

Paul J. Hurtado

<http://www.unr.edu/~phurtado/>

Assistant Professor
Department of Mathematics and Statistics
University of Nevada, Reno
Office: (775)-784-4655
email: phurtado@unr.edu

1664 North Virginia Street
University of Nevada, Reno/0084
Reno, Nevada 89557-0001

Skype: paul.j.hurtado

POSITIONS

- Assistant Professor – University of Nevada, Reno** Jan 2015 – Present
Department of Mathematics & Statistics
- Postdoctoral Fellow – The Ohio State University** Sept 2011 – Aug 2014
Mathematical Biosciences Institute & Aquatic Ecology Laboratory

EDUCATION

- Ph.D. Applied Mathematics – Cornell University** Jan 2012
Center for Applied Mathematics
Committee: Stephen P. Ellner, Advisor (Applied Mathematics, Ecology & Evolutionary Biology)
Richard Rand (Mathematics) & André Dhondt (Ecology & Evolutionary Biology)
- M.S. Applied Mathematics – Cornell University** May 2007
Center for Applied Mathematics
- B.S. Mathematics; B.S. Biology & Chemistry – University of Southern Colorado** Dec 2002
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RESEARCH INTERESTS

I use techniques from dynamical systems, stochastic processes, probability & statistics to develop & analyze mathematical models of biological systems to address questions in ecology, epidemiology & immunology. I also pursue interesting mathematical questions that emerge from such work.

PUBLICATIONS

- **Hurtado P.**, Kiro Singh A. General Proofs and Extensions of the *Linear Chain Trick* for Reducing Integro-differential Delay Equations to Ordinary Differential Equations. (*in preparation*)
- Pangle K., **Hurtado P.**, Lou Y., Marschall E., Ludsins S. Response by planktivorous fish to environmental hypoxia in Lake Erie's central basin. (*in preparation*)
- Slinn H., Richards L., Dyer L., **Hurtado P.**, Smilanich M. Phytochemical diversity and herbivore diet breadth have cascading effects on herbivore immunity and parasitism. (*submitted*)
- Dyer L., Philbin C., Ochsenrider K., Richards L., Massad T., Smilanich A., Forister M., Parchman T., Galland L., **Hurtado P.**, Espeset A., Glassmire A., Harrison J., Mo C., Yoon S., Pardikes N., Muchoney N., Jahner J., Slinn H., Shelef O., Jeffrey C. Modern Chemical Ecology Theory for Plant Insect Interactions (*in revision*, Nature Reviews Chemistry)
- Pardikes N., Lumpkin W., **Hurtado P.**, Dyer, L. 2018. Simulated tri-trophic networks reveal complex relationships between species diversity and interaction diversity. *PLOS ONE* 13(3): e0193822. doi:10.1371/journal.pone.0193822
- Osnas E., **Hurtado P.**, Dobson A. 2015. Evolution of Pathogen Virulence Across Space During an Epidemic. *The American Naturalist*. 185(3):332-342. doi:10.1086/679734
- **Hurtado P.**, Hall S, Ellner SP. 2014. Infectious disease in consumer populations: dynamic consequences of resource-mediated transmission and infectiousness. *Journal of Theoretical Ecology* May 2014, 7(2):163-179. doi:10.1007/s12080-013-0208-2
- **Hurtado P.** 2012. Within-Host Dynamics of Mycoplasma Infections: Conjunctivitis in Wild Passerine Birds. *Journal of Theoretical Biology*, 306:73-92. doi:10.1016/j.jtbi.2012.04.018.
- Simpson J., **Hurtado P.**, Medlock J., Molei G., Andreadis T.G., Galvani A., Diuk-Wasser M. 2011. Vector host-feeding preferences drive transmission of multi-host pathogens: West Nile virus as a

