

BRENDAN C. FRY

CONTACT INFORMATION

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RESEARCH INTERESTS

Mathematical biology, modeling oxygen transport and blood flow regulation in the microcirculation

EDUCATION

University of Arizona, Tucson, Arizona USA

Doctoral Student, Applied Mathematics, entered August 2008
GPA: 4.0 out of 4.0
Expected graduation date: May 2013
Advisor: Timothy Secomb
Comprehensive exam completed: April 2011
Qualifying exam completed: August 2009
Graduate coursework completed:
MATH 527 (Real Analysis: year-long sequence)
MATH 575 (Numerical Analysis: year-long sequence)
MATH 583 (Methods of Applied Mathematics: year-long sequence)
MATH 586 (Case Studies in Applied Mathematics: year-long sequence)
MATH 563 (Probability Theory)
MATH 567A (Theoretical Statistics)
MATH 576 (Numerical Analysis of Partial Differential Equations: year-long sequence)
PSIO 572 (Quantitative Modeling of Biological Systems)
BME 511 (Physiology for Biomedical Engineering)
BME 510 (Molecular Cell Biology for Biomedical Engineering)
BME 516 (Biomedical Imaging)
MCB 695E (Science, Society, and Ethics)
ECOL 553 (Functional, Evolutionary, and Computational Genomics)
CPH 576A (Biostatistics in Public Health)

University of Arizona, Tucson, Arizona USA

M.S., Applied Mathematics, December 2009
GPA: 4.0 out of 4.0
Graduated Summa cum laude

University of Arizona, Tucson, Arizona USA

B.S., Mathematics, May 2008
GPA: 3.8 out of 4.0
Graduated with Honors, Magna cum laude

HONORS AND AWARDS

University of Arizona Graduate Interdisciplinary Programs: Winner of Student Poster Competition,
November 2011
Poster: "Mathematical Model for Metabolic Blood Flow Regulation in Microvascular Networks"

National Institute of General Medical Sciences (NIGMS) Computational and Mathematical Modeling of Biomedical Systems: Predoctoral Trainee Appointment, January 2010 - December 2011

National Science Foundation VIGRE Fellowship, 2008-2009

Department of Mathematics: Excellence in Undergraduate Research Award, 2008

University of Arizona: National Merit Scholar, 2004-2008

RESEARCH
EXPERIENCE

University of Arizona, Tucson, Arizona USA

Graduate Research Assistant

January 2012 - present

Currently doing research in mathematically modeling metabolic blood flow regulation and oxygen transport in the microcirculation.

- Research topic: “Mathematical model for metabolic blood flow regulation in microvascular networks”
- Advisor: Timothy Secomb

NIH Grant Trainee

January 2010 - December 2011

Did research in mathematically modeling oxygen transport in the microcirculation.

- Research topic: “Modeling the effect of blood flow regulation on oxygen delivery in heterogeneous microvascular networks”
- Advisor: Timothy Secomb

Research Tutorial Group

August - December 2009

Modeled the response of arteriolar diameters in responses to changes in intraluminal pressure.

- Research topic: “Time-dependent myogenic behavior of arterioles”
- Advisor: Timothy Secomb

Graduate Student Term Paper

January - May 2009

Developed and tested a model for tumor growth with viral therapy.

- Research topic: “A mathematical model of diffusion-driven tumor growth with viral therapy”
- Advisor: Alain Goriely

Undergraduate Research Assistant

August 2007 - May 2008

Researched the effects of adding a predator variable to a previous periodical insect population model for Honors thesis.

- Thesis topic: “Semelparous periodical insects”
- Advisor: Jim Cushing

Undergraduate Research Assistant

August 2006 - May 2007

Researched representations of the symmetric group S_n and how they relate to the irreducible partitions of n .

- Research topic: “Partitions and the symmetric group”
- Advisor: James Cossey

NASA / University of Arizona, Tucson, Arizona USA

Space Grant Intern

August 2005 - May 2006

Learned how to run molecules through a microwave spectrometer and analyze the results in the lab of the Kukolich group, as well as built a new microwave spectrometer.

- Research topic: “Microwave spectroscopy”
- Advisor: Stephen Kukolich

TEACHING
EXPERIENCE

University of Arizona, Tucson, Arizona USA

Graduate Teaching Assistant

January 2012 - present

Currently independently teaching Calculus I with Applications (MATH 124), giving all lectures, grading, and writing all homework assignments and exams.

Graduate Teaching Assistant

August - December 2009

Independently taught College Algebra (MATH 112), gave all lectures, graded, and wrote all homework assignments and exams.

Undergraduate Teaching Assistant

January - May 2008

Assisted Dr. David Savitt in teaching, giving demonstrations, and helping students in a senior-level cryptography course.

Undergraduate Teaching Assistant

January - May 2007

Assisted Dr. Ryan Vinroot in teaching and helping students in second semester undergraduate abstract algebra course.

PROFESSIONAL
EXPERIENCE

Lockheed Martin Corporation, Goodyear, Arizona USA

Applied Mathematics Engineer

June 2008 - August 2008

Designed algorithms for radar image processing and developed techniques to try to resolve focusing problem for high resolution images. In addition, was in charge of mathematical problems on a team of engineers.

National Security Agency, Fort Meade, Maryland USA

Applied Research Mathematician

June 2007 - August 2007

Worked in cryptanalysis and in diagnosing an unknown cryptological system, and used probability and statistics to program tests in C and in Python. Also worked with regular expressions to parse through data for desired information.

