

Michelle Hine Armstrong

University of Arizona
Program in Applied Mathematics

Mathematics Department
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EDUCATION

Ph.D. Candidate, Applied Mathematics expected August 2015

University of Arizona, GPA 3.94

Dissertation: "A Finite Element Model for Mixed Porohyperelasticity with Transport, Swelling, and Growth"

Master of Science, Applied Mathematics May 2012

University of Arizona, GPA 3.91

Bachelor of Science, Mathematics June 2009

Concentration in Economics

University of California, Irvine

Graduated Magna Cum Laude, GPA 3.95

TEACHING EXPERIENCE

G-TEAMS Fellow June 2012-May 2013

University of Arizona/Howell Elementary School

Worked in fourth and fifth grade classrooms, engaging students in mathematics as part of an NSF grant to place graduate students in K-12 education. Focused on project based learning and building connections between math, science, and other disciplines. Created biweekly problem solving sessions to develop students' critical thinking skills and encourage writing about mathematics.

Teaching Assistant—Precalc. Supplemental Instruction Jan. 2011-May 2012

University of Arizona

Nudged student small groups toward correct solutions and to build student problem solving skills. Helped evaluate and further develop curriculum.

Teaching Assistant—College Algebra August 2011-May 2012

University of Arizona

Acted as primary instructor for 32 students. Planned all lessons, delivered all lectures, wrote and graded exams, held office hours, assigned and graded homework. Focused on student interaction and engagement during class.

Tutor November 2009-June 2010

Future Focused, CA

Tutored high school students one-on-one in physics and math, ranging from Algebra to college-level Statistics and AP Calculus.

Summer School Volunteer June-July 2007

Capistrano Unified School District, CA

Helped instruct high school students in Algebra IA and Geometry, assisting students one-on-one. Taught lesson to entire class.

Science Instructor July 2003-August 2005

Dana Point Ocean Institute, CA

Explained current science to public, such as liquefaction, underwater archeology, and time lapse photography. Maintained and interpreted a variety of exhibits, adapting curriculum to all ages. Presented to groups of fifteen to twenty people. Led group of 8 children, ages 5-8, teaching summer camp about marine science including bioluminescence, echolocation, and tides. Ran camp kitchen, preparing snacks for up to 120 campers.

RESEARCH EXPERIENCE

Finite Element Method for Growth of Soft Tissue January 2012-present
University of Arizona; Department of Biomedical Engineering
Worked with Dr. Jonathan Vande Geest, learning continuum mechanics and developing an axisymmetric finite element model for growth and modeling of the human eye as a porous material. Programmed finite strain porohyperelasticity with transport and swelling (porous material deformation with species transport and osmosis) in MATLAB and ABAQUS.
Research assistant position beginning August 2013.

Growth and Modeling of Soft Tissue June-August 2013
University of Oxford, UK; Centre for Collaborative Applied Mathematics
Worked with Alain Goriely, Helen Byrne, Cameron Hall, and Laura Kimpton, to study growth and development of human eyes. Learned tensor calculus and differential geometry. Programmed and derived analytical solutions for simple growth problems. Funded by the Whitaker International Summer Program.

Contaminant Transport Modeling August-December 2011
University of Arizona; Department of Hydrology and Water Resources
Worked with Dr. Larry Winter, studying the contaminant transport problem over a random conductivity field. Programmed a multi-stage method in MATLAB. Performed numerical testing on random conductivity fields.

Analysis of Numerical Integrator January-May 2011
University of Arizona; Program in Applied Mathematics
Worked with Dr. Stepanov, studying the exponential Rosenbrock-type method of order two. Numerical testing showed that the method exhibits stiffness characteristics in the limit as stiffness tends towards infinity; however, for high stiffness, the method suffers reduction to first order.

Fingering of Non-Newtonian Fluid August-December 2010
University of Arizona, Program in Applied Mathematics
As part of Math 586, co-authored a paper with fellow students Yusuke Shimabukuro and Amy Veprauskas on fingering of both Newtonian and non-Newtonian fluids. Ran experiments, collected and analyzed data. Explored an adaptation of the power law time dependence of finger growth rate to describe the behavior of non-Newtonian fluids.

Health Coverage and Labor Force Participation March-June 2009
University of California, Irvine; Department of Economics
Studied the effect of health care coverage on women's participation in the labor force. Investigated data from the U.S. Census Bureau, building a data set of 19,185 women from husband/wife led households. Analysis showed that women on dependent health care policies are less likely to work, indicating that women will work for health care.

Research Assistant March-June 2009
University of California, Irvine; Department of Economics
Worked as a research assistant to Dr. Jeliaskov, helping create an integrated model with data from the University of Michigan's Panel Study of Income Dynamics. Investigated the dynamic intergenerational relationships between health, education, and socioeconomic status.

OTHER WORK EXPERIENCE

Intern June-September 2008
Prescott Tax and Wealth Management
Organized files and client data to prepare for change of broker-dealer. Transferred client records to new database on LaserApp. Ran reports on Morningstar. Wrote Excel formulas to help automate reports. Prepared financial records and tax return for a small business.

Professional Aide July-September 2006
San Onofre Nuclear Generating Station
Worked in Project Management Group, creating and presenting training materials using PowerPoint. Ran reports using site-specific software. Wrote Excel formulas to help automate reports.

PUBLICATIONS

Armstrong, Michelle Hine, et al. "A Finite Element Model for Mixed Porohyperelasticity with Transport, Swelling, and Growth." *In preparation*.