model system. *Proc. R. Soc. B.* 279(1730):925-933. doi:10.1098/rspb.2011.1282

- **Hurtado P.** 2008. The Potential Impact of Disease on the Migratory Structure of a Partially Migratory Passerine Population. *Bull Math Biol*, 70(8):2264-82. doi:10.1007/s11538-008-9345-y
- **Hurtado P.** Probable Black Swift (*Cypseloides niger*) Nesting Colony Found in the Wet Mountains, Pueblo County. *Journal of the Colorado Field Ornithologists*, 36(2) April 2002.
- Loeffler C.W. First Pueblo County Record of Smooth Green Snake (*Liochlorophys vernalis*). *Herpetological Review* 32(1), 2001 pp 60. [Documentation by **P. Hurtado** and M. DiMatteo]

INVITED TALKS

Society for Mathematical Biology Annual Meeting: Session on Confronting Biological Models with Data. Salt Lake City, UT - 20 July 2017

Mathematics & Statistics Colloquium, UNR. Reno, NV - 29 September 2016.

The 11th AIMS Conference on Dynamical Systems, Differential Equations and Applications. Orlando, FL - July 4 2016.

Keynote Speaker, Undergraduate Research Symposium.
Colorado State University - Pueblo, Pueblo, CO - 22 October 2015

RUSIS Summer REU Guest Lecture. Reno, NV - 24 July 2015

MathFest 2014: Mathematical Epidemiology Invited Paper Session.
Portland, OR - 7 August, 2014

Mathematics & Statistics Research Colloquium.
Utah State University, Logan, UT - 27 March, 2014

From Within Host Dynamics to the Epidemiology of Infectious Disease (MBI Workshop).
Mathematical Biosciences Institute, Columbus, OH - 8 April, 2014

Biomathematics Seminar Series. Trinity University, San Antonio, TX - 13 November, 2013

MBI-NIMBioS-CAMBAM Summer Graduate Workshop
NIMBioS, University of Tennessee, Knoxville - 18-21 June, 2013

Science Lecture Series. Ohio Wesleyan University, Delaware, OH - 28 March, 2013

Hancock County Naturalists. Oakwoods Nature Preserve, Findlay, OH - 14 March, 2013

Science Lecture Series. Ohio Wesleyan University, Delaware, OH - 1 November, 2012

Mathematics & Computer Science Department Seminar
Ohio Wesleyan University, Delaware, OH - 1 November, 2012

Ecology (EEOB 3410) Guest Lecture. The Ohio State University, Columbus, OH - 18 October, 2012

SACNAS National Conference: Up-to-the-minute Reports on Mathematical Epidemiology.
Seattle, WA - 12 October, 2012

Modern Mathematics Workshop, SACNAS National Conference (MBI Representative)
Seattle, WA - 10 October, 2012

Battelle Lecture Series. Capital University, Columbus, OH - 13 September, 2012

East Central Ohio Audubon Society Annual Meeting

College Town House, Granville, OH - 11 June, 2012

American Society for Information Science & Technology, Central Ohio Chapter

Grange Insurance Audubon Center, Columbus, OH - 7 June, 2012

RUMBA Seminar. The Ohio State University, Columbus, OH - 10 January, 2012.

European Conference on Mathematical and Theoretical Biology

Krakow, Poland - 28 June, 2011

Science Lecture Series. Ohio Wesleyan University, Delaware, OH - 30 October, 2008

Pan American Sciences Institute 2006.

Universidad De El Salvador, San Salvador, El Salvador - July, 2006

CONTRIBUTED TALKS & OTHER PRESENTATIONS

Dynamics Days 2018 (Poster). Denver, CO - 5 January 2018

SIAM Conference on Dynamical Systems (Talk). Snowbird, UT - 25 May 2017.

SIAM Conference on Dynamical Systems (Poster)

Snowbird, UT - 24 May 2017. (Presented by student co-author Jace Gilbert)

Population Models in the 21st Century [Workshop 4] (Poster)

Mathematical Biosciences Institute at The Ohio State University. Nov 14, 2016.

