ANNUAL REPORT

2009-2010

Annual Report
Mathematics Department
2009-2010

Annual Report Executive Summary, 2009-10
Department of ___Mathematics_____

Learning: Undergraduate
The Mathematics Department awarded 76 B.S. degrees from June, 2009, through May, 2010. 7 students participated in 6 undergraduate research projects, including 1 honors thesis. Three Virginia Tech teams participated in COMAP's international Mathematical Contest in Modeling, and they earned rankings of Meritorious, Honorable Mention, and Successful. The Mathematics Department introduced a new undergraduate course in mathematical modeling and a new undergraduate course in the use of programming to solve mathematical problems.
Learning: Graduate
The Mathematics Department awarded 16 M.S. degrees and 8 Ph.D. degrees from June, 2009, through May, 2010. The Mathematics Department has 69 graduate students, with 46 supported as department GTA's, 6 as GRA's, 1 as a Hatcher Fellow, 1 as a 2010 Fellow, 1 as an ICTAS Fellow, 4 by their employers, and 5 by other departments at Virginia Tech. Students have more opportunities than ever before in geometry/topology and in math education. The department's GTA training and mentoring program remains exceptionally strong. The Graduate School recognized Math GTA Rachel Arnold as Virginia Tech GTA of the Year.
Discovery
Total expenditures for Math and ICAM in 2009 were $991,740 distributed among roughly 32 grants held by 24 faculty members. In 2009 members of the faculty published over 90 refereed articles and gave over 120 invited lectures. 13 members of the faculty served on 36 editorial boards. Mark Shimozono is one of three Principal Investigators on the National Science Foundation Focused Research Group: Affine Schubert Calculus: Combinatorial, Geometric, Physical, and Computational Aspects.

Reinhard Laubenbacher is a Principal Investigator, John Burns and Lizette Zietsman are Co-Principal Investigators, and Jeff Borggaard and Henning Mortveit are Senior Personnel on the National Science Foundation Research Experience for Undergraduates: Modeling and Simulation in Systems Biology.

Michael and Yuriko Renardy were Very Important Visitors for the 2009 program on Complex Fluids at the Institute for Mathematics and its Applications.

John Burns was nominated for the W.T. and Idalia Reid Prize.

Engagement

In its thirty-first year, the Virginia Tech Regional Mathematics Contest included 503 students from 85 colleges, including colleges as far away as California, Oregon, and Prince Edward Island. The annual number of participants has more than doubled over the last ten years.

Various members of the faculty are in leadership roles in all three major national mathematics organizations. Reinhard Laubenbacher is the SIAM Vice-President for Science Policy, Ezra Brown is the Governor of the MAA MD-DC-VA Section, and Frank Quinn is a member of the Council of the American Mathematical Society.

Members of the faculty advised three science projects involving six high school students, and other members of the faculty judged science fairs at the school, regional, and international levels.

Sue Hagen is a member of the management team of The Virginia Algebra Project.

Diversity

The Mathematics Department hosted its fifteenth annual Women in Mathematics: Career Day at Virginia Tech. 258 students from 22 schools attended.

A member of the faculty is active in active in programs designed to enhance higher education in Africa.

Various members of the faculty serve as:

a member of the External Advisory Committee of the Alliance for the Advancement of Biomedical Research Excellence in Puerto Rico,

a member of the Minority Serving Institutions Advisory Council at Virginia Tech,

a member of the Spelman College ASPIRE Advisory Board, and

the Summer Mathematics Director of the Center for the Enhancement of Engineering Diversity.

Andy Norton is the Principal iInvestigator on a NSF Robert Noyce Scholarship Grant, Virginia Teach: Serving Mathematics Students in Need. The grant provides scholarships for students who commit to teach in high-need schools.

Two members of the faculty serve as mentors in the international mentoring networks established by MentorNet and the Association for Women in Mathematics.

Goals for 2010-11

We will further develop our new upper division undergraduate courses in mathematical modeling and in using programming to solve mathematical problems in order to increase the opportunities for undergraduate students to gain skills in solving multidisciplinary problems.

We will begin a project to integrate material taught in lower division math courses for life sciences majors with courses taught in life sciences departments.

We will change the software on which the Math Emporium runs in order to increase capacity, scalability, and portability.

We will teach one revamped graduate course and proceed with development of another intended to provide the mathematics needed for graduate work in engineering and in the life sciences.

ICAM will increase emphasis on research in energy-efficient buildings.

Part 2

Academic Accomplishments

Learning: Undergraduate

We awarded 76 B.S. degrees during the period running from June, 2009, through May, 2010.

There are four degree options, with advisors who specialize in each option, as well as a department career advisor (general career advice, notification of opportunities, and

assistance with individual placements) and an undergraduate research coordinator (promotes undergraduate research and advises students seeking mentors).

Seven students participated in six undergraduate research projects, including one honors thesis.

For the second year in a row, three Virginia Tech teams participated in the Mathematical Contest in Modeling, sponsored by the Consortium for Mathematics and its Applications. The teams earned rankings of Meritorious, Honorable Mention, and Successful.

The department introduced a new undergraduate course in mathematical modeling and a new undergraduate course in the use of programming to solve mathematical problems.

