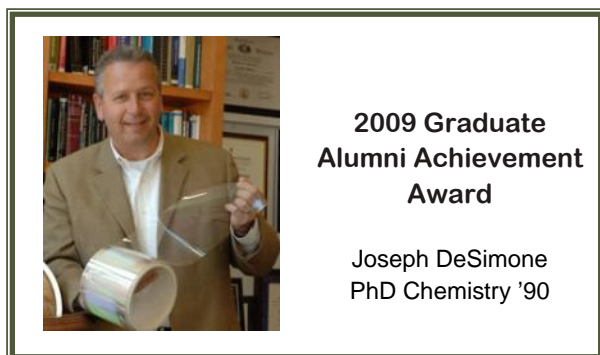
Marni Byrum



Pat Caldwell

Members of the College of Science Dean’s Roundtable

Alumnus Joseph DeSimone (PhD Chemistry '90) received the 2009 Graduate Alumni Achievement Award at the May Graduate Commencement for his exceptional accomplishments as a scholar and an innovator. He currently holds two chaired professorships: the chancellor's eminent professor of chemistry at the University of North Carolina at Chapel Hill (UNC), and the William R. Kenan, Jr. professor of chemical engineering at North Carolina State University. An accomplished researcher and inventor, DeSimone has published more than 240 scientific articles and has 115 patents with 120 patents pending. His projects range from bio-absorbable stents to an environmentally friendly process for the creation of high performance plastics.



The year 2009 – 2010 offers exceptional opportunities and challenges for the Alumni Relations office. With ensuing budget constraints being faced by the University and the individual colleges, it is imperative to find methods of connecting with our alumni without large monetary commitments while also achieving the objective of actively involving alumni with the college. This challenge is one that can be met by enhancing the already existing alumni programs, utilizing creatively the medium of email and the college and departmental websites, taking advantage of opportunities where the Dean and faculty will be participating in on- and off-site university and departmental events, working closely with the Development office to coordinate events, and following effectively our mission statement.

Development

The Development Office in the College of Science continue its missions of connecting alumni to the college and its departments through personal and professional involvement both on and off campus and through private and corporate giving.

The college began the fiscal year with a campaign fundraising total of \$55.7 million and completed the fiscal year with a fundraising total of \$82.3 million. This represents an increase of more than \$26.6 million and the college's most successful campaign year ever. Significant gifts were designated to several endowments supporting undergraduate scholarships, graduate fellowships, and faculty positions. Notable leadership gifts were made to the college's Chemistry Department and two capital projects—the Chemistry/Physics Building and the Geosciences Discovery Center.

Summary of development activities and initiatives

- In October 2007, Virginia Tech announced the national, public phase of its \$1 billion fundraising campaign. The campaign is scheduled to conclude on December 31, 2010. The College of Science exceeded its new campaign goal of \$62 million in December 2008.
- The college secured over \$26.6 million pledged commitments of support from generous alumni and donors and, at the close of this fiscal year, achieved more than 132.9 percent of its campaign goal.
- The college received its highest pledged gift commitment in its history—an \$18 million pledged commitment of cash designated for the new Geosciences Discovery Center.
- The college participated in regional campaign events located in Northern Virginia, Raleigh/Durham, Greensboro/Winston Salem, and San Francisco.
- The development office in the college managed all its activity within its operating and development budgets for the fiscal year.

- Jenny Orzolek was appointed as the new Director of Development for the College of Science in June 2009.



Jenny Orzolek

Corporate and Foundation Relations

The corporate and foundation relations office continues to strengthen existing relationships while also aligning our objectives with many philanthropic foundation priorities. Corporate and foundation relations office experienced mixed results in FY2009. The nation-wide economic recession put several projects on hold while many unanticipated opportunities presented themselves. Above all, we had a successful year with many major in-kind gifts including new analytical instruments. The outlook continues to be uncertain as the recession continues. We thank our alumni and friends as they continue to be our biggest champions in making the right connections for corporate philanthropy, research, recruiting and taking advantage of corporate matching programs.

