ANNUAL REPORT
Department of Mathematics
2013-2014
Academic Year 2013-2014
College of Science Annual Report

Department: Mathematics

Research and Innovation

- **Research Expenditures**

  FY14: Mathematics $1,311,508
  ICAM $161,559

- **Notable new research awards in 2013-14 (incl. PIs, Amount, Title and Funding Agency)**

  *Agency: NIH R21 Grant number: 1R21GM107683-01 PI: Matthias Chung Co-PI: Mihai Pop (University of Maryland at College Park)*
  *Title: Identifying the dynamics of small and large microbial communities*  
  *Awarded funds: $313,067*

- **Faculty awards/honors (e.g., Humboldt Fellowships, NSF CAREER awards, etc.):**

  Yuriko Renardy was named a Fellow of the Society for Industrial and Applied Mathematics.

  Bud Brown received the Mathematical Association of America (MAA) 2013 Carl B. Allendoerfer Award for Excellence in Expository Writing for “Why Ellipses Are Not Elliptic Curves” (with Adrian Rice), 85 (June 2012), 163-174.

  Shu-Ming Sun was appointed as an Honorary Professor at Hubei University of Arts and Sciences, China.

- **Number of manuscripts, number of books and book chapters (CY 2013); list high impact papers:**

  64 journal articles
  20 refereed conference proceedings papers
  3 book chapters
  3 books

  We do not do citation analyses on an annual basis.

- **Number of presentations (CY 2013); notable invited lectures:**
163 presentations


Eric de Sturler, Invited Presentation + Short Course on Newton-Krylov Methods (with Philipp Birken), Efficient Solution of Large Systems of Nonlinear PDEs in Science, Ecole Normale Superieur, Lyon, France, October 7 – 9, 2013 (The workshop is part of the TOFU European Research Council Project).  

- Iterative Linear Solvers and Jacobian-free Newton-Krylov Methods
- Recent Advances
- Updating Preconditioners for Sequences of Linear Systems


- Links and support from university’s research investment institutes (ICTAS, VTCRI, VBI, Fralin, VTTI, ISCE, ICAM, ICAT):

  Henning Mortveit has a primary appointment at VBI.

  ICTAS played a role in coordinating the VT proposal that led to the DOE Energy Hub grant on which John Burns and other ICAM mathematicians are co-PI’s.

  Stanca Ciupe is a co-advisor of a GBCB Ph.D. student whose primary advisor is at VBI.

  Many Math Department faculty members are affiliated with ICAM.

  Andy Norton is a Co-Principal Investigator for a $19,000 grant from the Institute of Society Culture & Environment (ISCE) at Virginia Tech. “Validating Mathematical Ways of Operating with Neural Correlates (Math WONC)” (PI Anthony Cate, Psychology, VPI).

- Number of post-doctoral positions in STEM-H research areas:

  One endowed position (Patricia Ann Caldwell Post-Doctoral Fellowship).
Two postdocs supported on research grants.

- Examples of links with NCR for research into issues of security and resiliency:

- Examples of partnerships with external collaborators which have enabled VT to compete more effectively for external funding:

  John Burns has developed a promising scientific relationship with United Technologies Corporation.

  The DOE Energy Hub grant (J. Burns and other ICAM members, co-PI’s) was awarded to a consortium of 24 partners, including Penn State, United Technologies, Lawrence Livermore National Laboratory, and IBM.

The Life of the Mind

- Faculty and departmental teaching awards (incl. college, university and national awards):

- Undergraduate student achievements and awards (e.g., Goldwater Scholars, Man/Woman of the Year):

- Graduate student achievements and awards (incl. college, university and national awards):

  Kelli Karcher won the university-wide GTA Excellence Instructor of Record Award.

- Grants in undergraduate teaching and learning (e.g., PhysTec):

  National Science Foundation Transforming Undergraduate Education in STEM, Collaborative Research: Developing Inquiry-Oriented Instructional Materials for Linear Algebra (DUE-1245673, 1245796, and 1246083), M. Wawro (PI), M. Zandieh and C. Rasmussen (co-PIs), $179,949, 2013-15.

  Virginia Tech Center for Innovation in Learning, Innovation in Undergraduate Mathematics Education: Supporting Student-Centered Instruction, M. Wawro
(PI) and David Plaxco (co-PI), $10,000, 2013-14.

National Science Foundation Robert Noyce Teach Scholarship, *Virginia Teach, Phase II: A Community-Based Approach to Serving Mathematics Students in Need* (DUE-1339947), C. Ulrich (PI), J. Wilkins, B. Kreye, A. Norton, and M. Wawro (co-PIs), $800,000, 2013-18.

Estrella Johnson, Consultant on the NSF REESE grant “Characteristics of Successful Programs in College Calculus”

4-VA grant to revise the curriculum of calculus for the life sciences (in collaboration with the Department of Biological Sciences). Math Department portion: $169,968.

- **Grants in graduate education (e.g., IGERTS):**
  
  2014-2015 Sixth Annual Graduate Student Mini-conference on Computational Mathematics, (L. Zietsman and J. Borggaard), National Science Foundation, $8,966.

- **One to two notable events or programs related to undergraduate education (e.g., first year of a signature course or FYE):**

  The Math Department revised the calculus courses taken by life sciences students to use more examples from the life sciences to motivate the mathematics. The new courses will be taught during AY 2014-2015.

  The Math Department revised the lower division curriculum taken by students in engineering and the mathematical and physical sciences to include more sophisticated linear algebra, to introduce more computation into the curriculum, and to align the curriculum more closely with the AP curriculum and the curricula of many colleges from which students transfer to VT. The new courses will be taught during AY 2014-2015.

  The Math Department sponsored the thirty-fifth Virginia Tech Regional Math Contest. Participants included 726 students from 107 colleges and universities in 28 states.

  Mathematics faculty members introduced two new CMDA courses this year.
One to two notable events or programs related to graduate recruitment and/or education:

The Math Department hosted the Sixth Annual Graduate Student Mini-conference on Computational Mathematics.

Examples of research experiences and experiential learning opportunities for undergraduates:

The Mathematics Department awards an annual Layman Prize for the best undergraduate research project, as presented in written and spoken format.

The Mathematics Department sponsored six more teams in the Consortium for Mathematics and its Applications’ Mathematical Contest in Modeling. One of the teams scored Meritorious (top 11%).

