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Department of Mathematics

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Department of Pathology
University of Washington
1959 NE Pacific St
Seattle, WA, 98195

Dear Dr. Kristin R. Swanson,

I am applying for the postdoctoral research position in your lab at the University of Washington. I am currently a PhD candidate in the Department of Mathematics at the University of Florida, expecting to graduate in May of 2012. My advisor is Dr. Maia Martcheva and my area of research is Mathematical Biology.

The topic of my dissertation is modeling heterogeneities in malaria. In particular, this research focuses on heterogeneities in malaria parasite species and spatially heterogeneous transmission landscapes. An earlier collaboration with Dr. Carlos Castillo-Chavez and undergraduate mathematics students from various universities led to a research project in which I studied control interventions in the presence of co-circulating seasonal and pandemic H1N1 influenza strains. Currently, I am collaborating with a Biology graduate student to study the optimal control of malaria vaccination in regions with low and high malaria endemicity. Through my research I have gained experience in model-building, analysis of complex systems of nonlinear ordinary differential equations, numerical simulation, parameter estimation through model-fitting, and optimal control theory. Although my dissertation and previous research is focused on infectious disease models, I am very interested in applying my skills to other biological problems, particularly in cancer biology.

Effective communication across disciplines is essential to the study of disease ecology. As an IGERT fellow at the University of Florida, I have substantial experience working in an interdisciplinary environment. Working with biologists and statisticians has led to productive and enjoyable collaborations.

My educational background in theoretical mathematics, experience in mathematical biology research, ability to collaborate in interdisciplinary groups, and my desire to motivate students would be an asset to your department. Please find enclosed my curriculum vitae.

You may contact the following individuals acting as references on my behalf:
    Maia Martcheva, maia@ufl.edu, 352-392-0281 ext 326
    Carlos Castillo-Chavez, ccchavez@asu.edu, 480-965-2115
    Ben Bolker, bolker@mcmaster.ca, 905-525-9140 ext 23320

Please let me know if you would like me to forward any additional information or materials. You may reach me by phone at 352-256-9291, or by e-mail at prosper.olivia@gmail.com. Thank you for considering my application. I look forward to hearing from you.

Best regards,

Olivia Prosper

Olivia Prosper

The Foundation for The Gator Nation
An Equal Opportunity Institution

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Research Interests:

- Mathematical Biology
- Mathematical modeling of disease dynamics
    - Malaria
    - Influenza
- Parameter estimation in dynamic models
- Determining optimal strategies for disease control
- Application of differential equations to biological problems

Current Position:

- PhD candidate, Department of Mathematics, University of Florida
    - QSE^3 IGERT fellow   January 2009 – present

Education:

- PhD in Mathematics, University of Florida   August 2006 – Present
    - Expected graduation date   May 2012
    - Advisor: Dr. Maia Martcheva
- M.S. in Mathematics, University of Florida   May 2008
- B.S. in Mathematics, University of Florida   May 2006
- Minor in French, University of Florida   May 2006

Honors:

- IGERT fellowship   January 2009 – Present
- SEAGEP fellowship   August 2006 – December 2009
- Board of Education fellowship   Summer 2006

Teaching experience:

- Graduate Teaching Assistant, Mathematics Department, University of Florida (August 2006 – May 2009)
- Courses Taught:
  Precalculus (MAC 1140) – Discussion, Precalculus with Trigonometry – Discussion and **Lecture**, Trigonometry – **Lecture**, Survey of Calculus II – TA, Analytic Geometry and Calculus I (MAC 2311) Discussion, and Analytic Geometry and Calculus II (MAC 2312) Discussion.

Research Experiences:

- **Spring 2009-Present:** Participation in QSE3 IGERT activities including

  - Weekly colloquium. Highlights include:
    - Presentations of research
    - Presentation introducing multidisciplinary group to spatial disease modeling
    - Developed lab on how to solve differential equations numerically using MATLAB
  - Internship in the Department of Biology with Dr. Benjamin Bolker

  - Interdisciplinary research with my IGERT cohort: M. Acevedo, T. Caughlin, K. Lopiano, and N. Ruktanonchai
    Supervisors: Dr. M. Martcheva and Dr. C. Osenberg.

  - Products of interdisciplinary IGERT research include thus far two manuscripts (one under review, one in preparation):
    - Assessing the role of spatial heterogeneity and human movement in malaria dynamics and control (revised version submitted to JTB). Authors: O. Prosper, N. Ruktanonchai, and M. Martcheva.
    - The implications of spatial heterogeneity in transmission intensity and human movement on malaria dynamics (tentative title). Authors: M. Acevedo, O. Prosper, K. Lopiano, N. Ruktanonchai, T. Caughlin, M. Martcheva, and C. Osenberg.

  - Participated in IGERT poster competition (May 2011) on IGERT.org.