Highlights of corporate and foundation activities

- Corporate partners programs continue for the Biological Sciences, Chemistry, and Statistics departments. The Department of Biological Sciences continues to strengthen and adapt VT BioSPIRE. The Department of Chemistry MII Review was attended by 11 major companies interested in cutting edge polymeric discoveries and techniques. The Department of Statistics continues building its relationships with BD Diagnostics, CapitalOne, DuPont, Eli Lilly, GE, JP Research, Minitab, Pratt & Whitney, and SAS.
- The Department of Geosciences continues to be recognized and supported for its top status in geology and geophysics by BP, Cascade Minerals, Chevron, ConocoPhillips, and Fairfield Industries. These fellowships and in-kind donations provide

the tools to attract top intellectual talent and provide hands-on curriculum.

- The X-ray Crystallography Laboratory held the 4th Annual Structural Biology Symposium sponsored by Oxford Diffraction (now a part of Varian) and the university's College of Science, Departments of Biological Sciences, Biochemistry, Chemistry, Molecular Cell Biology & Biotechnology, Physics and Geosciences. Some of the work cited was made possible through in-kind donations by Merck and PPD.

Communications

The communications goal for the 2008-09 year was to increase awareness of the college among identified target audiences. The college's communications plan included utilizing specific tools in the areas of publications, electronic communications, and media relations to enhance awareness of the renowned learning, discovery, and engagement being carried out within the college and the university.

This year, special emphasis was placed on analyzing results of various communications strategies using Google Analytics to determine trends and effectiveness of these efforts.

Publications

The fall 2008 and spring 2009 issues of the College of Science Magazine featured faculty, staff, and student accomplishments along with updates on some of the most notable research projects underway in the college. The magazine is distributed to 25,000 college alumni, donors, faculty members, and friends of the college.

Current and past issues of the magazine can be found on the College of Science website at: <http://www.science.vt.edu/news/magazine/index.html>.

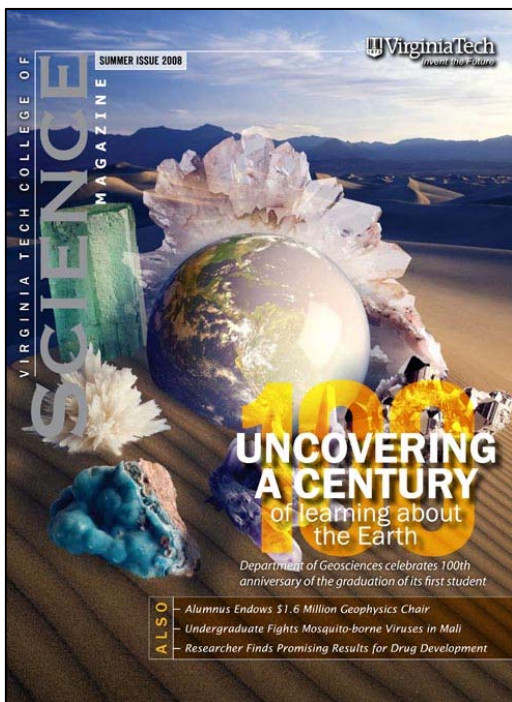
Total unique page views (UPVs) for the online versions of the magazine during 2008-2009 was 345.

For a more qualitative evaluation of the success of the magazine, a reader survey was conducted among members of the college's Roundtable, and an in-depth critique was conducted by Gail Kent, MFA, ABC

executive editor of the cultural arts magazine, *Hampton Roads Bravo!* Both evaluations yielded

constructive comments and suggestions, many of which will be incorporated into future issues.

2008-09 College of Science Magazines



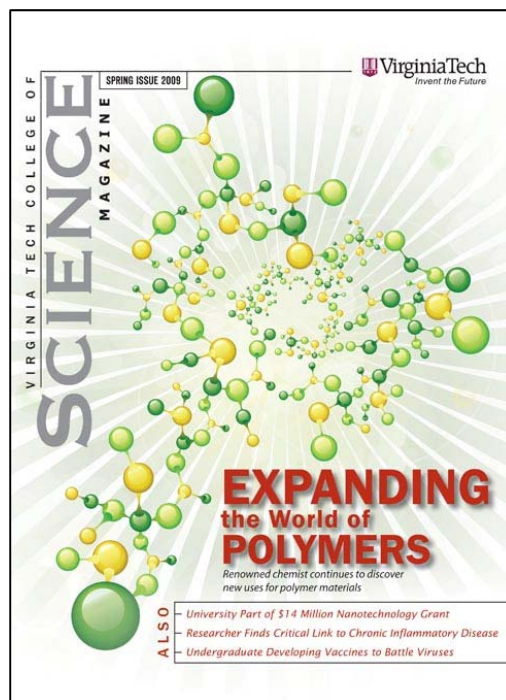
“Uncovering a Century of Learning about the Earth”

In addition, articles about neutrino research in the Department of Physics and nano-geo-particle research by University Distinguished Professor of Geosciences (UDP), Michael F. Hochella, were featured in the Virginia Tech Research Magazine.

