

Curriculum Vitae

Name: Dr. Allison Kolpas
Address: 25 University Avenue, West Chester, PA 19383
Office: UNA 106
Telephone: (610) 430-4964
Email: akolpas@wcupa.edu

EDUCATION

Ph.D. Mathematics, University of California, Santa Barbara 2008
M.A. Mathematics, University of California, Santa Barbara 2004
B.A. Mathematics, *cum laude*, Revelle College, University of California, San Diego 2002
Minor in Dance, Revelle College, University of California, San Diego 2002

PROFESSIONAL EXPERIENCE

Assistant Professor, Department of Mathematics, West Chester University 2011-present
Adjunct Faculty, Department of Mathematical Sciences, University of Delaware 2011-2014
UNIDEL Foundation Postdoctoral Researcher in Mathematical Biology 2009-2010
Department of Mathematical Sciences, University of Delaware
Visiting Researcher in the Couzin Laboratory on Collective Animal Behavior 2009-2010
Department of Ecology and Evolutionary Biology, Princeton University
Lecturer, Department of Mechanical Engineering, U.C. Santa Barbara 2009
Postdoctoral Scholar in Theoretical Ecology 2008-2009
Department of Ecology, Evolution, and Marine Biology, U.C. Santa Barbara
NSF IGERT Associate in Systems Biology, U.C. Santa Barbara 2008
Graduate Student Researcher in Dynamical Systems, U.C. Santa Barbara 2005-2008

TEACHING AND PROFESSIONAL RESPONSIBILITIES

Teaching

Instructor, West Chester University of Pennsylvania

- Introduction to Mathematics (MAT 103) Fall 2011-2013, 2015, Spring 2011-2012
- College Algebra (MAT 107) Fall 2012, Spring 2013, 2015
- Calculus for the Life Sciences (MAT 109) Spring 2014-2015, Fall 2014-2015
- Calculus I (MAT 161) Fall 2013, Spring 2014
- Ordinary Differential Equations (MAT 343) Spring 2011-2013, Fall 2014
- Calculus IV (MAT 362) Fall 2011
- Special Topics (Mathematical Modeling in Biology) (MAT 405/595) Fall 2012
- Independent Study in Mathematics (MAT 499) Fall 2013, 2015, Spring 2012-2013

Instructor, University of Delaware
A sophomore level undergraduate sequence in mathematics for mechanical engineering students

- Engineering Mathematics I (linear algebra and ordinary differential equations) Fall 2009
- Engineering Mathematics III (numerical analysis) Fall 2010, Spring 2010

Instructor, University of California, Santa Barbara
An upper division undergraduate dynamical systems course for physics and engineering students using the textbook by Strogatz

- Nonlinear Dynamics Spring 2009

Instructor, University of California, Santa Barbara
An undergraduate calculus course for biologists and social scientists

- Calculus for Social and Life Sciences II Summer 2004

Instructor, Summer Transition Enrichment Program, University of California, Santa Barbara
A summer enrichment class for incoming first-generation college students

- Precalculus Summer 2005-2006

Teaching Assistant, University of California, Santa Barbara
Ran weekly discussion sections, held office hours, worked in drop-in tutorial center, wrote and graded quizzes, assisted in grading exams, held review sessions

- Calculus with Applications III Winter 2005
- Introduction to Linear Algebra and Differential Equations Fall 2004
- Differential Equations and Fourier Series Spring 2004
- Calculus for Social and Life Sciences II Winter 2004
- Calculus for Social and Life Sciences II Fall 2003
- Calculus with Applications III Spring 2003
- Calculus for Social and Life Sciences I Winter 2003
- Calculus with Applications I Fall 2002

Tutor, University of California, Santa Barbara
Scheduled and worked in drop-in tutorial center

- Math Lab Coordinator and Tutor Summer 2003

Teaching Assistant, University of California, San Diego
Ran weekly discussion sections, held office hours, worked in drop-in tutorial center, wrote and graded quizzes, assisted in grading exams

- Precalculus, Precalculus for Science and Engineering, Multivariable Calculus 2000-2002

Teaching Assistant, Glendale Community College

- Self-Paced Algebra and Intermediate Algebra Summer 2000-2001

Curriculum Development

Calculus for the Life Sciences (MAT 109), West Chester University of PA 2014
Developed a new calculus class for undergraduate biology majors at WCUPA. The catalogue description is as follows: "An overview of differential and integral calculus, motivated through biological problems. Topics include mathematical modeling with functions, limits, continuity, differentiation, optimization, and integration. Graphing calculators are used as an aid in the application of calculus concepts and methods to realistic biological problems."

