

**2007-08 ANNUAL REPORT  
DEPARTMENT OF BIOLOGICAL SCIENCES**

**PART 1: EXECUTIVE SUMMARY**

Learning: Undergraduate

Enrollment continued to increase in the Biological Sciences major, most likely reflecting the public perceptions of the value of life science education and the reputation of the university, college, and department. This trend, plus biological sciences growth in other departments and colleges, has increased demands on instruction provided by department faculty and graduate students. Classroom and experiential learning activities were diverse and impacted many students beyond those who are Biological Sciences majors. Success and quality of majors (measured by numbers of students receiving various honors and awards or being accepted into professional or graduate schools) remain high. Biological Sciences faculty actively pursue teacher training to maintain or improve learning outcomes for undergraduate and graduate students. The department is a campus leader in academic advising and providing substantive first-year experiences.

Learning: Graduate

The 2007-08 academic year was marked by increases in the number of PhD students, ratio of PhD to MS student enrolled, and grant and fellowship support for graduate students. The number of postdocs, after increasing dramatically in recent years, appears to be reaching a plateau. The Annual Research Day event, which highlights graduate education, has become a signature event in the department's culture. Interdepartmental graduate student recruitment and training appears to be strongly entrenched within the life sciences at Virginia Tech, with widespread participation from faculty and students in the Biological Sciences Department.

Discovery

Research productivity remained relatively constant in CY 2007 relative to 2006, with a small decline in the number of peer reviewed publications in press and print and a small increase in the number of invited presentations. Four key indicators of external grant funding (grants in force, overhead generated, research expenditures, and new grant awards) increased in fiscal year 2008 relative to the previous year. Biological Sciences faculty members continue to show leadership in their fields by receiving highly competitive research grants, and publishing peer-reviewed papers that have gained national attention.

Engagement

The department's outreach efforts continue their focus on K-12 Science Education and partnerships with biotech corporations. Substantial levels of international links to education and research exist. Faculty, staff, and student commonly participate in activities and programs to increase engagement of underrepresented groups in science. The faculty collectively provides a substantial level of service to support departmental, college, and university operations, our profession and our local community.

Diversity

The Department is attempting to create a work environment that is welcoming to all, and to increase the number of people from underrepresented groups in science-based professions. Many of the Department's personnel participate in university level diversity programs. Additional activity is organized by the Department's diversity committee, which provides a forum to discuss issues, and conducts programs to facilitate progress.

Honors and Awards

Members of the Biological Sciences community were recognized at the departmental, college, university, and professional levels for a variety of activities spanning all mission areas.

### Goals for 2007-08

Internal and external faculty committees reviewed the department's programs in 2006-07. During 2007-08, many discussions of the review recommendations were conducted within the Department and College. An additional meeting between the Dean and faculty is being planned for August 2008. From these discussions, several changes in departmental operations have been made, enhancements to the graduate program have been pursued, and planning has been initiated to meet the challenges of being divided between several buildings, teach increasing numbers of new students, and hire new faculty.

## PART 2: ACADEMIC ACCOMPLISHMENTS

### I. Learning

#### A. Undergraduate programs

*The number of Biological Sciences majors increased in 2007 adding to a long term trend that has increased demand on instruction. Relative to the previous year a small decrease in the number of graduates occurred but the total number of student credit hours taught remained the same. Nearly half of the department's undergraduate teaching was focused on the university's curriculum for liberal education; the remaining efforts were focused primarily on Biological Sciences Majors, but with high demand from non-majors in some courses. There has been a trend over the past six years for increasing enrollments in three core sophomore courses: genetics, cell and molecular biology, and general microbiology. Many students achieve academic honors and awards, and the quality of instruction remains high. Biological Sciences faculty members continually strive for enhanced teaching quality using a variety of approaches. The department continues to invest considerable resources into its high quality, high volume academic advising program.*

	Fall 02	Fall 03	Fall 04	Fall 05	Fall 06	Fall 07
<b>Primary Majors</b>	1049	1217	1297	1295	1312	1366
<b>Secondary Majors</b>	24	43	73	58	65	59
<b>Total</b>	1073	1260	1370	1353	1377	1425

- Undergraduate enrollment in the Biological Sciences major has increased substantially since 2002.
- In addition to the 1425 majors in fall 2007, 171 students were enrolled as Biological Sciences minors; each of these is equivalent to approximately one half of a major (measured by hours of biological sciences courses required). If the latter are counted as 88 additional students, then the total enrollment impact in fall 2007 was equivalent to 1513 full-time students.
- Early indications are that the number of students in the major will increase in fall 2008 relative to fall 2007.
- Participation in the University Honors program provides an indicator of the quality of Biological Science Majors. Using institutional research data, we calculate that in fall 2007:
  - 2.8% of all Biological Sciences Majors (40 out of 1425) were enrolled in the University Honors program
  - Out of the University's 1276 Honors Students, 3.1% (40) were Biological Sciences Majors.
- In AY 2007-08, 318 students graduated (down from 357 last year). We speculate that this downward turn is due to normal variation, or reduced course availability, caused by increasing enrollments, that is resulting in more time needed to graduate. Many of our graduates achieved honors, as shown in the following table.

	Dec 2007	May 2008	Total
<b>Total graduates</b>	38	280	318
<b>Magna Cum Laude</b>	5	34	39
<b>Summa Cum Laude</b>	2	20	22
<b>Cum Laude</b>	6	41	47
<b>Commonwealth scholars</b>	0	13	13
<b>In honors</b>	1	14	15
<b>Health scholars</b>	0	3	3

- Success in providing excellent pre-med and pre-dent advising, leading to a high percentage of applicants being accepted in medical and dental schools, has been a hallmark of the department and the university. Data for students who were juniors and seniors in 2006-07 provide an example of the good preparation and guidance our students receive. For example:
  - 28 students were interviewed by the honors advising office for competitiveness in the pre-dent program
    - 18 students were considered competitive and applied to dental school.
    - 12 were accepted, a 67% acceptance rate for official applicants.
    - 7 of these 12 (58%) were Biological Sciences majors.
  - For pre-medical students seeking placement in med schools in fall 2007
    - 63 within the university were interviewed by the honors advising program, and of these 36 had strong interviews and competitive MCAT scores.
    - Of these 36 applicants approximately 50% have been accepted in medical school.
    - 15 of the 36 (42%) were Biological Sciences majors.
- VT Institutional Research, using its Teaching Load Data Sources reported that total credit hour delivery (measured by all courses with the BIOL prefix) in calendar 2007 (33,676 hours) was relatively similar to that in 2006 (33,598 hours) and 2005 (34,210 hours). Student credit hours are the product of the credit hours in a course and the number of students. We have found that small differences in these estimates occur depending on data sources used.
- To gain insight into patterns in our teaching, student credit hours in BIOL courses taught in fall and spring semesters were plotted for the period Fall 2001 through Fall 2007. Several important trends were noted:
  - For all undergraduate teaching:
    - Roughly half of all the student credit hours taught through this period (a total of 6000 to 8000 credit hours per semester) supported the University's Core Curriculum, renamed recently as the Curriculum for Liberal Education (Figure 1). Liberal Education courses include most of our freshman level lecture and labs, plus the Plants and Civilization Course (BIOL 2204). Biological Sciences majors comprised a small portion of the students in these liberal education classes.
    - In the remaining half of undergraduate credit hours delivered (7000 to 9000 hours per semester), Biological Sciences majors comprised nearly two thirds of the students in the classes (Figure 1). Students from the College of Agriculture and Life Sciences were next most common at about 20% or less of the total (Figure 1).
  - For the seven 3-credit hour, lecture based core sophomore courses in the Biological Science major:
    - Total student credit hours have steadily increased from 2001 to 2007 (Figure 2).
    - Genetics, Cell and Molecular Biology, and General Microbiology have seen the most growth in enrollment (Figure 2).
    - Non-Biological Sciences majors comprise nearly 50% of the demand in Genetics and 65% in General Microbiology (Figure 2).
- Quality of classroom teaching also remained high. It is departmental policy to obtain student evaluations for each course using the student perception of teaching (SPOT) method. In the fall 2007 and spring 2008 semesters, of 130 lecture and upper division (junior and senior) laboratory classes rated by students, the mean overall SPOT score was 3.3, which lies between "good" and "excellent." In the same semesters, of 134 lower division (freshman and sophomore) laboratories offered by the department, taught by graduate students and evaluated by undergraduate students, the mean overall SPOT score was 3.4.
- To enhance teaching quality, the department initiated a new faculty committee that is developing mechanisms to assess student learning outcomes. Implementation of the assessment will start in 2008 and continue for the indefinite future.