Electronic Communications

Four faculty members from the college were featured in the Virginia Tech Spotlight on the university's homepage:

- University Distinguished Professor of Psychology, Thomas Ollendick and his research on oppositional and defiant behavioral disorder in children (2,510 UPVs for May 2009, third highest Spotlight for the month).



“Expanding the World of Polymers”

(http://www.vt.edu/spotlight/impact/2009-05-04_oddstudy/2009-05-04_oddstudy.html)

- John Simonetti (Physics) and his research on string theory and the possibility of a fourth dimension in space (1,415 UPVs in March 2009, fifth highest Spotlight for the month). (<http://www.vt.edu/spotlight/innovation/2009-03-23-dimension/2009-03-23-dimension.html>)
- University Distinguished Professor of Chemistry, David Kingston and his research on natural products that can be used for the effective treatment of cancer (2,916 UPVs for January 2009, highest number of spotlight page views for the month). (http://www.vt.edu/spotlight/achievement/2009-01-05_kingston/2009-01-05_kingston.html)
- The Department of Geosciences' centennial celebration (2,268 UPVs in October 2008,

second highest for the month).
<http://www.vt.edu/spotlight/achievement/2009-03-09-geosciences/2009-03-09-geosciences.html>

Communications Manager Catherine Doss worked with the Office of Alumni Relations to create a Hokie Nation Network page for College of Science alumni and friends.

<https://virginiatech.affinitycircles.com/virginiatech/groups/33341/view>

The college's web site was evaluated by industry expert Rob Pongsajapan, new media director for the Center for New Designs in Learning and Scholarship at Georgetown University. A number of his comments will be incorporated into ongoing site development and updates, where appropriate.

Media Relations

Dozens of media hits cited one or more of the college's departments in local, state, and national news outlets. Several hits were particularly noteworthy:

- ▶ Djavad Salehi-Isfahani (Economics) and his expertise on Iranian politics and economics were featured in the *New York Times*, *Washington Post*, *Time Magazine*, and *National Public Radio*.
- ▶ Tom Ollendick (Psychology) and his research on child phobias were featured along with one of his former study participants in *People Magazine*.
- ▶ Liwu Li (Biological Sciences) and his latest discoveries about a key protein molecule and its potential link to human inflammatory diseases were featured in *Science Daily*.
- ▶ James Spotila (Geosciences) and his research about global erosion and plate tectonics also were featured in *Science Daily*.
- ▶ John Tyson (Biological Sciences) and his studies on molecules in cell division were featured in an issue of *Science News*.
- ▶ David Kingston (Chemistry) and his research into natural products and potential pharmaceuticals were featured in *Medical News Today*.

Public Relations

Communications Manager Catherine Doss met individually with each of the college's department heads to exchange ideas about effective communications between departments and the dean's office. Also discussed were new COS web site features and ideas for possible stories to pitch to national media.

Diversity

COS Diversity Committee

The College of Science Diversity Committee was chaired by Anne McNabb (Biological Sciences) and members were Russell Jones (Psychology), Bob Rogers (Mathematics), Madeline Schreiber (Geosciences), Chris Thomas (Physics and representing staff), Judy Riffle (Chemistry), Marlow Lemons (Statistics), and Jack Finney (COS and ex officio member).

The committee's overall goals are:

- ▶ To promote greater diversity among faculty, staff, graduate students, and undergraduate students in COS by promoting active recruiting strategies. This includes providing information to departments and helping develop strategies for recruitment.
- ▶ To promote a climate of openness and acceptance for all in COS.

During the past year, the members of the Committee:

- ▶ Continued communication with the focus area groups--undergraduate pipeline activities, graduate recruitment, and faculty recruitment.
- ▶ Met with Manuel Perez-Quinones, Associate Dean of the Graduate School, to develop a visitation plan to HBCUs to promote faculty collaborations and student recruitment for graduate programs.
- ▶ Participated in a wide range of activities promoting diversity at Virginia Tech, including events sponsored by the Office of Equity and Inclusion and *AdvanceVT*.

