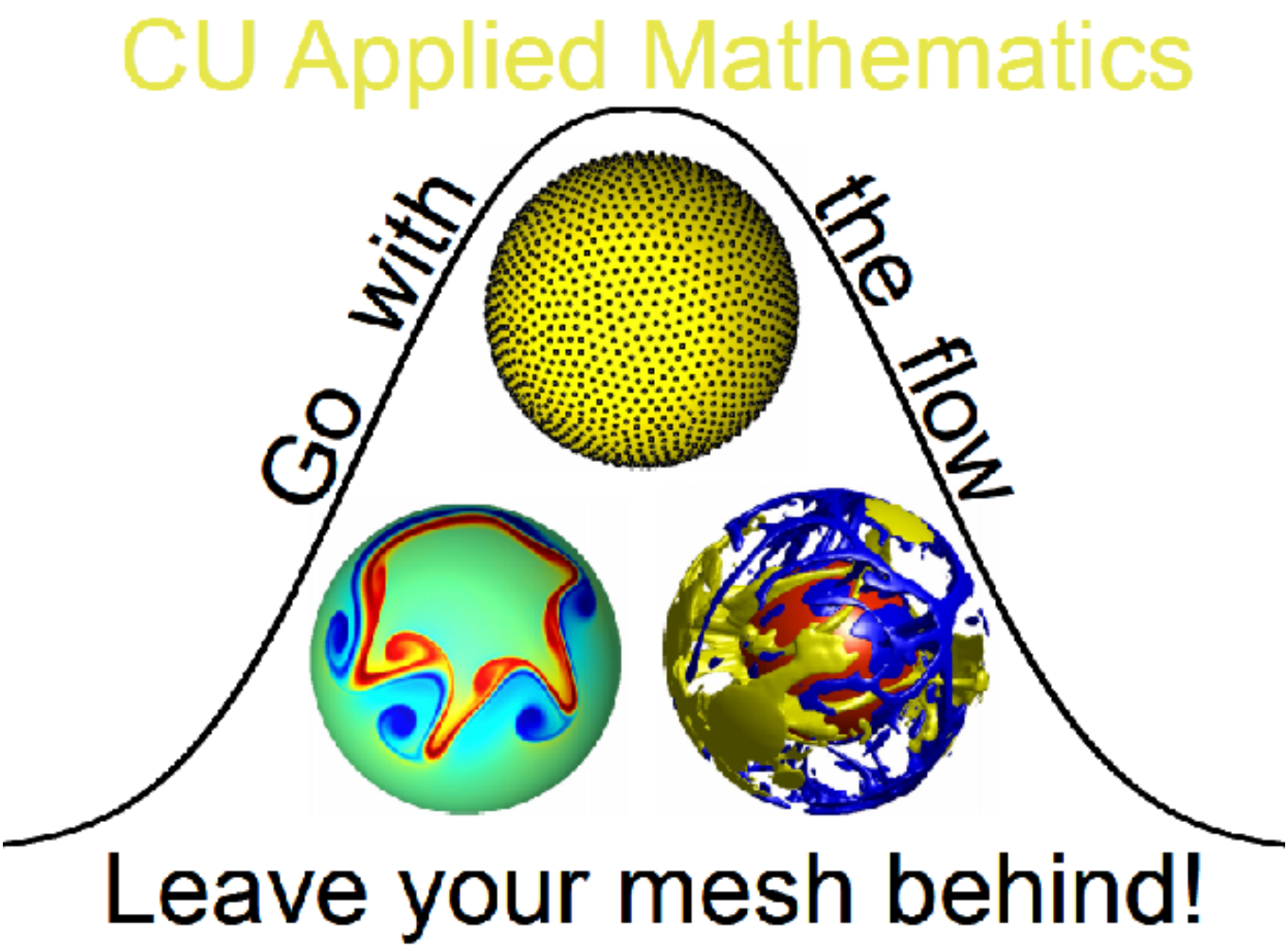
Department of Applied Mathematics

Annual Report 2011



Colorado
University of Colorado at Boulder

Department of Applied Mathematics

University of Colorado at Boulder

Vision

The vision of the Department of Applied Mathematics at the University of Colorado is to be an internationally leading department in Applied Mathematics in research and education.

Mission

The Department of Applied Mathematics at the University of Colorado strives to provide excellent teaching, research, and service to the university community and to the world in the application of mathematics to other disciplines.

Objectives

The Department of Applied Mathematics has four primary objectives:

- *To teach our students well;*
- *To seek out and develop new, interesting applications of mathematics in other disciplines;*
- *To provide each student with a rich educational experience;*
- *To create new mathematics.*

We interpret this to mean:

- *Provide undergraduate and graduate students with a high quality education and training in applied mathematics and prepare them for careers in government, industry, laboratories, and the academic professions;*
- *Offer and monitor degree programs leading to BS, MS and PhD degrees in Applied Mathematics;*
- *Nourish and maintain a professional environment in which excellence in teaching, learning, scholarship, and creativity are of central importance;*
- *Assure teaching and research expertise in a number of key areas of applied mathematics including the methodology of applied mathematics, computational mathematics and algorithms, industrial applications, applied probability, and statistics.*

Cover Art

Each year, the Department of Applied Mathematics at the University of Colorado at Boulder creates a t-shirt that illustrates aspects of current research in the department. This year's design was created by affiliated faculty member Natasha Flyer of the National Center for Atmospheric Research (NCAR).

Department of Applied Mathematics 2011 Annual Report
Table of Contents

Department of Applied Mathematics 2011 Annual Report
Overview

Dr. James H. Curry
Department Chair

Dr. Anne Dougherty
Associate Chair

Department of Applied Mathematics 2011 Annual Report
Departmental Activities

Undergraduate Education

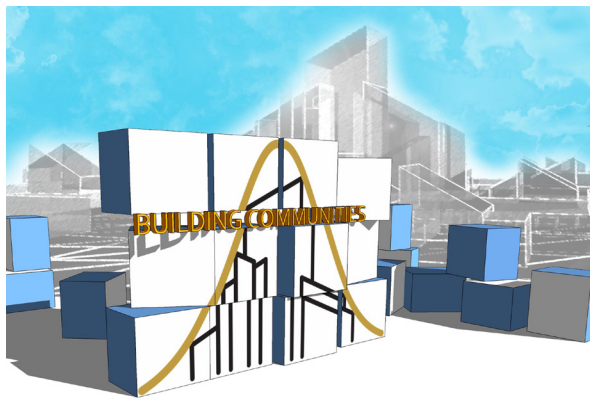
Anne Dougherty continued to serve the department as Chair of Undergraduate Studies. The Undergraduate Committee consisted of Anne, Adam Norris, and Harvey Segur. Undergraduate education in the Department of Applied Mathematics provides students with broad-based preparation for the challenges and opportunities of today and tomorrow. Through courses, projects, research and other educational activities, the Department provides unique experiences to our majors and minors. The Department also has a large teaching commitment since most undergraduate engineering majors are required to take four courses in applied mathematics. Applied Mathematics faculty and graduate students taught nearly 15,000 credit hours of courses to over 4,000 students in 2011. See p. 37 for a detailed list of the courses taught.

Applied Mathematics had 167 undergraduate Applied Mathematics majors in 2011. 34 students received their baccalaureate degrees this year. (See p. 06 for a list of our graduates.) Our minor program, attracting students from other majors who are interested in more in-depth training in applied mathematics, had 53 students in 2011, and more are taking at least some of the upper division courses towards it.

Undergraduate Chair Anne Dougherty is responsible for nominating students for the annual Goldwater Scholarship award. Four CU undergraduate students, majoring in science, math or engineering, are selected each year for the national competition. The 2011 nominee from Applied Mathematics was Stephen Kissler, who received an Honorable Mention when the scholarships were awarded.

The College of Engineering underwent ABET (formerly Accreditation Board for Engineering and Technology) accredidation review in 2011. Applied Mathematics was reviewed in support of the ABET accredited engineering programs. Five of our core courses (Calculus 1, 2, and 3 for Engineers; Differential Equations and Linear Algebra; and Statistical Methods) were examined in depth, including an examination of the curriculum covered, the quality of APPM faculty in teaching the subject matter, and the means by which the material was conveyed to students, including textbooks.

The Double BS Degree offered in Civil Engineering and Applied Mathematics was made redundant when the College of Engineering changed its rules for double majors within the college. Previously, the college rules had required seekers of second degrees to obtain an extra 30 hours beyond the nominal 128 hours for a Bachelor of Science degree. The CVEN/AMEN double degree program had streamlined this to 143 hours. With the 2011 change in college rules, all double degrees within the College of Engineering only require 143 hours. This rule was changed, in part, due to the prior success of the CVEN/AMEN double degree program.



Graduate Education

Jim Meiss served as the department's Graduate Committee Chair. The Graduate Committee consisted of Dr. Meiss, David Bortz, Bengt Fornberg, and Congming Li. 15 new graduate students entered the department in 2011, 13 of them PhD candidates.

The role of the graduate program is to give students in-depth training in applied mathematics and to provide the skills necessary for success in industry, government laboratories, and academia. Different departments around the country use different definitions of "applied mathematics." In this department, the areas of mathematical expertise are: scientific computation, physical applied mathematics, dynamical systems, analysis, statistics/probability, and mathematical biology. In addition, the Department maintains an active program of affiliated faculty. These are faculty members in other departments with an interest in applying mathematics within their own disciplines. A graduate student in Applied Mathematics can pursue a doctorate in Applied Mathematics with an affiliated faculty member as the thesis advisor, along with an Applied Mathematics co-advisor. A basic goal of this department is to seek out and develop new areas of application for mathematics and our affiliated faculty members play a crucial role in that process.

The department offers four formal interdisciplinary programs, three at the MS level.

- A **Combined MA/MS with the Molecular, Cellular, and Developmental Biology Department (MCDB)**. The combined MA/MS is a three-year interdisciplinary program designed to produce students trained both in applied mathematics and in molecular biology. A student who completes this program can begin a career in the biological sciences with a very desirable combination of skills, or can continue on to a PhD either in APPM or in MCDB.

- An **MS with a Computational Science and Engineering Track**. This track is designed for a student in a participating department in science or engineering, with a strong interest in scientific computation and mathematical analysis. Under this plan, the student obtains an MS in APPM on the way to a PhD in the other department. Six other departments now participate in this program.

- **Teacher-Licensure Option**. An APPM graduate student can fulfill the outside-sequence requirement in the School of Education. By also meeting the requirements of that School, a student can obtain both an MS in applied mathematics and a license to teach mathematics in a secondary school (i.e., in middle through high school). More information about the graduate program is available at http://amath.colorado.edu/programs/grad.html

In 2011, the department began to offer its PhD students a certificate via the University's **IQ Biology** interdisciplinary program. The IQ Biology program offers a mix of core classes, research projects and professional development experiences. These are all designed to help you work collaboratively across disciplines to solve problems. Other departments participating in IQ Biology include Chemistry & Biochemistry; Ecology and Evolutionary Biology; Molecular, Cellular and Developmental Biology; Computer Science; and Mechanical Engineering.