- Many faculty attended training sessions or workshops to build teaching skills. In AY 2007-08, 9 faculty had peer evaluations of their teaching, and in CY 2007, 27 faculty attended a total of 46 teacher training sessions or workshops.
- Undergraduate research provides a capstone experience for many Virginia Tech students. In calendar year 2007, faculty provided research mentoring for 118 undergraduate students.
- Undergraduate advising activities were extensive in AY 2006-07. Most academic advising and a large proportion of career advising were provided by the department's Center for Academic Advising, which includes two full time classified staff, one non-tenure track faculty member, and one tenure track faculty member. In anticipation of a change in leadership within our advising center, an additional tenured faculty member provided substantial support in AY 2007-08.
- The department continued its unique freshman advising program, which helps students deal with the transition to college life.
- Biological Sciences continued its active role in leading the Biological and Life Sciences Learning Community (BLSC), which included 39 students in AY 2007-08. **Dr. Joe Cowles** and **Ms. Betsey Waterman** organize this residential learning community for students to develop a sense of community and a focus on academics.

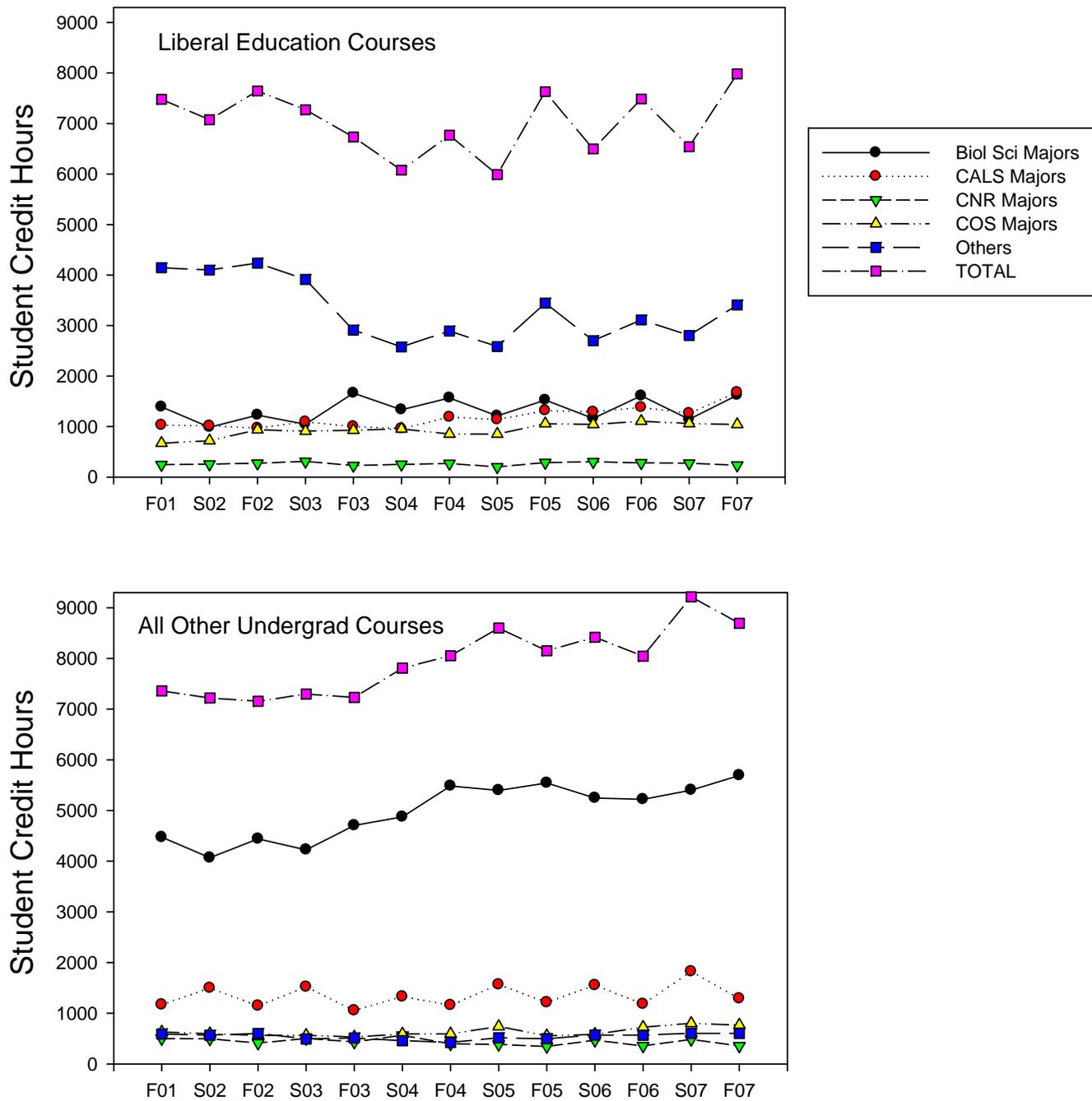


Figure 1. Student credit hours (course credits times number of students in each course, summed over all courses in a category) taught in Biological Sciences Courses (BIOL prefix) in fall (F) and spring (S) semesters from 2001 through 2007. TOP PANEL: liberal education courses (most courses in freshmen year plus BIOL 2204). BOTTOM PANEL: all other undergraduate courses. CALS = College of Agriculture and Life Sciences, CNR = College of Natural Resources, COS = College of Science.