PUBLICATIONS

Fry BC, Lee J, Smith NP, and Secomb TW. Estimation of blood flow rates in large microvascular networks based on incomplete boundary conditions. 2012. (Submitted)

FUNDED
CONFERENCES
ATTENDED

Mathematical Biosciences Institute (MBI) Workshop for Young Researchers in Mathematical Biology. Columbus, Ohio. August 29-September 1, 2011. Presenter.

National Institute for Mathematical and Biological Synthesis (NIMBioS) Investigative Workshop on Modeling Renal Hemodynamics. Knoxville, Tennessee. August 1-3, 2011. Presenter.

Experimental Biology Conference. Washington, DC. April 9-13, 2011. Presenter.

Society for Industrial and Applied Mathematics (SIAM) Annual Meeting and Conference on the Life Sciences. Pittsburgh, Pennsylvania. July 12-16, 2010.

Mathematical Association of America (MAA) MathFest. Madison, Wisconsin. July 31 - August 2, 2008.

Statistical and Applied Mathematical Sciences Institute (SAMSI) Undergraduate Workshop. SAMSI, Research Triangle Park, North Carolina. February 29 - March 1, 2008 and March 2-3, 2007.

Southwestern Undergraduate Mathematics Research Conference. Arizona State University, Tempe, Arizona. February 22-24, 2008. Presenter.

Arizona Mathematics Undergraduate Research Conference. Western New Mexico University, Silver City, New Mexico. April 27-29, 2007. Presenter.

PRESENTATIONS

Fry BC and Secomb TW. Mathematical model for metabolic blood flow regulation in microvascular networks. Graduate Interdisciplinary Programs (GIDP) Community Event, Tucson, Arizona. November 17, 2011. Poster.

Fry BC and Secomb TW. Mathematical model for metabolic blood flow regulation in microvascular networks. Graduate and Professional Student Council (GPSC) Student Showcase, Tucson, Arizona. November 4, 2011. Poster.

Alexander MJ and Fry BC. Models for conducted responses. Quantitative Biology Colloquium, Tucson, Arizona. October 25, 2011.

Fry BC and Secomb TW. Mathematical model for metabolic blood flow regulation in microvascular networks. National Alliance Mathematical Field of Dreams Conference, Tempe, Arizona. October 14, 2011. Poster.

Alexander MJ and Fry BC. Introduction to the microcirculation and vascular communication. Quantitative Biology Colloquium, Tucson, Arizona. October 4, 2011.

Fry BC. Modeling metabolic blood flow regulation in microvascular networks. Applied Math Brown Bag Seminar, Tucson, Arizona. September 2, 2011.

Fry BC and Secomb TW. Mathematical model for metabolic blood flow regulation in microvascular networks. MBI Workshop for Young Researchers in Mathematical Biology, Columbus, Ohio. August 29, 2011. Poster.

Fry BC and Secomb TW. Mathematical model for metabolic blood flow regulation in microvascular networks. NIMBioS Investigative Workshop on Modeling Renal Hemodynamics, Knoxville, Tennessee. August 1, 2011. Poster.

Fry B. Modeling oxygen transport in the microcirculation. Applied Math Brown Bag Seminar, Tucson, Arizona. April 15, 2011.

Fry B, Lee J, Smith NP, and Secomb TW. Estimation of blood flow rates in large microvascular networks based on incomplete boundary conditions. Experimental Biology Conference, Washington, DC. April 11, 2011. Poster.

Fry B. Effects of blood flow distribution on oxygen delivery in a heterogeneous microvascular network. Mathematics Graduate Student Colloquium, Tucson, Arizona. February 2, 2011.

Fry B and Shelton D. Stem Cells: Introduction and Ethics. Quantitative Biology Colloquium, Tucson, Arizona. November 16, 2010.

Fry B. The effect of blood flow distribution on oxygen delivery in a heterogeneous network. Applied Math Brown Bag Seminar, Tucson, Arizona. April 30, 2010.

Fry B. Time-dependent myogenic response of arterioles. Applied Math Second-Year Graduate Research Conference, Tucson, Arizona. December 18, 2009.

Fry B. An introduction to modeling tumor growth with viral therapy. Applied Math First-Year Mini-Conference, Tucson, Arizona. May 15, 2009.

Fry B, McGuire L, and Shah A. An experimental study of frequency regimes of honey coiling. Applied Math Laboratory Mini-Conference, Tucson, Arizona. December 3, 2008.

Fry B. Semelparous Periodical Insects. Southwestern Undergraduate Mathematics Research Conference, Tempe, Arizona. February 22-24, 2008.

Fry B. Partitions and the symmetric group. Arizona Mathematics Undergraduate Conference, Silver City, New Mexico. April 27-29, 2007.

OUTREACH AND
LEADERSHIP

Volunteer Coordinator, Protest Judge, and Moderator, MathCounts Southern Arizona, 2011-2012

Creator and Organizer, SIAM Journal Club in Mathematical Biology, 2011-2012

Organizer, Arizona Days Applied Math Conference, 2011

Mentor, Undergraduate Math Modeling Class, 2011

Organizer, Applied Math Brown Bag Seminar, 2010-2011

Vice President, MathCats Undergraduate Math Club, 2006-2008

College of Science Ambassador, 2006-2008

American Cancer Society Relay for Life Co-Chair, 2006-2007

COMPUTER SKILLS

- Languages: MATLAB, C, Perl, Java, Python
- Applications: L^AT_EX, Maple, and common Windows database, spreadsheet, and presentation software
- Operating Systems: Unix/Linux, Windows

MEMBERSHIPS

Society for Industrial and Applied Mathematics (SIAM), American Mathematical Society (AMS), Society for Mathematical Biology (SMB)