Colleen C. Mitchell

Department of Mathematics
University Of Iowa
225E MacLean Hall
Iowa City, IA 52242

Telephone: (319)-335-3813
email: colleen-mitchell@uiowa.edu
http://www.math.uiowa.edu/∼mtchll

Educational and Professional History

Education

Ph. D.	Department of Mathematics, Duke University, May 2003
	Advisor: Michael C. Reed
	Thesis: Mathematical Properties of Time Windowing in Neural Systems
M.A.	Department of Mathematics, Duke University, May 2001
B.S.	Duke University, Magna Cum Laude, May 1998
	Majors in both Mathematics and Biology

Academic Positions

Assistant Professor of Mathematics, The University of Iowa, 2005-
NSF Mathematical Sciences Postdoctoral Research Fellow,
The University of Iowa 2005-2006
NSF Mathematical Sciences Postdoctoral Research Fellow,
Boston University, 2003-2005

Memberships

Society for Mathematical Biology
Society for Industrial and Applied Mathematics
Association for Women in Mathematics

Teaching

Summary of Teaching at The University of Iowa

- 2011 Collegiate Teaching Award Winner.
- Ace scores consistently in the high 5s. Summary and full evaluations are included in a separate document with teaching materials.

Semester	Advisees		Course	Enrolled
	Grad	UnderGrad		
Fall 2005	0	0	22M:034 Engineering Math IV: Differential Equations	31
Spring 2006	0	0	22M:037 Engineering Math V: Vector Calculus	28
Fall 2006	1	1	22M:034 Engineering Math IV: Differential Equations 22M:210 Analysis I	25 19
Spring 2007	1	2	22M:211 Analysis II	17
Fall 2007	1	2	22M:025:AAA Calculus I 22M:025:BBB Calculus I	36 39
Spring 2008	1	2	22M:034 Engineering Math IV: Differential Equations	30
Fall 2008	2	2	Flex Load Semester	
Spring 2009	2	2	22M:025:BBB Calculus I 22M:096 Introduction to Applied Math Research	39 8
Fall 2009	2	3	22M:034:102 Engineering Math IV: Differential Equations 22M:034:131 Engineering Math IV: Differential Equations 22M:330 Topics in Mathematical Biology	29 31 10
Spring 2010	2	3	22M:072 Elementary Numerical Analysis	35
Fall 2010	3	2	22M:025:BBB Calculus I 22M:025:JJJ Calculus I	41 39
Spring 2011	2	2	22M:100 Ordinary Differential Equations 22M:055 Fundamental Properties of Spaces and Functions	43 33
Fall 2011	2	2	22M:032 Engineering Math II: Multivariable Calculus	200
Spring 2012	2	2	22M:034:131 Engineering Math IV: Differential Equations 22M:144 Partial Differential Equations with Numerical Methods	

Students

- Advisor: Ian Besse. 2006-2010.
  Tenure Track at University of Missouri, Kansas City.
- Advisor: Roseanne Wolf 2009-Dec 2011 (expected)
- Advisor: Rebecca Gasper 2009-2013 (expected)

- PhD Committee Member: Ian Besse. 2010
- PhD Committee Member: Hyeyoung Moon. 2010
- PhD Committee Member: Stephanie Adkinson-Schmidt. 2010
- PhD Committee Member: Omayra Ortega. 2008
- PhD Committee Member: Ram Medikonduri. 2007
- PhD Committee Member: Joaquin Rivera-Cruz. 2007
- PhD Committee Member: Roberto Saenz. 2006

- Comprehensive Exam Committee: Rebecca Gasper. 2011
- Comprehensive Exam Committee: Kamuela Yong. 2010
- Comprehensive Exam Committee: Jason Graham. 2010
- Comprehensive Exam Committee: Roseanne Wolf. 2010
- Comprehensive Exam Committee: Danilo Diedrichs. 2010
- Comprehensive Exam Committee: Jeannine Abiva. 2009
- Comprehensive Exam Committee: Ian Besse 2008

- Mentor: Candice Price 2006-2008 (now advised by Dr. Darcy)
- Mentor: Roseanne Wolf 2006-2009 (now my advisee)
- Mentor: Jeannine Abiva 2006-2008 (now advised by Dr. Curtu)
- Mentor: Rebecca Gasper 2008-2009 (now my advisee)

- VIGRE Undergraduate RA: Andrew Buller. 2007-2008
- USA Undergraduate RA: Matthew Moehlmann. 2006-2007
- VIGRE Undergraduate RA: Emily Jacobsen. 2006-2007

- Undergraduate Honors Designated Course,

Students in 22M:025: Kate Juhn and Andrea Weber, Fall 2007; James Wu, Spring 2009; and six students in Fall 2010.