Diversity Highlights

- ▶ The Department of Mathematics hosted its 14th annual Women in Mathematics Career Day.
- ▶ Departments in the college are active participants in MAOP, VT PREP, VT-AMP and the McNair Scholars program. Jill Sible (Dean's Office) serves as Co-Principal Investigator of the VT PREP program. Jack Finney (Dean's Office) serves on the McNair Advisory Board.
- ▶ The Department of Economics recruited Eric Bahel, who is a native and citizen of Cameroon. The department also hired Gebremeskel Gebremariam, a native of Eritrea, as a full time instructor.
- ▶ The Department of Psychology recruited Bethany Bray, who will join the faculty as assistant professor in August 2009, increasing the number of women faculty members in the department to eight.
- ▶ Nancy Ross (Dean's Office) served as College Liaison for *AdvanceVT*. She met with all candidates for faculty positions during their campus visits and hosted several gatherings for women faculty members.
- ▶ Beate Schmittmann (Physics) and Roseanne Foti (Psychology) served as *AdvanceVT* Professors and Nancy Ross and Jack Finney served on the *AdvanceVT* Leadership Team.
- ▶ Jack Finney chaired the *AdvanceVT* Department Climate Committee, and Joe Merola (Chemistry) and Carla Finkelstein (Biological Sciences) served as committee members. The committee provided several workshops and presentations to the university community.
- ▶ Eileen van Aken (Industrial and Systems Engineering) and Jack Finney met with the deans and department heads from each college to present the survey results from the 2008 Department Climate Survey conducted by *AdvanceVT*.
- ▶ Two faculty members in Mathematics are active in programs designed to enhance higher education in Africa.
- ▶ The Department of Psychology supports a chapter of the Association of Black Psychologists,

which has strong undergraduate and graduate participation.

- ▶ The "Ladies of Robeson" in the Department of Physics is an active group of female students and faculty who meet for networking, organize alumni events, and invite visiting speakers. The intent is to promote the success and networking.
- ▶ Kelly Oaks (Office of Equity and Inclusion) and Jack Finney met with the four department faculty search committees to review "best practices" for hiring procedures that promote successful searches. Topics included unconscious bias, questions to ask and questions not to ask, family friendly policies, and general HR procedures.
- ▶ Several faculty from the college participated in events designed to promote multiculturalism and diversity, including the January Advancing Diversity conference, the Fourth Annual Multicultural Luncheon, and Cranwell Center activities.
- ▶ Biological Sciences hosted an annual international luncheon for faculty, staff, and students.
- ▶ Judy Riffle (Chemistry) spearheaded the establishment of Virginia Tech's participation in the Virginia/Nebraska Alliance for Minority Participation.
- ▶ Joe Merola (Chemistry) served on the VA/NC Alliance for Minority Participation Advisory Board.

Diversity Award



Anne McNabb, Professor of Biological Sciences, was awarded the 2009 College of Science Diversity Award

Faculty Spotlights

<p>John Simonetti PHYSICS Wine Award COS Outreach Award Certificate of Teaching Excellence</p>	<p>Nancy Ross GEOSCIENCES Elected President of the Mineralogical Society of America</p>	<p>Fred Read GEOSCIENCES 2009 Grover Murray Outstanding Educator Award American Assn of Petroleum Geologists</p>	<p>Ann Stevens BIOLOGICAL SCIENCES Alumni Award for Excellence in Teaching</p>
<p>Reinhard Laubenbacher MATHEMATICS Vice President for Science Policy Society for Industrial and Applied Mathematics</p>	<p>Richard Turner CHEMISTRY American Chemical Society Division of Polymer Chemistry's Industrial Polymer Scientist Award for 2008</p>	<p>Tom Ollendick PSYCHOLOGY Elected President of the Society for a Science of Clinical Psychology</p>	<p>T. S. Roger Chang PHYSICS Sporn Award for Excellence in Teaching Introductory Engineering Courses</p>
<p>Anne McNabb BIOLOGICAL SCIENCES College of Science Diversity Award</p>	<p>Barbara Bekken GEOSCIENCES Certificate of Teaching Excellence</p>	<p>Edward Valeev CHEMISTRY NSF CAREER Award Sloan Research Fellowship</p>	<p>Louis A. Madsen CHEMISTRY NSF CAREER Award</p>
<p>Kirby Deater-Deckard PSYCHOLOGY Elected Fellow of the Association for Psychological Science</p>	<p>John Tyson BIOLOGICAL SCIENCES Elected Associate Member of the Royal Academy of Belgium</p>	<p>Scott Geller PSYCHOLOGY 2009 APF Gold Medal Award for Life Achievement in Psychology in the Public Interest</p>	<p>Harold McNair CHEMISTRY LCGC Award for Lifetime Achievement in Chromatography</p>
<p>Robert B. Moore CHEMISTRY Elected Vice-Chair of the ACS Polymer Division</p>	<p>Ken Eriksson GEOSCIENCES Inducted as Fellow of the Geological Society of America</p>	<p>Theresa Reineke CHEMISTRY NSF CAREER Award Sloan Research Fellowship Cottrell Scholar Award</p>	<p>Robin Panneton PSYCHOLOGY Canadian-U.S. 2008 Fulbright Visiting Chair Award</p>