- **Fall 2009:** Course – Ecological Models and Data
  Project Title: Underreporting of Visceral Leishmaniasis Deaths in Bihar, India
  Supervisor: Dr. Benjamin Bolker
  Group members: Swati DebRoy (Graduate Student, Department of Mathematics), Nick Ruktanonchai (Graduate Student, Department of Biology)

- **Summer 2009:** Summer research program at the Mathematical and Theoretical Biology Institute (MTBI) at Arizona State University

Project Title: Vaccination Strategy and Optimal Control for Seasonal and H1N1 Influenza Outbreak
Supervisors: Dr. Carlos Castillo-Chavez, Dr. Xiaohong Wang, Griselle Torres (ASU graduate student)
Group members: Omar Saucedo (Texas A&M University at College Station undergraduate), Doria Thompson (Spelman College undergraduate)

- **Spring 2009:** Course – Ecology and Evolution of Infectious Diseases
  Project Title: H5N1 Mutations and the Effects of Evolutionary Processes on their Dynamics
  Supervisor: Dr. Benjamin Bolker

Publications:

- O. Prosper, O. Saucedo, D. Thompson, G. Torres-Garcia, X. Wang, and C. Castillo-Chavez. *Modeling control strategies for concurrent epidemics of seasonal and pandemic H1N1 influenza*. Mathematical Biosciences and Engineering, **8(1)** (2011) 141-170. doi:10.3934/mbe.2011.8.141 .

- O. Prosper, N. Ruktanonchai, and M. Martcheva. *Assessing the Role of Spatial Heterogeneity and Human Movement in Malaria Dynamics and Control.* Revised Version Submitted to the Journal of Theoretical Biology 2011.

- M. Martcheva and O. Prosper . Unstable Dynamics of Vector-Borne Diseases: Modeling Through Delay Differential Equations. In S. H. R. Vadrevu (Ed.), Dynamics of Infectious Diseases. Springer, USA. Submitted 2011.

- O. Prosper and M. Martcheva, *Impact of Enhanced Malaria Control on the Competition between Plasmodium falciparum and Plasmodium vivax in India*. Submitted 2011.

Publications in Preparation:

- M. Acevedo, O. Prosper, K. Lopiano, N. Ruktanonchai, T. Caughlin, M. Martcheva, and C. Osenberg. *The implications of spatial heterogeneity in transmission intensity and human movement on malaria dynamics*.

Funded grant proposal:

- O. Prosper and N. Ruktanonchai. Optimal control of malaria in a heterogeneous environment with seasonal transmission. Funding for Fall 2011 semester, provided by QSE[3] IGERT/NSF and the Emerging Pathogens Institute ($26,846.56).

Talks:

- Biomath Seminar, University of Florida, *Impact of Enhanced Malaria Control on the Competition between Plasmodium falciparum and Plasmodium vivax in India* (April 2011)

- SIAM Gators' seminar at the University of Florida, *Assessing the Role of Spatial Heterogeneity and Human Movement in Malaria Dynamics and Control* (March 2011)

- meeting organized by IGERT students to present research results and goals to representatives of the CDC Michelle Chang and Laurence Slutsker, as well as Justin Cohen from CHAI: Malaria Elimination Assessment: Hispaniola. Emerging Pathogens Institute, University of Florida, *A Two-Patch Model for Malaria* (January 2011)

- SIAM Gators' seminar at the University of Florida: *Vaccination Strategy and Optimal Control for Seasonal and H1N1 Influenza Outbreak* (Fall 2009)

- **Invited talk** at the conference Mitigating the spread of influenza A (H1N1), Part II, in Vancouver, B.C.: *Vaccination Strategy and Optimal Control for Seasonal and H1N1 Influenza Outbreak* (September 2009)

Poster Presentations:

- Workshop for Young Researchers in Mathematical Biology (WYRMB) at MBI, Ohio State University, *Impact of Enhanced Malaria Control on the Competition between Plasmodium falciparum and Plasmodium vivax in India* (August/September 2011)
- IGERT Trainee Poster Competition on IGERT.org, *Assessing the Role of Spatial Heterogeneity and Human Movement in Malaria Dynamics and Control* (May 2011)
- EPI Research Day, *Assessing the Role of Spatial Heterogeneity and Human Movement in Malaria Dynamics and Control* (Feb 2011)
- NSF Research Day held at the University of Florida, *Vaccination Strategy and Optimal Control for Seasonal and H1N1 Influenza Outbreak* (October 2009).
- SACNAS conference in Dallas, TX, *Vaccination Strategy and Optimal Control for Seasonal and H1N1 Influenza Outbreak* (October 2009)

Workshops and Conferences Attended:

- "Workshop for Young Researchers in Mathematical Biology at MBI"
- "Malaria Modeling and Control" workshop at NIMBioS, University of Tennessee, Knoxville (June 2011).
- SIAM Annual Conference in Denver, CO (July 2009).
- Mitigating the spread of influenza A (H1N1), Part I at Arizona State University, (June 2009)
- "Optimal Control and Optimization for Biologists" workshop at NIMBioS, University of Tennessee, Knoxville (December 2009).
- Mathematical and Theoretical Biology Institute (MTBI) Research Workshop, Arizona State University (June-August 2009).

Programming Skills:

- Proficient in MATLAB and R, previous experience with C
- Word, Latex, Powerpoint

Other positions held:

- SIAM Gators, University of Florida SIAM chapter, Vice President (August 2009 – August 2010)

Relevant non-mathematics coursework:

- Mathematical Statistics
- General Ecology
- Ecological Models and Data
- Ecology and Evolution of Infectious Diseases

Synergistic activities:

- Collaborated with undergraduate mathematics students on research project
  - Modeling co-circulation of seasonal and H1N1
- Collaborated with biologists and statistician on research projects
  - Analyzing Two-Patch model for malaria and its implications for control
  - Study of 10-patch malaria model dynamics
  - Studying the relationship between SES variables and communities formed by optimizing modularity in cell-phone call data (ongoing)
  - Optimal control of malaria vaccine disbursement under resource constraints in low-endemic and high-endemic areas (ongoing)
- Reviewer of journal articles for MBS and JTB