Examples of international experiences for undergraduate students:

Examples of international experiences for graduate students:

Each year the Math Department hosts two or three graduate students in year-long visits from the Karlsruhe (Germany) Institute of Technology.

Any additional examples that address goals in Virginia Tech’s “Plan for a New Horizon”:

- Ways in which computational science and skills for managing and analyzing complex data sets are integrated across a wide range of disciplines


Math Department faculty members introduced two new CMDA courses this year.

- Use of technology in classrooms and examples of distance-learning opportunities
The Math Emporium makes extensive use of technology in support of student learning. The Math Department has added short video clips of lectures to many of the Math Emporium online materials. These video clips enhance the experiences of students on campus while increasing the suitability of the course materials for distance learning. Emporium courses are offered in distance-learning format during the academic year when there is demand, and they are serving a rapidly increasing population of distance learners during the summers.

- Incentives for teaching and learning through distance education
- Creation of flexible classroom spaces that fully support e-learning components

The Math Emporium offers 60 hours per week of short-response help, 25 hours per week of long-response help, and one weekly problem discussion section in each of five courses, all in a setting in which e-learning is fully supported via the presence of 537 computers and VT-written online textbooks and online problems, for which student answers get immediate online responses that include links back to relevant lessons.

Lawrence Sewell won the 2013 Governor’s Award for Innovation, largely for his work on the Math Emporium.

Some Math Department faculty members are starting to use SCALE-UP classrooms when those classrooms are available.

- Quality and availability of academic advising from orientation through graduation

Every student has a faculty advisor with whom (s)he is invited to meet at least twice annually and with whom (s)he can meet more often. The faculty advisors are supported by the advising coordinator, Sandy Blevins, and the associate chair for undergraduate students, Bob Rogers.

- Examples of STEM-related activities fostering entrepreneurship, science and technology policy, and ethics

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**The Virginia Tech Experience**

- Faculty service (Editorships, NSF/NIH program managers or panel members, leadership positions in professional societies):
16 members of the faculty served in 39 editorial positions.

Joe Ball:
Member of Steering Committee for annual IWOTA (International Workshop on Operator Theory and Applications) and biennial MTNS (Mathematical Theory of Networks and Systems) conferences

Jeff Borggaard:

Bud Brown:
MAA Committee to Select the Recipients of the Henry L. Alder Award for Distinguished Teaching, 2010 - 2013

MAA Committee to Select Speakers for Invited Addresses for the 2014 Joint Mathematics Meetings, 2012 - 2013

Committee to Select Speakers for the Joint AMS-MAA Invited Addresses for the 2014 Joint Mathematics Meetings, 2013

MAA Council on Prizes and Awards, 2013 to present

John Burns:
Member of Member of SIAM Committee on Science Policy, 2010 – Present.

Member of SIAM Committee on Why Do Math Project 2007 – Present.

Member, International Federation of Automatic Control - Technical Committee T C 2.6.: Distributed Parameter Systems, 2011 - Present

Member of the International Organizing Committee for the 1st IFAC Workshop on Control of Systems Modeled by Partial Differential Equations, held in Paris, France, September, 2013.


Julianne Chung:
Alumni committee Department of Energy Computational Science Graduate Fellowship.

Eric de Sturler:

Scientific Committee/Co-Chair Efficient solution of large systems of non-linear PDEs in science - Sciencesconf.org, ENS Lyon, Lyon, France, October 7-9, 2013. The workshop is part of the TOFU European Research Council Project.


Mark Embree:

Member, SIAM Committee on the Gene Golub Summer School.

Serkan Gugercin:

Served as a reviewer for The National Agency for the Evaluation of Universities and Research Institutes (ANVUR) for the assessment of research performed in the time frame 2004-2010 by researchers of all Italian universities and research institutes.

Terry Herdman:

Member SIAM Careers and Professional Development Committee.

Council Member, Coalition for Academic Scientific Computation.

Board Member, Southeastern Universities Research Association (SURA).

Board Member, Mu Alpha Theta.

Council Member, Oak Ridge Associated Universities.

Board Member and Vice Chair, Oak Ridge Associated Universities.

Board member for UT Battelle LLC management of Oak Ridge National Laboratory.

Member, CUPM Curriculum Guide Revision for Mathematics and Engineering.
Andy Norton:

Steering Committee member for the *North American Chapter of the International Group for the Psychology of Mathematics Education*

Yuriko Renardy:

Society of Rheology Technical Programming Committee, organizational work for the February 2013 annual meeting, Pasadena, CA.

Reporting of panel memberships inconsistent due to the expectation of some agencies that such service remain confidential.

- **Examples of economic development (e.g., industrial partnerships, patents):**

  John Burns has developed a promising scientific relationship with United Technologies Corporation.

  The DOE Energy Hub grant (J. Burns and other ICAM members, co-PI’s) was awarded to a consortium of 24 partners, including Penn State, United Technologies, Lawrence Livermore National Laboratory, and IBM.

- **Study Abroad programs:**

- **PK-12 STEM programs:**


  National Science Foundation Robert Noyce Teach Scholarship, *Virginia Teach, Phase II: A Community-Based Approach to Serving Mathematics Students in Need* (DUE-1339947), C. Ulrich (PI), J. Wilkins, B. Kreye, A. Norton, and M. Wawro (co-PIs), $800,000, 2013-18.

  Andy Norton is a Co-Principal Investigator for a $2,200,000 NSF DRK-12 grant, “Gateways to Algebraic Motivation, Engagement and Success (GAMES): Supporting and Assessing Fraction Proficiency with Game-Based, Mobile Applications and Devices.” Awarded 2011-2014.

  Andy Norton is a Partner on a $9,874 4VA grant in collaboration with James Madison University. Fraction Schemes and Operations: An Extension to
Prospective PreK-8 Teachers” (Director LouAnn Lovin, JMU). Awarded 2013-2014.

- **Examples of Community and Student Engagement:**

  Jeff Borggaard, Terry Herdman, and Lizette Zietsman:
  Judge for 2013 Moody’s Mega Math Challenge.