Mathematical Modeling in Biology (MAT 405), West Chester University of PA Fall 2012
Developed a special topics class on mathematical modeling in biology for junior/senior undergraduate students and beginning graduate students. Topics include modeling population dynamics, infectious diseases, biological motion, invasions, and epidemics. Students are introduced to nonlinear dynamics and bifurcation theory. A three-tiered approach is emphasized including model development, mathematical methods for analysis, and interpretation of the results.

Mathematics of Engineering, University of California, Santa Barbara Summer 2009
Incorporated topics in mathematical biology and dynamical systems into the curriculum of a freshman-level engineering class on computing. Developed a new module on the simulation of swarms of animal groups.

Student Mentorship

Undergraduate students mentored

- Corin Stratton (math) (2015-present). Co-advisor: Dr. Josh Auld, Biology, WCUPA. Funded by my NSF RUI grant (spring 2015) and by a CAS Student Engagement grant (summer 2015). Topic: Theoretical analysis of optimal mating strategies for simultaneous hermaphrodites in the presence of predators.
- Nicole Bishop (biology) (2015-present). Co-advisor: Dr. Josh Auld, Biology, WCUPA. Funded by my NSF RUI grant (spring 2015). Topic: Experimental analysis of optimal mating strategies for simultaneous hermaphrodites in the presence of predators.
- Patrick Dozier (math) (2012-2013). Awarded CAS Undergraduate Student Research Award (2012). Topics: Robotics, swarming, modeling infectious diseases (zombie outbreak).
- Alex Meade (math) (Spring 2013). Co-advisor: Dr. Frank Fish, Biology, WCUPA. Topic: Mathematical analysis of three-dimensional open water maneuverability by mantas.
- Matthew Murname (math) (2012). Awarded CAS Undergraduate Student Research Award. Topic: Swarm modeling and simulation.

Graduate students mentored

- Rebekah Agar (math) (Fall 2013). Awarded 6-credit Graduate Assistantship (GA). Topic: Mathematical analysis of animal locomotion kinematics. Project in collaboration with F. Fish, Biology, WCUPA and A. Crossett, Statistics, WCUPA.

Advising

Major Advising

- General program advising for mathematics majors in BA, BS, and BSED programs.
- Internship advising/placing (BS programs in computational and industrial mathematics).

SCHOLARLY WORK

Journal Articles (peer-reviewed)

- C. Stratton, **A. Kolpas**, Optimal Mating Strategies for Simultaneous Hermaphrodites in the Presence of Predators, *in preparation*.
- **A. Kolpas**, F. Fish, A. Crossett, et al. Open water maneuverability by mantas (*Manta Birostris*), *in preparation*.
- K. E. Anderson, L. R. Harrison, R. M. Nisbet, and **A. Kolpas**, Modeling the influence of flow on invertebrate drift across spatial scales using a 2D hydraulic model and a 1D population model, *Ecological Modelling*, **265**, 207-220, 2013.
- **A. Kolpas**, M. Busch, H. Li, I. D. Couzin, L. Petzold, and J. Moehlis, How the Spatial Position of Individuals Affects their Influence on Swarms: A Numerical Comparison of Two Popular Swarm Dynamics Models, *PLOS ONE*, **8**, No. 3, e58525, 2013.
- J. M. Miller, **A. Kolpas**, J. P. J. Neto, and L. F. Rossi, A continuum three-zone model for swarms, *Bull. Math. Biology*, **74**, No. 3, 536-561, 2012.
- **A. Kolpas** and R. M. Nisbet, Effects of Demographic Stochasticity on Population Persistence in Advective Media. *Bull. Math. Biology*, **72**, 1254-1270, 2010.
- **A. Kolpas** and J. Moehlis, Optimal Switching Between Coexisting Stable Collective Motion States. *Applied Mathematics Letters*, **22**, 600-604, 2009.
- H. Li, **A. Kolpas**, L. Petzold, and J. Moehlis, Parallel Simulation for a Fish Schooling Model on a General-Purpose Graphics Processing Unit. *Concurrency and Computation: Practice and Experience*, **21**, 725-737, 2009.
- H. Li, **A. Kolpas**, L. Petzold, and J. Moehlis, Efficient Parallel Simulation of an Individual-Based Fish Schooling Model on a Graphics Processing Unit, to appear in *Proceedings of the Grace Hopper Celebration of Women in Computing Conference*, 2008.
- **A. Kolpas**, J. Moehlis, T. A. Frewen, and I. G. Kevrekidis, Coarse Analysis of Collective Motion with Different Communication Mechanisms. *Math. Biosciences*, **214**, 49-57, 2008.
- **A. Kolpas**, J. Moehlis, and I. G. Kevrekidis, Coarse Analysis of Stochasticity-Induced Switching Between Collective Motion States. *Proc. Nat. Acad. Sci. USA*, **104**, 5931-5936, 2007.