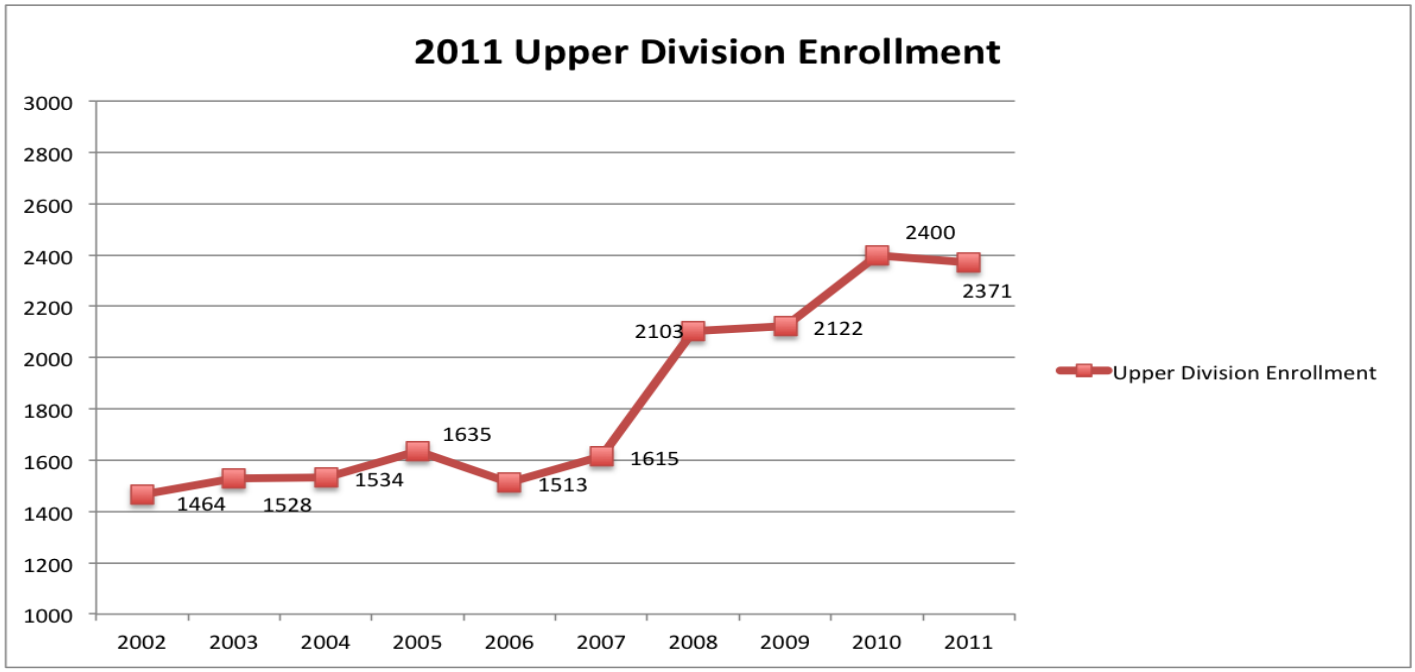
Enrollment Statistics

Year	Total Number of Enrolled Students in All APPM Courses	Number of Enrolled Graduate Students (MS/PhD)	Number of Enrolled Undergraduate Majors	Number of Enrolled Undergraduate Minors
2001 (Calendar)	5,435	22/57	66	29
2002 (Calendar)	5,899	28/55	67	34
2003 (Calendar)	6,127	39/54	85	37
2004 (Calendar)	6,443	35/60	90	42
2005 (Calendar)	6,342	31/54	105	48
2006 (Calendar)	6,358	28/50	120	65
2007 (Calendar)	6,746	32/55	110	63
2008 (Calendar)	6,775	26/52	119	64
2009 (Calendar)	7,428	37/48	127	69
2010 (Calendar)	7,179	20/65	130	66
2011 (Calendar)	7,409	19/76	167	53

Undergraduate major enrollment reach its highest point ever, to some extent at the cost of undergraduate minor enrollment. Not all majors in 2011 remained majors the entire calendar year, as many students find the department a more rigorous program than they'd anticipated. Total number of enrolled students climbed in 2011, although it has not yet reached our historic high enrollment from 2009.

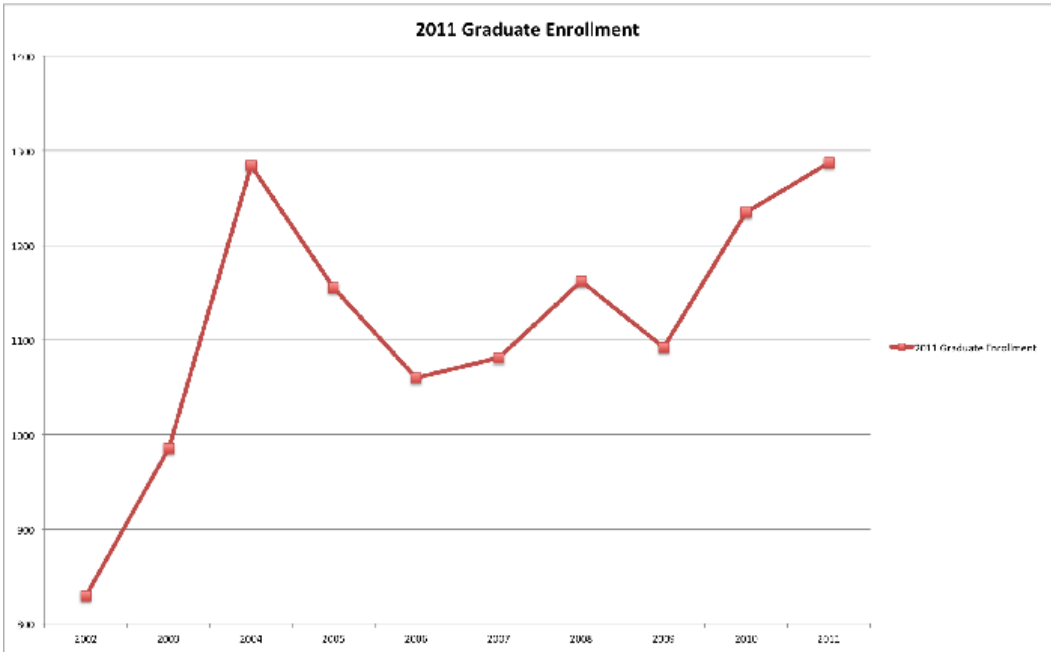
The dramatic upturn in PhD enrollment can partially be attributed to many of our Master's candidates making the decision to pursue a PhD during their tenure in our program. Master's enrollment declined again in 2011, but a 10-year high in PhD enrollment more than compensates for this drop..

Undergraduate Enrolled Upper-Division Student Credit Hours



Upper Division enrollment took a small dip (equivalent to 9 or fewer students) in 2011, but the department anticipates another jump in 2012 and 2014 as new majors from 2009 and 2011 begin to take upper division courses.. Newly added courses in APPM in 2011 were lower division, and their added enrollment helps to explain the increase in overall enrollment in the face of a slight dip in courses at the 3000-level or higher.

Graduate Enrolled Credit Hours



As anticipated, Graduate Enrollment reached an all-time APPM record in 2011, topping 2004's previous record by 3 credit hours. Due to aggressive recruitment of top students nationwide, the department anticipates a smoothing out of the "boom-bust" cycle seen in previous years where large incoming classes were followed by smaller incoming classes, seeing enrollment drops as students completed their degrees without being replaced by incoming first year students.

Faculty Awards and Honors

Harvey Segur won the $20,000 Hazel Barnes Prize for 2011. This is the largest and most prestigious single faculty award funded by the University of Colorado Boulder. It was established in 1991 by former Chancellor James Corbridge in honor of Philosophy Professor Emerita Hazel Barnes to recognize "the enriching interrelationship between teaching and research."

Gregory Beylkin won the Boulder Faculty Assembly award for Excellence in Research, Scholarly, and Creative Work for 2011. The Chancellor provides funds for these prestigious awards. Recipients were granted $3,000 and were honored by colleagues, family and friends at a reception at the end of March.

Department of Applied Mathematics 2011 Annual Report
Graduating Students

May

Bachelor's Degrees

Blake Arensdorf
Andrew Bordon
Anne Byrne
Cody Cichowitz
Amanda Crawford
Samuel Ehrlich
Alex Fout
Andrew Glugla
John Goblirsch
Ryan Gurule
Yirui Huang
Kyla Maletsky
Claire McNamara
Kevin M. Murphy
James Nixon
Robert Richmond
Melissa Rondi
Carly Z. Smith
Steven Van Buskirk
Christopher Vanek
Zachary Vaughan
Tianhao Zhang

Master's Degrees

Ben Barrow (BS/MS)
Jon Bowen
Anil Damle (BS/MS)
Christopher-Ian Davis
Josh Garland
Andy Guinn
Jeff Hajewski
Li Huang
Joe Novak
Ashley Patchen

Doctoral Degrees

Ian Grooms
Krissy Snyder

August

Bachelor's Degrees

Cory Zachman

Master's Degrees

Ashar Ali
David Biagioni
Andrew Glugla (BS/MS)

Doctoral Degrees

Erin Byrne
Adrianna Gillman
Sean Nixon
Kye Taylor

December

Bachelor's Degrees

Joshua Aragon
Randilyn Cornelius
Caroline Gough
Kristen Hargett
Paul Landers
Vu Nguyen
Riley Pack
Julia Ratcliff
Forrest Shetley
Ryan Young

Master's Degrees

Crystal W. Lee
Nicholas D. Levine
Ling Shen Lewis
Collin E. Powell
Aaron R. Smith (BS/MS)
Matthew H. Wilder

Department of Applied Mathematics 2011 Annual Report
Faculty, Instructors, Research Associates, Visitors, and Staff

Core Faculty, Instructors, and Research Associates

Mark J. Ablowitz – Professor; College of Arts and Sciences Professor of Distinction; PhD, Massachusetts Institute of Technology. *Partial Differential Equations, Solutions, Nonlinear Waves.*

Jerrold Bebernes – Professor Emeritus; PhD, University of Nebraska. *Differential Equations, Reaction Diffusion Systems, Combustion Theory, Analysis.*

Gregory Beylkin – Professor; PhD, New York University. *Computational Methods, Wavelets, Geophysical Inverse Scattering.*

Sujeet Bhat – Instructor; PhD, University of Florida. *Partial Differential Equations, Numerical Analysis, Graph Theory.*

David Bortz – Assistant Professor; Ph.D, North Carolina State University. *Biological Systems.*

Marian Brezina – Research Associate; PhD, University of Colorado at Denver. *Multigrid Methods, Scalable Algorithms, Parallel Computing.*

Michael Calkins - Research Associate; PhD, University of California Los Angeles (UCLA). *Computational Methods, Geophysical Flows, Turbulence, Fluid Instabilities, Thermal and Compositional Convection.*

Jem Corcoran – Associate Professor; PhD, Colorado State University. *Applied Stochastic Processes, Perfect Simulation, Statistical Physics.*

James H. Curry – Department Chair; Professor; J. R. Woodhull Logicon Teaching Professor of Applied Mathematics; PhD, University of California at Berkeley. *Dynamical Systems, Numerical Methods, Nonlinear Equations.*

Christopher Curtis – Instructor; PhD, University of Washington. *Computational Mathematics.*

Anne Dougherty – Associate Department Chair; Chair of Undergraduate Studies: Senior Instructor; PhD, University of Wisconsin, Madison. *Applied Probability, Stochastic Processes.*

Vanja Dukic – Associate Professor; PhD, Brown University. *Biostatistics.*

Robert Easton – Professor Emeritus; PhD, University of Wisconsin. *Dynamical Systems, Hamiltonian Mechanics.*

Bengt Fornberg – Professor; PhD, Uppsala University, Sweden. *Numerical Analysis, Computations of Wave Phenomena.*

Terry Haut - Research Associate; PhD, University of Colorado at Boulder.

Keith Julien – Chair of Graduate Studies; Associate Professor; PhD, Cambridge University, United Kingdom. *Mathematical and Computational Fluid Dynamics, Dynamical Systems Theory.*

Congming Li – Professor; PhD, New York University. *Elliptic Partial Differential Equations.*

Manuel Lladser – Assistant Professor; PhD, Ohio State University. *Probability Theory.*

Thomas Manteuffel – Professor; PhD, University of Illinois, Urbana. *Computational Math, Numerical Linear Algebra, Iterative Mathematics, Numerical Solution of Partial Differential Equations, Parallel Computation, Computational Fluid Dynamics.*

Per-Gunnar Martinsson – Assistant Professor; PhD, University of Texas at Austin. *Numerical Analysis, Modeling of Heterogeneous Media, Computational Biochemistry.*

Stephen McCormick – Professor; PhD, University of Southern California. *Computational Math, Numerical Partial Differential Equations, Multigrid Methods, Parallel Computation, Computational Fluids, Tomography, Electromagnetics, Biomathematics.*

James D. Meiss – Professor; PhD, University of California at Berkeley. *Dynamical Systems, Hamiltonian Mechanics, Plasma Physics.*

Lucas Monzon – Postdoctoral Associate; PhD, Yale University. *Harmonic Analysis, Wavelets.*

Mary Nelson – Instructor; PhD, University of Colorado at Boulder. *Assessment.*

J. Adam Norris – Instructor; PhD, University of Colorado at Boulder. *Phase Change Kinetics, Perturbation Methods, Numerical Methods.*

Juan Restrepo – Assistant Professor; PhD, Northeastern University. *Analysis of dynamical processes on complex networks*

Antonio Rubio - Research Associate; PhD, Arizona State University. *Computational Fluid Dynamics, Dynamical Systems.*

John Ruge – Research Associate; PhD, Colorado State University. *Algebraic Multigrid Methods.*

Harvey Segur – Professor; PhD, University of California at Berkeley. *Nonlinear Waves, Fluid Dynamics, Asymptotic Methods.*

Lei Tang - Research Associate; PhD, University of Colorado at Boulder

John Williamson – Professor Emeritus; PhD, University of Minnesota. *Statistical Methods in Genetics, Applied Probability, Mathematical Statistics.*

Affiliated Faculty

Steve C. Arendt – Colorado Research Associates

Meredith Betterton – Physics

Elizabeth Bradley – Computer Science

Richard Byrd – Computer Science

Xiao-Chuan Cai – Computer Science

John Cary – Physics

John Crimaldi - Computser Science

Senarath P. de Alwis – Physics

Thomas DeGrand – Physics

Alireza Doostan – Aerospace Engineering

Garland Durham – College of Business

Scot Elkington – Laboratory for Atmospheric and Space Physics (LASP)

Samuel Flaxman - Ecology and Evolutionary Biology

Natasha Flyer – Institute for Mathematics Applied to Geosciences

Baylor Fox-Kemper – Cooperative Institute for Research in Environmental Sciences (CIRES)

Fred Glover – College of Business

Debra S. Goldberg – Computer Science

Martin Goldman – Physics

Vijay K. Gupta – Civil, Environmental, and Architectural Engineering

Ute C. Herzfeld – Institute of Arctic and Alpine Research (INSTAAR)

Christine M. Hrenya – Chemical and Biological Engineering

Shannon Hughes – Electrical, Computer, and Energy Engineering

Elizabeth Jessup – Computer Science

Laskshmi Kantha – Aerospace Engineering

David R. Kassoy – Mechanical Engineering

Dhinaker Kompala – Chemical and Biological Engineering

Manuel Laguna – College of Business

Michael Lightner – Electrical Engineering;

Oliver McBryan – Computer Science

Francois Meyer – Electrical and Computer Engineering

Nathalie Moyen - Finance

Doug Nychka – Geophysical Statistics Project, National Center for Atmospheric Research (NCAR)

Lev Ostrovsky – National Oceanic and Atmospheric Administration (NOAA)

K. C. Park – Aerospace Engineering

Scott Parker – Physics

Annick Poquet – National Center for Atmospheric Research (NCAR)

Harihar Rajaram – Civil, Environmental, and Architectural Engineering

Steven Sain – Institute for Mathematics Applied to Geosciences

Robert Sani – Chemical Engineering

Daniel Scheeres – Aerospace Engineering

J. Michael Shull – Astrophysical and Planetary Sciences (APS)

Rex Skodje – Chemistry

James Syvitski – Institute for Arctic and Alpine Research (INSTAAR)

Juri Toomre – Astrophysical and Planetary Sciences (APS)

Henry Tufo – Computer Science

Patrick Weidman – Mechanical Engineering

Jeffrey B. Weiss – Astrophysical and Planetary Sciences (APS), Atmospheric and Oceanic Sciences.