  Bud Brown:
  Judge for the Roanoke Valley Governor’s School Science Forum, Patrick Henry High School, Roanoke VA (February 2)

  Presentations on Chocolate Key Cryptography (“CKC”) to two classes at Walt Whitman High School, Bethesda MD (April 12)

  Presentations on Archimedes and the Ball of Cork to three classes at the Roanoke Valley Governor’s School, Roanoke VA (May 23)

  George Hagedorn:
  Judge at the Blue Ridge Highlands Regional Science Fair, March 2013.

  Terry Herdman:
  Head Special Award Judge, Intel International Science and Engineering Fair, Phoenix, May 2013.

  Werner Kohler:
  Judge at the Governor’s School Science Fair.

  Andy Norton:
  Volunteer at Price’s Fork Elementary School

  Organized Virginia Council of Teachers of Mathematics conference for the fifth time in March, 2013.
George Hagedorn was an organizer for a Workshop held in Banff, Alberta, Canada, 28 April – 3 May 2013, “Mathematical Methods in Quantum Molecular Dynamics.”

Slimane Adjerid served on the Scientific committee of the ”Gulf International Conference on Applied Mathematics”, Kuwait, organizers, A. Ansari and H. Temimi, November 2013.

John Burns and other mathematicians associated with ICAM serve as co-PI’s on Advanced Computer Design Tools for Modeling, Design, Control, Optimization and Sensitivity Analysis of Integrated Whole Building Systems, U.D. Department of Energy Energy-Efficient Building Systems Design HUB. ($122,000,000 – Virginia Tech share: $5,000,000). This project involves government, corporate, and university partners. Theoretical and computational formulations are tested in actual buildings.

Examples leveraging the strengths of our business programs to provide a competitive advantage

Examples of strategic global investment, development of research programs on energy and critical technologies, informatics, infrastructure, policy and planning at VT’s international centers

Diversity
One to two notable activities by students, faculty and/or staff activities promoting diversity:

Megan Wawro was PI on National Science Foundation Transforming Undergraduate Education in STEM, *MPWR: Mentoring and Partnerships for Women in RUME* (DUE-1352990), M. Wawro (PI), Jessica Ellis and Hortensia Soto-Johnson, senior personnel, $44,148, 2013-14. She organized the meeting supported by this grant and held it in February, 2014.

Susan Anderson is in her twenty-first year as faculty advisor to the student organization Womanspace.

Diversity awards and honors (e.g., MAOP scholarships; McNair Scholars):

Susan Anderson won the 2013-2014 College of Science Diversity Award.
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
De Sturler, Eric
Embree, Mark
Floyd, William
Gugercin, Serkan
Hagedorn, George
Haskell, Peter
Herdman, Terry
Illiescu, Traian
Kim, Jong
Klaus, Martin
Kohler, Werner
Lin, Tao
Linnell, Peter
Prather, Carl
Quinn, Frank
Rogers, Robert
Rossi, John
Russell, David
Shimozono, Mark
Sun, Shu Ming
Turner, James C
Associate Professors
Elgart, Alexander
Loehr, Nicholas
Mortveit, Henning
Norton, Anderson
Wapperom, Peter
Zietsman, Lizette

Assistant Professors
Chung, Julianne
Chung, Matthias
Ciupe, Stanca
Glatt-Holtz, Nathan
Johnson, Estrella
Mihalcea, Leonardo
Orr, Daniel
Wawro, Megan
Yue, Pengtao

Senior Instructors
Agud, Diane
Anderson, Susan
Bourdon, Terri
Hagen, Susan
Kohler, Abigail
Shugart, Eileen
Stephens, Catherine

Advanced Instructors
Hart, Heath
McQuain, Margaret
Smith, Deborah
Schmale, Jessica
Instructors
Arnold, Rachel
Asfaw, Tefera
Chung, Myung Suk
Clemons, Joshua
Gildersleeve, Nate
Hanks, Lucy
Heitzman, Michael
Hurdus, Jessica
Jasso, Fanny
Miller, Shelley
Ordonez-Delgado, Bartleby
Peters, Leroy
Richards, Trevor
Robbins, Nicholas
Robinson, Kelly
Saenz Maldonado, Edgar
Savel’ev, Evgeny
Ufferman, Eric
Wilson, Jason
**GRANTS**

**SLIMANE ADJERID**

Continuing:


Pending:


**JOSEPH BALL**

Continuing

BSF ’’Noncommutative Function Theory and its Applications'' (with Dmitry Kaliuzhnyi-Verbovetskyi (Drexel University) and Victor Vinnikov (Ben Gurion University), starting date: 10/2011; 4-year duration at $22,000 per year: funds for travel by the PIs between the US and Israel.

**CHRISTOPHER BEATTIE**

Continuing:

“Collaborative Research: Innovative Integrative Strategies for Nonlinear Parametric Inversion,” NSF –Division of Mathematical Sciences, Computational Mathematics, Co-PIs: Christopher Beattie (VT), Eric de Sturler (VT), Serkan Gugercin (VT), Misha Kilmer (Tufts). $447,582 – VT

Grants (pending):

JEFF BORGGAARD

Grants (continuing):

Improved Parameterization of Groundwater Flow Models using Interferograms and Adjoint Sensitivity Analysis, Senior personnel (T. Burbey PI), National Science Foundation, 2010-2013, $260,000.


Grants (pending):

Sixth Annual Graduate Student Mini-conference on Computational Mathematics, Senior personnel (with L. Zietsman PI), National Science Foundation, 2014–2015, $8,966.

JOHN BURNS
Continuing:

2010-Present “Computational Methods for Identification, Optimization and Control of PDE Systems”, Principal Investigator (with E. M. Cliff and Lizette.Zietsman), AFOSR ($600,000).


JULIANNE CHUNG

Grants (pending):


MATTHIAS CHUNG

Grants (new):

Agency: NIH R21 Grant number: 1R21GM107683-01 PI: Matthias Chung Co-PI: Mihai Pop (University of Maryland at College Park) Title: Identifying the dynamics of small and large microbial communities Awarded funds: $313,067
Grants (pending):


STANCA CIUPE

Grants (continuing):


Grants (pending):

PI: NSF DMS 1410880, Mathematical models of immune responses to viral infections, 09/01/2014-08/312017, $176,010.00.