Students in 22M:034: Samantha Hansen, Fall 2009.

Summary of Previous Teaching Experience

- Instructor, Discrete Mathematics. Boston University, Summer 2005.
- Instructor, Calculus II (Large Lecture). Boston University, Spring 2005.
- Instructor, Discrete Mathematics. Boston University, Fall 2004.
- Instructor, Laboratory Calculus I. Duke University, Spring 2003.
- Instructor, Ordinary Differential Equations. I gave the lectures for undergraduate ODEs for the second half of the semester. Duke University, Fall 2002.
- Mentor, I directed the research project of an undergraduate in the Duke Summer Program in Mathematical Biology. Summer 2002.
- Teaching Assistant, Perspectives on Science, a weekly seminar for first year women intended to showcase research which relies on quantitative methods. Duke University, Fall 2000 and Spring 2001.
- Instructor, Laboratory Calculus I. Duke University, Fall 1999.
- Resident Adviser, RESM: Research Experiences in Science and Math, a COSEN summer program for second year women and minorities. Summer 1999.
- Laboratory Instructor, Laboratory Calculus I. Duke University, fall 1998.

Scholarship

Research Interests

- Mathematical Physiology
- Probability
- Dynamical Systems
- Analysis

Refereed Publications

$*$ = major contribution, $**$ = secondary, $***$ = equal, $****$ = minor

- **Mitchell, C.*****, and McMurray, B. (UI Psychology). *Mathematical Models of the Vocabulary Explosion in Young Children.* In Progress.

- **Mitchell, C.***, Besse, I. (PhD Advisee), Shibata, E (UI Biophysics and Physiology), Hund, T (Formerly UI Internal Medicine). *A Probabilistic Model for Cardiac Caveolar Current.* In Progress.

- Gasper, R. (PhD Advisee), **Mitchell C.***, Abbas, P. (UI Audiology). *A Stochastic Model for Accomodation in Auditory Nerve.* In Progress.

- McMurray, B. (UI Psychology) and **Mitchell, C.***** *Understanding Word Difficulty using Models of Language Acquisition.* In Progress.

- **Mitchell, C.** *Stochastic Timing of Spikes in Auditory Processing: The Time Window Model with Inhibition.* In Progress.

- **Mitchell, C.** *The Role of the h-current in Precise Onset Timers of the Cochlear Nucleus.* In Progress.

- Besse, I. (PhD Advisee), **Mitchell, C.***, and Shibata, E (UI Biophysics and Physiology) *A Reduced Model For Caveolar Current in Ventricular Myocyte.* Work Completed in Dr. Besse's Thesis. In Progress.

- Wolf RM (PhD Advisee), **Mitchell CC ****, Mohler PJ, and Hund TJ.(both formerly UI Internal Medicine). *Molecular pathway for atrial arrhythmias in ankyrin-B syndrome: Insights from a computational model.* Undergoing Revisions.

- McMurray, B. (UI Psychology) and **Mitchell, C.***** *The mathematical underpinnings of acceleration in early word learning: The mathematics of parallel learning and frequency.* Undergoing Revisions. Manuscript Included. We plan to submit to Psych Review early Fall 2011

- Snyder JS, Koval OM, Wolf RM (PhD Advisee), Glynn P, Cardona N, Dun W, Wright PJ, Qian L (UI Internal Medicine), **Mitchell CC ****, Boyden PA, Binkley PF, Anderson ME (UI Internal Medicine and Molecular Physiology and Biophysics), Mohler PJ and Hund TJ (Many including Hund and Mohler are formerly UI Internal Medicine). *CaMKII-based regulation of voltage-gated Na+ channel in disease.* Submitted. Circulation.

- Besse, I. (PhD Advisee), **Mitchell, C.***, Hund, T. (Formerly UI Internal Medicine) and Shibata, E. (UI Biophysics and Physiology) *A computational investication of caveolae as a source of persistent sodium current.* Revised and Resubmitted. Frontiers in Computational Physiology and Medicine.