Joseph Werne – Colorado Research Associates

Department Staff

Marcia Flynt – Director of Operations

Susan Pryor – Graduate Program Assistant.

Beth Klein - Accounting Technician

Ian Cunningham - Office Coordinator and Undergraduate Program Assistant

Amit Gupta - Part-Time Graduate IT Support

James Blades, Sidney Bonar, Anthony Chavez, Hannah Farar, Eric Phelan – Part-Time Student Assistants

Changes in Personnel

Assistant Professor **Tiejun Tong** made the decision not to return to the University of Colorado at Boulder in July 2011. The department began its search for a replacement in the Fall 2011 semester - the five finalists arrived for interviews and to present special seminars on their research in December. Ultimately, **William Kleiber** was selected, and will join the Department of Applied Mathematics in the Fall 2012 semester.

Professor **Keith Julien** was on Sabbatical leave in the Fall 2011 Semester.

Visitors in 2011

In addition to our speakers who visited to present talks (listed beginning on page 10), faculty from other universities will visit Applied Mathematics in order to work with their collaborators in the department. Visitors are normally housed in the department's visitor's office (ECOT 215).

Professor **Holger Dullin** of the University of Sydney, NSW, Australia, arrived for an extended research visit as part of his sabbatical in July, and was here through October. Dr. Dullin is a long-time research associate of Applied Mathematics professor **James D. Meiss**.

Chad Westphal, an Associate Professor at Wabash College in Indiana, took his sabbatical leave at the University of Colorado in Boulder, teaching a single numerical analysis course in the Fall 2011 semester, and working on research with Applied Mathematics professor **Tom Manteuffel**.

Department of Applied Mathematics 2011 Annual Report
Departmental Seminars and Colloquia

Tuesdays - Computational Math Seminar

The Computational Mathematics seminar series was held on Tuesday mornings during the academic year at 10:00 am, in the Grandview Conference Room. Steve McCormick chaired and organized the seminars in the spring semester, and Tom Manteuffel chaired and organized in the fall.

01/18/11	**Hari Rajaram**, Department of Civil, Environmental, and Architectural Engineering, University of Colorado at Boulder	*Overview of Ice Sheet and Glacier Flow and Modeling*
02/01/11	**Michael Brutz** and **Phil Lenzini**, Department of Applied Mathematics, University of Colorado at Boulder	*High Dimensional Data and Music Genre Classification*
02/22/11	**Oliver Röhrle**, Stuttgart Research Centre for Simulation Technology and Cluster of Excellence "Simulation Technology" (SimTech)	*Modeling Skeletal Muscle Mechanics: The Grand-Overview*
03/01/11	**José Garcia**, Department of Applied Mathematics, University of Colorado at Boulder	*High Order Method Modeling Environment (HOMME)*
03/08/11	**Jacob Schroder**, Department of Applied Mathematics, University of Colorado at Boulder	*Scientific Computing with Python: Algebraic Multigrid Solvers in Python*
03/15/11	**Christoph Erath**, National Center for Atmospheric Research (NCAR), Boulder, CO	*Coupling the Finite Volume and Boundary Element Methodsl*
04/12/11	**Adrianna Gillman**, Department of Applied Mathematics, University of Colorado at Boulder	*Fast Direct Methods for Solving Discretized Elliptic PDES*
04/19/11	**Chris Leibs** and **Toby Jones,** Department of Applied Mathematics, University of Colorado at Boulder	*Basic Multigrid GPU Experience*
04/26/11	**Lei Tang**, Department of Applied Mathematics, University of Colorado at Boulder	*Parallel Adaptive Mesh Refinement for FOSLS-AMG*
08/30/11	**Jacob Schroder**, Department of Applied Mathematics, University of Colorado at Boulder	*An Introduction to Smoothed Aggregation Methods*
9/13/11	**Chad Westphal**, Department of Mathematics and Computer Science, Wabash College	*Weighted Norm Least Squares Finite Element Methods for Problems with Singularities*
9/20/11	**Michael Brutz,** Department of Applied Mathematics, University of Colorado at Boulder	*Particle Tracking Methods*

10/11/11	**Jehanzeb Hameed Chaudhry**, Department of Mathematics, Colorado State University	*A Goal-Oriented Approach to Least-Squares Finite Element Methods*
10/18/11	**Jonah Reeger,** Department of Applied Mathematics, University of Colorado at Boulder	*A Comparison of Transcription Techniques for the Optimal Control of the International Space Station*
10/25/11	**Alireza Doostan**, Department of Aerospace Engineering Sciences, University of Colorado at Boulder	*Sampling techniques for uncertainty propagation in stochastic PDE*S
11/08/11	**José Garcia,** Department of Applied Mathematics, University of Colorado at Boulder	*Non-Hydrostatic Modeling of General Ocean Circulation with First Order System Least Squares Finite Element Method*
11/14/11	**Jeff Heys**, Department of Chemical and Biological Engineering, Montana State University	*Weighted Least-Square Finite Element Methods for PIV Data Assimilation*
11/15/11	**Ashar Ali**, Department of Applied Mathematics, University of Colorado at Boulder	*Particle Radial Diffusion in the Inner Magnetosphere*

Tuesdays - Nonlinear Waves Seminar

The Nonlinear Waves seminar series was held on Tuesday afternoons in the Spring 2010 semester at 4:00 pm, in ECOT 226. Mark Ablowitz chaired and organized the seminar series, with assistance from graduate student Douglas Baldwin

01/11/11	**Karima Khusnutdinova**, School of Mathematics, Loughborough University, Leicestershire, UK	*On classical and radiating solitary waves in layered elastic structures*
01/18/11	**S. Cundiff,** Joint Institute for Laboratory Astrophysics (JILA)	*Exotic Modelocked Lasers*
02/21/11	**Alex Turbiner**, Nuclear Science Institute, UNAM, Mexico City	*Dynamics of Nonlinear Bound States in Inhomogeneous Media*
04/19/11	**Yury Stepanyants**, Department of Mathematics and Computing, University of Southern Queensland, Australia	*Scalar description of three-dimensional flows of incompressible fluid*
07/27/11	**Indu Satija**, George Mason University	*Dark and Bright Solitons in Strongly Repulsive Bose-Einstein Condensates*
08/23/11	**Sheehan Olver**, St. John's College, Oxford University, UK	*Numerical Riemann-Hilbert Problems: Painlevé II and KdV*
09/13/11	**Christopher Curtis,** Department of Applied Mathematics, University of Colorado at Boulder	*On Using Conservation Laws to Model Perturbations of KP Web-Solutionss*
09/27/11	**Ana Maria Rey**, Joint Institute for Laboratory Astrophysics (JILA), University of Colorado at Boulder	*Strongly Inhibited Transport of a Degenerate 1D Bose Gas in a Lattice*
10/25/11	**Bengt Fornberg**, Department of Applied Mathematics, University of Colorado at Boulder	*A Numerical Methodology for the Painlevé Equations*

11/02/11	**Gino Biondini**, Department of Mathematics, SUNY Buffalo	*Solitons, boundary value problems, and a nonlinear method of images*
11/09/11	**Boaz Ilan**, Department of Applied Mathematics, University of California, Merced	*Luminescent solar concentrators, photon transport, and affordable solar harvesting*
11/22/11	**James A. Powell**, Department of Mathematics and Statistics; Department of Biology, Utah State University	*Emerging at the Right Time, Stopping at the Right Place, and Scaling Up the Right Way: Phenology and Differential Motility Describe Patterns of Bark Beetle Outbreak*
12/06/11	**Gregory Lyng**, Department of Mathematics, University of Wyoming	*Refined stability for gas-dynamic shocks*

Thursdays - Complex Systems/Dynamics Seminar

The Complex Systems/Dynamics seminar series was held on Thursday afternoons during the academic year at 2:00 PM, in the Applied Mathematics Conference Room. Jim Meiss and Juan Restrepo co-chaired this series.

01/20/11	**Yuzuro Sato**, Department of Mathematics, Hokkaido University	*Noise-induced phenomena in one-dimensional maps*
01/27/11	**Adam Fox**, Department of Applied Mathematics, University of Colorado at Boulder	*An algorithm for the computation of Invariant Tori in Area and Volume-Preserving Maps*
02/03/11	**David Albers**, Biomedical Informatics, Columbia University	*Population physiology: An information theory perspective*
02/10/11	**Colleen Webb**, Department of Biology, Colorado State University	*Using Traits-based Approaches to Understand the Dynamics of Biodiversity and Productivity*
02/17/11	**Dane Taylor**, Department of Applied Mathematics, University of Colorado at Boulder	*Subcritical percolation on networks*
02/24/11	**Andrzej Szymczak**, Department of Mathematical and Computer Science, Colorado School of Mines	*Robust and efficient algorithms for piecewise constant vector field topology*
03/03/11	**Ted Galanthay**, Department of Applied Mathematics, University of Colorado at Boulder	*Why ignoring your Darwinian fitness may be adaptive: Evolutionary dynamics of movement strategies in the presence of realistic contraints*
03/10/11	**Ashar Ali**, Department of Applied Mathematics, University of Colorado at Boulder	*A Chaotic Encryption Scheme Based on a 4-Dimensional Chaotic System*
03/17/11	**Kye Taylor**, Department of Applied Mathematics, University of Colorado at Boulder	*Diffusion-based Time-series Analysis: Justification via Graph Models*
03/31/11	**Hector Lomeli**, Visiting Professor, University of Texas (Austin)	*Parameterization of invariant manifolds for difference equations including discrete Lagrangians*

04/05/11	**Pascale Garaud**, Department of Applied Mathematics, University of California, Santa Cruz	*Double-diffusive behaviour at high and low Prandtl number*
04/21/11	**Michael Swift**, Department of Physics and Astronomy, University of Nottingham, UK	*Phase transitions and Pattern Formation in Vibrated Granular Media*
04/28/11	**Juliana Dias**, Cooperative Institute for Research in Environmental Sciences (CIRES)	*Modeling Interactions between Large Scale Atmospheric flows and Moist Convection*
09/01/11	**Jason R. Marden**; Department of Electrical, Computer, and Energy Engineering; University of Colorado at Boulder	*Utility Design for Distributed Multiagent Systems*
09/08/11	**Holger Dullin**, Department of Mathematics and Statistics, University of Sydney, Australia	*A Lie-Poisson structure and integrator for the reduced N-Body problem*
09/15/11	**Sebastian Skardal**, Department of Applied Mathematics, University of Colorado at Boulder	*Cluster Synchrony in Systems of Coupled Oscillators*
09/22/11	**Randall O'Reilly**, Department of Psychology and Neuroscience, University of Colorado at Boulder	*Computational Cognitive Neuroscience*
09/29/11	**Geoff Vasil**, Canadian Institute for Theoretical Astrophysics, University of Toronto, Canada	*Dynamic bifurcations and melting-boundary convection*
10/06/11	**Sergio Verduzco**, Department of Psychology and Neuroscience, University of Colorado at Boulder	*From Working Memory to Epilepsy: Dynamics of Facilitation and Inhibition in a Cortical Network*
10/13/11	**Dane Taylor**, Department of Applied Mathematics, University of Colorado at Boulder	*Network connectivity during mergers and growth: Optimizing the addition of a module*
10/20/11	**Juan Restrepo**, Department of Applied Mathematics, University of Colorado at Boulder	*Macroscopic description of spatially coupled oscillators with finite response times*
10/27/11	**Manuele Santoprete**, Department of Mathematics, Wilfrid Laurier University, Canada	*Relative equilibria in the four vortex problem with two poirs of equal vorticities*
11/03/11	**Debra Goldberg,** Department of Computer Science, University of Colorado at Boulder	*Evaluating and Improving Models of Protein Interaction Network Evolution*
11/10/11	**Amrik Sen**, Department of Applied Mathematics, University of Colorado at Boulder	*Anisotropy in rapidly rotating helical flows*
11/17/11	**Marshall Carpenter**, Department of Applied Mathematics, University of Colorado at Boulder	*Size and Duration of Avalanches in Complex Networks*
12/08/11	**Adrean Webb**, Department of Applied Mathematics, University of Colorado at Boulder	*Global Stokes Drift and Climate Wave Modeling*

Fridays - Applied Mathematics Colloquium

The Applied Mathematics Colloquium series was held on Friday afternoons during the academic year at 3:00 pm, with refreshments preceding at 2:30 pm outside the Applied Mathematics conference room. David Bortz chaired and organized the Colloquium Series in Spring, with Manuel Lladser assuming the committee chair position in Fall.