ERIC DE STURLER

Grants (continuing):

Collaborative Research: CMG: Quantum Monte Carlo Calculations of Deep Earth Materials, NSF $801,471 (total collaborative award), $183,306 (VT), 09/15/10 – 08/31/13, extended till 08/31/14, PI

Collaborative Research: Innovative Integrative Strategies for Nonlinear Parametric Inversion, NSF 1217156 $550,000 (total collaborative award), $360,582 (VT/lead proposal), 9/15/2012 – 8/31/2015, Principal Investigator (lead PI), CoPIs at VT: Chris Beattie and Serkan Gugercin.

AFOSR-BRI: Co-Design of Hardware/Software for Predicting MAV Aerodynamics, AFOSR FA9550-12-1-0442 $6,004,922 (total award),
$4,004,922 (VT), 9/01/2012 – 10/31/2017, CoPI (one of five PIs).

MRI-R2: Acquisition of a Heterogeneous Supercomputing Instrument for Transformative Interdisciplinary Research, NSF $1,992,527, 7/01/10 – 9/30/13, senior personnel.

Grants (pending):

Multilevel Multiresolution Topology Optimization of Aerospace Structures, AFOSR $577,715, PI. (this proposal was kept pending by the program manager because of the sequester)

FRG: Collaborative Research: An Integrated Framework of Model Reduction, Regularization, and Iterative Solvers for Large-scale Inverse Problems, $1,489,095 (total award), $959,095 (VT/lead proposal), lead PI: Serkan Gugercin, CoPIs at VT: Chris Beattie, Julianne Chung, Eric de Sturler, Adrian Sandu; (2 CoPIs at MIT and Texas Austin)

ALEXANDER ELGART

Grants (continuing):

US National Science Foundation Grant DMS-1210982, Mathematical studies in quantum mechanics, joint with G. Hagedorn, $334,188, 8/1/2012-7/31/2015.

NATHAN GLATT-HOLTZ

Grants (new):

2013-2016 NSF-DMS-1313272.

Oberwolfach Summer Research in Peace Program (Summer 2014)
SERKAN GUGERCIN

Grants (continuing):

**Agency:** NSF – Division of Mathematical Sciences
**Title:** Collaborative Research: Innovative Integrative Strategies for Nonlinear Parametric Inversion
**PIs:** Chris Beattie, Eric de Sturler, and Serkan Gugercin
**Amount:** $359,942

**Agency:** DOE
**Duration:** 2010 - 2015
**PIs:** J. Burns, E. Cliff, S. Gugercin, T. Herdman, T. Iliescu, M. Marathe and L. Zietsman.
**Amount:** $5,000,000

Grants (pending):

**Agency:** NSF – Division of Mathematical Sciences
**Title:** FRG: Collaborative Research: An Integrated Framework of Model Reduction, Regularization, and Iterative Solvers for Large-scale Inverse Problems
**PIs:** Chris Beattie, Julianne Chung, Eric de Sturler, and Serkan Gugercin, Adrian Sandu
**Amount:** $959,019

GEORGE HAGEDORN

Grants (continuing):

Principal Investigator, “Rigorous Studies in Quantum Mechanics.”
(co–Principal Investigator, Alexander Elgart)
National Science Foundation Grant DMS–0907165.
$337,000 (5/15/09 – 6/30/13)

Principal Investigator, “Mathematical Studies in Quantum Mechanics.”
(co–Principal Investigator, Alexander Elgart)
National Science Foundation Grant DMS–1210982.
$344,188 (8/1/12 – 7/31/15).

**TERRY HERDMAN**

Grants (continuing)


2012 – 2022 – Core Team Member with Sotera Defense Solutions, (CIO-SP3) Government-wide Acquisition Contract (GWAC), 10 year National Institutes of Health (NIH), award ceiling $20B.

Grants (pending)

Grants (pending):
Core Team Member with Sotera Defense Solutions, DHS EAGLE II UNRESTRICTED IDIQ contract, HSHQDC-11-R-10001, award up to $20B – under protest.

**TRAIAN ILIESCU**

Grants (continuing)

CMG Collaborative Research: Ocean Modeling by Bridging Primitive and Boussinesq Equations (with J. Duan, P. Fischer and T. Ozgokmen), National Science Foundation, Grant DMS-1025314, 2010-2013, $208,348.
Computational Algorithms for Model Reduction of Complex Flows (with J. Borggaard), National Science Foundation, DMS-1016450, 2010-2013, $110,000.


ESTRELLA JOHNSON

Grants (Continuing)

Consultant on the NSF REESE grant “Characteristics of Successful Programs in College Calculus”

Grants (pending):

Principal Investigator for a $312,595 sub-award from the Mathematical Association of America for as NSF IUSE grant, “Progressing Through Calculus.” Pending

Principal Investigator for a $247,726 NSF IUSE grant, “Collaborative Research: Teaching Inquiry-Oriented Mathematics: Establishing Supports.” Pending

TAO LIN

Continuing:

Grants (pending):


PETER LINNELL

Continuing:

NSA 091019-Linnell standard grant May 2011-June 2013, $54853

NSA grant H98230-13-1-0221 June 2013-June 2015 $52473 (second year depends on “fiscal cliff” etc.)

NICHOLAS LOEHR

Grants (continuing):

“Exploring the combinatorics of symmetric and quasisymmetric functions.” Simons Collaborative Grant for Mathematicians, $35,000 requested, funding period 9/2012- 8/2017, P.I. Loehr. Submitted on 1/10/2012. Awarded July 2012. First year of the grant has been transferred to U.S. Naval Academy while I am on leave without pay from VT.

LEONARDO MIHALCEA

Grants (continuing):

NSA Young Investigator Award NSA - 111013, (2 years, total amount: $40,000) started on February 2013. Title: Quantum cohomology for generalized flag manifolds and applications.

Grants (pending):

NSF grant, title "Quantum cohomology of generalized flag manifolds and related problems"; decision pending, expected by July 2014.

NSA Young Investigator grant, title "Quantum cohomology of generalized
flag manifolds and related problems”; decision pending, expected late 2014.

