

Daniel E. Zak

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OBJECTIVE

A tenure-track faculty position in a chemical, biomedical, or bio- engineering department where I may develop my research and teaching program in mammalian systems biology. My research interests are computational and experimental approaches to modeling cellular adaptation, at the systems scale, in response to extracellular signals, and developing these techniques for modeling host-pathogen interactions. Positions where collaborations with biomedical scientists may be pursued are especially desirable.

EDUCATION

Ph.D. Chemical Engineering, Expected February 2005

University of Delaware, Newark, DE (GPA: 3.6/4.0)

Structured Modeling of Mammalian Transcription Networks

Babatunde A. Ogunnaike & James S. Schwaber , Advisors

M.S. Chemical Engineering, January 2000

University of Illinois, Urbana-Champaign, IL (GPA: 3.5/4.0)

B.S. Chemical Engineering, May 1998

University of Illinois, Urbana-Champaign, IL (GPA: 3.7/4.0)

Graduate with Distinction

RESEARCH EXPERIENCE

University of Delaware (Newark, DE) /Thomas Jefferson University (Philadelphia, PA)

Graduate Research Assistant, Summer 2000 – present.

Computational modeling of the system-wide transcriptional response of mammalian cells to extracellular signals

Experimental Systems: EGFR signaling in rat hepatocytes & neuromodulation in the rat SCN

Experimental Methods:

-Gene expression: RNA extraction and purification, qRT- PCR, & cDNA microarrays (aRNA amplification, labeling, hybridization, scanning, quantification)

-Mammalian cell culture

Computational methods:

-Development of an integrative structured modeling framework for mammalian transcription networks

-Data analysis: qRT-PCR modeling, cDNA microarray data analysis, microarray cluster analysis

-Modeling: Biochemical kinetic modeling, system identification

-Model analysis: Sensitivity analysis, identifiability analysis, experimental design, stochastic kinetic analysis

-Bioinformatics: Promoter analysis, literature mining

PUBLICATIONS

- Zak DE, Vadigepalli R, Gonye GE, Doyle FJ III, Schwaber JS, & Ogunnaike BA. Unconventional systems analysis problems in molecular biology: a case study in gene regulatory network modeling. *Computers and Chemical Engineering* (In press, 2004).
- Zak DE, Stelling J, & Doyle FJ III. Sensitivity analysis of oscillatory (bio)chemical systems. *Computers and Chemical Engineering* (In press, 2004).
- Zak DE, Pearson RK, Vadigepalli R, Gonye GE, Schwaber JS, & Doyle FJ III. Continuous-time identification of gene expression models. *Omics*, 7(4), 373-86, 2003.
- Zak DE, Gonye GE, Schwaber JS, & Doyle FJ III. Importance of input perturbations and stochastic gene expression in the reverse engineering of genetic regulatory networks. *Genome Research*, 13(11), 2396-405, 2003.
- Vadigepalli R, Chakravarthula P, Zak DE, Schwaber JS, & Gonye GE. PAINT: A promoter analysis and interaction network generation tool for genetic regulatory network identification. *Omics*, 7(3), 235-52, 2003.

PROCEEDINGS

- Zak DE, Doyle FJ, Vlachos DG and Schwaber JS. Stochastic kinetic analysis of transcriptional feedback models for circadian rhythms. *Proceedings of the 40th IEEE Conference on Decision and Control*. 849-854, 2001.
- Zak DE, Doyle FJ, Gonye GE and Schwaber JS. Simulation studies for the identification of genetic networks from cDNA array and regulatory activity data. *Proceedings of the Second International Conference on Systems Biology*. 231-238, 2001.
- Markevich N, Kiyatkin AB, Zak DE, Pastorino JG, Hoek JB, and Kholodenko BN. Four-dimensional organization of cellular signal transduction cascades. *Proceedings of the Second International Conference on Systems Biology*. 141-147, 2001.