Armstrong, Michelle Hine, Piercey, V.I., and Greene-Hunley, S. "A Tale of Two Stock Markets." *Mathematics Teaching in the Middle School* (2015): 522-530. DOI: 10.5951/mathteachmidscho.20.9.0522

PRESENTATIONS

Computational Growth and Remodeling October 25, 2013
Graduate Student Brown Bag Seminar, University of Arizona; Tucson, AZ

Making Math Stick: Teaching Through Project Based Learning* June 2013
Presented at both GK-12 Summer Institutes for HEATWAVES and G-TEAMS, University of Arizona, Tucson; AZ

Elasticity Theory and Finite Elements Using Porous Media* April 2, 2013
Undergraduate Mathematics Brown Bag, University of Arizona; Tucson, AZ

Project-Based Learning & Partnerships February 13, 2013
International Teacher-Scientist Partnership Conference; Boston, MA

*Denotes Invited Speaker

POSTERS

Finite Element Model of Mixed Porohyperelastic Transport and Growth for an Axisymmetric Porcine Coronary Artery June 18, 2015
Summer Biomechanics, Bioengineering, and Biotransport Conference; Snowbird, UT

Mixed Porohyperelastic Transport Finite Element Model with Chemically-Driven Growth July 10, 2014
World Congress of Biomechanics; Boston, MA

Partnership at Peter Howell Elementary: Fourth and Fifth Grades February 19, 2013
GK-12 Showcase, University of Arizona; Tucson, AZ

G-TEAMS: Graduate Students and Teachers Engaging in Mathematical Sciences February 15, 2013
International Teacher-Scientist Partnership Conference/ AAAS Annual Meeting; Boston, MA

**CONFERENCES
ATTENDED**

7th World Congress of Biomechanics July 2014
World Congress of Biomechanics; Boston, MA

Oxford Conference on Challenges in Applied Mathematics July 2013
University of Oxford; Oxford, UK

International Teacher-Scientist Partnership Conference February 2013
University of California at San Francisco & AAAS; Boston, MA

AMS Western Sectional Meeting October 2012
American Mathematical Society; Tucson, AZ

G-TEAMS Summer Institute June 2012
Institute for Mathematics and Education; Tucson, AZ

ArizMATYC April 2012
Arizona Mathematical Association of Two Year Colleges; Tucson, AZ

Mathematicians in Mathematics Education April 2012
Institute for Mathematics and Education; Tucson, AZ

SKILLS

Mathematical Modeling, MATLAB, Abaqus, Git (Version Control),
LaTeX, Office Suite, HTML,
C/C++ (Winter 2007), Python & FORTRAN (Summer 2013)

AFFILIATIONS

Mathematical Association of America
National Council of Teachers of Mathematics
Phi Beta Kappa
Tau Beta Pi
Society for Industrial and Applied Mathematics

**FELLOWSHIPS
AND HONORS**

ARCS Foundation Scholar June 2014-May 2015
Don Wilson Applied Mathematics Endowed Fund Travel Grant March 2015
Visitor to Stanford University March 2015
H.E. Carter Travel Award July 2014
GPSC Travel Grant July 2014
WAAM Travel Award April 2014
Whitaker International Summer Program (Oxford, UK) June-August 2013
NSF GK-12 Fellow June 2012-May 2013
ITSP Conference Travel Scholarship February 2013
NSF-VIGRE Fellowship August 2010-May 2011
Graduate College Diversity Fellowship August 2010-May 2011
Dean's Honor List: 12 Quarters September 2005-June 2009
Phi Beta Kappa, National Honor Society June 2009
UC Irvine Outstanding Math Senior June 2009
Tau Sigma, National Honor Society November 2008
Tau Beta Pi, Engineering Honor Society March 2007
Robert C. Byrd Honors Scholarship June 2005
UC San Diego National Merit Scholar April 2005
UC San Diego Revelle College Freshman Honors Program April 2005
Employee of the Month, Dana Point Ocean Institute July 2004

OUTREACH

Graduate Co-organizer of WAAM Seminar April 2013-May 2014
Helped organize the “Women Advancing Arizona Mathematics” Seminar at the University of Arizona, with a goal of highlighting minority contributions in mathematics. Created and maintained web page and designed seminar logo.

Sonia Kovalevsky Day March 2011, March 2012, March 2014
Co-organized and co-led workshops on Compartmentalized Disease Models, Math & Music, and Mathematical Card Tricks. Introduced high school girls to the beauty and applications of high-level mathematics.

Undergraduate Research October 2013-December 2013
Directed undergraduate research project on coding growth of nonlinear elastic material in Python. Met weekly with a minority undergraduate student and Dr. Moysey Brio as part of Western Alliance to Expand Student Opportunities, funded by the NSF.

Math and the City October 2012
Mingled with Tucson natives to represent the Program in Applied Mathematics.

Mentor June-September 2009
Mentored local high school girls.

Tau Beta Pi Outreach January-February 2007
Volunteered in a low-performing 5th grade class. Helped students complete science experiments, stimulating early enjoyment of science and math.

Sally Ride Festival November 2006
Volunteered for a science day to encourage girls to enter engineering.

ACTIVITIES

Treasurer—SIAM Student Chapter August 2013-June 2014
GPSC Travel Grants Judge December 2013
Grad Representative—Program in Applied Mathematics June 2012-May 2013
Adult Tap January-May 2013
Beginner Ballet June-November 2012
Ritmos Latinos, Salsa Club February-May 2011
UA Faculty/Staff Choir August-December 2010
UCI Sailing Association July 2007-June 2010
Tutoring (Algebra; Geometry; Economics) March 2008-June 2009
Anteater Mathematics Club September 2007-June 2009