HENNING MORTVEIT

Grants (continuing):

Project Title: Rigorous Approaches for Validation and Verification of Networked Systems. PI: Madhav Marathe Co-PIs: Christopher Barrett, Stephen Eubank, Henning Mortveit Source of Support: DTRA Total Amount Awarded: $1,190,969 (VBI Portion: $1,190,969) Total Award Period Covered: 06/01/11-05/31/14 Effort: 0.60 months per calendar year. (Co-PI)

Project Title: Synthetic Information Systems for Better Informing Public Health Policymakers. PIs: Stephen Eubank, Madhav Marathe. Source of Support: NIH Total Amount Awarded: $3,933,969 (VBI Portion: $3,315,332) Total Award Period Covered: 05/01/11-04/30/16. Effort: 1.20 calendar months per year. (Senior personnel)

Project Title: Comprehensive National Incident Management System (CNIMS) PI: Christopher Barrett Source of Support: DTRA Total Amount Awarded: $10,012,079 Total Award Period Covered: 10/01/11-09/30/14 Effort: 5.40 months cy (Senior personnel)

Project Title: “SDCI NMI New: From Desktops to Clouds – A Middleware for Next Generation Network Science” PI: Madhav Marathe Source of support: NSF. Total amount awarded: $1,499,998. Total award period covered: 08/01/2010–07/31/2013 Effort: 0.20 calendar months per year. (Senior personnel)

Grants (new):

Approved but not funded initially due to availability of funds. Is still being considered if funds become available. Project title: “HPC Methods for Reasoning about Large, Realistic, Societally-coupled Physical Networks”. Source of Support: DTRA. PI: Madhav Marathe. Total Amount: $4,000,000 Proposed project dates: 10/01/13-09/30/18 (PI)

Grants (pending):
Project Title: Stability in Generalized Boolean Network Models for Cell Differentiation
PI: Henning Mortveit
Source of Support: NSF
Total Amount Requested: $193,684
Total Award Period Covered: 06/01/14-05/31/17
Date Submitted: 11/15/13
Effort: 1.00 months cy (PI)

Project Title: “Rigorous Approaches for Validation and Verification of Networked Systems”
This is an extension proposal for HDTRA1-11-1-0016 and covers two option years at $400k/year. See details in current grant above (Co-PI).

ANDERSON NORTON

Grants (continuing):


Co-Principal Investigator for a $2,200,000 NSF DRK-12 grant, “Gateways to Algebraic Motivation, Engagement and Success (GAMES): Supporting and Assessing Fraction Proficiency with Game-Based, Mobile Applications and Devices.” Awarded 2011-2014.

Grants (new):

Co-Principal Investigator for an $800,000 Robert Noyce Scholarship Phase II grant from NSF, “Virginia Teach: Phase II” (PI Catherine Ulrich, School of Education, VPI) Awarded 2013-2018.

Consultant on Amy Hackenberg’s NSF-funded Career grant.

Co-Principal Investigator for a $19,000 grant from the Institute of Society Culture & Environment (ISCE) at Virginia Tech. “Validating Mathematical Ways of Operating with Neural Correlates (Math WONC)” (PI Anthony Cate, Psychology, VPI).

Partner on a $9,874 4VA grant in collaboration with James Madison.
University. Fraction Schemes and Operations: An Extension to Prospective PreK-8 Teachers” (Director LouAnn Lovin, JMU). Awarded 2013-2014.

Co-Principal Investigator for a $200,000 supplement to existing NSF DRK-12 grant, “Gateways to Algebraic Motivation, Engagement and Success (GAMES): Supporting and Assessing Fraction Proficiency with Game-Based, Mobile Applications and Devices” (PI Michael Evans, School of Education, VPI). Awarded 2011-2014.

Grants (pending):

Principal Investigator for a $1,073,046 NSF DRK-12 grant, “Anchoring Curriculum and Instruction on Children’s Fractional Knowledge.” Pending.

Principal Investigator for a $1,498.757 NSF REAL grant, “Validating Mathematical Ways of Operating with Neural Correlates (Math WONC).” Pending.

MICHAEL RENARDY

Continuing:

NSF DMS-1008426

Grants (pending):

New proposal submitted to NSF for three year funding.

YURIKO RENARDY

Grants (continuing):

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

I am a mentor on the Virginia Tech Post Baccalaureate Research and Education Program (VT-PREP, PI Ed Smith in Animal and Poultry Science Department). In the past, I mentored Shernita Lee, currently Prof. Laubenbacher’s PhD student.

Grants (new):


Aspen Center for Physics proposal for Winter Conference on Biophysics: Active Fluids, Bridging Complex Fluids and Biofluids. Accepted. To take place in January 2014.

MARK SHIMOZONO

New Grant:

NSF DMS 1200804 Affine Schubert Calculus, 6/1/2012 to 5/31/2015, 100 percent responsibility. Approximate 3 year amount is $155000.

SHU-MING SUN

Grants (continuing):


PETER WAPPEROM

Continuing:
Simulation of molding of long fiber thermoplastic composites, NSF-CMMI, $414,846, 2009-2013, PI: D.G. Baird (50%), co-PI: P. Wapperom (50%).

MEGAN WAWRO

Grants (new):

National Science Foundation Transforming Undergraduate Education in STEM, Collaborative Research: Developing Inquiry-Oriented Instructional Materials for Linear Algebra (DUE-1245673, 1245796, and 1246083), M. Wawro (PI), M. Zandieh and C. Rasmussen (co-PIs), $179,949, 2013-15.

National Science Foundation Transforming Undergraduate Education in STEM, MPWR: Mentoring and Partnerships for Women in RUME (DUE-1352990), M. Wawro (PI), Jessica Ellis and Hortensia Soto-Johnson, senior personnel, $44,148, 2013-14.

Virginia Tech Center for Innovation in Learning, Innovation in Undergraduate Mathematics Education: Supporting Student-Centered Instruction, M. Wawro (PI) and David Plaxco (co-PI), $10,000, 2013-14.

National Science Foundation Robert Noyce Teach Scholarship, Virginia Teach, Phase II: A Community-Based Approach to Serving Mathematics Students in Need (DUE-1339947), C. Ulrich (PI), J. Wilkins, B. Kreye, A. Norton, and M. Wawro (co-PIs), $800,000, 2013-18.

Grants (pending):

PENGTAO YUE

Grants (pending):

National Science Foundation – Division of Mathematical Sciences (DMS). Title: Numerical methods for solid-fluid-fluid three-phase flows with moving contact lines. Principal Investigator: Pengtao Yue.