Ecology and Evolution of Infectious Disease (EEID) Annual Conference. (Poster)

Cornell University, Ithaca, NY - 4 June 2016

MBI Postdoc Seminar (Talk)

Mathematical Biosciences Institute (MBI), OSU, Columbus, OH - 6 February, 2014

International Association for Great Lakes Research (IAGLR) 2013 Annual Conference (Talk)

Purdue University, West Lafayette, IN - 3 June, 2013

MBI Postdoc Seminar (Talk)

Mathematical Biosciences Institute (MBI), OSU, Columbus, OH - 6 December, 2012

Ecology and Evolution of Infectious Diseases Conference (Poster)

University of Michigan, Ann Arbor, MI - May, 2012

MBI Postdoc Seminar (Talk)

Mathematical Biosciences Institute (MBI), OSU, Columbus, OH - 19 January, 2012

Workshop for Young Researchers in Mathematical Biology (Poster)

Mathematical Biosciences Institute (MBI), OSU, Columbus, OH - 31 August, 2011

Ecological Society of America Annual Meeting (Talk). Austin, TX - 12 August, 2011

MBI Postdoc Seminar (Talk)

Mathematical Biosciences Institute (MBI), OSU, Columbus, OH - 21 April, 2011

Institute Partners Meeting (Poster)

Mathematical Biosciences Institute (MBI), OSU, Columbus, OH - 6 February, 2011

Ecology and Evolution of Infectious Diseases Conference (Poster)

Cornell University, Ithaca, NY - June, 2010

Ecology and Evolution of Infections and Disease, Cornell Retreat (Short Talk)

Ithaca, NY - 2 October 2009.

SIAM Life Sciences 2009 Annual Conference (Minisymposium Speaker)

Denver, CO - July 2009.

Mathematical Biology Workshop (Poster). University of Utah - May 2009**2008 Workshop for Young Researchers in Mathematical Biology** (Poster)

Mathematical Biosciences Institute (MBI), OSU, Columbus, OH. Sept 2-4, 2008

SIAM Life Sciences 2008 Annual Conference (Minisymposium Speaker)

Montreal, QC - July 2008

Ecology and Evolution of Infectious Diseases Conference (Poster)

Cornell University, Ithaca, NY - June, 2007

Math Sciences Colloquium (Talk)

Center for Applied Mathematics, Cornell University - March 1, 2007

HONORS AND AWARDS

Westfall Scholar Mentor Award, UNR College of Science - Fall 2017

Nominated for the Lee A. Segel Award for Best Student Research Paper (2008-2009)

Cornell University Provost's Diversity Fellowship - Fall 2008

Cornell University SAGE Fellowship, Fall 2005 - Spring 2006

SLOAN Graduate Fellowship, Fall 2003 - Spring 2005

Outstanding Mathematics Graduate, University of Southern Colorado (USC), Fall Class of 2002.

Certificate of Achievement for contributions to USC & the Experiential Learning Center, April 2002.

Colorado Mathematics Award: 3rd Place, William Lowell Putnam Mathematical Competition, 2000.

USC Excellence Awards in Organic Chemistry (1999-2000); General Chemistry (1998-1999).

STUDENT RESEARCH SUPERVISED**Graduate Research**

Amy Robards (Thesis advisor, Mathematics M.S., UNR; 2017 - present)

Project Leader, MBI-NIMBioS-CAMBAM 2013 Summer Graduate Program

Project Assistant, MBI-NIMBioS-CAMBAM 2012 Summer Graduate Program

Undergraduate Research

Jace Gilbert (Research advisor; 2017 - present) – Funded by an internal GURA award.

Adam Kiro Singh (Research advisor; 2017 - Fall 2018; Currently: Ph.D. candidate, Stanford University)

Narae Wadsworth (Co-advised by Deena Schmidt) – Fall 2017 - present.