Seven semester-long courses (all but two offered in fall, spring, and summer) are in full-Emporium format. Almost 5000 students enroll in these courses in the fall, and about 2700 students enroll in them in the spring. The Math Emporium continues to attract visits from educators employed elsewhere, ranging from the University of Wisconsin to a higher education group from Nigeria. Emporium materials and policies undergo continual assessment and revision. Recent changes include the addition of a webpage for parents and the hosting of an open house during Family Weekend. The Emporium's Instructional Assistant Training Workshop has International Tutor Program Certification from the College Reading and Learning Association.

Susan Hagen coordinates the quantitative and symbolic reasoning component of the Earth Sustainability program, a program that won a University Exemplary Department award.

Learning: Graduate

We awarded 16 M.S. degrees and 8 Ph.D. degrees during the period running from June, 2009, through May, 2010. In addition to learning mathematics, our graduate students are trained as teachers by our extensive GTA training and mentoring program developed and led by our GTA coordinator Eileen Shugart. The Graduate School recognized Math GTA Rachel Arnold as Virginia Tech's Outstanding GTA of the Year.

Our mix of domestic students, international students (particularly from Peru, Tunisia, Algeria, and China), and German exchange students creates a diverse environment that is an effective setting for graduate student research and teaching. Of our 69 graduate students, 46 are supported as department GTA's, 6 as GRA's, 1 as a Hatcher Fellow, 1 as a 2010 Fellow, 1 as an ICTAS Fellow, 4 by their employers, and 5 by other departments at Virginia Tech.

We have exceeded previous highs in geometry and topology offerings. In 2007-2008 we offered a year-long sequence in differential topology and differential geometry. In 2008-2009 we offered a year-long sequence in algebraic topology, a year-long sequence in algebraic geometry, and a one-semester course in point-set topology. In 2009-2010 we

offered a year-long sequence on de Rham cohomology and Hodge theory. All classes had healthy enrollments.

As part of an effort to bring our math education Ph.D. program to a new level, Andy Norton started a seminar designed to provide for Math and Education math education students a common introduction to research in math education.

Discovery

Total expenditures for Math and ICAM in 2008 were $991,740, distributed among roughly 32 grants held by 24 faculty members.

In 2008 the faculty published over 90 refereed articles and gave over 120 invited lectures.

The department employed two visiting assistant professors during 2009-2010.

Mark Shimozono is one of three Principal Investigators on the National Science Foundation Focused Research Group: Affine Schubert Calculus: Combinatorial, Geometric, Physical, and Computational Aspects.

Reinhard Laubenbacher is a Principal Investigator, John Burns and Lizette Zietsman are Co-Principal Investigators, and Jeff Borggaard and Henning Mortveit are Senior Personnel on the National Science Foundation Research Experience for Undergraduates: Modeling and Simulation in Systems Biology.

Michael and Yuriko Renardy were Very Important Visitors for the 2009 program on Complex Fluids at the Institute for Mathematics and its Applications.

Thirteen members of the faculty served on 36 editorial boards.

Members of the faculty participated in the organization of 18 conferences, meetings, workshops, or conference sessions.

Members of the faculty reviewed proposals for governments in Israel, Belgium, Canada, Ireland, South Africa, and for many U.S. programs.

John Burns was nominated for the W.T. and Idalia Reid Prize.

Engagement

The Virginia Tech Regional Mathematics Contest, in its thirty-first year, continued to grow, with participation by 503 students from 85 colleges. The contest is no longer regional (participants from Oregon and California) or national (The University of Prince

Edward Island competed.). The annual number of participants has more than doubled over the last ten years.

Several members of the faculty served as science fair judges: Intel International Science and Engineering Fair, Blue Ridge Highlands Regional Science Fair, and Dublin Governor's School Science Fair.

Members of the faculty advised science fair projects by two students from the Dublin Governor's School and four students from Montgomery County, Radford, and Roanoke.

Reinhard Laubenbacher is the program leader of Kids' Tech University.

The department hosted a visit by 35 students from the Roanoke Valley Governor's School.

Various members of the faculty are in leadership roles in all three major national mathematics organizations. Reinhard Laubenbacher is the SIAM Vice-President for Science Policy, Ezra Brown is the Governor of the MAA MD-DC-VA Section, and Frank Quinn is a member of the Council of the American Mathematical Society. They and others are in other leadership roles in these organizations and in IWOTA, MTNS, ORAU, and IEEE.

Frank Quinn is the chair of the AMS Working Group on Preparation for Technical Careers.

Susan Hagen is a member of the management team of The Virginia Algebra Project.

Diversity

The fifteenth annual Women in Mathematics: Career Day at Virginia Tech involved 258 students from 22 middle and elementary schools. Two math alumnae participated in the Career Day activities.

Peter Haskell is a MentorNet mentor and an AWM mentor. Lizette Zietsman is an AWM mentor. Yuriko Renardy is a mentor to a female IMA postdoc.

Three members of the faculty have advised a VT-IMSD scholar.

The department hosted one AdvanceVT visitor and two AdvanceVT Future Faculty visitors.

Reinhard Laubenbacher is a member of the External Advisory Committee of the Alliance for the Advancement of Biomedical Research Excellence in Puerto Rico.

Reinhard Laubenbacher is a member of the Minority Serving Institutions Advisory Council at Virginia Tech.

Andy Norton is the principal investigator on a NSF Robert Noyce Scholarship Grant, Virginia Teach: Serving Mathematics Students in Need. The grant provides scholarships for students who commit to teach in high-need schools.