01/14/11	**Mauro Maggioni**, Department of Mathematics and Computer Science, Duke University	*Multiscale geometric methods for noisy point clouds in high dimensions*
01/21/11	**Walter Strauss**, Department of Mathematics, Brown University	*Steady Rotational Water Waves*
01/28/11	**Markus Nebel**, Department of Mathematics, University of Kaiserslautern	*Multiple grammars and the enumeration of RNA pseudoknots*
02/04/11	**George Biros**, School of Computational Science and Engineering, Georgia Tech	*Fast algorithms for simulations of blood flow in the Stokes regime*
02/11/11	**Konstantin Mischaikow**, Department of Mathematics, Rutgers University	*A Database Schema for Global Dynamics of Multiparameter Nonlinear Systems*
02/18/11	**Jan Mandel**, Department of Mathematical and Statistical Sciences, University of Colorado at Denver	*Coupled atmosphere-wildland fire numerical simulation and data sources*
02/25/11	**Thomas Hauser**, Director Research Computing, Office of the Vice Chancellor for Research, University of Colorado at Boulder	*Particle Image Velocimetry data analysis - from a portable cluster to multiple GPUs*
03/04/11	**Ed Ott**, Department of Electrical and Computer Engineering, University of Maryland	*Synchronism in Large Networks of Oscillators: An Emergent Behavior of Complex Systems*
03/11/11	**Tom Cech**, Department of Chemistry and Biochemistry, University of Colorado at Boulder	*Interdisciplinary Research: From Howard Hughes to CIMB*
03/18/11	**Chris Jones**, Department of Mathematics, University of North Carolina - Chapel Hill	*Mathematical challenges of climate research: data assimilation and uncertainty*
04/01/11	**Jonathan Cohen**, Senior Research Scientist, NVIDIA	*Domain decomposition and multilevel methods on GPUs*
04/08/11	**Bjorn Jorgensen**, Leeds School of Business, University of Colorado at Boulder	*Identification and detection of earnings management*
04/15/11	**David Banks**, Department of Statistical Science, Duke University	*Adversarial Risk Analysis*
04/22/11	**Xiaoming Wang**, Department of Mathematics, Florida State University	*Examples of Boundary Layers Associated with the Incompressible Navier-Stokes Equations*
04/29/11	**John Burns**, Department of Mathematics, Virginia Tech	*Mathematical and Computational Science Challenges in the Design and Control of Energy Efficient Buildings*

09/02/11	**Janos Englander**, Department of Mathematics, University of Colorado at Boulder	*Some challenging open problems for spatial branching models*
09/09/11	**Mike Mozer**, Department of Computer Science University of Colorado at Boulder	*Improving the Quality of Human Judgments via Decontamination*
09/16/11	**Robin Dowell-Deen**; Department of Molecular, Cellular, and Developmental Biology; University of Colorado at Boulder	*Probabilistic Models of noncoding RNA*
09/23/11	**Heidibert Lopes**, Booth School of Business, University of Chicago	*Cholesky Stochastic Volatility*
09/30/11	**Aaron Clauset**, Department of Computer Science, University of Colorado at Boulder	*Models of morphological diffusion and the macroevolution of whales*
10/07/11	**Itai Cohen**, Department of Physics, Cornell University	*Flight of the Fruit Fly*
10/14/11	**Holger Dullin**, School of Mathematics and Statistics, University of Sydney, Australia	*Geometric Phase in Aerial Motion*
10/21/11	**Francois Meyer**; Department of Electrical, Computer, and Energy Engineering; University of Colorado at Boulder	*A random walk on image patches*
10/28/11	**Edgar Knobloch**, Department of Physics, University of California, Berkeley	*Spatially localized states and homoclinic snaking*
11/04/11	**Martha Palmer**, Department of Linguistics,University of Colorado at Boulder	*Verbs - the key to knowledge representation*
11/11/11	**James Brasseur**, Department of Mechanical and Nuclear Engineering, Pennsylvania State University	*Application of Lattice Boltzmann Bicomputation to Investigate Multiscale Transport, Mixing and Absorption in the Intestine*
11/18/11	**Javiera Barrera**, School of Engineering, Universidad Adolfo Ibáñez, Chile	*Multicommodity capacited network design under stochastic demand*

Other Applied Math Talks

Applied Mathematics often offers special talks that do not fall within the normal seminar schedule. There are many reasons for this, but all are as important as any of our regularly scheduled seminars.

Joint Mathematics & Applied Mathematics Distinguished Lecture

12/02/11	**Bernd Sturmfels**, Department of Mathematics, University of California, Berkeley	*The Central Curve in Linear Programming*

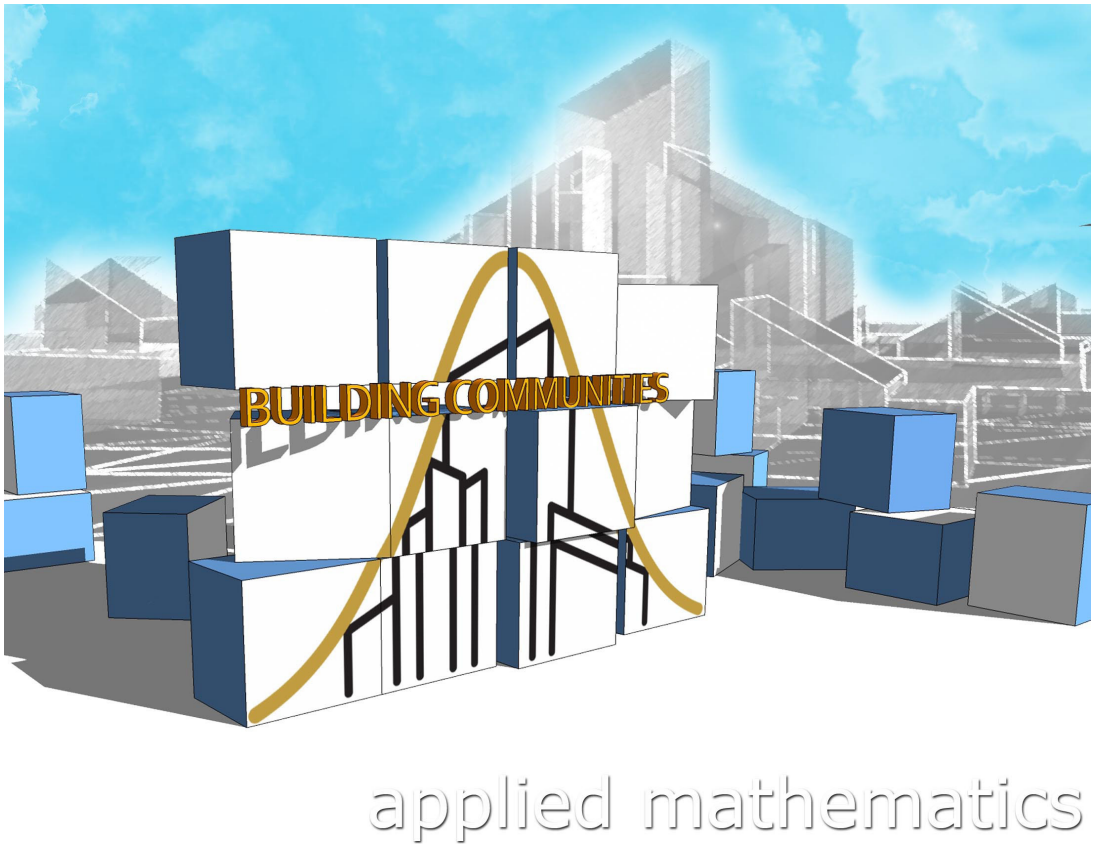
Applied Mathematics Assistant Professor Search

12/12/11	**Giles Hooker**, Department of Biological Statistics and Computational Biology, Cornell University	*Detecting Evolution in Experimental Ecology: Diagnostics for Missing State Variables*

12/13/11	**Harry Crane**, Department of Statistics, University of Chicago	*Statistical modeling of partitions and trees by stochastic processes*
12/14/11	**Dimitrios Giannakis**, Center for Atmosphere Ocean Science (CAOS), Courant Institute for Mathematical Sciences, New York University	*Nonlinear Laplacian spectral analysis for time series: Capturing intermittency and low-frequency variability*
12/15/11	**Aaron Smith**, Department of Mathematics, Stanford University	*Non-Markovian Couplings and Gibbs Samplers*
12/15/11	**Hongxiao Zhu**, Department of Statistical Science, Duke University	*Bayesian graphical models for multivariate functional data*
12/16/11	**William Kleiber**, National Center for Atmospheric Research (NCAR), Boulder, CO	*Computer Model Calibration with High and Low Resolution Model Output for Spatio-Temporal Data*

2011 Front Range Applied Mathematics Student Conference Keynote Speaker

03/05/11	**Ed Ott**, Department of Electrical and Computer Engineering, University of Maryland	*Collective Behavior in Large Systems of Coupled Dynamical Units*



Department of Applied Mathematics 2011 Annual Report
Student Organizations

Undergraduate Organizations

The University of Colorado at Boulder undergraduate chapter of the Society for Industrial and Applied Mathematics (SIAM) was founded to promote interactions between Applied Mathematics students and faculty. Society functions include technical presentations by students, faculty, and industry speakers, field trips and student/faculty social events –all designed to introduce undergraduates to the widespread use of applied mathematics in engineering and the sciences. All interested students, from any major, are encouraged to participate in SIAM-sponsored events. Sujeet Bhat served as the faculty advisor for the Undergraduate Chapter in 2011.

7th Annual Front Range Applied Mathematics Student Conference
Saturday, March 5th, 2010
Location: The University of Colorado at Denver
This conference allowed student representatives from universities across the Front Range to meet and share research in the field of applied mathematics.

Graduate Organizations

The graduate student chapter of SIAM at the University of Colorado at Boulder is a low-pressure, informal setting for discussing and learning about applied mathematics. The graduate student chapter holds regular meetings every other Thursday throughout the academic year. Faculty are not allowed at these meetings and the atmosphere is very low-key so that students can feel free to ask questions that they may not otherwise address to faculty members. ... served as the Faculty Advisor for the Graduate Chapter in 2011. Adam Fox served as chapter president, and Dan Kaslovsky as chapter vice-president.

The SIAM Graduate chapter presented ... student talks in 2011, as well as participated in the 7th Annual Front Range Applied Mathematics Student Conference.

Department of Applied Mathematics 2011 Annual Report
Faculty Research

Department-wide Grants

.

Individual Research Grants

Several new grants were received by APPM faculty in 2011, totaling nearly $800,000 in total funds received. Department faculty were Principal Investigator, or Co-Principal Investigator, on over 15 million dollars in grant funding in 2011. APPM faculty remain strong researchers and work closely with both government and private industry.

