

Katherine S. Williams

University of Arizona Graduate Program in Applied Mathematics
617 N Santa Rita Ave, Tucson, AZ 85721

EDUCATION

Doctor of Philosophy, Applied Mathematics
University of Arizona, Tucson, AZ, expected May 2016
Doctoral Minor: Biomedical Engineering
Graduate Certificate: Statistics
Advisor: Timothy Secomb

Master of Science, Mathematical Biology
The Ohio State University, Columbus, OH, May 2011
Advisor: Avner Friedman

Bachelor of Science, Mathematical Biology
University of Michigan, Ann Arbor, MI, May 2009

PUBLICATIONS *Peer-Reviewed Journal Articles*

- Brown RL, Camacho E, Cameron EG, Hamlet C, Hoffman K, Kang H, Robinson PR, **Williams KS**, Wyrick GR. (2014) A stochastic model of the melanopsin phototransduction cascade. *IMA Volumes in Mathematics and its Applications*, Volume 158.
- **Williams KS**; Diniz Behn C. (2011) Dynamic Interactions between Orexin and Dynorphin May Delay Onset of Functional Orexin Effects: A Modeling Study. *Journal of Biological Rhythms*.

Conference Proceedings

- **Williams KS**, El-Kareh AW, Secomb TW. (2015) Peak and additive damage models for cellular response to radiochemotherapy. *SMB*.
- **Williams KS**, El-Kareh AW, Secomb TW. (2014) Two-mechanism Hill mathematical model better characterizes cellular response to radiation than the linear quadratic. University of Arizona GIDP Showcase.
- **Williams KS**, El-Kareh AW, Secomb TW. (2014) Mathematical models for cellular response to radiochemotherapy. *AACR 5336*.
- **Williams KS**, Fata S. (2014) G-TEAMS at Academy of Tucson Elementary. GK-12 Showcase, University of Arizona.
- **Williams KS**, El-Kareh AW, Secomb TW. (2013) Mathematical modeling of cellular dose-response for radiation and radiation-drug combinations including cell cycle effects. *AACR 439, 20*.
- **Williams KS**, Diniz Behn C. (2009) A Hodgkin-Huxley-type model orexin neuron. *SIAM-DW*.

Masters Thesis

- The effects of cell-surface composition on natural killer cell activation: a modeling study. 2011. The Ohio State University, Columbus, OH

PROFESSIONAL EXPERIENCE *Takeda International* January 2015 - present
Drug Metabolism and Pharmacokinetics Intern
Applied mathematical approaches to interpret *in vitro* dose response data. Developed mathematical models to assist in determining pre-clinical treatment efficacy.

Takeda International Summer 2014
Clinical Pharmacology Intern
Visualized and modeled complex graded safety data to evaluate dosing options for reducing toxicity occurrence in next phase of clinical trials. Contributed to analysis package that allowed team to make a more informed decision going forward with development.

SKILLS Conceptual and practical fluency with mathematical modeling; ability to apply mathematics and statistics to biological systems; knowledge in methods of parameter estimation; experience developing quantitative models to aid in drug development; fluency in Matlab, familiarity with C++; experience with PKPD, pop PK, and compartment modeling & analysis; familiarity with bioinformatics algorithms

HONORS & AWARDS *NIH Comp. & Math Modeling of Biomed. Systems Fellowship*, U. Arizona 2014 - 2015
NSF GK-12 Fellowship, University of Arizona 2013 - 2014
NSF VIGRE Fellowship, University of Arizona 2011 - 2012
Academic All-America Award, The Ohio State University 2010
Big Ten Conference Sportsmanship Award, The Ohio State University 2009
Academic All-Big Ten Conference Award, University of Michigan 2007 - 2009

TEACHING EXPERIENCE *Academy of Tucson Elementary* Fall 2013 - Spring 2015
Developed lesson materials, taught 4th grade math, provided fun applications to engage students in math. Communicated scientific concepts across backgrounds and abilities

University of Arizona Fall 2012 – Spring 2013
Developed course materials and taught College Algebra. Team-taught pre-calculus lab. Mentored students in mathematical modeling course (Spring 2013, Spring 2014).

The Ohio State University Fall 2009 – Spring 2011
Delivered lectures, reviewed materials, and wrote and administered assessment for Business Calculus I & II, Calculus I & II. Tutored undergraduate students in math

RELEVANT COURSEWORK *University of Arizona*
Algorithms in Bioinformatics (1 semester)

- Topics: Algorithms for combinatorial problems in bioinformatics, computational biology

Asymptotic Analysis and Perturbation Methods (1 semester)

- Topics: Asymptotic solutions of algebraic equations, asymptotics of integrals, local solutions of ODEs

Biology & Physiology for Engineers (2 semesters)

- Topics: PhD courses in biology, physiology for biomedical engineering students

Biomechanical Engineering (1 semester)

- Topics: Cauchy stress/strain, Navier-Stokes equations, fluid modeling

Methods in Applied Mathematics (2 semesters)

- Topics: Fourier theory, complex analysis, elementary spectral theory

Numerical Methods (3 semesters)

- Topics: Matrix factorizations, convergence, stability, consistency of numerical methods, finite element, finite difference, FFT

Pharmacology (1 semester)

- Topics: Contrast agents, molecular imaging, kinetics, compartment models

Probability Theory (1 quarter, 1 semester)

- Topics: Measure theoretic probability, Weak/Strong Law of Large Numbers, CLT

Stochastic Processes (3 semesters)

- Topics: Martingales, Markov Processes (discrete and continuous time), stochastic integrals, Ito formula, stochastic DEs, diffusions

Theory of Statistics (1 semester)

- Topics: Principles of data reduction, point estimation, hypothesis testing

Multivariate Statistics (1 semester)

- Topics: Random vectors & distributions, parameter estimation, hypothesis testing, regression, PCA

The Ohio State University

Cancer Genetics (1 quarter)

- Topics: Introductory graduate course in cancer genetics

Dynamical Systems (3 quarters)

- Topics: Intro to chaos, averaging, Melnikov theory, manifolds, bifurcations

Evolutionary Dynamics (1 quarter)

- Topics: Game theory, evolutionary graph theory

University of Michigan

Computational Neuroscience (1 semester)

- Topics: Mathematical models in neuroscience, dynamical systems

Undergraduate courses in biochem. (1 sem), genetics (1 sem), organic chem. (2 sem)