James Turner is the lead developer of the VT African Center (CESTED).

James Turner is a Spelman College ASPIRE advisory board member.

Heath Hart is the Summer Mathematics Director for the Center for the Enhancement of Engineering Diversity.

Three of the four outstanding seniors (overall and in degree options) were women.

Goals for 2010-2011

We will further develop our new upper division undergraduate courses in mathematical modeling and in using programming to solve mathematical problems in order to increase the opportunities for undergraduate students to gain skills in solving multidisciplinary problems.

We will begin a project to integrate material taught in lower division math courses for life sciences majors with courses taught in life sciences departments.

We will change the software on which the Math Emporium runs in order to increase capacity, scalability, and portability.

We plan to do the most thorough analysis yet of our math readiness formula.

We will teach one revamped graduate course and proceed with development of another intended to provide the mathematics needed for graduate work in engineering and in the life sciences.

ICAM will increase emphasis on research in energy-efficient buildings.

FACULTY

Hatcher Professor
Burns, John

Class of 1950 Professors
Renardy, Michael
Renardy, Yuriko

Alumni Distinguished Professor
Brown, Erza

Professors
Adjerid, Slimane
Ball, Joseph
Beattie, Christopher
Borggaard, Jeffrey
Day, Martin
Floyd, William
Green, Edward
Greenberg, William
Hagedorn, George
Haskell, Peter
Herdman, Terry
Kim, Jong Uhn
Klaus, Martin
Kohler, Werner
Laubenbacher, Reinhard
Lin, Tao
Linnell, Peter
Lloyd, Gwendolyn
Parry, Charles
Prather, Carl
Quinn, Frank
Rogers, Robert
Rossi, John
Russell, David
Shimozono, Mark
Snider, Robert
Sun, Shu Ming
Turner, James C
Wheeler, Robert

Associate Professors
De Sturler, Eric

Gao, David
Gugercin, Serkan
Illiescu, Traian
Shockley, James
Wapperom, Peter
Williams, Michael

Assistant Professors
Norton, Anderson
Elgart, Alexander
Loehr, Nicholas
Mortveit, Henning
Yue, Pengtao
Zietsman, Lizette

Visiting Assistant Professors
Jin, Qinian
Li, Yiqiang

Instructors
Agud, Diane
Anderson, Susan
Bourdon, Terri
Cothren, Marlene
Hagen, Susan
Hanks, Lucy
Hart, Heath
Kline, Jessica
Kohler, Abigail
McQuain, Margaret
Peters, Tom
Powers, Linda
Reynolds, Bernice
Savel'ev, Evgeny
Schmale, Jessica
Shugart, Eileen
Smith, Deborah
Stephens, Catherine

GRANTS

SLIMANE ADJERID

CONTINUING:

Discontinuous Galerkin Methods for Partial Deferential Equations, National Science Foundation, PI, $110K, status: no cost extension, 2008-09. Expired in August 31, 2009.

Discontinuous Immersed Finite element Methods for Interface Problems, NSF, Co-PI, PI: Tao Lin, National Science Foundation, $150K, status: continuing, 2007-10.

Discontinuous Galerkin Methods for PDEs: Superconvergence and a posteriori error estimation, NSF, $180K, status: continuing, 2008-2011.

CHRISTOPHER BEATTIE

CONTINUING:

"Model Reduction with Rational Krylov Methods" NSF-Division of Mathematical Sciences, June 1,
2005 – May 31, 2009. coPIs**:** Christopher Beattie and Serkan Gugercin ($210,766).

(This grant ended in May 2009 - during the activity period.)

NEW:

"Interpolatory Model Reduction for Coastal Ocean Hydrodynamics" Naval Research Laboratory,
February, 2010 – December, 2010 ($132,424)

Cont.

NEW: BUT IRRELEVANT:

"Estuary Variance Mapping for In Situ Sample Station Placement" NASA under the Research

Opportunities for Space and Earth Science (ROSES -2009) Program A.19. PIs: Bruce Spiering (NASA) and Christopher Beattie ($110,000). (This proposal was funded but my involvement was eliminated due to cuts in NASA's core funding – c'est la vie)

JEFF BORGGAARD

CONTINUING:

Reduced-Order Modeling for Optimization and Control of Complex Flows, co-PI (with T. Iliescu), Air Force Office of Scientific Research, 2007-2010, $391,021.

REU Site: Modeling and Simulation of Biological Networks, Senior personnel (R. Laubenbacher, J. Burns, S. Faulkner, and L. Zietsman co-PI), 2008-2011, $269,193.

1A follow up work was also submitted to the AIAA Flow Control Conference along with Imran Akhtar

JOHN BURNS

CONTINUING:

2007-2009: "Computational Methods for Identification, Optimization and Control of PDE Systems", Principal Investigator (with E. M. Cliff and Lizette. Zietsman), AFOSR ($669,117).

2007-Present: "REU Gant on Modeling and Simulation of Biological Networks", Principal Investigator (with S. Faulkner, R. Laubenbacher and L. Zietsman), NSF ($269,193).

Cont.

2009-Present: "Computer Design Tools for Building Models, Simulation and Sensitivity Analysis", Principal Investigator (with E. M. Cliff and L. Zietsman), DOD – United Technologies Contract ($375,018).

