

Matthew Scott

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Research Interests

- Phenomenological models of bacterial growth and physiology
- Analytic approximation schemes for stochastic processes in chemistry and biology

Education

Post-Doctoral Scholar Microbiology, University of California at San Diego, 2008

Supervisor: T. Hwa.

Ph. D. Applied Mathematics, University of Waterloo, 2005.

Dissertation: The modeling of blood rheology in small vessels.

Supervisors: G. Tenti and W.-K. Liu.

M. Sc. Chemistry, University of Calgary, 2000.

B. Sc. Chemistry, University of Calgary, 1998.

Teaching Experience

CURRENT AUG 2008	Assistant Professor, University of Waterloo <i>Applied Mathematics</i> Undergraduate teaching: Calculus and differential equations at freshman and sophomore levels. Primarily taught physics and engineering students. Graduate teaching: Designed and taught course in stochastic processes applied to biology, chemistry and physics. Wrote course notes (300 pages).
2006-2007	Guest Lecturer, University of California at San Diego <i>Quantitative Biology</i> Taught a class on stochastic processes in genetic circuits, both as a guest lecturer in a graduate quantitative biology course and as a tutorial at a summer school.

Honors, Awards and Fellowships

- Canadian Natural Science and Engineering Research Council Postdoctoral Fellowship, 2006-2008
- Ontario Graduate Scholarships, 2003-2005
- Stanford Fleming Foundation Teaching Award, 2001
- Don Tavares Teaching Excellence Award, 2000

Publications

Papers in refereed journals

1. **M. Scott**, C. W. Gunderson, E. M. Mateescu, Z. Zhang and T. Hwa (2010) Inter-dependence of cell growth and gene expression: Origins and consequences. To be published in *Science*.

2. **M. Scott**, F. J. Poulin and H. Tang (2010) Approximating intrinsic noise in continuous multispecies models. To be published in *Proceedings of the Royal Society of London - Series A*.
3. C. Song, H. Phenix, V. Abedi, **M. Scott**, B. P. Ingalls, M. Krn and T. J. Perkins (2010) Estimating the stochastic bifurcation structure of cellular networks. *PLoS Computational Biology* **6**: e1000699
4. **M. Scott** (2009) Long delay times in reaction rates increase intrinsic fluctuations. *Physical Review E* **80**: 031129.
5. **M. Scott**, T. Hwa and B. Ingalls (2007) Deterministic characterization of stochastic genetic circuits. *Proceedings of the National Academy of Sciences USA* **104**: 7402-7407.
6. **M. Scott**, B. Ingalls and M. Kaern (2006) Estimations of intrinsic and extrinsic noise in models of nonlinear genetic networks. *Chaos* **16**: art. 026107, 1-15.
7. F. J. Poulin and **M. Scott** (2005) Stochastic parametric resonance in shear flow. *Nonlinear Processes in Geophysics* **12**: 871-876.
8. L. Qian, L., **M. Scott**, K.V.I.S. Kaler and R Paul (2002) Integrated concentric ring dielectrophoretic (DEP) levitator. *Journal of Electrostatics* **55**: 65-79.
9. **M. Scott**, R. Paul, and K.V.I.S. Kaler (2000) Theory of frequency-dependent polarization of general planar electrodes. Part 1: Theoretical foundations and general results. *Journal of Colloid and Interface Science* **230**: 377-387.
10. **M. Scott**, R. Paul and K.V.I.S. Kaler (2000) Theory of frequency-dependent polarization of general planar electrodes. Part 2: Applications and results from homogeneous and array systems of electrodes. *Journal of Colloid and Interface Science* **230**: 388-395.

Papers in refereed conference proceedings

11. M. Scott and B. Ingalls, "Using the linear noise approximation to characterize molecular noise in reaction pathways," proceedings of the Foundations of Systems Biology in Engineering (FOSBE), Santa Barbara, CA 2005.
12. M. Scott, G. Tenti and W.-K. Liu, "Some aspects of the rheology of blood," proceedings of the Canadian Congress of Applied Mechanics (CANCAM), Montreal, Quebec 2005.
13. M. Scott, R. Paul and K.V.I.S. Kaler (2001) Two-dimensional model of electrode polarization. Proceedings of the 4th International Conference on Applied Electrostatics, Dalian, China. 75-83.

Other publications

14. M. Scott, R. Paul and K.V.I.S. Kaler (2002) Electric fields at electrode surfaces: The theory of electrode polarization. Encyclopedia of Surface and Colloid Science, Edited by A. Hubbard. Marcel Dekker, New York.

Presentations, Seminars and Summer Schools

1. "Interdependence of cell growth and gene expression: Origins and consequences" (60 min) Invited seminar speaker, Dept. of Biochemistry and Biomedical Sciences, McMaster University, Hamilton, Ontario 2010.
2. "Intrinsic noise in continuous systems" (20 min) Invited speaker, Canadian Applied and Industrial Mathematics Society, St. John's, Newfoundland 2010.

3. “The role of physiology in growth-rate dependent decisions.” (30 min) Invited speaker, NSF / CIFAR / EPSRC / BBSRC: Cellular Decision Making Workshop, Arlington, Virginia 2010.
4. “Intrinsic noise in continuous systems” (20 min) Invited speaker, Banff International Research Station: Multiscale stochastic modeling of cell dynamics, Banff, Alberta 2010.
5. “SUMMER SCHOOL: Growth laws and modern biology” (3 hrs) Swiss Institute of Bioinformatics Summer School: Determinism, Stochasticity and Robustness in Biological Processes, Lugano, Switzerland 2009.
6. “Growth laws and indirect regulation” (60 min) Invited speaker, 435th WE Heraeus Seminar: Physics of Biological Function, Bad Honnef, Germany 2009.
7. “Growth laws and modern biology” (60 min) Invited colloquium speaker, Max Planck Institute - Terrestrial Microbiology and University of Marburg, Marburg, Germany 2009.
8. “Bacterial growth imposes strong indirect global regulation” (20 min) Invited speaker, American Society for Microbiology Philadelphia, Pennsylvania 2009.
9. “BLOCK COURSE: Genetic circuits and noise” (8 hrs) UNAM Cuernavaca, Mexico 2009. Cancelled - influenza outbreak.
10. “Growth laws and global regulation” (20 min) Invited speaker & **session co-chair**. American Physics Society, Pittsburgh, Pennsylvania 2009.
11. “Sustainability and genetic engineering in agriculture” (30 min) Invited speaker, American Pie UCSD International Center, La Jolla, California 2008.
12. “Engineering in biology” (60 min) Invited speaker, National Science Foundation Frontiers in Science, San Marcos, California 2007.
13. “TUTORIAL: Genetic circuits and noise” (90 min) Summer School - Quantitative Approaches to Gene Regulatory Systems, La Jolla, California 2006.
14. “Application of the linear noise approximation to biochemical networks” (20 min) Canadian Chemical Engineering Conference, Toronto, Ontario 2005.
15. “Control of uncertain systems” (20 min) International Conference on Decision and Impulsive Control (DCDIS), Guelph, Ontario 2005.
16. “The rheology of blood” (20 min) Invited speaker, Canadian Congress of Applied Mechanics (CAN-CAM), Montreal, Quebec 2005.