Graduate Student Spotlights

<p>Michael Kavic Physics COS Outstanding Doctoral Student</p>	<p>Rebecca French Geosciences Graduate Student Representative to the VT Board of Visitors for 2009-10</p>	<p>Theresa Detrie Geosciences COS Outstanding Master's Student</p>
<p>Juliette Mammei Physics Jefferson Sciences Associates Graduate Fellowship</p>	<p>Laura Freeman Statistics 2009 Graduate Woman of the Year</p>	<p>David Abrams, Physics/CS Bradley Shapiro, Math/Econ Shiv Dutt Kale, Bioc/Biol Laura Hamm, Geosciences NSF Graduate Research Fellowship</p>
<p>Nicole West Geosciences William Preston Society Thesis Award</p>	<p>Sunny Crawley Biological Sciences 2009 Graduate Student Teaching Excellence Award</p>	<p>Zachary Lewis Physics 2009 Graduate Teaching Excellence Commendation Award</p>
<p>Jessicu Lu Chemistry Fulbright Scholarship to the Weizmann Institute in Israel</p>	<p>Travis Belote Biological Sciences 2009 Dissertation Commendation Award for Science, Mathematics and Engineering</p>	<p>Brandi Echols, Biol. Sciences Rebecca French, Geosciences Laura Freeman, Statistics Sven Dorosz, Physics Roundtable Scholarship for Graduate Study</p>

Virginia Tech - Office of the Senior Vice President and Provost
College Level Scorecard Reporting
College of Science

Note on Trend Arrows: Color of arrow indicates 3 year trend. Green is up. Yellow is level or mixed and red is down. Direction of arrow indicates year to year change.