ERIC DE STURLER

CONTINUING:

Collaborative Research: CMG: Quantum Monte Carlo Calculations of Deep Earth Materials, NSF EAR 05-30643, Subaward from University of Illinois (2005-05100-01), $130,618, 12/25/2005 – 08/31/2010, PI (this is now VT part of original grant under 2)

Collaborative Research: CMG: Quantum Monte Carlo Calculations of Deep Earth Materials, NSF EAR 05-30643, $320,000, 09/15/2005 – 08/31/2010, CoPI (received at UIUC), extended by one year.

Materials Computation Center, NSF, $3,960,000, 10/01/2003 – 9/30/2010,
CoPI and member of MCC Advisory Committee, (received at UIUC), one year extension 9/30/2009 – 9/30/2010

ALEXANDER ELGART

CONTINUING:

Structured random matrix model for complex dynamics, other PI's: Cohen, D., Kottos, T., $106,000, United States-Israel Binational Science Foundation.

NEW:

Rigorous Studies in Quantum Mechanics, National Science Foundation Proposal DMS–0907165, $337,000 (co-PI with George Hagedorn)

DAVID GAO

CONTINUING:

AFOSR/NL: Division of Mathematics, Canonical Duality Theory and
Algorithms For Solving Some Challenging Problems in Global Optimization and Decision Sciences, 2009-2014: $750,000 (PI)

ED GREEN

CONTINUING:

National Security Agency research grant for 2009-2010, $48,329
(1st Year)

SERKAN GUGERCIN

CONTINUING:

1) Agency: NSF – Division of Mathematical Sciences
Title: CAREER: Reduced-order Modeling and Controller Design for Large-scale Dynamical Systems via Rational Krylov Methods,
Duration: May 1, 2007 – April 30, 2012
PI: Serkan Gugercin Amount: $400,000

2) NOTE: This grant ended during the activity period, in May 2009.
Agency: NSF-Division of Mathematical Sciences,
Title: Model Reduction with Rational Krylov Methods
PIs: Chris Beattie and Serkan Gugercin
Duration: June 1, 2005 – May 31, 2009
Total Amount: $210,766

GEORGE HAGEDORN

CONTINUING:

National Science Foundation Grant DMS–0600944. Mathematical Studies in Quantum Mechanics. Award Amount $243,770. 7/15/2006 – 4/30/2010.

NEW:

National Science Foundation Proposal DMS–0907165. Rigorous Studies in Quantum Mechanics. (co-PI with Alexander Elgart). Award Amount $337,000. 5/16/2009 – 4/30/2012.

SUE HAGEN

CONTINUING:

Evaluating Students' Quantitative Literacy Learning Outcomes in the Interdisciplinary Earth Sustainability Project: Assessing the Impact of an Embedded Quantitative Literacy Design. (2008-9) Core Competency Grant.
Project Members: Barbara Bekken, Charles Walter and Susan Hagen.

TERRI HERDMAN

CONTINUING:

PI, Research Collaboration and Program Development, ORNL/UT Battelle LLC, $260,826.
Co-PI, Investigation and Implementation of Sparse Grids, with John Burkardt, Sandia National Laboratories. $87,000.

NEW:

PI, Data Fusion and Analysis Center: Systems Molding and Mathematics, Department of Homeland Security, $222,540

Cont.
Senior Investigator, Computer Design Tools for Building Models, Simulations and Sensitivity Analysis, PIs: John Burns, Lizette Zietsman and Eugene Cliff, $375,018.

TRAIAN ILIESCU

CONTINUING:

CMG Collaborative Research: A New Modeling Framework for Nonhydrostatic Simulationsof Small-Scale Oceanic Processes, Principal investigator (with J. Duan, P. Fischer, and T. Ozgokmen), National Science Foundation, Grant OCE-0620464, 2006 - 2010, $147,861.

Reduced-Order Modeling for Optimization and Control of Complex Flows, co-PI (with J. Borggaard), Air Force Office of Scientific Research, 2007-2010, $391,021.

REINHARD LAUBENBACHER

CONTINUING:

Wake Forest University Translational Science Institute (TSI)
V. Shulaev (PI), R. Laubenbacher (co-PI), S. Akman (co-PI)
6/2008-5/2010
Translational breast cancer metabolomics. A joint project with Wake Forest University to discover cancer biomarkers.

Cont.

DMS-0755322-NSF – REU
Laubenbacher (PI), Burns, Zietsman (co-PIs)

5/2008 - 4/2011
REU Site*:* Modeling and Simulation of Biological Networks*.* The objective of the proposed program is to provide a 10-week residential summer research experience in mathematical biology to undergraduate students from around the U.S. and Puerto Rico, with the goal of increasing their desire and preparation to enter a Ph.D. program in mathematics or computational biology.

RO1CA120170-01A2 – NIH
V. Shulaev (PI), Laubenbacher, Mendes (co-PIs)
6/2007- 5/2010
Molecular fingerprinting of breast cancer development. Joint project with Wake Forest University Cancer Biology Department. The focus of the project is to study a metabolic network and its changes in breast cancer cells.

EEC-0609225- NSF
R. Davalos (PI), Laubenbacher (co-PI)
8/2006-8/2010
BBSI*:* Summer Institute for Quantitative and Integrative Bioengineering*.* Joint project of the Virginia Polytechnic Institute and State University, Wake Forest University School of Biomedical Engineering and Sciences (SBES) and the Virginia Bioinformatics Institute (VBI. The intellectual focus of the program--integrated and quantitative bioengineering--and will emphasize three major thrusts: computation systems biology, computational bio-imaging, and computational physiology.