LIZETTE ZIETSMAN

Grants (New)

2014-2015 Sixth Annual Graduate Student Mini-conference on Computational Mathematics, (with J. Borggaard), National Science Foundation, $8,966.

Grants (continuing):

2010-Present “Computational Methods for Identification, Optimization and Control of PDE Systems”, Principal Investigator (with J. A. Burns and E.M. Cliff), AFOSR ($600,000).

DISTINGUISHED PROFESSIONAL SERVICE

SLIMANE ADJERID

Editorial boards: Journal on Advances in Numerical Analysis

JOSEPH BALL

Co-organizer (with Vladimir Bolotnikov) of Minisymposium ``Abstract Interpolation and Linear Algebra'' at 2013 Conference of the International Linear Algebra Society (ILAS), Providence, RI, June 3-7, 2013.

Associate editor for Journal of Mathematical Analysis and Applications: handled 33 submissions.

Associate editor for Complex Analysis and Operator Theory: handled 6 submissions.

Associate editor for Banach Journal of Mathematical Analysis: handled 3 submissions.

Associate Editor for Integral Equations and Operator Theory.

Associate Editor for Leiba Rodman Special Issue of Linear Algebra and its Applications: handling 4 papers.

Member of Editorial Board for the journal Multidimensional Systems And Signal Processing (3-year term beginning in October 2011)

JEFF BORGGAARD

Associate editor of Optimization and Engineering, Springer.
Associate editor of ISRN Applied Mathematics, Hindawi Publishing.
ERZA BROWN

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

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

JOHN BURNS

Associate Editor – Mathematical Problems in Engineering, 2008 – 2013.

Series Editor: Monographs and Research Notes in Mathematics, 2013 – Present

ERIC DE STURLER


SERKAN GUGERCIN

Associate Editor for Systems and Control Letters

Member of the IEEE Conference Editorial Board

Associate Editor for the 21st International Symposium on Mathematical Theory of Networks and Systems, 2014

TERRY HERDMAN

Associate Editor, Journal of Integral Equations and Applications.

ESTRELLA JOHNSON

Guest editor for a special issue of the Journal of Mathematical Behavior
JONG KIM

Inducted to the editorial board of the journal “Evolution Equations and Control Theory.”

PETER LINNELL

Editorial Adviser of London Math Society

ANDERSON NORTON

Chair of the Editorial Panel, Journal for Research in Mathematics Education

Guest Editor, Journal for Research in Mathematics Education

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, Zeitschrift fuer angewandte Mathematik und Mechanik.


Co-Editor, Evolution Equations and Control Theory.

YURIKO RENARDY

SHU-MING SUN

I was an Associate Editor for the Journal of Applied Mathematics and Physics (ZAMP) in 2013 (handled 4 papers)

LIZETTE ZIETSMAN

Associate Editor of SIAM Undergraduate Research Online.
HONORS, AWARDS

SUSAN ANDERSON

I received my “Favorite Faculty” learn.grow.develop journal at the Favorite Faculty Reception on April 3.

I received a certificate in recognition of Thirty Years of Service on April 30.

On October 22, I was interviewed as a Courageous Leader by a committee of the Division of Student Affairs.

DIANE AGUD

Favorite Faculty (Housing and Residence Life/Division of Student Affairs)
Spring 2013

RACHEL ARNOLD

Favorite Faculty (Housing and Residence Life)

JOE BALL

SIAM certificate for ``significant referee work on manuscripts submitted to its journals, crossing a threshold that few attain, by reviewing 15 papers."

JOHN BURNS

Elected Fellow of SIAM, 2013.

Elected Honorary Member of the Argentinean Association for Applied, Computational and Industrial Mathematics, 2013.

MYUNGSUK CHUNG

Received two “Thank a Teacher” notes (through CIDER) from students in spring.
MARK EMBREE

Rice University, Presidential Mentoring Award, 2013 (two awarded university-wide)

HEATH HART

Housing and Residential Life: 2013 Favorite Faculty

Department of Mathematics: 2013 Instructor of the Year

TRAIAN ILIESCU

Erich Foster, my former student, was a finalist for the Bavarian Graduate School of Computational Engineering (BGCE) Student Paper Prize awarded at the 2013 SIAM CS&E Conference, February 25 – March 1, 2013, in Boston, Massachusetts.

MARGARET MCQUAIN

I was nominated and honored at the Favorite Faculty Reception April 3, 2013.

I received a THANK YOU TEACHER recognitions through CIDER in March, 2013.

I received two THANK YOU TEACHER recognitions through CIDER in May, 2013.

I have also received a THANK YOU TEACHER recognitions through CIDER in Jan, 2014 for a class taught in Fall 2013.

I have been nominated for the CIDER TEACHER OF THE WEEK recognition. (2013 -14)

ANDERSON NORTON
Early Career Award, from the Association of Mathematics Teacher Educators, 2013

YURIKO RENARDY

The APS Division of Fluid Dynamics meeting in Pittsburgh November 24-26, 2013, chose me as one of several professors to host a table of 8 students for the Student Luncheon. This is an event where students have the opportunity to meet professors and senior scientists in the field of fluid dynamics and talk with them informally about their experiences in research and in their scientific careers.

BOB ROGERS

MAA Student Chapter Professor of the Year

SHU-MING SUN

I was appointed as an Honorary Professor at Hubei University of Arts and Sciences, China, in 2013.

MEGAN WAWRO

Received the Best Paper Award for the SIGMAA on RUME, 16th annual conference on Research on Undergraduate Mathematics Education conference proceedings.