PRESENTATIONS (partial listing)

- Zak DE (speaker), Egan B, Schwaber JS, Ogunnaike BA. "Gene dynamics and transcription networks," To be presented at the: American Institute of Chemical Engineers Annual Meeting, Austin, 2004.
- Zak DE (speaker). "Structured modeling of transcription networks: computational and experimental applications in mammalian systems biology," poster to be presented at the: American Institute of Chemical Engineers Annual Meeting, Austin, 2004.
- Zak DE (speaker), Vadigepalli R, Schwaber JS, Gonye GE, Ogunnaike BA. "Integrating multiple genomic data types into structured models of gene regulatory networks," poster presented at: NIH-BISTI Symposium: Digital Biology: The Emerging Paradigm, Bethesda, 2003.
- Zak DE (speaker), Pearson RK, Vadigepalli R, Gonye GE, Schwaber JS, Ogunnaike BA. "Assigning Significance to the Appearance of Regulatory Elements in Experimentally Defined Collections of DNA Sequences Using Empirical Reference Distributions," American Institute of Chemical Engineers Annual Meeting, San Francisco, 2003.
- Zak DE (speaker), Lombardo TG, Kholodenko BN, Su C, Ogunnaike BN. "Modeling the Interaction of Growth Factor and Apoptosis Subsystems in Cancer," American Institute of Chemical Engineers Annual Meeting, San Francisco, 2003.
- Zak DE, Gonye GE, Schwaber JS, Doyle FJ 3rd (speaker). "Systems identification concepts in the reverse engineering of gene networks." Third International Conference on Systems Biology, Stockholm, Sweden, 2002.
- Zak DE (speaker), Doyle FJ 3rd, Pearson RK, Schwaber JS. "Experimental Design in Genetic Regulatory Network Identification: Results From In Silico Studies," American Institute of Chemical Engineers Annual Meeting, Indianapolis, November 2002.
- Zak DE (speaker), Doyle FJ 3rd, Schwaber JS, Pearson RK. "Genetic Regulatory Network Simulations for Data Analysis." DIMACS Workshop on Complexity in Biosystems, Piscataway, April 2002.
- Zak DE (speaker), Doyle FJ 3rd, Vlachos DG and, Schwaber JS. "Stochastic kinetic analysis of transcriptional feedback models for circadian rhythms." 40th IEEE Conference on Decision and Control, Orlando, 2001.

(complete listing of presentations available at: <http://www.che.udel.edu/systems/people/zak/conferences>)

TEACHING EXPERIENCE

University of Delaware

-Teaching Assistant, Fall 2001: Senior Lab, Composites

-Guest Lecturer, Spring 2000: UD/TJU Short course in computational biology and bioinformatics

University of Illinois

-Teaching Assistant, Fall 1999: Fluid Mechanics

-Teaching Assistant, Spring 1998: Mass Transfer Operations

INDUSTRIAL EXPERIENCE

Mobil Oil Joliet Refinery, Joliet, IL Summer 1999

Modeling of multiphase heat exchangers in refinery and online methods to track fouling.

TECH Semiconductor, SINGAPORE, Spring 1999

Dynamic modeling of water softener, experiments and simulations of scaled-down softener to analyze performance.

US Army Construction Engineering Research Lab, Champaign, IL Fall 1997/Spring 1998

Cost estimate for a carbon adsorption vapor recovery system, toxicological study of fog oil mixtures.

Zagreb Brewery, Zagreb, CROATIA Summer 1997

Analytical tests of brews for quality.

Air Products and Chemicals, Allentown, PA Summer/Fall 1996

Parametric analysis of distillation sieve tray system, developed sieve tray design heuristics.

ADDITIONAL COURSES

Systems engineering: Control System Theory and Design, Nonlinear Dynamics

Biomedical: Graduate level Biochemistry, Cell Biology, Molecular Pharmacology

(courses completed at Thomas Jefferson University, Philadelphia, PA).

ADDITIONAL SKILLS

Programming: MATLAB, R/S+, PERL (basic)

Languages: Hindi (elementary), Spanish (elementary)

REFERENCES

Prof. Babatunde A. Ogunnaike, tel. (302)831-4504, e-mail: ogunnaik@che.udel.edu

University of Delaware Department of Chemical Engineering (Newark, DE 19716)

Prof. James S. Schwaber, tel. (215)503-7823, e-mail: james.schwaber@mail.tju.edu

Thomas Jefferson University, Daniel Baugh Institute for Functional Genomics

& Computational Biology (Philadelphia, PA 19107)

Academic transcripts and additional references are available upon request