Catalina Medina (Co-advised by Deena Schmidt; McNair Scholars Program, UNR) – Fall 2017 - present.

Amanda Fredrickson (Co-advised by Deena Schmidt; Honors Thesis – Fall 2016 - May 2017)

Project Assistant, University of Akron, 2007 Summer REU - Akron, OH (Organizer: Deena R. Schmidt)

TEACHING EXPERIENCE**Workshop Instructor**May 2014 **NIMBioS Tutorial: Parameter Estimation for Dynamic Biological Models***Responsibilities:* Co-organizer and Instructor.

June 2013 **MBI-NIMBioS-CAMBAM Summer Graduate Workshop**
Responsibilities: Taught basic statistical concepts and programming in R and Matlab.
 Co-organized lectures during the first three days of the two-week workshop.

Course Instructor (UNR)

Spring 2018 **Mathematical Modeling (MATH 420/620)**
Topics in Applied Analysis (MATH 429)
 Fall 2017 **Mathematical Modeling (MATH 420/620)**
 Spring 2017 **Nonlinear Dynamic and Chaos II (MATH 722)**
 Fall 2016 **First Year Experience I: Science and Mathematics (SCI 110.1010)**
Nonlinear Dynamic and Chaos I (MATH 721)
 Spring 2016 **Applied Regression (STAT 757)**
 Fall 2015 **Mathematical Modeling (MATH 420/620)**
 Spring 2015 **Probability Theory (MATH 461/661; UNR)**

Course Instructor (Previous Institutions)

Fall 2013 **Foundations of Quantitative Ecology (EEOB 8896.1; OSU)**
Responsibilities: Taught basic programming and modeling to Ecology & Evolution graduate students.
 Curriculum and resource development, lectures, and weekly computer labs in R.

Fall 2009 **Ecological design and analysis I: programming in R (BioEE 7600; Cornell)**
Responsibilities: Taught basic programming, statistical concepts to biology graduate students.
 Curriculum and resource development; Lecture and computer labs twice a week.
 Course goals: R programming basics, foundational mathematics, maximum likelihood.

Fall 2007 **Finite Mathematics (Math 105)**
Responsibilities: Lecture 3 sessions per week; create exams, quizzes and worksheets; assign final grades
 Managed an undergraduate grader; Maintained course website; Weekly office hours
 Used MapleTA for HW assignments and communication with students

2006, 2007 **Calculus I (Math 111)**
Responsibilities: Lecture 3 sessions per week; create exams, quizzes and worksheets; assign final grades
 Used MapleTA for online pre-class HW assignments and communication with students
 Held weekly office hours and managed an undergraduate grader

Teaching Assistant

Spring 2009 **Theoretical Ecology (BioEE 4600)**
Instructor: S. P. Ellner
Responsibilities: Assist with computer labs, grade homework and labs, and help create exam questions.
 Provide feedback on student projects extending published models.

Spring 2008 **Dynamic Models in Biology (Math 362 / BioEE 362)**
Instructors: S. P. Ellner and J. Guckenheimer
Responsibilities: Office hours and study sessions, assist computer labs; grade homework, labs, and exams.

Winter 07/08 **Tropical Field Ornithology (BioEE 264)**
Instructor: A. A. Dhondt
Responsibilities: Co-lead field excursions near the Punta Cana field station in the Dominican Republic.
 Mentored student field projects. Assisted capturing and measuring birds near the field station.
 Facilitate classroom discussions of daily field observations and assigned reading.
 Organized project presentations for Cornell's Ornithology Seminar.