Awarded AWM-NSF Travel Grant for a mathematics education researcher to travel to a mathematics conference, $1500, 2013.
B.S. DEGREES AWARDED 2013

An, Soo Min – Spring 2013
Aurora, Julie – Spring 2013
Bakelas, Nicholas – Spring 2013
Baltzer, Garrett – Spring 2013
Barry, Alexander – Summer II 2013
Beck, Nicole E. – Spring 2013
Bills, Daisy K. – Spring 2013
Brand, Jonathan – Spring 2013
Brehm, David – Spring 2013
Brewer, Kathryn – Spring 2013
Brooks, Bret – Spring 2013
Brown, Heather – Spring 2013
Burkard, Andrew – Dual – Spring 2013
Cain, Stefanie – Spring 2013
Carr, Stephanie – Summer I 2013
Casey, Thomas – Spring 2013
Chahine, Yousef – Spring 2013
Cogswell, Michael – Dual – Fall 2013
Cook, Todd – Summer II 2013
Corder, Scott – Dual – Spring 2013
Coskun, Emir – Spring 2013
Cumminskey, Sean – Summer II 2013
D’Augustine, Anthony – Dual – Spring 2013
Daniels, Emily – Spring 2013
Delawder, Kevin – Spring 2013
Deutsch, Jessica – Spring 2013
DeVito, Sarah – Spring 2013
Elliott, Rachel – Dual – Spring 2013
Evert, Eric – Spring 2013
Foley, Evan – Summer II 2013
Fox, Houston – Dual - Spring 2013
Gillespie, Michael – Spring 2013
Gilliam, Andrew – Spring 2013
Gimenez, Caroline – Spring 2013
Harbula, Katherine – Spring 2013
Harrison, Stephanie – Spring 2013
Haskell, David – Spring 2013
Heimburger, Joseph – Dual – Spring 2013
Heisler, Elizabeth – Dual – Spring 2013
Holloman, Chelsea – Spring 2013
Huffman, Mary – Spring 2013
Hutcherson, Seth – Spring 2013
Huynh, Sean – Spring 2013
Jenkins, Derek – Fall 2013
Johnson, Gregory – Spring 2013
Ketterman, Melissa – Spring 2013
King, Kevin – Spring 2013
Lassiter, Andrew – Dual – Spring 2013
Lawless, Peter – Spring 2013
Lesher, Emily – Spring 2013
Lewellen, Jacob – Spring 2013
Lewers, Mark – Fall 2013
Lind, Frederick – Spring 2013
Lowery, Michael – Spring 2013
Lynch, Owen – Spring 2013
Marrione, Amanda – Summer II 2013
Mattfeld, Bryan – Dual - Spring 2013
McDonald, David – Dual - Spring 2013
McKnight, Kayla – Fall 2013
Mitchell, William – Spring 2013
Morris, Stephanie L. – Spring 2013
Moulton, Matthew – Fall 2013
Murray, Anne-Claire – Spring 2013
Naper, Michael – Dual – Spring 2013
Navarro, Isabel – Spring 2013
Neale Travis – Summer II 2013
Nuhn, Christopher – Spring 2013
Orem, Christopher – Spring 2013
Petersen, Benjamin – Spring 2013
Pogue, Jennifer – Spring 2013
Raum, Peter – Dual - Spring 2013
Robertson, Zachary – Dual – Spring 2013
Savage, Nola – Summer I 2013
Schaefer, Laurel – Spring 2013
Seward, Phillip J. – Summer I 2013
Shah, Eeshan – Dual – Spring 2013
Shonk, Katherine – Spring 2013
Simmons, Andrew – Spring 2013
Smith, Daniel – Spring 2013
Somersall, Colin – Fall 2013
Steinwand, Richard – Spring 2013
Suddeth, Andrea – Summer I 2013
Tardif, Marie-Kristine – Spring 2013
Taylor, Bradley – Spring 2013
Tran, Tony – Spring 2013
Ulfers, Carolyn – Fall 2013
Walters, Jackson – Dual – Summer II 2013
White, Harry D. – Dual – Spring 2013
Williams, Mary – Spring 2013
Yu, Junjie – Fall 2013
Yuan, Bowen – Fall 2013
## Undergraduate Semester Course Offerings