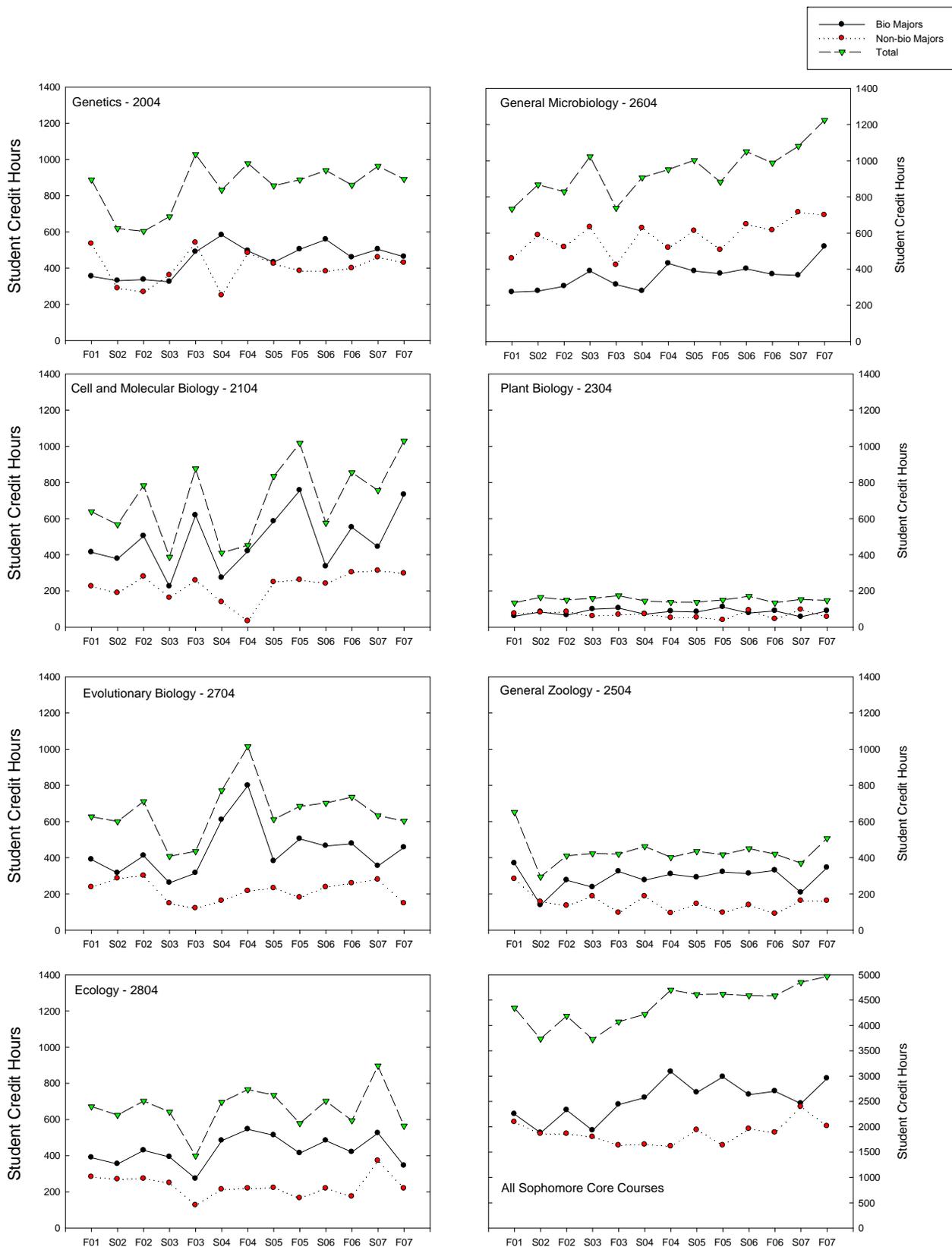


Figure 2. Student credit hours taught in Biological Sciences Sophomore Core Courses in fall (F) and spring (S) semesters from 2001 through 2007. TOP PANEL: liberal education courses (most courses in freshmen year plus BIOL 2204). BOTTOM PANEL: all other undergraduate courses. CALS = College of Agriculture and Life Sciences, CNR = College of Natural Resources, COS = College of Science.

## **B. Graduate education and postdoc training programs**

*The 2007-08 academic year was marked by increases in the number of PhD students, ratio of PhD to MS student enrolled, and grant and fellowship support for graduate students. The number of postdocs, after increasing dramatically in recent years, appears to be reaching a plateau. The Annual Research Day event, which highlights graduate education, has become a signature event in the department's culture. Interdepartmental graduate student recruitment and training appears to be strongly entrenched within the life sciences at Virginia Tech, with widespread participation from faculty and students in the Biological Sciences Department.*

- Active full-time students in the Biological Sciences degree program with GTA or GRA support increased in 2007-08; numbers had been averaging in the 60s to 70s over the previous five years; but by spring 2008, 80 were enrolled (plus one self-funded PhD student).
- Four Biological Sciences Faculty supervised a total of 9 PhD students in the Genetics, Bioinformatics and Computational Biology graduate degree program, plus 1 student in Computer Science, for a grand total of 92 full time graduate students, across three majors, supervised by Biological Sciences Faculty.
- The number of PhD students in the Biological Sciences degree program, and ratio of PhD students to MS students increased in 2007-08 relative to the previous years (see table below).
- The funds expended for Biological Sciences GTA and GRA stipends were \$1,634,091 in 2007-08, which was an increase of \$421,731 (35%) over the previous year (see table below).
- Most of the increase in graduate student stipend support came through large increases in Fellowship funding (which includes training grants and GRA support from faculty with joint VBI-Biological Sciences appointments) and GRAs funded by research grants generated by Biological Sciences Faculty.
- The number of postdocs appears to be leveling off in the mid 20s after a considerable increase between 2002-03 and 2006-07 (see table below).
- The fifth annual Biological Sciences Research Day was held on Saturday, February 23, 2008 in Owens Banquet Hall.
  - Co-organized by graduate students **Sarah Learman, Eric Sokol, and Justin Tanner**, and by faculty members **Drs. Fred Benfield, Asim Esen, Khidir Hilu, and Jeff Kuhn**.
  - Included 6 invited talks by current graduate students, 37 posters by current graduate students, and an invited plenary talk delivered by **Dr. Rytas Vilgalys** (a former PhD student of Dr. Orson Miller from the department).
  - An abstract book was published on the web, and over 115 people attended the meeting, including several from the Biological Sciences Alumni Advisory Board.
  - Also in attendance were 10 graduate student prospects for the Biological Sciences degree program.
- Department faculty and graduate students participated in, or led the organization of two major university seminar series: the Molecular and Cell Biology and Biotechnology series (MCBB) and the Ecology Evolution and Behavior (EEB) series. **Dr. Lisa Belden** chaired the EEB seminar series committee. Weekly seminars were held for both series in fall and spring semesters.

**Summary of graduate student enrollment, types of graduate support, graduate stipend payroll, and number of postdocs for FY 2003 through FY 2008.**

	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
PhD students enrolled <sup>1</sup>	33	38	37	46	52	65
MS students enrolled <sup>1</sup>	34	31	40	26	21	15
Total students enrolled <sup>1</sup>	67	69	77	72	73	80
PhD/MS ratio <sup>1</sup>	0.97	1.23	0.93	1.77	2.48	4.33
Fellowships/training grants <sup>4</sup>					13	19
Funded GRAs <sup>1,2</sup>	26	27.5	27	32	17	24
Funded GTAs <sup>1,2</sup>	44	38.5	46.7	39	41	37
Active students not funded					2	1
(GRA+fellow)/GTA ratio <sup>1,2</sup>	0.59	0.71	0.58	0.82	0.76	1.16
Fellowship payroll <sup>3,4</sup>					\$231,133	\$372,438
GRA stipend payroll <sup>3</sup>	\$416,658	\$553,817	\$571,061	\$614,801	\$413,812	\$643,863
GTA stipend payroll <sup>3</sup>	\$511,894	\$516,707	\$583,192	\$528,485	\$567,415	\$617,790
Total Payroll	\$928,552	\$1,070,524	\$1,154,253	\$1,143,286	\$1,212,360	\$1,634,091
Full-time postdocs <sup>1</sup>	8	9	10	17	25	25

<sup>1</sup> Snap shot taken in spring of academic year; roughly half of postdocs are funded outside of dept accounting codes.

<sup>2</sup> Includes a small number of students from other life science departments occasionally funded to meet critical teaching on short notice.

<sup>3</sup> Stipend data are for a 12-month basis, August 10 through August 9.

<sup>4</sup> Fellowships include the “PhD 2010”, Cunningham, Maly, Paterson, Cairns, all GRA support from VBI for Biol. Sci. students, various minority fellowships, and training grants.

- The department entered the fifth 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. No students taught a lecture course in 2007-08, but several have been taking courses in preparation of teaching in the coming years.
- The number of Biological Sciences graduate degree conferred in 2007-2008 (10 total) was relatively low compared to previous years (see table below), and has not yet reflected the demographic shift toward enrollment in the PhD degree program. However, trends in degree completion are indicating a relatively large number of PhD degrees will be awarded in 2008-09.

**Number of Graduate Degrees in Biological Sciences Awarded**

Degree	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
M.S.	14	7	9	8	10	7
Ph.D.	5	5	8	8	4	3

- The quantity of all graduate recruits has not changed appreciably in recent years in terms of number of applicants, percent accepted, and percent accepted who chose to enroll (see table below). However, we continue to see a trend toward more PhD and fewer MS recruits.
- The quality of recruits has also remained very stable as indicated by GRE and GPA scores of students enrolled in regular status (see following table).