NEW:

* U.S. Army Research Office
Laubenbacher (PI)
8/2009-7/2013
Computational Biomathematics: Toward Optimal Control of Complex Biological Systems

CMMI-0908201-NSF
Laubenbacher (PI)
10/2009-9/2012
Polynomial dynamical systems over finite fields: from structure to dynamics*.*

TAO LIN

CONTINUING:

Discontinuous Immersed Finite Element Methods for Interface Problems, NSF, July, 2007-June, 2010, $153,000, (PI: T. Lin, Co-PI: S. Adjerid)

GWEN LLOYD

CONTINUING:

Improving the Learning of Preservice Secondary Mathematics Teachers through Engagement with Middle and high School Curriculum Materials, 2006-2009 (no cost extension granted through March 2010), $100,000; National Science Foundation's Division of Undergraduate Education CCLI Program (PI Lloyd; co-PI V.R. Pitts Bannister)

Virginia Tech Serving Mathematics Students in Need, 2008-2013, $750,000; National Science Foundation's Robert C. Noyce Scholoarship
Program (PI A. Norton; co-PI Lloyd and others.)

NICHOLAS LOEHR

CONTINUING:

"Symmetric Functions, Macdonald Polynomials, Quantum Combinatorics, and Nabla." NSA Young Investigator Grant, $30,000, P.I. Loehr (awarded 2007, funding period 4/30/2008-4/30/2010

HENNING MORTVEIT

CONTINUING:

Project title: REU: Modeling and Simulation of Biological Networks. Principal investigators: Reinhard Laubenbacher, John Burns, Susan Faulkner and Lizette Zietsman. Other senior personnel: Jeff Borggaard, Abdul Jarrah and Olga Pierrakos. ($269,193) (**Senior personnel)**

Cont.

NEW:

Project Title: High Performance Computing Methods for Inference State Assessment and Course of Action Analysis in Large Socio-Technical Networks PI: Chris Barrett Co-PIs:

Richard Beckman, Henning Mortveit, Madhav Marathe Source of Support: DTRA Total Amount Awarded: $1,425,000 Total Award Period Covered: 03/11/09-02/28/11. Effort: 1.2 months cy (Co-PI)

Project Title: A Stochastic Simulation Platform for Predicting the Effects of Different Malaria Intervention Strategies. PI: Thomas Smith (Swiss Tropical Institute). Source of Support: Gates Foundation. Total Amount Requested for NDSSL: $400,000. Total Award Covered: 01/1/09-12/31/10. Effort: 2.95 months cy (PI for NDSSL portion of contract.) Note: Contract signed in September 2009

Project Title: A Stochastic Simulation Platform for Predicting the Effects of Different Malaria Intervention Strategies. PI: Thomas Smith (Swiss Tropical Institute). Source of Support: Gates Foundation. Total Amount Requested for NDSSL: $400,000. Total Award Covered: 01/1/09-12/31/10. Effort: 2.95 months cy (PI for NDSSL portion of contract.) Note: Contract signed in September 2009

ANDERSON NORTON

CONTINUING:

Principal Investigator for a $890,307 Robert Noyce Scholarship Grant from NSF, "Virginia Teach: Serving Mathematics Students in Need." Awarded 2008-2013.

Co-Principle Investigator for a $780,000 DR-K12 grant from NSF, "Untangling Mathematical KnoTSS (Knowledge for Teaching Secondary School)" (PI Rebecca McGraw, UAZ). Awarded 2008-2011

Co-Principal Investigator for a $311,650 MSP Grant from the State of Virginia, implementing a professional development program for all middle school mathematics teachers in Montgomery County (PI Jesse Wilkins, VPI). Awarded 2008-2009.

Co-Principal Investigator for a $1,500,000 DR-K12 Grant from NSF, studying restructuring of early field experiences for elementary pre-service teachers (PI Enrique Galindo, IUB). Awarded 2007-2012.

Co-Principal Investigator for a $500,000 Robert Noyce Scholarship Grant from NSF, providing scholarships in order to recruit future secondary math teachers for highneed schools in Indiana (PI Diana Lambdin, IUB). Awarded 2006-2009.

Cont.

NEW:

Note that the "Virginia Teach" Noyce grant listed above includes a $150,000 supplement applied for and awarded in 2009.

Also note that the grants from UAZ and IU include subcontracts awarded to Virginia Tech on an annual basis.

FRANK QUINN

CONTINUING:

NSF DMS-0936249 Evaluation and dissemination of task-oriented math courseware ($45,197)

MICHAEL RENARDY

CONTINUING:

NSF DMS-0936249 Evaluation and dissemination of task-oriented math courseware ($45,197)

YURIKO RENARDY

CONTINUING:

NCSA SGI Altix Renewal, grant CTS060022 for 30,000 service units, 7/23/2008-7/22/2009. Title: Numerical investigation of drop deformation in shear flow of immiscible viscoelastic liquids.

Title: Two-fluid dynamics in polymer processing, ferrohydrodynamics and electrowetting. TeraGrid Large Resource Allocations grant MCA08X019. 500,000 service units at Purdue University Steele cluster, 100,000 service units TeraGrid Wide Roaming Access. 10/1/2008-3/30/2010. Principal Investigators: Yuriko Renardy and Shahriar Afkhami.