**Fall '13 and Spring '14**

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Title</th>
<th>Number of Sections</th>
</tr>
</thead>
<tbody>
<tr>
<td>1015</td>
<td>Elementary Calculus with Trig. I</td>
<td>12</td>
</tr>
<tr>
<td>1015*</td>
<td>Elementary Calculus with Trig. I</td>
<td>3</td>
</tr>
<tr>
<td>1015**</td>
<td>Elementary Calculus with Trig. I</td>
<td>2</td>
</tr>
<tr>
<td>1016</td>
<td>Elementary Calculus with Trig. I</td>
<td>15</td>
</tr>
<tr>
<td>1016*</td>
<td>Elementary Calculus with Trig. I</td>
<td>3</td>
</tr>
<tr>
<td>1016**</td>
<td>Elementary Calculus with Trig. I</td>
<td>2</td>
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<tr>
<td>1114</td>
<td>Elementary Linear Algebra</td>
<td>19</td>
</tr>
<tr>
<td>1114H</td>
<td>Elementary Linear Algebra</td>
<td>3</td>
</tr>
<tr>
<td>1114**</td>
<td>Elementary Linear Algebra</td>
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</tr>
<tr>
<td>1205</td>
<td>Calculus</td>
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<tr>
<td>1206</td>
<td>Calculus</td>
<td>30</td>
</tr>
<tr>
<td>1224</td>
<td>Vector Geometry</td>
<td>56</td>
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<tr>
<td>1224H</td>
<td>Vector Geometry</td>
<td>2</td>
</tr>
<tr>
<td>1525</td>
<td>Elementary Calculus with Matrices</td>
<td>9</td>
</tr>
<tr>
<td>1526</td>
<td>Elementary Calculus with Matrices</td>
<td>10</td>
</tr>
<tr>
<td>1535</td>
<td>Geometry &amp; Math of Design</td>
<td>4</td>
</tr>
<tr>
<td>1535**</td>
<td>Geometry &amp; Math of Design</td>
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<tr>
<td>1536</td>
<td>Geometry &amp; Math of Design</td>
<td>4</td>
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<tr>
<td>1536**</td>
<td>Geometry &amp; Math of Design</td>
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<tr>
<td>1614</td>
<td>Number and Computing for Teachers</td>
<td>1</td>
</tr>
<tr>
<td>1624</td>
<td>Geometry and Computing for Teachers</td>
<td>1</td>
</tr>
<tr>
<td>2015</td>
<td>Elementary Calculus with Trig. II</td>
<td>15</td>
</tr>
<tr>
<td>2016</td>
<td>Elementary Calculus with Trig. II</td>
<td>3</td>
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<tr>
<td>2214</td>
<td>Intro Differential Equations</td>
<td>32</td>
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<tr>
<td>2214H</td>
<td>Intro Differential Equations</td>
<td>2</td>
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<tr>
<td>2224</td>
<td>Multivariable Calculus</td>
<td>42</td>
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<tr>
<td>2224H</td>
<td>Multivariable Calculus</td>
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<tr>
<td>2534</td>
<td>Introduction to Discrete Mathematics</td>
<td>4</td>
</tr>
<tr>
<td>2644</td>
<td>Mathematical Tutoring</td>
<td>1</td>
</tr>
<tr>
<td>2984H</td>
<td>SS: Math Computational Context I</td>
<td>1</td>
</tr>
<tr>
<td>2984H</td>
<td>SS: Math Computational Context II</td>
<td>1</td>
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<tr>
<td>Code</td>
<td>Course Title</td>
<td>Credits</td>
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<tr>
<td>-------</td>
<td>--------------------------------------------------</td>
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</tr>
<tr>
<td>3034</td>
<td>Introduction to Proofs</td>
<td>7</td>
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<tr>
<td>3054</td>
<td>Programming for Math</td>
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<tr>
<td>3124</td>
<td>Modern Algebra</td>
<td>6</td>
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<tr>
<td>3134</td>
<td>Applied Combinatorics &amp; Graph Theory</td>
<td>8</td>
</tr>
<tr>
<td>3144</td>
<td>Linear Algebra I</td>
<td>5</td>
</tr>
<tr>
<td>3214</td>
<td>Vector Calculus</td>
<td>10</td>
</tr>
<tr>
<td>3224</td>
<td>Advanced Calculus</td>
<td>6</td>
</tr>
<tr>
<td>3624</td>
<td>Early Teaching Experience</td>
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<tr>
<td>4044</td>
<td>History of Mathematics</td>
<td>1</td>
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<tr>
<td>4124</td>
<td>Introduction to Abstract Algebra</td>
<td>2</td>
</tr>
<tr>
<td>4134</td>
<td>Number Theory</td>
<td>1</td>
</tr>
<tr>
<td>4144</td>
<td>Linear Algebra II</td>
<td>1</td>
</tr>
<tr>
<td>4175</td>
<td>Cryptography</td>
<td>2</td>
</tr>
<tr>
<td>4176</td>
<td>Cryptography</td>
<td>1</td>
</tr>
<tr>
<td>4225</td>
<td>Elementary Real Analysis</td>
<td>2</td>
</tr>
<tr>
<td>4226</td>
<td>Elementary Real Analysis</td>
<td>2</td>
</tr>
<tr>
<td>4234</td>
<td>Elementary Complex Analysis</td>
<td>1</td>
</tr>
<tr>
<td>4245</td>
<td>Intermediate Differential Equations</td>
<td>1</td>
</tr>
<tr>
<td>4246</td>
<td>Intermediate Differential Equations</td>
<td>1</td>
</tr>
<tr>
<td>4254</td>
<td>Chaos and Dynamical Systems</td>
<td>1</td>
</tr>
<tr>
<td>4324</td>
<td>Elementary Topology</td>
<td>1</td>
</tr>
<tr>
<td>4334</td>
<td>College Geometry</td>
<td>2</td>
</tr>
<tr>
<td>4404***</td>
<td>Applied Numerical Methods</td>
<td>1</td>
</tr>
<tr>
<td>4414****</td>
<td>Issues in Scientific Computing</td>
<td>2</td>
</tr>
<tr>
<td>4425</td>
<td>Fourier Series PDE</td>
<td>1</td>
</tr>
<tr>
<td>4426</td>
<td>Fourier Series PDE</td>
<td>1</td>
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<tr>
<td>4445</td>
<td>Introduction to Numerical Analysis</td>
<td>2</td>
</tr>
<tr>
<td>4446</td>
<td>Introduction to Numerical Analysis</td>
<td>2</td>
</tr>
<tr>
<td>4564</td>
<td>Operational Methods for Engineers</td>
<td>7</td>
</tr>
<tr>
<td>4574</td>
<td>Vector and Complex Analysis for Engrs.</td>
<td>4</td>
</tr>
<tr>
<td>4625</td>
<td>Math for Secondary Teachers</td>
<td>1</td>
</tr>
<tr>
<td>4626</td>
<td>Math for Secondary Teachers</td>
<td>1</td>
</tr>
<tr>
<td>4644</td>
<td>Secondary Math w/ Tech</td>
<td>1</td>
</tr>
<tr>
<td>4664</td>
<td>Senior Math Education Seminar</td>
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</tr>
<tr>
<td>4984**</td>
<td>SS: Applied Complex Variables</td>
<td>1</td>
</tr>
</tbody>
</table>
*VTASP Sections
**On-Line Course
*** Taught by AOE
****Taught by CS (Spring Semester)

<table>
<thead>
<tr>
<th>Enrollment Summary, Fall 2013 - Spring 2014</th>
<th>Number of Sections</th>
<th>Enrollment</th>
<th>Average Section Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>*Courses below level of calculus</td>
<td>50</td>
<td>4,396</td>
<td>88</td>
</tr>
<tr>
<td>**First year calculus courses</td>
<td>132</td>
<td>6,366</td>
<td>48.2</td>
</tr>
<tr>
<td>Other undergraduate courses</td>
<td>231</td>
<td>9,700</td>
<td>42</td>
</tr>
<tr>
<td>Graduate courses</td>
<td>33</td>
<td>313</td>
<td>9.48</td>
</tr>
<tr>
<td>Total</td>
<td>446</td>
<td>20,775</td>
<td>46.6</td>
</tr>
</tbody>
</table>

Number of Undergraduate Majors: 595
Number of Graduate Students: 68

* courses included: 1015, 1114, 1525
** courses included: 1016, 1205, 1224, 1526
GRADUATE STUDENT DEGREE STATUS
SUMMER 2013-SPRING 2014

MASTER OF SCIENCE

Samantha H. Erwin
John P. Brock
Alexander Rudolf Grimm
Gregory Marx
Haithem Ezzat Mohammed Taha
Benjamin Unger
Camron Michael Withrow
Vitalij Schwarzmann
Christopher John Gartland
Andrew Taylor Glaws
Ryan Patrick Nikin-Beers
Mingqiang Zhang
Peng Zhang

DOCTOR OF PHILOSOPHY

Jason Cory Brunson
Matthew Scott Oremland
Adam Bowman
Christopher Hunter Jarvis
Yu Ran