Mark J. Ablowitz

Principal Investigator on Grants Received:

*Air Force Office of Scientific Research (AFOSR), Program in Physical Mathematics, "***Nonlinear wave propagation***", 2008-2011*

*National Science Foundation-Division of Mathematical Sciences (NSF-DMS), "***Nonlinear wave motion***", 2009-2012*

*NSF-Division of Chemistry (NSF-CHE), "***SOLAR Collaborative: Photonic Enhancement of Organic Photovoltaics to Enable Higher Efficiencies and Exotic Mechanisms***", 2011-2014*

Gregory Beylkin

Principal Investigator on Grants Received:

*Department of Energy (DOE)/UT-Battelle/Oak Ridge National Laboratory (ORNL), "***Multiresolution Adaptive Numerical Evaluation and Scientific Simulation***", 2005-2013*

*AFOSR Small Business Technology Transfer program (STTR), Phase I, Numerica Corporation, "***Efficient propagators and gravity models in non-Cartesian coordinate systems***", 2010-2011*

*NSF-DMS, "***Nonlinear Approximations for Inverse Problems***", 2010-2013*

*AFOSR-STTR, Phase II, Omitron, "***Innovative Earth Gravity Reformulation and Numerical Integration for Responsive Space Situational Awareness (SSA)***", 2011-2013*

*National Renewable Energy Laboratory (NREL), "***Award No.: UGA-0-41026-08***", 2011-2012*

David M. Bortz

Principal Investigator on Grants Received:

*AFOSR, "***Solving Differential Equations with Random Ultra-Sparse Numerical Discretizations***"*

*NREL, "***Applied Mathematics Research for High Performance Systems Biology"**

*NVIDIA, "***Academic Partner Grant***"*

Co-Principal Investigator on Grants Received:

*National Institutes of Health (NIH), "***Biomechanics of Bloodstream Infections***", **PI:** J.G. Younger, **Co-PI:** M.J. Solomon*

*NSF, "***Collaborative Research: Type II: Flow-induced fragmentation mechanisms in bacterial biofilms by hierarchical modeling of polymeric, interfacial and viscoelastic interactions***", **PI:** M.J. Solomon*

*NIH, "***Complement C5a in Human Sepsis***", **PI:** J.G. Younger*

James H. Curry

Principal Investigator on Grants Received:

*NSF, "***Mentoring Through Critical Transition Points***", 2006-2011*

Co-Princial Investigator on Grants Received:

*NSF, "***Course Curriculum and Laboratory Improvement (CCLI), Phase II***", **PI:** M. Nelson*

Anne M. Dougherty

Co-Principal Investigator on Grants Received:

NSF, **"CCLI, Phase II; Colorado Momentum: Oral Assessments in the Mathematical Sciences Classroom***", **PI:** Mary Nelson*

*CU-Boulder Outreach Committee, "***Colorado Math Circle***", **Co-PIs:** Silva Chang, Congming Li*

*NSF, "***MCTP: Colorado Advantage***"*

Vanja Dukic

Principal Investigator on Grants Received:

*NIH, "***Translational approaches to multilevel models of prenatal exposure to cigarettes***", 2010-2014*

Co-Principal Investigator on Grants Received:

*NIH, "***Modeling the spread of MRSA in the Community***", **Co-PI:** D. Lauderdale*

*NSF, "***Collaborative Research: Combining models and experiments to understand heterogeneities in susceptibility and virulence***", **PI:** G. Dwyer*

Bengt Fornberg

Principal Investigator on Grants Received:

*NSF-DMS, "***Radial Basis Functions***", 2006-2011*

*NSF-DMS, "***Radial Basis Functions",** *2009-2012*

Keith Julien

Principal Investigator on Grants Received:

*NSF-Focused Research Group (FRG), "***Collaborative Research: Models of Balanced Multiscale Ocean Physics for Simulation and Parameterization***"*

*Cooperative Studies of the Earth's Deep Interior (CSEDI), "***Collaborative Research: Next Generation Modeling of Core Turbulence via Combined Laboratory, Numerical and Theoretical Model***", Co-PI: Aumou.*

Co-Principal Investigator on Grants Received:

*NSF, "***MCTP: Colorado Advantage***"*

*NASA-Physical Oceanography, "***Langmuir Circulations; Observing and Modeling on Global Scales***", **PI:** Baylor Fox-Kemper*

*NSF MRI-Consortium, "***Acquisition of a Supercomputer by the Front Range Computing Consortium (FRCC)***"*

Congming Li

Principal Investigator on Grants Received:

*NSF-DMS, "***The Role of Convection on Dynamic Stability of 3D Incompressible Navier-Stokes Equations***"*

Co-Principal Investigator on Grants Received:

*CU-Boulder Outreach Committee, "***Colorado Math Circle***", **Co-PIs:** Silva Chang, Anne Dougherty*

*NSF-Division of Earth Sciences (EAR), "***Multiscale Nonlinear Domain Decomposition Meethod for Modeling the Impact of Climate Change on Groundwater Resources***"*

Manuel B. Lladser

Principal Investigator on Grants Received:

*NSF, "***AMC-SS: Markovian Embeddings for the Analysis and Computation of Patterns in non-Markovian Random Sequences***", 2008-2011*

Co-Principal Investigator on Grants Received:

*NIH, "***New Tools for Understanding the Composition and Dynamics of Microbial Communities in Human Body Habitats***", **PI:** R. Knight*

Thomas A. Manteuffel

Principal Investigator on Grants Received:

*Department of Energy (DOE), "***First-order system least-squares (FOSLS) for nonlinear systems arising from DOE applications***", **Co-PI:** S. McCormick, 2010-2013*

*NSF-EAR, "***CMG: Modelling River Basin Dynamics: Parallel Computing and Advanced Numerical Methods***", **Co-PIs:** S. Peckham, S. McCormick, G. Tucker*

Co-Principal Investigator on Grants Received:

*DOE, "***Towards Optimal Petascale Simulation (TOPS)***", **PI:** S. McCormick, **Co-PI:** X.C. Cai*

*NSF, "***Petascale Multilevel Quantum Chromodynamics***", **PI:** S. McCormick*

*NSF, "***Enhanced Least-Squares Methods for PIV Analysis***"*

Per-Gunnar Martinsson

Principal Investigator on Grants Received:

*NSF-DMS, "***CAREER: Fast Direct Solvers for Differential and Integral Equations***", 2009-2013*

Co-Principal Investigator on Grants Received:

*NSF, "***CDI-Type I: Geometrical Image Processing with Fast Randomized Algorithms***", **Co-PI:** F. Meyer*

*NSF, "***Challenges in Geometry, Analysis and Computation: High Dimensional Synthesis***"*

Steve McCormick

Principal Investigator on Grants Received:

*DOE, "***Towards optimal petascale simulations (TOPS)***", 2006-2011*

Lawrence Livermore National Laboratory (LLNL), " **Geometric and Algebraic Multigrid Methods for QCD, MHD, Elasticity, Transport, and Other DOE Applications***", 2007-2011*

*NSF, "***Multigrid QCD at the Petascale***", 2007-2011*

*NSF, "***Enhanced Least-Squares Methods for PIV Analysis***", 2008-2011*

Co-Principal Investigator on Grants Received:

*DOE, "***First-order system least squares (FOSLS) for nonlinear systems arising in DOE applications***", **Co-PI:** T. Manteuffel*

*NSF, "***CMG Research: Modeling River Basin Dynamics: Parallel Computing and Advanced Numerical Methods***", **PI:** S. Peckham*

James Meiss

Principal Investigator on Grants Received:

*NSF-DMS, "***Chaos and Bifurcations in Volume-Preserving Dynamics***", 2007-2012*

Mary Nelson

Principal Investigator on Grants Received:

NSF, **"CCLI, Phase II; Colorado Momentum: Oral Assessments in the Mathematical Sciences Classroom***", Co-**PIs:** A. Dougherty, H. Segur, 2008-2011*

Harvey Segur

Principal Investigator on Grants Received:

*NSF-DMS, "***Collaborative Research: Nonlinear Water Waves***", 2011-2014*

Co-Principal Investigator on Grants Received:

*NSF, "***MCTP: Colorado Advantage***"*

NSF, **"CCLI, Phase II; Colorado Momentum: Oral Assessments in the Mathematical Sciences Classroom***", Co-**PIs:** A. Dougherty, M. Nelson*

Publications

Research dollars alone do not measure the quality of an academic body's faculty - the dictum of "Publish or Perish" still holds. Applied Math faculty have published dozens of articles and contributed to or written five books in 2011. We cite the peer reviewed materials published below.

Mark J. Ablowitz

Ablowitz, MJ (2011). *Nonlinear Dispersive Waves, Asymptotic analysis, and Solitons. Cambridge, UK: Cambridge University Press.*

M.J. Ablowitz, S.D. Nixon, T.P. Horikis, and D.J. Frantzeskakis, "Perturbations of dark solitons"***,*** *Proceedings of the Royal Society A: Mathematical, Physical & Engineering Sciences,* **vol. 467***, pg. 2597*

M.J. Ablowitz, T.S. Haut, T.P. Horikis, S.D. Nixon, and Y. Zhu, "Nonlinear wave dynamics: from lasers to fluids", *Discrete and Continuous Dynamical Systems, Series S,* **vol. 4***, pp. 923-955*

M.J. Ablowitz, T.P. Horikis, S.D. Nixon, and D.J. Frantzeskakis, "Dark solitons in mode-locked lasers", *Optics Letters,* **vol. 36,** *pp. 793-795*

M.J. Ablowitz, C.W. Curtis, "On the evolution of perturbations to solutions of the Kadomtsev-Petviashvilli equation using the Benney-Luke equation", *Journal of Physics A: Mathematical and Theoretical,* **vol. 44,** *pg. 195202*

M.J. Ablowitz, Y. Zhu, "Nonlinear diffraction in photonic graphene", *Optics Letters,* **vol. 36,** *pp. 3762-3764*

Gregory Beylkin

B.A. Jones, G. Beylkin, G.H. Born, "A multiresolution model for small-body gravity estimation", *Celestial Mechanics and Dynamical Astronomy,* **vol. 111,** *pp. 309-335*

David M. Bortz

J.F. Hammond, D.M. Bortz, "Analytical solutions to Fisher's equation with time-variable coefficients", *Applied Mathematics and Computation,* **vol. 218, issue 6,** *pp. 2497-2508*

E.C. Byrne, S.P. Dzul, M.J. Solomon, J.G. Younger, D.M. Bortz, "Postfragmentation density function for bacterial aggregates in laminar flow", *Physical Review E: Statistical, nonlinear, and soft matter physics,* **vol. 83,** *pg. 041911*

S.P. Dzul, M.M. Thornton, D.N. Hohne, E.J. Stewart, A.A. Shah, D.M. Bortz, M.J. Solomon, J.G. Younger, "Contribution of the Klebsiella pneumoniae capsule to bacterial aggregate and biofilmmicrostructures", *Applied and environmental microbiology,* **vol. 77, issue 5,** *pp. 1777-1782*

Jem N. Corcoran

J.N. Corcoran, W. Mao, "A Class Coupler for Perfect Sampling from Continuous Distribution With and Without Atoms", *Journal of Statistical Theory and Applications,* **vol. 10, issue 3,** *pp. 501-518*

Christopher W. Curtis

M.J. Ablowitz, C.W. Curtis, "On the evolution of perturbations to solutions of the Kadomtsev-Petviashvilli equation using the Benney-Luke equation", *Journal of Physics A: Mathematical and Theoretical,* **vol. 44,** *pg. 195202*

Vanja Dukic

L. Wakschlag, D. Henry, J. Blair, J. Burns, V. Dukic, K. Pickett, "Unpacking the association: Individual differences in the relation of prenatal exposure to cigarettes and disruptive behavior phenotypes", *Neurotoxicology & Teratology,* **vol. 33,** *pp. 145-154*

V. Dukic, M. David, D. Lauderdale, "Internet Queries and MRSA Surveillance", *Emerging Infectious Diseases,* **vol. 17, issue 6,** *pp. 1068-1070*

Bengt Fornberg

N. Flyer, B. Fornberg, "Radial basis functions: Developments and applications to planetary scale flows", *Computers & Fluids,* **vol. 46,** *pp 23-32*

B. Fornberg, N. Flyer, "A numerical implementation of Fokas boundary integral approach: Laplace's equation on a polygonal domain", *Proceedings of the Royal Society A: Mathematical, Physical & Engineering Sciences,* **vol. 467,** *pp. 2983-3003*

B. Fornberg, E. Lehto, "Stabilization of RBF-generated finite difference methods for convective PDEs", *Journal of Computational Physics,* **vol. 230,** *pp. 2270-2285*

B. Fornberg, E. Larsson, N. Flyer, "Stable computations with Gaussian radial basis functions", *SIAM Journal of Scientific Computation,* **vol. 33,** *pp. 869-892*

B. Fornberg, J.A.C. Weiderman, "A numerical methodology for the Painleve equations", *Journal of Computational Physics,* **vol. 230,** *pp. 5957-5973*

Fornberg, B. & Flyer, N. (2011). The Gibbs phenomenon for radial basis functions. *In* **A. Jerri (Ed.)**, *The Gibbs Phenomenon in Various Representations and Applications (pp. 197-219). Potsdam, NY: Sampling Publishing.*

.