I am a faculty mentor on VT-PREP and VT-IMSD, principal investigator Ed Smith, Professor, Animal and Poultry Science, Virginia Tech, funded by NIH.

Cont.

NEW:

National Science Foundation Division of Mathematical Sciences 0907788. Title: Computational study of drop deformation in systems with two immiscible liquids.

Principal Investigator: Yuriko Renardy. Co-Principal Investigator: Pengtao Yue. 6/1/2009-5/31/2012. $247,880.

MARK SHIMOZONO

CONTINUING:

NSF FRG grants (two): FRG: Collaborative Research: Affine Schubert calculus: Combinatorial, geometric, physical, and computational aspects.
NSF DMS 0652648, $129,565 (through VT), 7/2007 to 6/2010, 100% responsibility.

NSF DMS FRG 0652641, $671,270 (umbrella grant through AIM), 7/2007-6/2010, 33% responsibility.

SHU-MING SUN

CONTINUING:

National Science Foundation, Division of Mathematical Science, Grant Number: DMS-0807597. Title: ―Stability of Solitary Waves on Water of Finite Depth‖. $118,515. Duration: September 15, 2008 - August 31, 2011. Principal Investigator: S. M. Sun

PETER WAPPEROM

CONTINUING:

Simulation of injection molding of thermoplastics reinforced with micro and nanoparticles, ended Aug. 2009, NSF/DOE, $360,000, PI D.G. Baird (50%), co-PI P. Wapperom (50%).

NEW:

Simulation of molding of long fiber thermoplastic composites, NSF-CMMI, $414,846, 2009-2012, PI: D.G. Baird (50%), co-PI: P. Wapperom (50%).

PENGTAO YUE

NEW:

National Science Foundation Division of Mathematical Sciences 0907788. Title: Computational study of drop deformation in systems with two immiscible liquids. Principal Investigator: Yuriko Renardy. Co-Principal Investigator: Pengtao Yue. 6/1/2009-5/31/2012. $247,880.

LIZETTE ZIETSMAN

CONTINUING:

2007-2009: "Computational Methods for Identification, Optimization and Control of PDE Systems", Co-PI (with J. Burns and E. M. Cliff), AFOSR ($669,117).

2007-Present: "REU Gant on Modeling and Simulation of Biological Networks", Co-PI with (with J. Burns, S. Faulkner, R. Laubenbacher), NSF ($269,193).

2009-Present: "Computer Design Tools for Building Models, Simulation and Sensitivity Analysis", Co-PI with (with J. Burns and E. M. Cliff),
DOD – United Technologies Contract ($375,018).

DISTINGUISHED PROFESSIONAL SERVICE

SLIMANE ADJERID

Journal of Mathematical Problems in Engineering

SUSAN ANDERSON

Contributions to the advancement of scholarly and professional organizations, including holding offices, developing programs, editing journals, debating professional issues and assisting colleagues.

JOSEPH BALL

Associate editor for:
Integral Equations and Operator Theory (handling editor for 2 papers in 2009)

Journal of Mathematical Analysis and Applications (handling editor for 36 papers in 2009)

Complex Analysis and Operator Theory (handling editor for 3 papers in 2009)

Co-editor for IWOTA 2008 Proceedings volume: handling editor for 29 contributions

JEFF BORGGAARD

Associate editor of Optimization and Engineering, Springer.

ERZA BROWN

Associate Editor for the American Mathematical Monthly (Problems and Solutions Department—refereed and compiled solutions for seven problems)

Editorial Board, INTEGERS: The Electronic Journal of Combinatorial Number Theory

Editorial Board, Math Horizons

JOHN BURNS

Associate Editor – Mathematical Problems in Engineering, 2008 – Present.

Associate Editor - Journal of Dynamical and Control Systems, 1994-Present.

Technical Director, Interdisciplinary Center for Applied Mathematics, 1987-Present.

Member of National Academy of Sciences Panel to Review NSF VIGRE program.

ERIC DE STURLER

Associate Editor SIAM Journal on Numerical Analysis

Editorial Board Applied Numerical Mathematics

Editorial Board International Journal on Computational Science and Engineering

Editorial Board Open Applied Mathematics Journal

DAVID GAO

Co-Editor-in-Chief for book series on Modern Mechanics
and Mathematics published by Taylor l& Francis.

Co-Editor-in-Chief for book series on Modern Mechanics and
Mathematics, published by Springer.

An International Journal Bridging Mathematics and Sciences.
AIMS Press.

Associate Editor for Journal of Industrial and Management Optimization.
Editor for Discrete and Continuous Dynamical Systems, Series B.

Associate Editor for Optimization Letters, Springer.

Associate Editor of Electronic Journal of Mathematics and
Technology.

BILL GREENBERG

Editor Board: Journal of Transport Theory and Statistical Physics.

Editor Board: International Journal of Evolution Equations.

TERRY HERDMAN

Associate Editor, Journal of Integral Equations and Applications.