**Graduate student recruitment into the Biological Sciences Major (includes CDB students in 2007-08; does not include small nos. of transfers from other recruitment programs)**

Class <sup>1</sup>	No. Applicants	% Accepted	% of Accepted Enrolled	# Enrolled	GRE Verbal <sup>2</sup>	GRE Quantitative <sup>2</sup>	GRE Total <sup>2</sup>	GPA <sup>2</sup>
1991	125	46	14	8	530	650	1180	3.1
1992	114	26	11	3	566	654	1220	3.5
1993	99	32	22	7	539	640	1179	3.5
1994	108	56	66	40	550	605	1155	3.45
1995	154	28	72	31	582	626	1208	3.59
1996	121	24	59	17	591	670	1261	3.66
1997	113	25	68	19	517	601	1118	3.43
1998	93	31	69	20	502	635	1137	3.68
1999	102	25	54	14	538	636	1164	3.43
2000	98	33	73	24	540	637	1177	3.46
2001	93	32	90	27	505	639	1144	3.52
2002	115	25	59	17	522	671	1193	3.39
2003	113	31	69	24	490	625	1115	3.42
2004	79	20	80	13	547	652	1199	3.50
2005	105	20	76	16	540	634	1174	3.65
2006	115	29	79	26	544	641	1185	N/A <sup>3</sup>
2007	94	28	69	18	445	681	1126	3.26
2008	120	23	59	16	529	664	1193	3.5
<b>Mean</b>	<b>109</b>	<b>30</b>	<b>61</b>	<b>18.8</b>	<b>532</b>	<b>642</b>	<b>1174</b>	<b>3.5</b>

<sup>1</sup> Students applying for spring and fall semester of indicated year

<sup>2</sup> Calculated for students entering in regular status; GPA is for undergraduate degree

<sup>3</sup> N/A = not available

- Biological Sciences faculty maintained leadership in 3 university-wide graduate recruiting programs.
  - The Interdepartmental Microbiology Graduate Program (IMGP) was initiated in 2003 and includes over 40 faculty participants from across the university. Sixteen students were recruited into this program during its first four years, and 10 more have been recruited for fall 2008. Students who apply and are recruited spend their first semester rotating through laboratories before the decision is made on a major advisor. For details, see [http://www.biol.vt.edu/vtmicro/g\\_study.html](http://www.biol.vt.edu/vtmicro/g_study.html)
  - The Graduate Program in Molecular Plant Sciences (MPS) was initiated in 2005 with 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. Over the four years 22 students have been accepted into the program. Four have moved into the Biological Sciences degree program after an initial academic year of common MPS experiences. For details, see <http://www.molplantsci.org.vt.edu/INDEX.HTM>
  - The Graduate Program in Cell and Developmental Biology (CDB) was initiated in AY 2007, and now includes 11 participating faculty. In its first two years (fall 2007 and fall 2008), 12 students have been recruited. Following the model of the Microbiology program, students in the CDB rotate among faculty mentors before being accepted into a particular lab. For details, see <http://www.biol.vt.edu/research/cdb/index.html>

## II. Discovery

*Research productivity remained relatively constant in CY 2007 relative to 2006, with a small decline in the number of peer reviewed publications in press and print and a small increase in the number of invited presentations. Four key indicators of external grant funding (grants in force, overhead generated, research expenditures, and new grant awards) increased in fiscal year 2008 relative to the previous year. Biological Sciences faculty members continue to show leadership in their fields by receiving highly competitive research grants, and publishing peer-reviewed papers that have gained national attention.*

### Summary of research outputs for the departmental faculty (39-42 FTE research and teaching faculty) for CY 2002–2007 (except fiscal year where noted).

Indicator of research/scholarship activity	2003	2004	2005	2006	2007	2008
Books, book chapters, and journal articles in print or press (calendar year)	133	132	146	187	161	
Presentations at professional meetings and conferences (calendar year)	110	103	129	132	137	
Invited seminars (calendar year)	44	26	51	58	64	
Total research grants dollars in force regardless of PI versus co-PI status and regardless of location of funds (calendar year)	26,000,000	36,500,000	45,543,627	48,292,617	56,852,176	
Total overhead generated from contracts and grants; source = Banner (fiscal year)	738,465	555,625	740,544	1,009,565	980,837	1,065,301
Research expenditures; source = COS derived from Banner (fiscal year)	3,811,423	3,317,767	3,937,364	4,666,947	4,589,666	4,912,706
New research awards; source = COS derived from Banner (fiscal year)	3,695,384	3,505,070	4,444,148	4,786,651	4,285,511	5,233,039

Note: these numbers do not include any double counting; in cases where more than one Biological Sciences faculty member is an author or Co-PI, the data are only counted once.

Other significant contributions and accomplishments that reflect the high level of scholarship in the faculty include:

- In CY 2007, 17 individual faculty members were invited to present their research at other institutions.
- The third annual conference on structural biology, held on March 28, 2008, was hosted by Virginia Tech's Crystallography Lab, with leadership from Biological Sciences, Geosciences and Chemistry faculty **Drs. Ross Angel (chair), Daniel Capelluto, Carla Finkielstein, Florian Schubot, Carla Slebodnick and Nancy Vogelaar**. Cosponsored by 4 departments and 4 corporations, this event drew 147 registrants. For more information see: [http://www.biol.vt.edu/structural\\_symposium/index.htm](http://www.biol.vt.edu/structural_symposium/index.htm)
- **Dr. Iulia Lazar**, Assistant Professor with a joint appointment in VBI, organized a 2-day Mass Spectrometry Mini-symposium held at Virginia Tech April 24-25. For more information see:

[https://www.vbi.vt.edu/component/option,com\\_events/Itemid,65/task,view\\_detail/agid,183/year,2008/month,4/day,24/](https://www.vbi.vt.edu/component/option,com_events/Itemid,65/task,view_detail/agid,183/year,2008/month,4/day,24/)

- **Dr. Fred Benfield's** paper "Relationships between land use, spatial scale, and stream macroinvertebrate communities" published in 2001 in *Freshwater Biology* was cited by the editors as one of the most significant papers published in the journal in the last 25 years.
- **Dr. Lisa Belden**, Assistant Professor of Ecology, received a highly competitive \$20,000 NSF AdvanceVT grant titled "Evaluating DNA damage in amphibian embryos in response to environmental stressors".
- Biological Sciences Assistant Professors **Drs. Iulia Lazar** and **Ignacio Moore** hold active NSF CAREER awards, and Assistant Professor **Dr. Jeffrey Kuhn** holds an active Burroughs Wellcome Fund, Interfaces in Science Career Award.
- **Dr. Don Cherry**, Professor of Ecotoxicology, received a new \$260,000 research grant award titled "Evaluation of Coal Mining Discharges for Toxicity in Clinch/ Powell River Watersheds, VA". This is being funded by the Virginia Coal Association, which sought Dr. Cherry's support based on his unique and nationally known aquatic ecotoxicology research lab.
- Professor of Microbiology **Dr. Joseph O. Falkinham, III** is coauthor of a new book being published by Springer, and titled "The Ecology of Mycobacteria: Impact on Animal and Human Health".
- **Dr. Carla Finkielstein**, Assistant Professor of Cell Biology, received a \$300,000 research award from the Komen Foundation to study Circadian control of breast cancer development.
- **Dr. Khidir Hilu**, Professor of botany, and his graduate student **Michelle Barthet**, have a paper that appeared on the cover of the *Journal of Molecular Evolution* in 2008. The full citation for the article is: Barthet, Michelle and Khidir Hilu. 2008. Evaluating evolutionary constraint on the rapidly evolving gene matK using protein composition. *J. Mol. Evol.* Another paper of Hilu and coworkers was among the top 10 most downloaded papers in 2007 in the journal *Molecular Phylogenetics and Evolution*. The complete title is: Müller, Kai F., Khidir W. Hilu and Thomas Borsch. 2006. Phylogenetic utility of rapidly evolving DNA at high taxonomical levels: contrasting matK, trnT-F and rbcL in basal angiosperms. *Molecular Phylogenetics and Evolution* 41: 99-117.
- **Dr. Christopher Lawrence**, Associate Professor of fungal genomics in Biological Sciences and VBI, and Dr. Hirohito Kita of Mayo Medical School, received an NIH grant for \$2.4 million to study the Pathogenesis of Chronic Rhinosinusitis, and they also recently received a new NIH grant for \$1.6 million to study *Alternaria* and proteases in innate and acquired immunity.
- **Dr. Liwu Li**, Associate Professor of molecular physiology, is co-PI on two new NIH grant awards to study inflammation. These add to two ongoing NIH-funded inflammation research grants for which Dr. Li is the sole investigator.
- **Dr. Stephen Melville**, Associate Professor of Microbiology, is a co-PI on two new grants, one from USDA and the other from NIH, involved with pathogenic bacteria. Steve will receive \$129,000 to sequence strains of *Clostridium botulinum* and *Clostridium perfringens*.
- **Dr. Ignacio Moore**, Assistant Professor of animal physiological ecology, published an invited commentary that reviews the state of a theory of animal behavior first proposed in 1990. The full citation of the work is **Moore, I.T.** 2007. Advancing the Challenge Hypothesis. *Hormones and Behavior* 51:461-462.
- **Dr. John Phillips**, Professor of behavioral biology, received a new \$375,000 3-year grant from NSF to continue his studies of the physiological basis for navigation systems in animals.
- **Dr. Jill Sible**, Associate Professor of cell and developmental biology, was invited to submit two papers that are being published in *Interface: Journal of the Royal Society*. One is being co-authored by **Dr. John Tyson**, University Distinguished Professor of computational biology. Titles of the two papers will be: "Biological switches and clocks: preface to the special issue" and "Teaching at the interface: does computational cell biology fit in the undergraduate curriculum?" **Dr. John Tyson** also published a short paper in *Nature* on "Bringing cartoons to life", which refers to the use of graphics to depict subcellular structure and functions. This was one of nine peer reviewed works Dr. Tyson published in 2007. He also received four new grant awards in 2007 for a total of \$1,887,000, which are additions

to two existing grants he has from NIH. All of his recent funded research has been focused on computational methods to study cell reproduction and cancer.