Dricoll, TA & Fornberg, B. (2011). Pade-based interpretation and correction of the Gibbs phenomenon. *In* **A. Jerri (Ed.),** *The Gibbs Phenomenon in Various Representations and Applications (pp. 173-196). Potsdam, NY: Sampling Publishing.*

Keith Julien

I. Grooms, K. Julien, B. Fox-Kemper, "On the interactions between planetary geostrophy and mesoscale eddies", *Dynamics of Atmospheres and Oceans,* **vol. 51,** *pp. 109-136*

I. Grooms, K. Julien, "Linearly implicit methods for nonlinear PDEs with linear dispersion and dissipation", *Journal of Computational Physics,* **vol. 230, issue 9,** *pp. 3630-3650*

Congming Li

C. Li, J. Villavert, "An extension of Hardy-Littlewood-Polya inequality", *Acta Mathematica Scientia,* **vol. 31,** pp 1-4

J. Bebernes, Y. Lei, C. Li, "A singularity analysis of positive solutions to an Euler-Lagrange integral system", *Rocky Mountain Journal of Mathematics,* **vol. 4,** *pp 387-410*

W. Chen, C. Li, "Radial symmetry of solutions for some integral systems of Wolff type", *Discrete and Continuous Dynamical Systems,* **vol 30,** *1083-1093*

Y. Lei, C. Li, C. Ma, "Decay estimation for positive solution of a γ-Laplace equation", *Discrete and Continuous Dynamical Systems,* **vol. 30,** *pp. 547-558*

C. Ma, W. Chen, C. Li, "Regularity of Solutions for an Integral System of Wolff Type", *Advances in Mathematics,* **vol. 226,** *pp. 2676-2699*

T.Y. Hou, C. Li, Z. Shi, S. Wang, X. Yu, "On singularity formation of a one-dimensional model for incompressible flows", *Archive for Rational Mechanics & Analysis,* **vol. 199,** *pp. 117-144*

Manuel B. Lladser

Lladser, MB (2011). *Random Variables and Stochastic Simulation. Chile: JC Sáez*

M. Lladser, R. Gouet, J. Reeder, "Extrapolation of um models via Poissonization: accurate measurements of the microbial unknown", *PLoS One,* **vol 6, issue 6,** *e21105*

C. Lozupone, M. Lladser, D. Knights, J. Stombaugh, R. Knight, "UniFrac: an effective distance metric for microbial community comparison", *Multidisciplinary Journal of Microbial Ecology,* **vol. 5, issue 2,** *pp 169-172*

Thomas A. Manteuffel

J.H. Adler, J. Brannick, C. Liu, T. Manteuffel, L. Zikatanov, "First-order system least squares and the energetic variational approach for two-phase flow", *Journal of Computational Physics,* **vol 230, issue 17,** *pp. 6647-6663*

J. Adler, T. Manteuffel, S. McCormick, J. Nolting, J. Ruge, L. Tang, "Efficiency Based Adaptive Local Refinement for First-Order System Least-Squares Formulations", *SIAM Journal of Scientific Computing,* **vol 33, issue 1,** *pp 1-24*

H. DeSterck, T. Manteuffel, K. Miller, G. Sanders, "Top-level acceleration of adaptive algebraic multilevel methods for steady-state solution to Markov chains", *Advances in Computational Mathematics,* **vol 35,** *pp. 374-403*

Austin, T; Brezina, M; Manteuffel, T; Ruge J (2011) Automatic Construction of Sparse Preconditioners for High-Order Finite Element Methods. *In* **O. Axelsson & J. Karatson (Eds.),** *Efficient Preconditioning Methods for Elliptic Partial Differential Equations. Oak Park, IL: Bentham Science Publishers*

Per-Gunnar Martinsson

N. Halko, P.G. Martinsson, J. Tropp, "Finding structure with randomness: Probabilistic algorithms for constructing approximate matrix decompositions", *SIAM Review,* **vol 53, issue 2,** *pp 217-288*

P.G. Martinsson, "A fast randomized algorithm for computing a Hierarchically Semi-Separable representation of a matrix", *SIAM Journal on Matrix Analysis and Applications,* **vol 32, issue 4,** *pp 1251-1274*

N. Halko, P.G. Martinsson, Y. Shkolnisky, M. Tygert, An Algorithm for the Principal Component Analysis of large Data Sets", *SIAM Journal on Scientific Computation,* **vol 33, issue 5,** *pp 2580-2594*

P.G. Martinsson, V. Rokhlin, M. Tygert, "A randomized algorithm for the approximation of matrices", *Applied and Computational Harmonic Analysis,* **vol 30, issue 1,** *pp. 47-68*

Gillman, A; Young, P; Martinsson, PG (2011) Numerical homogenization via approximation of the solution operator. *In* **B. Engquist, O. Runborg, R. Tsai (Eds.),** *Numerical Analysis of Multiscale Computations. Heidelberg, DE: Springer Verlag*

Steve McCormick

J. Adler, T. Manteuffel, S. McCormick, J. Nolting, J. Ruge, L. Tang, "Efficiency-based adaptive local refinement for first-order system least-squares formulations", *SIAM Journal of Scientific Computing,* **vol. 33,** *pp. 1-24*

James D. Meiss

M. Gidea, JD Meiss, I. Ugarcovici, H. Weiss, "Applications of KAM Theorey to Population Dynamics", *Journal of Biological Bynamics,* **vol 5, issue 1,** *pp. 44-63*

BA Mosovsky, JD Meiss, "Transports in Transitory Dynamical Systems", *SIAM Journal of Dynamical Systems,* **vol 10, issue 1,** *pp 35-65*

Mary Nelson

R. Streveler, R. Miller, A. Santiago-Román, M. Nelson, M. Geist, B. Olds, "A Rigorous Methodology for Concept Inventory Development: Using the 'Assessment Triangle' to Develop and Test the Thermal and Transport Science Concept Inventory (TTCI)", *International Journal of Engineering Education,* **vol 27, issue 5,** *pp 968-984*

Juan G. Restrepo

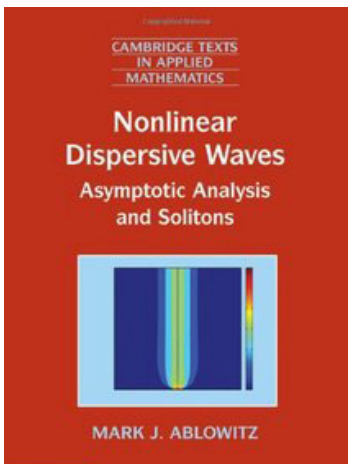
D. Taylor, JG Restrepo, "Network connectivity during mergers and growth: Optimizing the addition of a module", *Physical Review E: Statistical, Nonlinear, and Soft Matter Physics,* **vol 83,** *066112*

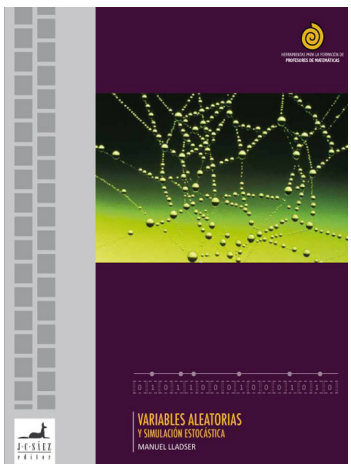
D. Larremore, WL Shew, E. Ott, JG Restrepo, "Effects of network topology, transmission delays, and refractoriness on the response of coupled excitable systems to a stochastic stimulus", *Chaos,* **vol 21,** *025117*

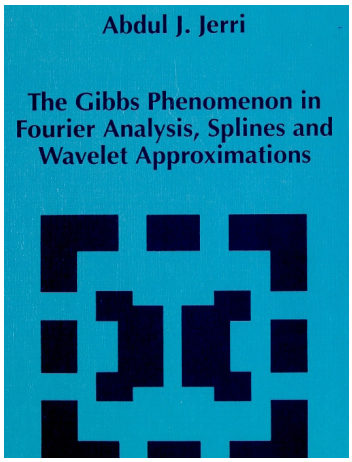
D. Larremore, WL Shew, JG Restrepo, "Predicting criticality and dynamic range in complex networks: effects of topology", *Physical Review Letters,* **vol 106,** *058101*

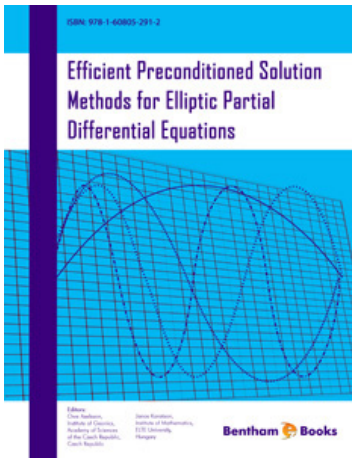
PS Skardal, E Ott, JG Restrepo, "Cluster Synchrony in Systems of Coupled Phase Oscillators with Higher-Order Coupling", *Physical Review E: Statistical, Nonlinear, and Soft Matter Physics,* **vol 84,** *036208*

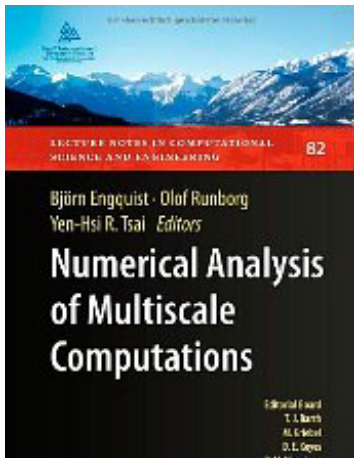
W Lee, JG Restrepo, E Ott, TM Antonsen, "Dynamics and Pattern Formation in Large Systems of Spatially-Coupled Oscillators with Finite Response











Invited Lectures and Meetings Attended

The department of Applied Mathematics is filled with dynamic instructors and active researchers. Presenting their results at other universities and at meetings of their peers demonstrates both of these traits. Sharing knowledge is vital to the scientific process - below we list the locations around the globe that our faculty have given and received shared knowledge.

Gregory Beylkin

"Approximations and Fast Algorithms for Green's Functions", ***International Conference on Applied Harmonic Analysis and Multiscale Computing; University of Alberta, Edmonton;*** July

"On Methods of Seismic Imaging", ***Workshop on Mathematics in the Geosciences; Northwestern University;*** October

David Bortz

AFOSR Computational Mathematics Review; Arlington, VA;June

International Congress of Industrial and Applied Mathematicians; Vancouver, British Columbia; July

Math Methods & Modeling in Life Sciences & Biomedicine; Şile, Turkey; August

Colloquium; Virginia Tech; Blacksburg, VA; September***Colloquium; Michigan State***

Mathematics; East Lansing, MI; October

DARPA/MTO kickoff meeting; Arlington, VA; October

Bengt Fornberg

Colloquium; University of Colorado Boulder

Colloquium; University of Colorado Colorado Springs

Colloquium; Uppsala University; Sweden

Colloquium; University of Stellenbosch; South Africa

Principal Lecturer, with Natasha Flyer; NSF-Conference Board of the Mathematical Science Regional Research Conference; University of Massachusetts Dartmouth

Keith Julien

"The NonHydrostatic Balanced Geostrophic Equations: The interplay between convection and barotropic dynamics", ***Geophysical Fluid Dynamics Summer School; Woods Hole Oceanographic Institute;*** July

"The NonHydrostatic Geostrophic Equations", ***Lunch Bag Seminar; Canadian Institute for Theoretical Astrophysics;*** July

"Physical balances in non-hydrostatic balanced quasi-geostrophic equations", ***American Physical Society - Division of Fluid Dynamics Meeting; Baltimore, MD; presented with A. Rubio, I. Grooms;*** November

"Large-scale barotropic circulation in rotating convection", ***American Geophysical Union Meeting; San Francisco, CA; presented with A. Rubio, I. Grooms;*** December

"The NonHydrostatic Balanced Geostrophic Equations: The interplay between convection and barotropic dynamics" ***; University of New Hampshire Applied Mathematics Program***

Congming Li

Applied & Computational Mathematics Colloquium; California Institute of Technology; May 16

International conference on nonlinear PDE and applications; University of Science and Technology; China; Summer

Colloquium; Shanghai Jiao Tong University; August

Analysis Seminar; New York University; November

Geometric Analysis Seminar; Princeton University; November

Colloquium; Shanghai Jiao Tong University; December

Colloquium; XuZhou Normal University; December

Manuel Lladser

Statistics Seminar; Colorado State University; February

2011 Frontier Probability Days; Salt Lake City, UT; March

Mathematics Colloquium; Iowa State University; March

"Cayley digraphs of a given degree and their diameter", ***22nd International Meeting on Probabilistic, Combinatorial, and Asymptotic Methods in the Analysis of Algorithms; Bedlewo, Poland;*** June

"Estimation of Distribution Overlap for Um Models", ***22nd International Meeting on Probabilistic, Combinatorial, and Asymptotic Methods in the Analysis of Algorithms; Bedlewo, Poland; presented with J. Hampton;*** June
15th International Conference on Random Structures and Algorithms; Emory University; Atlanta, GA; June

Seminar of Stochastic Modeling; Center of Mathematical Modeling; Chile; June
2011 Butcher Symposium; Boulder, CO; November

Séminaire d'algorithmique; Département d'informatique; University of Caen; France; November

Tom Manteuffel

"A parallel, adaptive first-order system least-squares (FOSLS) algorithm for incompressible, resistive magnetohydrodynamics (MHD)", ***Ninth International Conference of Numerical Analysis and Applied Mathamematics; Halkidki, Greece; written with J. Adler, S. McCormick, J. Nolting, J. Ruge, L. Tang;*** September

Per-Gunnar Martionsson

"A Fast Direct Solver for TMS Analaysis and Design in 3D"; ***Institute of Electrical and Electronics Engineers International Symposium on Antennas and Propagation***; ***presented with F. Cajko, E. Michielssen, L. Gomez, and L. Hernandez-Garcia***.