REINHARD LAUBENBACHER

Member, Editorial Board, Journal of Algebra
Member, Editorial Board, Bulletin of Mathematical Biology
Member, Editorial Board, Journal of Symbolic Computation
Member, Editorial Board, Applied Mathematical Sciences book series, Springer Verlag
Member, Editorial Board, Mathematical Modeling: Theory and Applications book series, Springer Verlag

MICHAEL RENARDY

Editor, Zeitschrift fuer angewandte Mathematik und Physik.
Co-Editor, Mathematical Methods in the Applied Sciences.
Co-Editor, SIAM Problems and Solutions (electronic publication).
Co-Editor, International Journal of Pure and Applied Mathematics.
Co-Editor, Zeitschrift fuer angewandte Mathematik und Mechanik.
Co-Editor, Qualitative Theory of Differential Equations and Applications
Co-Editor, International Journal of Mathematics and Computation

ROBERT ROGERS

Editorial Board Member – ZAMP

DAVID RUSSELL

Associate Editor; Journal of Mathematical Analysis and Applications (processed about 40 papers during 2009).

Associate Editor; Discrete and Continuous Dynamical Systems, Series B (processed just a few papers during 2009).

Honorary Editor: International Journal for Information Systems and Sciences.

HONORS, AWARDS

SUSAN ANDERSON

I was re-elected to the Town Council of Blacksburg on November 3, 2009, receiving the most votes of the ten candidates running for office.

JOHN BURNS

Nominated for The W. T. and Idalia Reid Prize in Mathematics.

ERIC DE STURLER

SIAM certificate of recognition for extensive reviewing,
SIAM certificate of recognition for 6 year editorship SINUM.

SERKAN GUGERCIN

Virginia Tech. Scholar of The Week for the weeks of May 18 and 25, 2009.

GEORGE HAGEDORN

Nominee for the Dannie Heineman Prize for Mathematical Physics (administered jointly by the American Physical Society and the American Institute of Physics).

SUSAN HAGEN

The Earth Sustainability Program received the University Exemplary Department Award.

HEATH HART

“Ten Years Of Service” award.
Favorite Faculty Reception (Virginia Tech Student Programs)

ABIGAIL KOHLER

Nominated as a Favorite Faculty, April ’09.

ANDERSON NORTON

Virginia Tech Favorite Faculty Nominee, 2009
Virginia Tech Math Club Professor of the Year, 2009

DAVID RUSSELL

Honored Guest, International Conference on Mathematical Control, Beijing, May, 2009.

BS DEGREES AWARDED 2009

Allen, Hannah – Fall 2009
Amos, Melvin – Dual – Fall 2009
Arias Saavedra, Jurgen Max - Spring 2009
Balanc, Nicholas R. – Spring 2009
Beeson, Eric – Fall 2009
Blackburn, Ryan G. – Spring 2009
Bookbinder, Kaitlin R. – Spring 2009
Christensen, Eric K. – Spring 2009
Chun, Aron – Spring 2009
Clark, Amy C. – Spring 2009
Clay, Megan E. – Spring 2009
Cody, Brynn A. – Spring 2009
Colston, Scott R. – Spring 2009
Cox, Amanda E. – Spring 2009
Darby, Anna – Fall 2009
Donaldson, Lauren N. – Spring 2009
Dove, Andrew P. – Dual – Spring 2009
Dye, Michelle V. – Spring 2009
Ferrarini, Christopher D. – Spring 2009
Finelli, Kevin D. – Spring 2009
Gergen, Jillian – Fall 2009
Grigsby, Michelle – Fall 2009
Hagan, Robert D. – Dual – Spring 2009
Hancock, Nathan I. – Spring 2009
Henken, Benjamin E. – Spring 2009
Hester, Herbert Mason IV – Spring 2009
Johnson, Stephen B. – Spring 2009
Kim, Jung H. – Spring 2009
Kopelke, Jessica R. – Spring 2009
Lafond, Patrick – Dual – Spring 2009
Lecky, Alexander – Fall 2009
Lynch, Ashlee S. – Spring 2009
Madeja, Nathalie A. – Spring 2009
McLeod, Bryant B. – Spring 2009
Metz, Christopher – Spring 2009
Metz, Harold Arthur III – Triple Degrees – Spring 2009
Moffat, Patick J. – Spring 2009
Monaco, Michael – Spring 2009
Moore, Nicholas J. – Spring 2009
Morgan, Amber – Summer II 2009
Parr, Valerie M. – Spring 2009
Pickering, Brent P. – Spring 2009
Ramsey, Wanda F. – Spring 2009

Remchuk, Ryan C. – Spring 2009
Robeson, Lucy R. – Spring 2009
Rodman, Ruth – Spring 2009
Ronco, Charles – Dual – Spring 2009
Roop, Krista L. – Spring 2009
Ryan, Nicholas K. – Spring 2009
Saunders, Mark Riley – Spring 2009
Sawyer, Ernie Ray III – Spring 2009
Sellars, Lauren A. – Spring 2009
Shearman, Toby L. – Dual – Spring 2009
Sheridan, Patrick – Fall 2009
Sherman, Matthew S. – Spring 2009
Stephenson, Shane – Summer I 2009
Swett, Katherine E. – Spring 2009
Tatum , Eric D. – Spring 2009
Turner, Bethany N. – Spring 2009
White, Troy – Summer I 2009