- **Dr. Ann Stevens**, Associate Professor of microbiology, and a student from Johns Hopkins University working on a collaborative project with her, published a paper on intercellular communications among bacteria that is getting substantial attention in a variety of news services including Nature and MSNBC. The full citation of the work is: Cho, H., H. Jonsson, K. Campbell, P. Melke, J. W. Williams\*, B. Jedynak, **A. M. Stevens**, A. Groisman and A. Levchenko. 2007. Self-organization in high-density bacterial colonies: Efficient crowd control. PLoS Biol. 5:e302.
- **Dr. Dorothea Tholl**, Assistant Professor of molecular plant biology, received a new \$399,000 grant from USDA to investigate Biosynthesis of volatile homoterpene defense metabolites in plants.
- **Drs. Maury Valett** and **Jack Webster**, respectively Associate and Full Professors of ecosystem ecology, received a \$78,000 NSF award to refine their model on a stoichiometric approach to studying coupled N and P cycling in headwater streams. Drs. **Jack Webster** and **Fred Benfield** also received \$207,000 EPA funding for a functional assessment of headwater streams below valley fills (associated with coal mining) in West Virginia.
- **Dr. Jeff Walters**, Bailey Professor of Biology, and his co-PI Dr. Carola Haas from the Department of Fisheries and Wildlife Sciences, recently received a four-year, \$2,088,449 grant from the US Dept of Defense to study the population biology of endangered species at Eglin Air Force Base.

### III. Engagement

*The department's outreach efforts continue their focus on K-12 Science Education and partnerships with biotech corporations. Substantial levels of international links to education and research exist. Faculty, staff, and student commonly participate in activities and programs to increase engagement of underrepresented groups in science. The faculty collectively provides a substantial level of service to support departmental, college, and university operations, our profession and our local community.*

#### A. Outreach

- Corporate partnerships
  - In 2007, a new Corporate Partners program called VT BioSPIRES (Virginia Tech Biological Sciences Strategic Partners in Research and Education) was initiated. Two meetings with potential partners were held, and the process of securing commitments for annual funding from the partners was started by **Tim Howland**, Associate Director, Corporate Relations, College of Science. The goals of the program are to enhance recruitment of underrepresented students into undergraduate biological sciences degree programs, provide opportunities for undergraduate research, and develop stronger relationships between bio-tech based corporations, VT faculty, and VT students, leading to new research and employment opportunities.
  - Planning has advanced for a new building at the Corporate Research Center to house the Virginia Tech X-ray Crystallography Research Center, which has a partnership with Oxford Diffraction Limited, now a part of Varian. Occupation of the building is anticipated for September 2008.
- Activities for the Science Outreach Program (SOuP, <http://www.socm.vt.edu/>; led by **Dr. Mike Rosenzweig**, in collaboration with the Department of Geosciences and the College of Science) included:
  - Partnerships with PIs on 3 NSF funded grants and one PI on a DOE grant, providing educational components to the research projects.
  - Served 3764 teachers and students directly in Fall 2006 through Spring 2007 via outreach programs and kit loans.
  - Made 7 presentations to educational and research professionals in the region on topics such as freshwater resources in VA, integration of educational components in research grants, and STEM education.
  - Completed a two-day workshop serving 55 teachers at the VT Southwest Regional Center in Abingdon.
  - Brought Biological Sciences' activities to 125 children, parents, and teachers at Blacksburg Middle School through the Civics and Science classes. In addition to K-12 tours, there were on-campus tours for visiting parents, alumni, and teachers who brought students interested in applying to VT.
  - **Dr. Rosenzweig** and **Llyn Sharp** (Geosciences) continued to serve as co-coordinators of the VT-STEM initiative. This is a statewide leadership role involving the main campus and all VT geographic centers. This is a two-year appointment with a Aug 06–July 08 term, with some salary funding and support from the outreach division.
- Massey Herbarium activities included:
  - Curator **Tom Wieboldt** continued to refine data and significantly upgrade the web pages for the Digital Atlas of the Virginia Flora. Most notably, in collaboration with the Flora of Virginia Project and with assistance from **Rob Gunter**, hundreds of plant images are now associated with the distributional and taxonomic data, available to the public at [http://www.biol.vt.edu/digital\\_atlas/](http://www.biol.vt.edu/digital_atlas/). Many more images will be added in the future.
  - A pilot databasing project was completed on 1647 specimens to conform to the protocol used in a national survey of the decline in plant collecting and concordant loss in biodiversity information.

- Between June 2007 and May 2008, the herbarium added 967 specimens to its collection and had 15 visitors using the collection, the majority from outside the university community.
- Requests for plant identification totaled 355 specimens from Extension personnel and for various research purposes. About 300 additional determinations were made on a single lot of specimens in an effort to help a former benefactor.
- Wieboldt provides other sorts of information about plant science for about 10 requests per month.
- 15 loans comprising 389 plant, fungal, and lichen specimens were made to researchers at other institutions. At present, about 1126 vascular plant specimens are out on loan to 15 institutions.
- The last of the numerous fungal specimens left behind by the retired Dr. Orson Miller were either returned to their home institutions or filed into the VPI Mycological Herbarium.
- The alumni advisory board met in Blacksburg on November 10, 2007 and on February 23, 2008 (the latter coinciding with our graduate research day event).
  - The Alumni Board played a key role in completing our planning for the new Corporate Partner's program, and in reviewing the department's internal/external review of its programs.
  - Dr. George Levicki, who has served on the Advisory Board since its inception, was the invited keynote speaker at the department's 2008 commencement on May 10, 2007.
- The OWLS, our emeritus faculty group, met monthly to keep in contact with the Department's programs. They also attended most of the Department's social events, and maintained many professional activities (e.g., publishing papers). The group is co-led by **Drs. Bruce Parker** and **Ernie Stout**. Specific activities include:
  - **Dr. Bruce Parker** assisted in building scholarship funds toward endowment status.
  - **Dr. Robert Benoit** taught general microbiology.
  - **Dr. Noel Krieg** taught prokaryote diversity.
  - From July 2007 through June 2008, the OWLS met 7 times for lunch; each time, Biological Sciences faculty made presentations on the latest in research and departmental activities.
- Many Biological Sciences faculty are involved in local schools, providing lectures and other types of support for science education. **Drs. Dorothea Tholl** and **Brenda Winkel** were active in the regional high school educational project PREP (Partnership for Research and Education in Plants), which is a joint project between scientists and the VA Governor's school. Activities in 2007 included membership on the advisory board, travel to schools to meet students present lectures, and the hosting of host student research projects in VT laboratories.
- International aspects of the undergraduate curriculum remain a modest but high impact element within the total undergraduate learning environment.
  - Plants and Civilization (BIOL 2204; fall 2007, 70 students enrolled), taught by **Dr. Khidir Hilu**, continues as an Area 7 course within the university core curriculum, and Plant Taxonomy (BIOL 3204; spring 2008, 54 students), taught by **Dr. Khidir Hilu**, is of international scope.
  - **Drs. Art Buikema, Khidir Hilu, and Ignacio Moore** took a year off from summer study abroad teaching, but each worked on plans to contribute to international teaching in summer 2009.
- International aspects of discovery are a strong element of the Department of Biological Sciences. Fourteen of the department's faculty had substantive research interactions with researchers or field sites outside of the United States in a total of 18 different countries.