Book Chapters (peer reviewed)

- T. A. Frewen, I. D. Couzin, **A. Kolpas**, J. Moehlis, R. Coifman, and I. G. Kevrekidis, Coarse collective dynamics of animal groups, in *Coping with Complexity: Model Reduction and Data Analysis*, ed. A. N. Gorban and D. Roose, Springer, Berlin, 299-309, 2011.

Posters

- **A. Kolpas**, F. E. Fish, A. Meade, M. A. Dudas, and K. W. Moored. Mathematical analysis of three-dimensional open water maneuverability by mantas (*Manta birostris*).
 - presented by **A. Kolpas** and A. Meade at SIAM Computational Science and Engineering Conference, Boston, MA, February, 2013.
 - presented by F. Fish at Annual Meeting of the Society for Integrative and Comparative Biology, San Francisco, CA, January 2013.
- C. Stratton, N. Bishop, **A. Kolpas**, and J. Auld. Optimal Mating Strategies for Simultaneous Hermaphrodites in the Presence of Predators.
 - presented by Corin Stratton at the Philadelphia Undergraduate Mathematics Conference Series, Temple University, PA, April 2015.
 - presented by Corin Stratton at the CAS All Science Poster Session, WCU, May 2015.

Talks († = invited)

- † “Mathematical Modeling of Population Dynamics”
Biology Department Seminar, WCUPA April 2014
- † “Mathematical Biology: Modeling the Motion of Individuals and Populations”
STEM Speaker Series (morning and evening talk, open to public), DCCC, Media, PA April 2013
- † “Mathematical Modeling in Biology”
Immaculata University joint Mathematics and Biology Colloquium October 2012
- “Mathematical Analysis of Swarming: Integrating Agent-Based Simulation with Population-Level Modeling and Analysis”
SIAM Annual Meeting and Conference on the Life Sciences, Pittsburgh, PA July 2010
- “Spatio-temporal modeling of fluctuating populations in rivers”
River Ecosystem Modeling Workshop, Ottawa, Canada May 2010
- “Coarse-analysis of collective motion with different communication mechanisms”
Conference on Dynamics of Layering in Biological Systems, Pasadena, CA January 2010
- † “Effects of Demographic Stochasticity on Population Persistence in Advective Media”
Applied Mathematics Seminar, University of Ottawa, Ontario, Canada November 2009
- † “A simulation study on positions of influence in animal groups”
Behavioral Ecology Seminar, Princeton University, NJ October 2009
- “Coarse-Grained Analysis of Collective Motion in Animal Groups”
Kavli Institute for Theoretical Physics, Santa Barbara, CA July 2009
- “Individual-Based Models for the Dynamics of Populations in Advective Media”
SIAM Conference on Applications of Dynamical Systems, Snowbird, UT May 2009

- “Efficient Parallel Simulation of an Individual-Based Fish Schooling Model on a Graphics Processing Unit” (joint with H. Li)
Grace Hopper Celebration of Women in Computing, Keystone, CO October 2008
- † “Mathematical Modeling and Computation for the Collective Motion of Animal Groups”
Science Lecture Series, Glendale Community College, CA September 2008
- “Coarse Analysis of Stochasticity-Induced Switching Between Collective Motion States”
SIAM Conference on Applications of Dynamical Systems, Snowbird, UT May 2007
- † “Mathematical Modeling and Computation for Collective Motion”
Department of Mathematics, California State University, Channel Islands, CA Summer 2006

Funding

- Awarded a \$213,858 NSF RUI grant in Evolutionary Ecology. Award No. DEB-1406231.
Title: “A theoretical and experimental investigation of optimal mating strategies in a hermaphrodite”,
co-PI with Dr. Josh Auld (Biology), WCUPA July 1, 2014-June 30, 2017
- Awarded a WCU CAS Student Engagement grant for a 3-credit AWA and \$1900 in salary for an
undergraduate researcher. Project title: “Undergraduate Research in Biology”. Summer 2015
- Awarded a \$650 SIAM Travel Award to present at the SIAM CSE13 Conference February 2013
- Awarded a 6-credit WCU CAS Graduate Assistantship Award. Project title: “Mathematical Analysis
of Animal Locomotion Kinematics”. Spring 2013
- Awarded a WCU CASSDA Award for a 3-credit AWA. Project title: “Mathematical Modeling of
Swarming”. Spring 2012
- Awarded a \$5000 WCU Presidential Faculty Award for External Grant Development. Summer 2011
- Scholarship to attend the River Ecosystem Modeling Workshop
Ottawa, Canada May 2010
- Scholarship to attend the Conference on Dynamics of Layering in Biological Systems
Pasadena, CA January 2010
- Scholarship to attend the Grace Hopper Celebration of Women in Computing Conference
Keystone, CO October 2008
- Scholarship to attend AWM Workshop
SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah May 2007
- Scholarship to attend the Connections for Women: Dynamical Systems Conference
MSRI, Berkeley, CA January 2007
- Selected as one of 55 attendees from a group of over 730 applicants to attend the
NSF ADVANCE Workshop on Negotiating the Ideal Faculty Position
Rice University, TX October, 2006
- Scholarship to attend the Feedback and Dynamics in Nature Workshop in conjunction
with the Grace Hopper Celebration of Women in Computing Conference
San Diego, CA October 2006