Undergraduate Semester Course Offerings
Fall '09 and Spring '10

Course Number	Title	Number of Sections
1015	Elementary Calculus with Trig. I	12
1015*	Elementary Calculus with Trig. I	3
1015**	Elementary Calculus with Trig. I	2
1016	Elementary Calculus with Trig. I	15
1016*	Elementary Calculus with Trig. I	3
1016**	Elementary Calculus with Trig. I	2
1114	Elementary Linear Algebra	19
1114H	Elementary Linear Algebra	3
1114**	Elementary Linear Algebra	2
1205	Calculus	34
1206	Calculus	26
1224	Vector Geometry	50
1224H	Vector Geometry	2
1525	Elementary Calculus with Matrices	9
1526	Elementary Calculus with Matrices	10
1535	Geometry & Math of Design	4
1536	Geometry & Math of Design	4
1536**	Geometry & Math of Design	1
1614	Number and Computing for Teachers	1
1624	Geometry and Computing for Teachers	1
2015	Elementary Calculus with Trig. II	19
2016	Elementary Calculus with Trig. II	3
2214	Intro Differential Equations	27
2214H	Intro Differential Equations	2
2224	Multivariable Calculus	36
2224H	Multivariable Calculus	1
2534	Introduction to Discrete Mathematics	2
2644	Mathematical Tutoring	1
2984	SS: ES Math Applications III	1
2984	SS: ES Math Applications IV	1
3034	Introduction to Proofs	6
3124	Modern Algebra	4
3134	Applied Combinatorics & Graph Theory	6
3144	Linear Algebra I	3
3214	Vector Calculus	8
3224	Advanced Calculus	6
3414****	Numerical Analysis	2
4044	History of Mathematics	1
4124	Introduction to Abstract Algebra	2
4134	Number Theory	1

4164	Advanced Discrete Mathematics	1
4175	Cryptography	1
4176	Cryptography	1
4225	Elementary Real Analysis	2
4226	Elementary Real Analysis	1
4234	Elementary Complex Analysis	1
4245	Intermediate Differential Equations	1
4254	Chaos and Dynamical Systems	1
4334	College Geometry	2
4404***	Applied Numerical Methods	1
4414****	Issues in Scientific Computing	1
4425	Fourier Series PDE	1
4426	Fourier Series PDE	1
4445	Introduction to Numerical Analysis	2
4446	Introduction to Numerical Analysis	2
4454	Applied Math Modeling	1
4564	Operational Methods for Engineers	6
4574	Vector and Complex Analysis for Engrs.	4
4625	TS: Math for Secondary Teachers	1
4626	TS: Math for Secondary Teachers	1
4644	TS: Secondary Math w/Tech	1
4654	Capstone Thesis and Seminar	1
4664	TS: Senior Math Education Seminar	1
4984	SS: Teach Math Early Field Experience	1
4984	SS: Programming & Math Problem Solving	1
4984**	SS: Applied Complex Variables	1

*VTASP Sections
**On-Line Course
*** Taught by AOE
****Taught by CS XI.

XI. Graduate Course Offerings
Fall 2009 and Spring 2010

Course Number	Title	Number of Sections
5114	Specialized Topics in Algebra	1
5125	Abstract Algebra	1
5126	Abstract Algebra	1
5144*	Inverse Theory & Applications	1
5225	Real Analysis	1
5226	Real Analysis	1
5235	Complex Analysis	1
5236	Complex Analysis	1
5245	Differential Equations	1
5246	Differential Equations	1
5344	Topology & Geometry	1
5425	Ap Par Diff Equations	1
5426	Ap Par Diff Equations	1
5454	Graph Theory	1
5464	Combinatorics	1
5465	Numerical Analysis	1
5466	Numerical Analysis	1
5474	Finite Difference Mathematics	1
5484	Finite Element Methods	1
5485	Numerical Analysis & Software	1
5486	Numerical Analysis & Software	1
5515	Model & Simulation of Bio Systems	1
5524	Matrix Theory	1
5545	Calculus of Variations	1
5546	Calculus of Variations	1
5725	Math-Finance Modeling	1
6225	TS: Robust Control	1
6226	TS: Robust Control	1
6255	Functional Analysis	1
6256	Functional Analysis	1
6324	TS: Hodge Theory	1
6425	TS: Atmos and Oceanic Flows	1
6425	TS: Adv Topics FeM	1
6426	TS: Adv Topics FeM	1

*Taught by GEOS

Enrollment Summary, Fall 2009 - Spring 2010

	Number of Sections	Enrollment	Average Section Size
*Courses below level of calculus	50	4,200	84
**First year calculus courses	116	5,859	50.5
Other undergraduate courses	221	9,342	42.1
Graduate courses	33	352	10.7
Total	375	19,753	52.7

Number of Undergraduate Majors:	353
Number of Graduate Students:	72

* courses included: 1015, 1114, 1525
** courses included: 1016, 1205, 1224, 1526

GRADUATE STUDENT DEGREE STATUS

MASTER OF SCIENCE

Bastian Erdnuess
Steffen Fischer
Marc Palm
Kapil Ahuja
Mohamed Ben Romdhane
Matthew Timothy Brenneman
Ahmed Kaffel
Idir Mechai
Xu Zhang
Nicholas James Moore
Phanindra Tallapragada
Naim Dakhli
Amy Givler
Andrea L' Afflitto
Julian McMorrow
Daniel Schmidt

DOCTOR OF PHILOSOPHY

Adam Childers
Evgeny Savel'ev
Fabio Botelho
Jingwei Zhang
Grant Boquet
Elizabeth Niese
Carlos Rautenberg
Kristine Roinestad