## **B. Service**

- The following table of committee assignments for academic year 2005-06 shows that the department's faculty members were involved in many governance and service activities on behalf of the department, college, and university. In addition to the regular standing committee assignments shown in this table, faculty are often called on for special service to ad hoc committees, including search committees for various administrative, faculty, and staff positions and committees to examine curricula, university policies, or resource issues.

- Some examples of significant activities for the university and profession included:
  - 7 faculty participated in a total of 8 national grant review panels for the National Institutes of Health (4 panels), National Science Foundation (2 panels), and American Heart Association (2 panels).
  - **Dr. Robin Andrews** served as the immediate past president of the Society for the Study of Amphibians and Reptiles.
  - **Dr. Fred Benfield** is serving on a US EPA Science Advisory Board. Dr. Benfield is also very active with the North American Benthological Association, holding four committee posts (chairing two), co-editing the Association's professional journal, and judging graduate student papers at the national meeting.
  - **Dr. Art Buikema** served as a judge for the USA Today 2007 All-USA College Academic Team. In 2007, he served on over 24 committees or individual activities that supported departmental, college of university activities and programs. He continues to work with cheetah outreach professionals in South Africa to develop teaching materials for elementary and middle school teachers.
  - **Dr. Don Cherry** provided environmental advice to several regional coal companies and the US Army Corps of Engineers.
  - **Dr. Joe Cowles** served as interim department chair in the Department of Economics at VT, before joining the college office as Associate Dean of Instruction.
  - **Dr. Jack Cranford** is a member of the Coastal Conservation Association, which advises the State Legislature on issues pertaining to fisheries and environmental issues related to the Chesapeake Bay and coastal regions. He is also serves on the VDGIF State Mammal Committee, serves as a safe boating instructor, and is an officer in the U.S. Coast Guard Auxiliary.
  - **Dr. Joe Falkinham** served as a member of the Centers for Disease Control External Consultation Group on Nontuberculous Mycobacteria, (NM) which provides consultation to the CDC on how to address epidemiologic, surveillance, and laboratory issues for NM. He is also a member of a university committee to develop strategies for a VT research and education center in India.
  - **Dr. Carla Finkelstein** participated in two programs to recruit international students (from Argentina and Thailand) and served on 2 university governance committees in addition to 5 other university, college and departmental committees.
  - **Dr. Khidir Hilu** is part of an international committee that is advising Iraq on strategies to rebuild its higher education system.
  - **Dr. Liwu Li** has led the development of a new, VT interdepartmental research and graduate studies group on inflammation. Details can be seen at <http://www.inflammation.ibphs.vt.edu/>
  - **Dr. Stephen Melville** is co-chairing a university committee to plan a Dean's Forum on infectious diseases. One retreat was held on March 10, 2008, and a major forum with poster and oral presentations is being planned for fall 2008.
  - **Dr. Anne McNabb** has served ½ time as Associate Dean in the Graduate School, where she has taken the lead on the annual GTA workshop, a training session (mandatory for all VT graduate students) aimed at enhancing student engagement with teaching.
  - **Dr. John Tyson** serves on the Board of Governors, National Resource for Cell Analysis and Modeling, University of Connecticut Health Center, Framingham, CT.
  - **Dr. Maury Valett** Chaired an ad hoc committee of the North American Benthological Society (NABS) to review the strength, breadth, editorial process, name, and many other features of the society's peer-reviewed journal. Results of the analysis were presented the 55th Annual meeting NABS in Columbia, SC.
  - **Dr. Jeff Walters** served as member of eight panels, commissions or review teams that are evaluating or leading conservation efforts around the globe. Some examples include membership on the Committee on independent Scientific Review of Everglades Restoration Progress, which was commissioned by the National Research Council; Chair of an American

Ornithological Union panel to review the science behind the recovery of the California Condor; president of the Sandhills Ecological Institute; and member of the USFWS Guam Micronesian Kingfishers Recovery Committee.

- A number of the faculty are editors or on the editorial board of professional journals:
  - Fred Benfield – *J. North Amer. Benthological Society*
  - Joe Falkinham – *Applied and Environmental Microbiology*
  - Khidir Hilu - *Kurtziana, Journal of Systematics and Evolution, Annals of Botany*
  - Bob Jones – *J. Forestry Research* and *J. Ecology*
  - Iulia Lazar – *The Open Proteomics Journal, The Open Spectroscopy Journal*
  - Liwu Li – *J. Immunology*
  - Anne McNabb – *J. Experimental Zoology, Poultry & Avian Biology Reviews*
  - Erik Nilsen – *J. American Rhododendron Society*
  - Brent Opell – *J. Arachnology*
  - David Popham – *J. Bacteriology*
  - Duncan Porter – *Darwin Digital Library of Evolution*
  - John Tyson – *J. Theoretical Biology, J. Nonlinear Science, and Experimental Biology and Medicine*
  - Maury Valett – *J. Limnology and Oceanography*
  - Jeff Walters – *Ornithological Science*
  - Jack Webster - *Freshwater Biology*

## 2007 -2008 Governance and Service Assignments/Activities for Biological Sciences Faculty, Staff and Students

### Ad Hoc Committee on Assessment

Walker, Chair / Buikema / Evans / Lipscomb / Stevens

### Computing and IT committee

Tyson, Chair / Andrews / Gunter / Kuhn / Schubot  
Walker / Webster / Xing

### Curriculum Committee

Barrett, Chair / Cimini / Cranford / Evans / Hawley / Lazar  
Opell / Walker / Seyler

### Diversity Committee

McNabb (Chair) / Banerjee / Jones / Langer / J. Moore  
Phillips / Schubot / Surace / Tholl

### Executive/Personnel Committee

Jones, Chair / Benfield / Finkielstein / Lazar / Melville / Nilsen  
Phillips / Stevens / Walker / Winkel

### Faculty Recognition Committee

Buikema, Chair  
Cranford / Jones / Li / Melville

### Faculty Search (bio members only)

College Cluster Committee rep: Valett  
Microbiology: Stevens (chair) / Popham / Melville  
Ecosystem: Webster (chair) / Barrett / Benfield / Belden / Valett

### Graduate Evaluation Committee

Walters, Chair  
Cherry / Elgert / Lawrence / Nilsen / Sible

### Graduate Selection Committee

Andrews, Chair  
Barrett / Cimini / Moore / Rasmussen / Yang

### Honors Advisors

Buikema / Cowles / Simmons / Jones / Porter

### Student Recognition Committee

Lipscomb, Chair  
Cranford / Evans / Rosenzweig / Tholl / Tyson / Via

### Department Programs and Technical Functions

Alumni: Falkinham / Jones  
Animal Care: Elgert and Jarrett  
BGSA President: Ben Orsburn  
Collections: Porter / Wieboldt / Cranford / Rosenzweig  
Facilities: Benfield and Waller  
Freshman Labs: Buikema and Schaeffer  
Dept Greenhouse: Hilu (chair) / Nilsen / Wiley  
Micro/immuno labs: Stevens and Link  
Research Day: Benfield, chair / Esen / Hilu / Kuhn / Tanner  
Sebring / Sokol  
Research in Progress Seminar: Banerjee / Langer / Moore  
Web page: Andrews / Banerjee

### University/College Reps

Biology-VBI Greenhouse: Nilsen (chair) / Hilu / Wiley  
College Curriculum: Opell

College Faculty Association VP: Nilsen  
College Grad Affairs: Andrews  
College Honorifics: Winkel  
College P&T: Li  
College Research: Tyson  
College Scholarship: Falkinham / Nilsen / Tyson  
EEB Seminar: Belden / Hawley  
EIGER IGERT grad training program: Winkel (interim director)  
Faculty Senate: Evans / unfilled position  
Library: Cherry  
Life Sciences I Building Manager: Popham  
Life Sciences Learning Community: Cowles  
MCBB seminar: Schubot / Tholl / Yang  
Phi Sigma advisor: Popham  
Sigma Xi: McNabb  
Staff senate: unfilled position  
Structural Biology Symposium: Schubot / Vogelaar  
University Animal Care Comm.: Turner  
University Biotech oversight committee: Walker  
Univ. Comm. Undergrad Studies & Policies: Finkielstein  
University Council: Schaeffer  
University EIGER IGERT Director: Winkel  
University Honorifics: Buikema  
Univ. Intellectual Properties: Falkinham  
Univ. CDB Grad program: Banerjee / Cimini  
Univ. Inflammation Grad program: Li  
Univ. Micro Grad Program: Popham (chair)  
Univ. Plant Mol Bio Grad Program: Winkel / Tholl