"Fast Direct Solvers for Elliptic PDEs" ***presented at the following:***

SIAM conference on Computational Science and Engineering; Reno, NV; March

Institute for Computational Engineering and Sciences Seminar; University of Texas at Austin; May

25th Biennial Numerical Analysis Conference; Glasgow, Scotland, UK; June

"Randomized Methods for Very Large-Scale Linear Algebra" ***presented at the following:***

Computational Methods for High-Dimensional and Complex Data Sets workshop; Los Alamos National Laboratory; Santa Fe, NM; April

Foundations of Computational Mathematics Conference; Budapest, HU; July

Steve McCormick

Organizing Committee; 15th Copper Mountain Conference on Multigrid Methods; Copper Mountain, CO; March 27 - April 1

Chair; Algebraic Multigrid Summit; Lake City, CO; September 7 - 11

James D. Meiss

"Transport in Time-Dependent Flows - an Overview" ***SIAM Dynamical Systems Meeting; Snowbird, UT;*** May 25

Mary Nelson

Poster Presentation; Solar Engineering International Conference; Boulder, CO; March 15

Presenation; ***Mathematical Association of America; Boulder, CO;*** April

Invited Talk; Colorado Science Education Network; May 18

Paper Presentation; International Society for the Scholarship of Teaching & Learning; Milwaukee, WI; October

Invited Talks; Colorado Council of Teachers in Mathematics; October 29.

Poster Presentation; LA Workshop; November

STE&MER (DBER) seminar; Boulder, CO.

Juan Restrepo

"Synchronization of coupled oscillators: from pedestrians to clocks"***; JILA Colloquium, University of Colorado at Boulder;*** January

"Bifurcations and pattern formation in a system of continuum-coupled maps modeling a heart rhythm instability"***, Applied Dynamics Seminar, University of Maryland; College Park, MD;*** April

"Intermittent Synchronization in Adaptive Networks of Coupled Oscillators"; ***SIAM Conference on Applications of Dynamical Systems; Snowbird, Utah;*** May

"Dynamics Range in Networks of Coupled Excitable Systems"***; SACNAS Conference; San Jose, California;*** October

"Criticality and Statistics of Avalanches in Network Cascading Processes"; ***NICO Frontier Workshop; Northwestern University, Illinois;*** December

Harvey Segur

"Stability/Instability of waves on deep water"***; 7th IMACS Conference on Nonlinear Evolution Equations and Wave Phenomena; University of Georgia, Athens, GA;*** April 5

"Tsunamis"***; University of Colorado-Colorado Springs;*** April 14

"Tsunamis"; ***Erwin Schrödinger Institute; Vienna, Austria;*** May 13

"Stability/instability of waves on deep water"***; Nonlinear Water Waves Conference; Vienna, Austria;*** May 17

"Tsunamis"***; Workshop on Mathematics of Extreme Sea Waves: Tsunamis, Rogue Waves and Flooding; Field Institute, Toronto, ON;*** June 13-16

Department of Applied Mathematics 2011 Annual Report
Faculty Service

Service is the third pillar of faculty support for the University, alongside Teaching and Research. Activity in all three areas is required for tenure at the University of Colorado, and is expected of faculty even after achieving tenure. Service takes many forms, from membership on important governing committees, to educational outreach, to editing and reviewing scientific papers. Applied Mathematics faculty are active in all these areas and more.

Mark J. Ablowitz

Member of the 2011 *Department Assistant Professor Search Committee*.

Chair of the *College Scholar Awards Committee* for the College of Arts and Sciences.

Member of *Cambridge Texts in Applied Mathematics Editorial Board:*

Member of *Studies in Applied Mathematics Editorial Board*

Member of *Dynamics of Partial Differential Equations Editorial Board*:

Gregory Beylkin

Member of the *Department Undergraduate Committee*

Member of the *University Biotechnology Initiative Committee*

Member of *Applied and Computational Harmonic Analysis Editorial Board*

Reviewer on six papers

Sujeet Bhat

Course Coordinator, Spring *APPM 1350*

Course Coordinator, Spring *APPM 1360*

Course Coordinator, Summer *APPM 3310*

Course Coordinator, Fall *APPM 3310*

Course Coordinator, Fall *APPM 1360*

Faculty Advisor for *Undergraduate Chapter of SIAM*, Fall

Faculty Advisor for *Graduate Student Teachers*, Summer, *APPM 2360*

Faculty Mentor for *ASPIRE Summer Engineering Bridge Program*

Faculty Marshall, *Spring Commencement*

David M. Bortz

Member of the *Department Undergraduate Committee*

Affiliated with *Renewable and Sustainable Energy Institute (RASEI)*

Member of *University IQ•Biology Formation Committee*

Reviewer for *Mathematical Biosciences and Engineering*

Reviewer for *Journal of Numerical Mathematics Theory, Methods and Applications*

Jem Corcoran

Chair of the *Department Probability and Statistics Preliminary Examination Committee*.

Member of the *Department Instructor Search Committee*.

Member of the *Department Retirement Committee*

Reviewer for *Journal of Applied Probability*

Reviewer *Journal of Statistical Planning and Inference*

James H. Curry

Manages the *Afro-Americans in the Mathematical Science listserve*.

Member of the *National Research Council Fellowships Office Advisory Committee* (2006-present).

Chair of the *SIAM Di Prima Awards Committee*

Chair of *Department of Applied Mathematics*

Chair of *Department Program Review Process Committee*.

Member of the *College of Engineering's Diversity Action Committee*.

Member of the *Campus Interdisciplinary Computational Science and Engineering Program Development Committee*

Member of the *Search Committee for the Director of Research Computing*.

Member of the *ITS internal Review Committee*.

Associate Editor of the *SIAM online-Journal* (2008-present)

Reviewer on *German Dynamical Systems proposal*.

Member of the *NCAR IMAGe Advisory Committee*.

Chair of the *SIAM "The Richard C. DiPrima Prize" Selection Committee* (2009-present).

Trustee of the *University of Colorado Foundation*

Panelist for *NSF program in the math sciences*.

Anne M. Dougherty

Chair of the *Department of Applied Mathematics Undergraduate Committee*.

Associate Chair of *Department of Applied Mathematics*, July 1, 2000 to present.

Department representative to *University Admitted Students Day*, April 10, 2010;

Department representative to *College of Engineering Orientation* August 18-19, 2010.

Member of the *Undergraduate Education Council* in the College of Engineering.

Member of the *UEC Honors Subcommittee*

Member of the *College of Engineering Scholarship Committee*.

Member of the *ASSETT (Arts and Sciences Support of Education Through Technology) Advisory Committee*
January 2009 to the present.

Faculty Mentor at *High School Honors Institute*, July 25-28

Member of the *Actuarial Studies and Quantitative Finance Certificate Program Committee*
CU campus representative for the *Goldwater Scholarship*.

Member of the *Assistant Registrar for Degree Audit Systems Search Committee*.

Vanja Dukic

Program Chair for *Bayesian Statistical Science (ASA), for the Joint Statistical Meetings 2011*

Member of *International Biometrics Society (ENAR conference 2011) Program Committee*

Chair of *International Society for Bayesian Analysis and American Statistical Association (Section on Bayesian Statistical Science) Education Committee*

Chair of the *American Statisticians Association (Bayesian Statistical Science) Student Paper Competition Committee*

Member of the *Department Graduate Admissions Committee*

Member of the *Department Instructor Search Committee*

Member of the *Department Preliminary Exam committee for Probability and Statistics*

Member of Editorial Board for *"Journal of the American Statistical Association"*

Member of Editorial Board for *"JASA Reviews"*

Member of Editorial Board for *"Statistica Sinica"*
Special Emphasis Panel member for *NIH-NIGMS Grant Proposal Review* February

Special Emphasis Panel member for *NIH-NIGMS Grant Proposal Review* October

Special Emphasis Panel member for *NIH-NIGMS Grant Proposal Review:* ***Modeling of Infectious Disease Agent Systems (MIDAS)***

Reviewer for *BioMed Central Journal - Infectious Disease*

Reviewer for *Biometrics*

Reviewer for *Fertility and Sterility*

Reviewer for *International Journal of Environmental Health Research*

Reviewer for *Nicotine and Tobacco Research*

Reviewer for *"Paediatric and Perinatal Epidemiology"*

Reviewer for *Statistical Communications in Infectious Diseases*

Reviewer for *Radiology*

Bengt Fornberg

Member of the *Department Graduate Committee*.

Member of the *Department Post Tenure Review Committee*.
Member of *University IGP (The Innovative Grant Program) Review Panel for Physical sciences and Engineering*.

Proposal Reviewer for *proposals for NSF and its counterparts in Sweden, South Africa, Singapore, Saudi Arabia, and Hong Kong*.

Refereed 25 articles for various journals and book publishers.

Keith Julien

Chair of the *Department Primary Unit Evaluation Committee*

Chair of the *Department Instructor Search Committee*

Member of *Department Postdoctoral Program Committee*

Member of *Department Interdisciplinary Computational Science and Engineering Committee*

Chair of *ICSE Subcomittee for Exploration of content for Master and PhD*

Member of *Arts & Science Budget Committee*

Reviewer for *Journal of Fluid Dynamics*

Reviewer for *Physical Review Letters*

Reviewer for *Physics of Fluids*

Congming Li

Chair of the *Department Preliminary Exam committee for Applied Analysis*

Member of the *University of Colorado at Boulder Faculty Assembly*

Editor of *Communication on Pure and Applied Analysis*.

Reviewer for *Discrete and Continuous Dynamical Systems*

Editor of nine articles for *Communications on Pure and Applied Mathematics*.

Reviewer for *Communications on Pure and Applied Mathematics*

Reviewer for *Proceedings of American Mathematical Society*

Reviewer for *Journal of Mathematical Analysis and Applications*

Reviewer for:*Nonlinearity*
Reviewer for *Advances in Mathematics*

Reviewer for *Archive Rational Mech and Analysis*.

Reviewer for *Acta Matematica Scientia*

Reviewer for *Mathematical and Computer Modelling*

Reviewer for *Journal of Differential Equations*

Reviewed proposal for *General Research Fund of Hong Kong*

Manuel Lladser

Member of Program Committee for the *2011 Workshop on Analytic Algorithmics and Combinatorics (ANALCO)*, sponsored by SIAM

Member of *Department Calculus Textbook & On-line Homework Committee*

Member of *Department Preliminary Exam committee for Applied Analysis*

Member of *Department Undergraduate Committee*

Member of *Department Primary Unit Evaluation Committee*

Member of *Colorado Initiative in Molecular Biotechnology (CIMB) Task Force Committee*

Reviewer for *NSF Pan-American Advanced Studies Institutes Program (PASI) grant proposal*

Refereed manuscript for the *Bulletin of Mathematical Biology (Bull. Math. Bio.)*

Refereed manuscript for the *Central European Journal of Mathematics (CEJM)*

Refereed manuscript for the *Electronic Journal of Probability (EJP)*
Refereed manuscript for the *Journal of Statistical Physics (JOSS)*

Refereed seven submissions for the *2011 Workshop on Analytic Algorithmic and Combinatorics (ANALCO)*

Tom Manteuffel

Member of *SIAM Publication Committee*

Member of *SIAM Science Policy Committee*

Consultant to *DOE, Office of Science, Advanced Sceintific Computing Advisory Commettee*.

Consultant to *Advisory Board for Bavarian Graduate School of Computational Engineering*

Consultant to *Advisory Board for Fundamental and Computational Sciences Directorate, Pacific Northwest Laboratory*

Member of *Department Outreach Committee*

Member of *Department Promotion and Tenure Committee*

Member of *Department ICSE Committee*

Member of *Department Postdoctoral Program Committee*

Associate Editor for *Electronic Transactions in Numerical Analysis*

Member of Editorial Board for *Numerical Linear Algebra and Applications*

Editor-in-Chief for *SIAM Journal on Numerical Analysis*

Member of Editorial Board for *SIAM News*
Associate Editor for *Multiscale Modelling and Simulation*, SIAM Press

Member of Editorial Board, *SIAM Journal of Scientific Computing*
Reviewed proposals for DOE

Reviewed proposals for NSF

Reviewer for *Numerical Methods for Partial Differential Equations*

Tom Manteuffel (cont.)