- Scholarship to attend the Workshop on Swarming by Nature and by Design
Institute of Pure and Applied Mathematics,
University of California, Los Angeles, CA

February 2006

SERVICE

Department

- Coordinator of B.S. computational and industrial program 2015-present
- Member of Ad-Hoc Committee Responsible for reviewing the M.A. program in mathematics 2015-2016
- Member of Mathematics Department Undergraduate Curriculum Committee 2014-2017
- Member of Mathematics Department Graduate Committee 2012-2015, 2015-2018
- Member of Applied Mathematics Faculty Search Committee 2012-2013, 2014-2015
- Member of Ad-Hoc Committee Responsible for revising curriculum in MAT 105,107,108,110.
Reviewed and revised syllabus, course content, course catalogue description, and instructor information sheets and prepared paperwork submitted to CAPC Fall 2014. My subcommittee focused on MAT 107,108. In addition, I consulted with both subcommittees as well as the biology department on the implications of the creation of MAT 109 (Calculus for the Life Sciences) on the curriculum covered in MAT 105,107,108. 2014
- Member of Ad-Hoc Committee Responsible for Finding Internships for Majors
In charge of computational and industrial BS program students. 2013-present
- Member of EPADEL Careers Conference Planning Committee
Department of Mathematics, WCUPA 2011
- Member of Ad Hoc Textbook Selection Committee (MAT 103/104) Spring 2011

College & University

- Sigma Xi Charter Committee Member 2015-present
- Women and Gender Studies Steering Committee Member 2015-present
- CASSDA Committee Member 2012-2014
- APSCUF Representative Alternate, WCUPA 2011-2013

Department, College, & University Events

- Faculty Representative, Preview Day, WCUPA September 2011, 2014
- Faculty Representative, Accepted Student Day, WCUPA March 2011
- Faculty Representative, CAS Open House, WCUPA, February 2013-2015

Regularly attend the following

- Department meetings and seminars, Department Fall Awards Banquet, Department Thanksgiving potluck, Department New Mathematics Majors Orientation (presentation on Undergraduate Research, Fall 2012,2013), Pi Mu Epsilon Induction (Spring 2013, A. Meade and P. Dozier presented research), CAS Student Recognition Ceremony, Undergraduate Commencement (Spring 2013)

Referee

Articles

- Journal of the Royal Society Interface 2010
- Bulletin of Mathematical Biology March 2012
- Abstract and Applied Analysis May 2013
- Journal of Computer Science and Systems Biology June 2013

Thesis/Dissertations

- **Comittee member** for PhD thesis of Jennifer Miller, “A whole greater than the sum of its parts: mathematically modeling and analyzing swarms.” (PhD 2012, Advisor: Louis Rossi, Department of Mathematics, University of Delaware)
- Reviewed thesis of James Knighton, graduate student in UPenn’s LPS Master of Environmental Studies program (May 2013).

Professional Societies

- Panelist for Careers in Mathematics Conference
Sponsored by the EPADEL section of MAA, WCUPA October 2011
- Session Chair, SIAM Conference on Applications of Dynamical Systems May 2009

Community

- Super Science Saturday for the Girl Scouts
 - Taught three sessions of a hands-on activity “Mathematical Magic Tricks” and concluded each with a brief presentation on possible careers in mathematics. I also participated in a career panel with other faculty members in the sciences. Three female WCU undergraduate math majors assisted me with the sessions and participated in the career panel. April 2012
 - Taught four sessions of the hands-on activity “The math behind the collective motion of flocks, schools, swarms, and more!” suitable for grades 7-12. I selected and trained three WCU undergraduates to help run the sessions, Joelle Termine (math), Marissa Koch (math), and Kaitlyn Blair (biology). November 2014

- Interviewed for a documentary film on Open Space Conservation for the Save the Valley Conservancy, a group seeking to protect and preserve the natural beauty, wildlife and open space in Beaver Valley, in Delaware County, PA and New Castle County, DE. May, 2014
- Panelist for WE2: Women's Empowerment and Education
An outreach program for high school girls, WCUPA February 2011