- **Mitchell, C.*** and Reed, M. *Emergent Time Windows in Nonlinear Neural Models.* Revised and Resubmitted. Journal of Computational Neuroscience.

- Wolf, R.(PhD Advisee), **Mitchell, C.****, Christensen, M., (UI Undergraduate), Mohler, P., and Hund, T. (Both formerly UI Internal Medicine). *Defining new insight into atypical arrhythmia: a computational model of ankyrin-B-syndrome.* AJP Heart. **299:** H1505-H1514, 2010

- **Mitchell, C.***** and McMurray, B. (UI Psychology). *On Leveraged Learning in Lexical Acquisition and Its Relationship to Acceleration.* Cognitive Science **33:** 1503-1523, 2009.

- **Mitchell, C.***** and McMurray, B. (UI Psychology). *A Stochastic Model for the Vocabulary Explosion.* Cognitive Science Proceedings pp. 1919-1924, 2008.

- **Mitchell, C.*** and Reed, M. *Precision of Neural Timing in Highly Convergent Systems.* SIAM J. Appl. Math. **68:**720-737, 2007

- **Mitchell, C.** *Precision of Neural Timing: The Small ε Limit.* Journal of Mathematical Analysis and Applications **309:**567-582, 2005.

- **Mitchell, C.*** and Schaeffer, D. *A Two-Current Model for the Dynamics of Cardiac Membrane.* Bulletin of Mathematical Biology **65:**767-793, 2003.

- **Mitchell, C.** *Neural Mechanisms to Improve Timing.* Proceedings of the Annual Computational Neuroscience Meeting. Neurocomputing **52-54:**833-836, 2003.

- **Mitchell, C.** *Mathematical Properties of Time Windowing in Neural Systems* Duke University Thesis, 2003.

- Tolkacheva, E., Schaeffer, D., Gauthier, D. and **Mitchell, C.****** *Analysis of Fenton–Karma Model through Approximation with a One–Dimensional Map.* Chaos **12:** 1034-1042, 2002.

- Reed, M., Blum J. and **Mitchell, C.***** *Precision of Neural Timing: Effects of Convergence and Time-Windowing.* Journal of Computational Neuroscience **13:** 35-47, 2002.

Grants Funded

NSF Mathematical Sciences Postdoctoral Research Fellowship. PI. July 2003-July 2006.

$108,000

NSF Mathematical Biology (2010). *The Role of Cardiac Caveolae in Healthy and Diseased Heart.* PI. Erwin Shibata (UI Biophysics and Physiology) is Co-PI. October 2010-October 2013. $167,594

Funding Proposals Submitted But Not Funded

NSF Mathematical Biology (2007). *Modeling Timing Improvement in Neural Systems*

NSF Mathematical Biology (2008). *Stochastic Timing in Neural Systems*
Recommended For Funding if Possible (2E, 2VG, 4G)

Lectures and Conference Presentations

Special Invitations:

- Invited Speaker. *Do Neurons Have Sharp Time Windows?.* Frontiers in Applied and Computational Mathematics. New Jersey Institute of Technology. May, 2008.
- Invited Speaker *Precise Timing in Highly Convergent Neural Systems.* Applications of Analysis to Mathematical Biology Conference. Durham, NC. May 2007.

Invited Talks & External Seminars

- *A Stochastic Model for the Vocabulary Explosion.* Tulane University. Mathematical Biology Seminar. March 2009.
- *A Stochastic Model for the Vocabulary Explosion.* University of Michigan Mathematical Biology Seminar. November 2008.
- *Precise Timing in Highly Convergent Neural Systems.* University of North Carolina, Chapel Hill, Applied Math Seminar. March 2007
- *Mathematical Properties of Timing in Neural Systems.* Virginia Commonwealth University. Math Colloquium, 2005
- *Mathematical Properties of Timing in Neural Systems.* Western Washington University, Math Colloquium, 2005.
- *Mathematical Properties of Timing in Neural Systems.* University of Iowa, Math Colloquium, 2005.
- *Mathematical Properties of Timing in Neural Systems.* Courant Institute of Mathematical Sciences, NYU. Applied Math Seminar. Nov 2004.
- *Precision Timing in the Auditory Brainstem.* University of Washington, Rubel Lab, Bloedel Hearing Research Center. Aug 2004.