### OWLS (organization of retired faculty)

Bruce Parker and Ernie Stout, Co-chairs  
Curt Adkisson / Bob Benoit  
John Cairns / Bill Claus  
Al Heath / Al Hendricks  
Buck Holliman / Tom Jenssen  
Noel Krieg / Bob Paterson  
Charles Rutherford/ Steve Scheckler  
George Simmons / Harry Steeves  
David Stetler / Al Yousten

### Assistant Professors: Mentors

Lisa Belden: Jeff Walters  
Dana Hawley: Robin Andrews  
Iuliana Lazar: Brenda Winkel  
Dorothea Tholl: Brenda Winkel  
Ignacio Moore: Anne McNabb  
Daniela Cimini: Rich Walker  
Carla Finkielstein: Jill Sible  
Florian Schubot: Dave Popham  
Jeff Kuhn: Rich Walker  
Diya Banerjee: Jill Sible  
Jeb Barrett: Jack Webster  
Jianhua Xing: John Tyson

### Club Advisors

Biology: Evans / BGSA: Rosenzweig  
Clogging: Zwolack / Microbiology: Stevens  
Optometry: Evans / Pharmacy: Evans  
Phi Sigma Honor Society: Popham / Scuba: Waller  
SEEDS: Rosenzweig

#### **IV. Diversity (faculty, staff, student)**

*The Department is attempting to create a work environment that is welcoming to all, and to increase the number of people from underrepresented groups in science-based professions. Many of the Department's personnel participate in university level diversity programs. Additional activity is organized by the Department's diversity committee, which provides a forum to discuss issues, and conducts programs to facilitate progress.*

In AY 2007-08, the diversity committee, led by **Dr. Anne McNabb**, led the diversity committee. Under her leadership, the committee:

- Used scenarios at a group assistant professor mentoring session to foster diversity sensitivity discussions; the result was a lively discussion.
- Sponsored an international potluck lunch for the Department's faculty, staff and graduate students, held May 8, 2008 with a goal of building a stronger sense of local community for international postdocs and students.

The Department is adopting the University's **Inclusive Excellence** approach to diversity in which activities are being organized and evaluated in four broad categories: Access and Equity, Campus Climate, Diversity in the Curriculum and Learning and Development.

#### **Access and Equity**

- Drs. E. J. Smith, **Anne McNabb**, and R. Avery are a co-PIs on a \$1,606,467, four-year National Institute of General Medical Sciences grant titled "VT Initiative for Maximizing Student Diversity". This project is providing increased access to PhD science degree programs for underrepresented groups, including minorities and first generation college students.
- **Drs. Daniel Capelluto** and **Carla Finkielstein** have participated in student exchange programs with Mahidol University in Thailand and the University of Buenos Aires.
- **R. Jones** and **T. Howland** are co-leaders of VT BioSPIRES, a program to both recruit underrepresented groups into the Biological Sciences undergraduate degree program, and also to provide undergraduate research opportunities. In 2007-08, one African American student was recruited using a fellowship provided by this program.
- During 2007, five African American, three Hispanic, one Native American, and one first generation in college graduate students were enrolled. Most of these individuals were supported at one time in their academic program by fellowships or scholarships.
- One Minority Scholar, Dr. Jorge Mena-Ali, was invited to present a seminar and meet faculty and students in the department; in alignment with university initiatives, this visit was arranged as part of a departmental strategy to increase networking with bright, young minority scientists in hopes of enhancing the opportunity to recruit them into faculty positions at Virginia Tech.

#### **Campus Climate**

- Many in the Department have been active in Advance VT Programs to enhance the success of women faculty in sciences and engineering, largely through transforming the campus climate at VT. Examples include:
  - **Dr. Iulia Lazar** participated in an Advance VT Peer Mentoring Workshop

- **Drs. Anne McNabb, Ignacio Moore, Lisa Belden and Robert Jones** served on an Advance VT sponsored panel to discuss dual career hiring issues with VT graduate students.
- **Dr. Anne McNabb** served as a member of the Board of Directors of the Organization of Women Faculty
- In keeping with tradition, several department faculty and staff attended the annual university diversity summit, and several faculty attended the annual Advance VT workshop.

### **Diversity in the Curriculum**

- **Dr. Jill Sible** gave a workshop on teaching and diversity through the Center for excellence in Undergraduate Teaching.

### **Learning and Development**

- **Drs. Lisa Belden and Ann Stevens** advised 8 students in a trial freshman mentoring program for "1st generation" science students in fall 2007.
- **Dr. Ignacio Moore** made several presentations about biological research to school groups (ranging from primary school through college level) in Ecuador.
- **Dr. Anne McNabb**, largely through her role as ½ time Associate Dean of the Graduate School, has incorporated many elements of diversity in the annual GTA workshop (about 650 students participated in 2007), including:
  - special sessions for international GTAs to help them learn about cultural and academic aspects of VT that could be problematic for them
  - a workshop on "What the Principles of Community have to do with teaching"
  - two sessions on how understanding our students influences our teaching
  - a session on Civility in the Classroom
  - a session on Developing Community in the Classroom
  - a session for about 60 students that addressed exam construction and accessibility issues to raise awareness of hidden biases that affect learners with any form of disability
  - a session on pronunciation and word use in English to help international GTAs
  - a session for 25 students that involved the “reading” of the words of undergraduate students who had experienced discrimination followed by a discussion of the experiences and reaction of those who attended
- In 2007, department engagement with the University’s Mid-Eastern Alliance for Minority Participation (MEAMP) program for undergraduate students included one student advised (by **Dr. Daniela Cimini**), a presentation to MEAP participants (**Dr. David Popham**) and service on the Advisory Board (**Dr. Jill Sible**).
- Engagement with the University’s Multicultural Academic Opportunities Program (MAOP) included one graduate student advised (by Dr. Erik Nilsen), and two undergraduate intern participants (supervised by **Drs. Ann Stevens and Dorothea Tholl**).
- **Drs. Carla Finkelstein, Stephen Melville, and Jill Sible** each mentored a VT PREP student in 2007. This program, which is funded by an NIH grant to Virginia Tech, uses “developmental and experiential learning activities to prepare post-baccalaureate scholars from ethnic groups who have been historically underrepresented in the biomedical and behavioral sciences for the successful pursuit of a Ph.D and a research career”.

## V. Honors and Awards (faculty, staff, student) for AY 2007

*Members of the Biological Sciences community were recognized at the departmental, college, university, and professional levels for a variety of activities spanning all mission areas.*