University Scorecard Measures				Final College Performance 2008			Preliminary College Performance 2009			College Comment on 2009 Performance
Measure	Metric Definition and Information Sources	University Target Performance	Weblinks to Data Sources	Performance	Comment on Trends	Performance	Comment on Trends			
Learning	Number of graduating undergraduates who participated in research experiences.	Graduating undergraduates who received a passing grade in undergraduate research courses. From degrees extract and course files.	75% of graduating undergraduates.	Research Experiences IRE	355 43% in 2007-08	Down from prior 3 year average of 45%.	378 45% in 2008-09	College increased back to 06-07 levels in 08-09.	UG research a priority. Active in REU supplements & UG research programs (MAOP, McNair). Need faculty growth.	
	Minority student enrollment	Fall Enrollment Profile from IRPA Ethnol Report (fall student census file)	From Plan - Increase by 50% by 2012.	Minority Student Enrollment IRE	570 Undergraduate 50 Graduate 620 Total in Fall 2007	Growth in minority enrollment at both the undergraduate and graduate levels.	674 Undergraduate 54 Graduate 728 Total in Fall 2008	Up 158 undergraduates (30%) from 516 in Fall 2006.	Updated web pages focus on prospective students. Active campus visitation participation.	
	Minority students entering the freshman class.	Office of Undergraduate Admissions	Continuous increase tied to plan goal of 50% increase in minority enrollment	Minority Freshmen IRE	129 Students in Fall 2007	Growth in minority students entering the freshman class.	156 in Fall 2008	Up 54 students (53%) from 102 in Fall 2006.	Recruitment visits to high-population areas to visit with guidance counselors in planning.	
	PhD and EdDs Awarded	Degrees extract	From SCHEV 2B Projection - 366 Annually	Doctorates Awarded IRE	51 in 2007-08	Consistent with prior year production. Still down from peak year of 67 in 05-06.	53 in 2008-09	Three year trend is up slightly.	Growth in PhD students will result in increased doctorates awarded.	
	Graduate enrollment profile - masters, doctoral, and professional	Fall Enrollments in Advanced and Direct to PhD per IRPA Ethnol Report	From SCHEV 2B Projection	Graduate Enrollment IRE	107 Masters 448 Doctoral 555 Total in Fall 2007	Continuing shift from masters to doctoral but overall growth in enrollment.	97 Masters 482 Doctoral 579 Total in Fall 2008	Decrease in masters (-9%) and increase in doctoral (+8%) enrollments	Growing PhD programs a primary goal. Growth in research should lead to growth in GRAs.	
Discovery	Total expenditures in grants and contracts. (University metric is NSF Expenditures)	As reported by Office of the Vice President for Research	From Plan - \$541.3M	Research Statistics OVPB	\$20.8M College \$24.9M All Faculty in FY2008	Three year average growth is up 4.5% in college expense and 3.3% among all faculty.	\$23.6M College \$28.7M All Faculty in FY2009	Three year average growth is up 7.0% in college expense and 6.7% among all faculty.	Focus on collaborative grants and hiring of talented new faculty = growth in research.	
	Count and average value of sponsored awards	As reported in Sponsored Programs datawarehouse dashboard	3% Growth in Number of Awards. 6% Annual Growth in Average Dollar Value of Awards	Sponsored Awards IRE	238 Awards \$106,968 Avg Value in 2007-08	Both awards and average value of awards up significantly.	283 Awards \$93,830 Avg Value in 2008-09	Number of awards has increased by 26% over the three year period. Average value of awards is mixed but up over the three years.	Larger proposals have been encouraged and supported by COS. Predict continued growth in coming years.	
	Faculty arts and humanities awards, fellowships and memberships.	Websites of awards providers; list of awards from AAU	13 Awards from AAU List. Plan narrative states goal of 60 awards based on broader self-report survey of awards.	Faculty Awards IRE		Data not reported at college level		Data not reported at college level		
Engagement	Annual number of new licenses, start-ups and patents	As Reported in Annual Association of Technology Managers (AATM) Licensing Survey	Licenses to 31 and Patents to 41 Annually per IPS projections. Start-ups to be determined.	Licenses, Patents, and Start-Ups IRE		Data not reported at college level		Data not reported at college level		
	Number of graduating undergraduates who have participated in a study abroad experience or foreign language course	Degrees extracts and course files	From Plan - Double the 2005 level in Study Abroad. Level participation in foreign language courses.	Study Abroad, Foreign Language IRE	For. Lang. 212 (26%) Study Abroad 86 (10%) in 2007-08	Foreign languages level. Study abroad significant growth.	For. Lang. 194 (23%) Study Abroad 76 (9%) in 2008-09	Three year trend in foreign language study is down. Trend in study abroad is down from 07-08 but up from 06-07.	2 study abroad courses cancelled; students dropped out due to economic reasons. Greater % of majors enter VT with FL requirement met in HS.	
	Undergraduate participation in service learning and experiential programs. (Also in Learning)	Service learning course list provided by the Service Learning Center with enrollments from course files; experiential programs comes from annual survey by IR	25% Increase from 2005-06 Levels	Experiential and Service Learning IRE	Serv. Learn 80 Exp. Learn 697 in 2007-08	Service learning down from peak year of 06-07. Experiential learning about the same.	Serv. Learn 129 Exp. Learn 463 in 2008-09	Service learning up from 07-08. Experiential learning is down but data are incomplete. pending review of course attributes.	Pending	
Foundation	Diversity of the faculty	Gender, racial and ethnic profile of the faculty on the faculty census.	Increased gender and racial ethnic diversity in the faculty.	Faculty and Staff Profiles IRE	Increases in both racial and gender diversity.	The college added 8 net full-time faculty positions between Fall 06 and Fall 07. There were increases in both racial (+7) and gender (+0) diversity in that period.	Increases in both racial and gender diversity.	The college added a net of 3 filled faculty positions from Fall 2007 to Fall 2008. There were increases in both racial (+4) and gender (+3) representation.	All search committees are charged by O&I and Asso. Dean. And Asso. Dean meets with all candidates on campus and provides work/life information.	