- *Mathematical Properties of Timing in Neural Systems*. Miami University, Ohio. Math Colloquium, 2003.
- *Mathematical Properties of Timing in Neural Systems*. Harvey Mudd College. Math Colloquium, 2003.
- *Mathematical Properties of Timing in Neural Systems*. University of Utah. Mathematical Biology Seminar, 2003

Conference Presentations

- Presenter. *A Model For Cardiac Caveolae and Related Arhythmias*. Society for Mathematical Biology. Vancouver, BC. July 2009.
- Invited Presenter (MiniSymposium), *Precise Timing in Highly Convergent Neural Systems*, Society for Mathematical Biology Annual Meeting. Raleigh, NC. July 2006.
- Presenter, *Precise Timing in Highly Convergent Neural Systems*, MBI Young Researchers Workshop. Mathematical Biosciences Institute. The Ohio State University. March 2006.
- Presenter, *Timing in Neural Systems: The Small ε Limit*. AMS Southeast Sectional. Chapel Hill, NC. Oct 2003.
- Poster Presenter *Neural Mechanisms to Improve Timing*, Annual Computational Neuroscience Meeting. Chicago, IL. July 2002.
- Presenter, *Mathematical Properties of Timing in Neural Systems*. Society for Mathematical Biology Annual Meeting. Knoxville, TN. July 2002.
- Poster Presenter, *A Two Current Model for the Dynamics of Cardiac Membrane*. Society for Mathematical Biology Annual Meeting. Knoxville, TN. July 2002.
- Presenter, *Mathematical Properties of Timing Improvement in Neural Systems*. Society for Industrial and Applied Mathematics Annual Meeting. Philadelphia, PA. July 2002.
- Poster Presenter, *Mathematical Properties of Time-Windowing in Neural Systems*. Association fro Women in Mathematics Workshop for Women Graduate Students and Recent PhDs at SIAM Annual Meeting, Philadelphia, PA. July 2002.
- Poster Presenter, *A Two-Current Model for the Dynamics of Cardiac Membrane*. Nonlinear Differential Equations, Mechanics and Bifurcation Conference. Duke University, NC. May 2002.
- Poster Presenter, *A Two-Current Model for the Dynamics of Cardiac Membrane*. Biomedical Engineering Society Conference. Durham, NC. Oct 2001.

Service

Profession:

- NSF Panel Reviewer. April 2011.
- Referee, Nature Physics, 2011.
- Referee, SIAM Journal of Applied Mathematics. 2011.
- NSF Panel Reviewer. May 2009.
- Referee. Mathematics and Computers in Simulation, 2008
- NSF Panel Reviewer. June 2007.
- NSF Panel Reviewer. May 2006.
- Referee, Nonlinearity, 2006.
- Referee, Nonlinearity, 2003.

Department:

- Minority Student Recruitment and Development Committee. Fall 2010-
- Undergraduate Committee. Fall 2009-
- Internal Review Committee. Fall 2009-Spring 2010.
- Hiring Committee. Fall 2007-Spring 2009.
- Executive Committee. Fall 2006-Spring 2009.
- VIGRE Advisory Committee. Fall 2006-Spring 2009
- Colloquium Committee. Fall 2005-Spring 2006

- Search Committee Member. 2008 Mathematical Biology Search.
- Search Committee Member. 2007 Mathematical Biology Search.
- Search Committee Member. 2006 Mathematical Biology Search.

- Created and Coordinated Mathematical Biology Journal Club Lunch Fall 2006-Fall 2008, Spring 2011-Fall 2011. This group meets weekly to discuss current research in mathematical biology and typically includes 4-7 faculty, 1-3 undergraduate students, and 8-12 graduate students.
- Coordinated Mathematical Biology Seminar Fall 2007-Fall 2008, Fall 2011
- Faculty Advisor, SIAM student chapter. Applied Fall 2010.

University:

- Judge. James F. Jakobsen Graduate Conference. Spring 2011.
- Review Panelist. Mathematical and Physical Sciences Funding Program. Spring 2009.
- Judge. James F. Jakobsen Graduate Conference. Spring 2009.

Community:

- Judge. Undergraduate Math Modeling Competition, 2009.
- Speaker 2011 Sonia Kovalevsky Day.
- Panelist at 2008 Sonia Kovalesky Day. April 2008
- Speaker and Panelist at 2006 Sonia Kovalevsky Day.

  Sonia Kovalevsky Day is a day long program for high school age women which seeks to engage students through a variety of hands-on problem solving, mentoring, networking, and learning activities.