- *Teaching and Advising*
  - **Dr. Jill Sible** received an Alumni Teaching Award from the Virginia Tech Academy of Teaching Excellence.
  - **Drs. Stephen Melville, Ignacio Moore, and Mike Rosenzweig** received Department of Biological Sciences Outstanding Teaching Awards.
  - The department's 2007 Outstanding Undergraduate Advisor award was presented to **Dr. Jack Cranford**.
  - The department's 2007 Most Influential Professor Award, as determined by a vote of the senior class, was presented to **Dr. Art Buikema**.
  - PhD student **Jonathan Moore** received the department's annual Graduate Student Teaching Award.
- *Research and Professional*
  - **Dr. Dorothea Tholl** received the 2007 Arthur C. Neish Young Investigator Award from the Phytochemical Society of North America.
  - **Dr. John Tyson** was recognized as the Aisenstadt Chair, Centre de Recherches Mathematiques, University of Montreal.
  - **Dr. Jeff Walters** received the Recovery Leader Award from the US Fish and Wildlife Service, for work with the Laysan Duck in Hawaii.
  - The College of Science Roundtable Award was presented to **Mr. Kwang-Hyng Kim**, who is working in **Dr. Chris Lawrence's** lab.
  - **Dr. Qian Xu**, who completed a PhD under the mentorship of **Dr. Zhaomin Yang**, received a highly competitive 2007 Chinese Government Award for Outstanding Self-financed Students Abroad, which carries a \$5000 cash prize.
  - **Dr. Dana Hawley**, was recognized by her Alma Mater (Cornell University) with the 2007 Lamont C. Cole Award for Best Graduate Student Paper.
  - **Drs. Robin Andrews, Khidir Hilu and Zhaomin Yang** were recognized as "Scholars of the Week" by the Research Division of Virginia Tech.
  - Best poster awards for the department's Research Day event, held February 23, 2008, were presented to four of the department's graduate students: **Erin Hewitt, Alexandra Class, Tongli Zhang, Lu Gan, and Emily Lambert**. Honorable mentions went to **Kristen Huntington and Jung-Hyun Huh**.
  - The department's Undergraduate Research Award was presented to Kristen Schellor.
- *Service*
  - **Dr. Jack Cranford** was highly decorated as a US Coast Guard Auxiliarist. Awards in 2007 included: Hurricane Katrina Presidential Unit Citation Decoration; Auxiliarist of the Year Awards for Flotilla 83 and for the 5<sup>th</sup> Coast Guard District; Three other Flotilla 83 awards including most hours logged (768), Marine Safety Office Award, and Vessel Examiner of the Year Award; and two other district awards including his second Sustained Service Decoration for Superior Performance of Duty, Service Performance Award RBS Visitation.

- Department Outstanding Service Awards were presented to **Dr. David Popham** and **Mr. Jake Waller**.
- *Combined*
  - **Ms. Kathryn Harry** who completed her degree in **Dr. Stephen Melville's** lab, was recognized as the College of Science's Outstanding Master's Student.
  - Graduating senior **Christine George** was recognized as the College of Science and Virginia Tech Woman of the Year, and as the Department's Outstanding Senior.

## **VI. Future Directions**

*Internal and external faculty committees reviewed the department's programs in 2006-07. During 2007-08, many discussions of the review recommendations were conducted within the Department and College. An additional meeting between the Dean and faculty is being planned for August 2008. From these discussions, several changes in departmental operations have been made, enhancements to the graduate program have been pursued, and planning has been initiated to meet the challenges of being divided between several buildings, teach increasing numbers of new students, and hire new faculty.*

### **A. Major Findings/Recommendations from the Internal Review Committee**

#### **Committee:**

Brent D. Opell	Professor, Biological Sciences
Duncan M. Porter (Chair)	Professor, Biological Sciences
Janet Rankin	Professor, Department of HNFE
Jill Sible	Associate Professor, Biological Sciences
Zhaomin Yang	Associate Professor, Biological Sciences

#### **The Positives:**

1. *There is collegiality within the department*
2. *The quality of faculty is high*
3. *The department has seen some success in obtaining resources*
4. *The undergraduate advising program is outstanding.*

#### **The Challenges:**

1. *All groups indicated problems with IT support.*
  - We have changed personnel
2. *A concerted overhaul of graduate curricula is badly needed.*
  - The faculty held many discussions within individual discipline areas (i.e., plant science, microbiology/immunology, organismal biology, cell and developmental biology). Although constrained by a shortage of faculty lines to meet all teaching demands at the undergraduate and graduate levels, the groups had fruitful discussions and found several ways to increase course availability to graduate students.

- Some changes in course offerings and timing of offerings will be implemented in AY 2008-09. Discussions will continue to unfold, resulting in more changes in the following year.

3. *There is an increasing burden for teaching the large undergraduate enrollment.*

- Data on course demands were analyzed (e.g., see graphs in the undergraduate learning section of this report).
- The department will continue to apply for enrollment support funds through the college and provost offices to meet increasing demands. In 2007-08, special enrollment support amounted to \$226,418
- Increased emphasis will be placed on the following strategies:
  - Larger class sizes for freshmen and sophomore courses
  - Use of temporary and full time instructors
  - Partnership with other life science colleges

4. *Separate locations threaten departmental collegiality*

- The New Life Sciences I that opened up in spring 2008, will eventually have ~9 Biological Sciences faculty; 6 moved in during spring 2008: 2 from Fralin Biotech Center and 4 from Derring Hall
- Integrated Life Sciences Building at the VT Corporate Research Center will hold ~7 Biological Sciences Faculty; 6 are slated to move in August-September 2008
- Strategies we have employed or plan to use to maintain collegiality and a sense of community:
  - Spread faculty meetings around to different buildings
  - Enhance paperless business practices
  - Encourage university to maintain frequent shuttle bus service
  - Dept head to hold hours in each building each week
  - Socials at CRC

5. *Loss of organismal biology will bias biological education*

- Faculty groups have been refining hiring plans frequently, and there is a general sense that most new hires in the near future will be in the organismal area; areas of perceived need and opportunity that were identified in 2007-08 for hiring in the near future included:
  - Aquatic biology/ecosystem ecology (highest priority/ideally 2 positions/should be worked into the most recent college cluster on earth systems, energy and environment)
  - Other positions not listed in order of priority:
    - Population Genetics
    - Plant Science (at least 2 positions) possibly including evolution/development and systematics/ecology
    - Innate Immunity
    - Environmental Microbiology
    - Computational Biology

- The Department will participate in cluster hiring when it fits the needs of the College and Department to increase organismal representation; requests for hiring outside of clusters will be made to the College as needed

6. *Increasing complexity and size [of the department] require more effective and efficient department management and leadership*

- We have established greater roles for Associate Heads in supervising staff, planning space, advising and curriculum
- Stronger roles for faculty in some key leadership areas (e.g., building manager for Life Sciences I) are being established or considered to free up more department head time for external challenges

**B. External Review**

**Committee:**

Donald D. Brown	Staff Member Department of Embryology Carnegie Institution	National Academy of Sciences
Maarten J. Chrispeels	Professor University of California San Diego	National Academy of Sciences
Alan P. Covich	Professor Institute of Ecology, University of Georgia,	President, Ecological Society of America
Tina M. Henkin	Professor The Ohio State University	National Academy of Sciences Award in Molecular Biology
Gordon H. Orians	Professor Emeritus University of Washington	National Academy of Sciences

**Top 10 Recommendations**

1. *The Dean should meet with the faculty at least once a year, preferably more often.*
  - Department has scheduled more frequent meetings with the Dean
2. *The Dean's goal of 70 faculty members must be achieved by 2015.*
  - This has been complicated by state budget cuts and the high cost of start up for new faculty; this will be a stretch goal, but the department and college will keep trying

3. *Undergraduate teaching responsibilities for faculty doing active research should not exceed one major undergraduate course/year.*
  - We are currently at 1.5 courses per year
  - New hiring is the primary way to solve this issue so long as enrollment increases or stays high
  - Alternative models to co-teach some senior level and graduate level courses (at the same time but with greater expectations for the graduate students) are being implemented
4. *More TA and RA-ships need to be provided to allow the students more time for research and to expand the graduate program.*
  - Faculty are working to generate more funds to increase GRA lines
  - The Department is working on initiating graduate fellowships, established via private gifts to the foundation
  - When teaching needs justify, the Department has requested and received new GTA funds to support additional laboratory sections for undergraduate students
5. *A cohesive graduate curriculum must be organized.*
  - See internal report Challenge #2 for description of approach being taken
6. *50% of the new faculty hires and replacements should be non-cluster and should center on the disciplinary areas generated by the faculty.*
  - See internal report Challenge #5 for description of approach being taken
7. *The Department should appoint a staff member as Head of Staff.*
  - Dr. Rich Walker has accepted the role of Associate Head and Chief of Staff
8. *Day care and housing assistance must be provided to new faculty and to graduate students and post doctoral fellows.*
  - The desirability and need for this is well appreciated throughout the university; Over the past year, the university and colleges have been negotiating with local providers to increase capacity
9. *Funds for graduate student recruitment must be provided*
  - Funding from the College of Science and from the Institute of Biomedical Sciences and Public Health has been provided to increase recruitment activities
10. *Building a 600 seat auditorium must be a campus priority.*
  - A \$23,050,000, classroom building with 64,000 gross square feet has been approved by the Board of Visitors as Item #7 on the First Biennium of the 2008-2014 Capital Plan; This means that an opportunity exists to initiate a classroom building project if funding can be secured