Other Teaching Activities

- April 2007,2008 **Expanding Your Horizons**
Workshop assistant (2007) and organizer (2008) to promote STEM among middle-school girls.
- Aug 2003 **Mathematics Department TA Training**

PROFESSIONAL SERVICE

Conference, Workshop, Symposium & Seminar Organization

- Organizing Committee, Great Basin Bird Conference. May 2017.
Local Organizing Committee, Society for Mathematical Biology (SMB) Annual Meeting. July 2017.
Minisymposium Organizer: Connecting Dynamic Models to Data: Estimation, Uncertainty, Related Statistical Methods (I and II). 2017 Conference on Dynamical Systems. 25 May 2017.
NIMBioS Tutorial: Parameter Estimation for Dynamic Biological Models, May 2014 (Co-organized with Marisa Eisenberg and Ariel Cintron-Arias)
MBI Scientific & Professional Development Seminar, 2013-2014 (Co-organized with Lucy Spardy)
2013 SIAM Workshop Celebrating Diversity, Minisymposium Organizer
MBI Scientific & Professional Development Seminar, 2012-2013 (Co-organized with Arjun Beri)
MBI Postdoc Seminar, 2011-2012 (Co-organized with Harsh Jain)
Python Tutorial Organizer. Center for Applied Mathematics, Cornell University - Spring 2005

Mentoring Activity

- 2017 - present: Undergraduate Research Mentor, UNR
2015 Mentor, ESA Mentoring Workshop for graduate students
2013 MBI-NIMBioS-CAMBAM Summer Graduate Program, Project Leader.
2012 MBI-NIMBioS-CAMBAM Summer Graduate Program, Project Assistant with Linda Allen.
2007 Summer REU at University of Akron (OH), Project Assistant with Deena Schmidt.

Professional Memberships

- American Mathematical Society (AMS), Society for Industrial and Applied Mathematics (SIAM), Society for Mathematical Biology (SMB), Ecological Society of America (ESA)

Professional Development

- Multiple Grant Writing and Proposal Development Workshops at UNR, 2015-Present
Regular interaction with staff and students at OSU's Aquatic Ecology Lab, 2011-2014
Regular attendance at MBI workshops, postdoc seminars and colloquia, 2011-2014
Fall 2013: Ecosystem Dynamics and Management workshops at the MBI.
Math Biology: Looking at the Future (MBI's 10th Anniversary Meeting), September, 2012
MBI Fall Semester Course: Topics in Mathematical Neuroscience, Fall, 2012
Workshop for Young Researchers in Mathematical Biology, August 2012
Workshop 5: Spatial Models of Micro and Macro Systems, April, 2012
Workshop 4: Evolution and Spread of Disease, March, 2012
CTW: Recent Advances in Statistical Inference for Mathematical Biology, Feb, 2012
MBI Winter Course: An Invitation to Probability (Winter 2012)
Workshop 2: Stochastic Processes in Cell and Population Biology, Oct, 2011
CTW: Spatio-Temporal Dynamics in Disease Ecology And Epidemiology, Oct, 2011
Workshop 1: New Questions in Probability Theory Arising from Biology, Sept, 2011
MBI Autumn Course: Bifurcation Theory, Fall, 2011

Referee/Reviewer

- Bulletin of Mathematical Biology; The American Naturalist; Ecology Letters; Ecosphere; SPORA; PLoS ONE; Theory in Biosciences; Chaos, Solitons, & Fractals; Theoretical Ecology; Theoretical Population Biology; Journal of Theoretical Biology, Journal of Biological Dynamics, Journal of Biological Systems, Ecology Letters, SPORA: A Journal of Biomathematics

Grant Proposal Reviewer

- NSF; Army Research Office; The Mississippi-Alabama Sea Grant Consortium;
Colorado Field Ornithologists (Project Fund).

Other Service

Co-organizer: Math/Bio/Stats Chats, 2016 - Present. (Weekly drop-in mtg. for UNR grads & researchers)

Board of Directors, Great Basin Bird Observatory (GBBO), Nov 2016 - Present

Nevada Bird Records Committee (NBRC) member. June 2015 - Present

MBI Representative at SACNAS 2012, Seattle, WA.