Member of *11th Copper Mountain Conference on Iterative Methods Program Committee*, Copper Mountain, CO, April 4-9

Co-Organizer of *Workshop on Algebraic Multigrid Methods*, Boulder Colorado, October 26-30

Per-Gunnar Martinsson

Member of *Department Postdoctoral Program Committee*

Member of *Department ICSE Committee*

Reviewer for *Applied and Computational Harmonic Analysis*
Reviewer for *BIT Numerical Mathematics*

Reviewer for *Journal of Computational Physics*

Reviewer for *SIAM Journal of Scientific Computation*.
Reviewer for *Elsevier Publishing*

Reviewer for the *European Mathematical Society Publishing House*.

Co-organizer of the *Institute for Mathematics and its Applications (IMA) hot topics workshop*, University of Minnesota

Member of *Low-rank Methods for Large-scale Machine Learning workshop Program Committee* at NIPS (Neural Information Processing Systems) Conference in Vancouver.

Steve McCormick

Member of *Department Retirement Committee*

Member of *Copper Mountain Conference Program Committee*

Reviewed proposals for NSF

Reviewed proposals for DOE

Reviewer for *SIAM journal on Scientific Computing*

Reviewer for *SIAM Journal on Numerical Analysis*

Reviewer for *Journal of Computational Physics*

Reviewer for *AMS Reviews*

Reviewer for *Zentralblatt*

James Meiss

Member of *NSF Review Panel*, March 15-16

Chair of *Department Graduate Committee*

Fellow with *University Center for Integrated Plasma Studies*

Associate Chair of *Graduate Studies in APPM*

Reviewer for *Physica D*

Reviewer for *Nonlinearity*

Reviewer for *Physical Review Letters*

Reviewer for *Chaos (AIP Journal)*

Reviewer for *Physical Review E*

Reviewer for *European Physics Letters*

Reviewer for *SIAM Journal on Dynamical Systems*

Reviewer for *Mathematics & Computing in Simulation*

Reviewer for *New Journal of Physics*

Reviewer for *Foundations of Computational Mathematics*

Reviewer for *Physica Scripta*

Editorial Board Member with *SIAM Books*

Book Proposal Reviewer for *De Gruyter Publishing*

Book Proposal Reviewer for *Birkhäuser Boston Publishing*

Mary Nelson

Supervised *undergraduate Noyce Fellowship students*

Co-course coordinator, Fall *APPM 1350*

Member of *Department Textbook Selection Committee*

Faculty Participant in *CU Math Day*, April 6

Mentored three instructors

Department Representative at *University Learning Assistant orientation*

Evaluator on *College Project Grant*, "One Day's Pay,"

Participant in *Colorado LAtest project DBER (Discipline Based Educational Research) portion*

Participant in *CU Teach program*

Reviewer for *Frontiers in Education*

Reviewer for *Journal of Engineering Education*

Adam Norris

Member of the *Department Undergraduate Committee*

Course Coordinator, *APPM 2350*

Faculty Adviser for *professional engineering fraternity Theta Tau*

Department Respresentative at *College of Engineering New Student Orientation*.

Department Representative at *Engineering Sampler*

Departmental liaison to *ASSETT (A & S Support of Education Through Technology)*

Department Representative at *High School Honors Institute*

Boulder Faculty Assembly representative to the *CU Administrative Services and Technology Committee*

Boulder Faculty Assembly representative to the *Chancellor's Committee on Program Accessibility*.

Boulder Faculty Assembly *non-tenure at-large representative*.

Departmental liaison to *University Honor Council*

Member of *Boulder Faculty Assembly's CU Administrative Services and Technology Committee*.

Department representative for *University Arts & Sciences Council*.

Member of *Arts and Sciences Council Grievance Committee*

Reviewer for *SIAM Undergraduate Journal*

Juan Restrepo

Member of the *Department Graduate Committee*

Member of the *Department PDE Preliminary Exam Committee*

Reviewer for *Physica D*

Reviewer for *Physical Review Letters*

Reviewer for *Physical Review E*

Reviewer for *European Physics Letters*

Reviewer for *Chaos*

Reviewer for *Journal of Vibration and Acoustics*

Harvey Segur

Member of *Department Program Review Panel (PRP) Committee*

Reviewer for *Journal of Fluid Mechanics*

Reviewer for *Physical Review Letters*

Reviewer for *Physica D*

Reviewer for *Physical Review E*

Reviewer for *Proceedings of the Royal Society of London*

Reviewer for *Archives of Rational Mechanics & Analysis*

Reviewer for *SIAM Journal of Applied Mathematics*

Reviewer for *Science Foundation of Ireland*

Department of Applied Mathematics 2011 Annual Report
Faculty Outreach

Department of Applied Mathematics 2010 Annual Report
Teaching Activities

.

Undergraduate Courses Taught by Department Personnel

Spring Semester 2011

APPM 1345	*Silva Chang*	*Calculus 1B with Algebra*
APPM 1350	*Sujeet Bhat*	*Calculus I for Engineers*
APPM 1360-010, -020	*Sujeet Bhat*	*Calculus II for Engineers*
APPM 1360-030	*Mary Nelson*	*Calculus II for Engineers*
APPM 1710	*John Flynt*	*Intro. to Games Dev. 1*
APPM 2350-010	*Mary Nelson*	*Calculus III for Engineers*
APPM 2350-020	*Adam Norris*	*Calculus III for Engineers*
APPM 2350-030	*Christopher Curtis*	*Calculus III for Engineers*
APPM 2360-010	*Antonio Rubio*	*Introduction to Ordinary Differential Equations with Linear Algebra*
APPM 2360-020	*David Bortz*	*Introduction to Ordinary Differential Equations with Linear Algebra*
APPM 2360-030	*Yi Zhu*	*Introduction to Ordinary Differential Equations with Linear Algebra*
APPM 2360-040	*Christopher Curtis*	*Introduction to Ordinary Differential Equations with Linear Algebra*
APPM 2450	*Graduate Students*	*Calculus III Lab*
APPM 2460	*Graduate Students*	*Differential Equations Lab*
APPM 3050	*Adam Norris*	*Scientific Computing in Matlab*
APPM 3310	*Jim Meiss*	*Matrix Methods*
APPM 3570	*Anne Dougherty*	*Applied Probability*
APPM 4360	*Harvey Segur*	*Complex Variables*
APPM 4390	*David Bortz*	*Modeling in Mathematical Biology*
APPM 4450	*Anne Dougherty*	*Undergraduate Applied Analysis*
APPM 4570	*Vanja Dukic*	*Statistical Methods*
APPM 4660	*Juan Restrepo*	*Intermediate Numerical Analysis 2*
APPM 4720	*Gunnar Martinsson*	*Tpc - Fast Methods in Computing*
APPM 4950	*Adam Norris*	*Seminar in APPM*

Summer - Term C

APPM 1350	*Ashar Ali*	*Calculus I for Engineers*
APPM 1360	*Ashley Patchen*	*Calculus II for Engineers*
APPM 2350-300	*Chris Leibs*	*Calculus III for Engineers*
APPM 2350-301	*Juliet Hougland*	*Calculus III for Engineers*
APPM 2360-300	*Sebastian Skardal*	*Introduction to Ordinary Differential Equations with Linear Algebra*
APPM 2360-301	*John Villavert*	*Introduction to Ordinary Differential Equations with Linear Algebra*
APPM 2450	*Chris Nieves*	*Calculus III Lab*
APPM 2460	*Ben Sturdevant*	*Differential Equations Lab*
APPM 3310	*Sujeet Bhat*	*Matrix Methods*
APPM 4650	*Adam Norris*	*Intermediate Numerical Analysis 1*

Fall Semester

APPM 1340-001	*Mary Nelson*	*Calculus 1A with Algebra*
APPM 1340-002	*Silva Chang*	*Calculus 1A with Algebra*
APPM 1350-010	*Mary Nelson*	*Calculus I for Engineers*
APPM 1350-020	*Silva Chang*	*Calculus I for Engineers*
APPM 1350-030	*James H. Curry*	*Calculus I for Engineers*
APPM 1350-040	*Andy Guinn*	*Calculus I for Engineers*
APPM 1350-050	*Anne Dougherty*	*Calculus I for Engineers*
APPM 1360-010, -020	*Sujeet Bhat*	*Calculus II for Engineers*
APPM 1360-030	*Krissy Snyder*	*Calculus II for Engineers*
APPM 1710	*John Flynt*	*Tools/Mthds. Eng. Comp.*
APPM 2350-010	*Adam Norris*	*Calculus III for Engineers*
APPM 2350-020	*Christopher Curtis*	*Calculus III for Engineers*
APPM 2350-030	*Adam Norris*	*Calculus III for Engineers*
APPM 2350-040	*Daniel Larremore*	*Calculus III for Engineers*
APPM 2360-010	*Zach Alexander*	*Introduction to Ordinary Differential Equations with Linear Algebra*
APPM 2360-020	*Congming Li*	*Introduction to Ordinary Differential Equations with Linear Algebra*
APPM 2360-030	*Bengt Fornberg*	*Introduction to Ordinary Differential Equations with Linear Algebra*
APPM 2450	*Graduate Students*	*Calculus III Lab*
APPM 2460	*Graduate Students*	*Differential Equations Lab*
APPM 3010	*Jim Meiss*	*Intro/Nonlin.-Chaos*
APPM 3170	*Manuel Lladser*	*Discrete Applied Mathematics*
APPM 3310-001	*Sujeet Bhat*	*Matrix Methods*
APPM 3310-002	*Christopher Curtis*	*Matrix Methods*
APPM 3350	*Adam Norris*	*Adv. Engineering Calc.*
APPM 4350	*Mark J. Ablowitz*	*Methods in Applied Math I (Fourier Series)*
APPM 4380	*Juan Restrepo*	*Modeling in APPM*

APPM 4440	*Anne Dougherty*	*Undergraduate Applied Analysis*
APPM 4520	*Jem Corcoran*	*Introduction to Mathematical Statistics*
APPM 4560	*Manuel Lladser*	*Markov Processes*
APPM 4650	*Adam Norris*	*Intermediate Numerical Analysis 1*
APPM 4950	*Adam Norris*	*Seminar in Applied Mathematics*

Graduate Courses Taught by Department Personnel

Spring Semester 2011

APPM 5360	*Harvey Segur*	*Complex Variables*
APPM 5390	*David Bortz*	*Modeling in Mathematical Biology*
APPM 5450	*Per-Gunnar Martinsson*	*Applied Analysis 2*
APPM 5480	*Keith Julien*	*Approximation Methods*
APPM 5570	*Vanja Dukic*	*Statistical Methods*
APPM 5610	*Gregory Beylkin*	*Numerical Analysis 2*
APPM 6640	*Steve McCormick*	*Multigrid Methods*
APPM 7400-001	*Bengt Fornberg*	*Radial Basis Functions*
APPM 7400-005	*James Meiss*	*Intro to Research*

Fall Semester

APPM 5350	*Mark J. Ablowitz*	*Methods in Applied Math I (Fourier Series)*
APPM 5380	*Juan Restrepo*	*Modeling in APPM*
APPM 5440	*Manuel Lladser*	*Applied Analysis I*
APPM 5470	*Congming Li*	*Methods of Applied Mathematics 3: PDEs*
APPM 5520	*Jem Corcoran*	*Introduction to Mathematical Statistics*
APPM 5560	*Manuel Lladser*	*Markov Processes*
APPM 5600	*Bengt Fornberg*	*Numerical Analysis I*
APPM 6610	*Tom Manteuffel*	*Introduction to Numerical PDEs*
APPM 7100	*James Meiss*	*Dynamical Systems*
APPM 7400-001	*Anne Dougherty*	*Seminar on Teaching Excellence*
APPM 7400-003	*Juan Restrepo*	*Dynamics on Networks*

Courses Offered by the Department, Taught by Non-Departmental Personnel

APPM 2750	*Fall 2011*	*Catherine Bishop, Interdisciplinary Telecommunications*	*Java/Math Algorithms*
APPM 4520	*Spring 2011*	*Janos Englander, Mathematics*	*Introduction to Mathematical Statistics*
APPM 4540	*Spring 2011*	*Sergei Kuznetsov, Mathematics*	*Introduction to Time Series*
APPM 4570/5570	*Fall 2011*	*Jeffrey Luftig, Engineering Mgt*	*Statistical Methods*
APPM 4580/5580	*Spring 2011*	*Jeffrey Luftig, Engineering Mgt.*	*Statistical Methods of Data*
APPM 4650	*Spring 2011*	*Steve Preston, Mathematics*	*Intermediate Numerical Analysis 1*
APPM 4720	*Spring 2011*	*Michael J. Stutzer, Finance*	*Math Finance 1*

Department of Applied Mathematics
526 UCB
1111 Engineering Drive
ECOT 225
Boulder, CO 80309¬

http://amath.colorado.edu