Hannah L. Callender

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EDUCATION

Ph.D. Program in Mathematics, August 2001–Present
Vanderbilt University, Nashville, TN
Advisor: Mary Ann Horn, Department of Mathematics
Co-advisor: Glenn F. Webb, Department of Mathematics
Co-advisor: H. Alex Brown, Department of Pharmacology
Degree expected: May 2007

M.S., Mathematics, May 2003
Vanderbilt University, Nashville, TN

B.A., Mathematics, Summa Cum Laude, May 2001
Minors: Computer Science, Music
Wesleyan College, Macon, GA

EXPERIENCE

June 2004–Present

Research Assistant — **Vanderbilt University**
Departments of Mathematics and Pharmacology — **Nashville, TN**

Aiding in the effort to derive equations describing metabolic flux analysis of cellular lipids and modeling signaling pathways under the supervision of Professor H.A. Brown, Pharmacology and Professor M.A. Horn, Mathematics. Responsibilities include the following:

· Developing a mathematical model of the uridine 5'-diphosphate signaling pathway in the RAW 264.7 macrophage
· Utilizing the optimization capabilities of MATLAB and SIMULINK to estimate unknown rate parameters for the model
· Researching the field for known pathway components and parameters
· Growing and maintaining cells in tissue culture
· Developing new methodology pertinent to the modeling project and performing necessary experiments to obtain missing parameters
· Collecting data via an electrospray ionization mass spectrometer
· Analyzing data, primarily with SPLUS® and Excel
· Corresponding with collaborators to discuss results and future projects
· Presenting research progress and future goals on a regular basis at lab meetings
· Utilizing current mathematical concepts, with an emphasis on the theory of ordinary differential equations, to aid in the theoretical analysis of the model

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Aug 2006–Present
Instructor/Teaching Assistant — **Vanderbilt University**
Department of Mathematics — **Nashville, TN**

· Teaching Assistant for second semester Calculus, Fall 2006

Aug 2001–May 2004
· Instructor for first semester Accelerated Calculus, Spring 2004, Fall 2003, Summer 2003
· Instructor for second semester Calculus, Spring 2003
· Instructor for first semester Calculus, Fall 2002
· Teaching Assistant for second semester Calculus, Spring 2002
· Teaching Assistant for first semester Calculus, Fall 2001

Aug 2003–May 2004
Mathematics Tutor — **Vanderbilt University**
Academic Support for — **NAVY ROTC**
NAVY ROTC students — **Nashville, TN**

Conducted a tutored-study hall for NAVY ROTC students in Algebra II, first, second, and third semester Calculus, and first and second semester Accelerated Calculus.

June 2000–Aug 2000
Summer Research Assistant — **Oak Ridge National Laboratories**
Cooperative Robotics — **Oak Ridge, TN**

Revised and modified existing code designed to allow a robot to autonomously navigate through unknown territory and construct a map of the area. Supervisor: Lynne Parker.

RESEARCH ACTIVITIES

June 2006
Workshop participant — **Mathematical Sciences**
Mathematical Aspects of Computational Biology — **Research Institute**
Berkeley, CA

Attended lectures given by prominent researchers in the field of computational biology and also worked on group projects focused on the following areas: finding orthologs and homologs to yeast genes involved in oxidative stress response in the human genome in order to find candidate genes for an oxidative stress response network in human tissue; creating mathematical models of network dynamics for the yeast oxidative stress network using several modeling methodologies from both continuous and discrete mathematics. After completing their assigned projects, each group gave a presentation of their results at the end of the two-week workshop.

PUBLICATIONS

Callender, H. L.; Forrester, J. S.; Ivanova, P.; Preininger, A.; Milne, S.; Brown, H. A. Quantification of diacylglycerol species from cellular extracts by electrospray ionization mass spectrometry using a linear regression algorithm. *Anal. Chem.* **79** (2007) 263-272.

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PRESENTATIONS

Apr 2007	Using Mathematical Models to Predict the Future, *Vanderbilt University Undergraduate Seminar in Mathematics,* Nashville, Tennessee.
Jan 2007	Modeling Uridine 5'-Diphosphate Signaling Pathways in Macrophages, *Murray State University Biomathematics Seminar,* Murray, Kentucky.
Jan 2007	Purinergic Receptor Signaling in the RAW 264.7 Macrophage: Modeling Species-Specific Diacylglycerol Dynamics Following Receptor Activation by Uridine 5'-Diphosphate, *Joint Mathematics Meetings,* New Orleans, Louisiana.
Nov 2006	Modeling Small Molecule Dynamics in Macrophages Downstream Purinergic Receptor Stimulation, *Vanderbilt Analysis and Biomathematics Seminar,* Nashville, Tennessee.
Aug 2006	Mathematical Modeling of Cellular Signaling in Macrophages: Understanding the Pathways, *Vanderbilt Institute of Chemical Biology Retreat,* Nashville, Tennessee.
July 2006	Mathematical Modeling of Cellular Signaling: Lipid Signaling Kinetics, *Joint SIAM Conference on the Life Sciences,* Raleigh, North Carolina.
July 2006	Mathematical Modeling of Cellular Signaling in Macrophages: Understanding the Pathways, *AWM workshop at annual SIAM meeting,* Boston, Massachusetts.
Feb 2006	Mathematical Modeling of the UDP Pathway in RAW 264.7 Cells, *Wesleyan College Math and Science Divisional Seminar Series,* Macon, Georgia.
Nov 2005	Mathematical Modeling of the UDP Pathway in RAW 264.7 Cells, *Vanderbilt Pharmacology Department Works in Progress Seminar,* Nashville, Tennessee.
Nov 2005	Computational Lipidomics: Mathematical Modeling of the UDP Pathway in RAW 264.7 Cells, *Southeastern Regional Lipid Conference*, Cashiers, North Carolina.
Oct 2005	Computational Lipidomics: Mathematical Modeling of the UDP Pathway in RAW 264.7 Cells, *Vanderbilt Pharmacology Retreat*, Burns, Tennessee.
Apr 2005	Mathematical Modeling of Second Messenger Signaling, *Vanderbilt Graduate Student Research Day,* Nashville, Tennessee.

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PROFESSIONAL TRAINING

Spring 2005	Professional Development Seminar, Vanderbilt University Department of Mathematics
Jan 2003	GradSTEP (Graduate Student Teaching Event for Professional Development), Vanderbilt University Center for Teaching
Aug 2001– May 2002	Teaching Seminar, Vanderbilt University Department of Mathematics
Aug 2001	Teaching Assistant Orientation, Vanderbilt University Center for Teaching

COMMUNITY INVOLVEMENT

Aug 2003– Present	Organizer, Vanderbilt University Undergraduate Seminar in Mathematics
Aug 2001– May 2002	Graduate Student Council Representative, Department of Mathematics, Vanderbilt University
Aug 2001– Present	Active member and worship leader at Belmont Church, Nashville, TN

HONORS

- Vanderbilt University Bjarni Jonsson Award for Research in Mathematics
- Vanderbilt University College of Arts and Science 2006 Summer Research Award
- Summer research support from Vanderbilt professor's National Science Foundation grant, Summer 2002
- Phi Kappa Phi Graduate Fellowship Recipient
- Wesleyan College Lise Meitner Award in Physics
- Wesleyan College Division of Natural Sciences and Mathematics Outstanding Senior Award
- Wesleyan College Departmental Award in Mathematics and Computer Science
- Wesleyan College Monroe Scholar
- Wesleyan College Scholarship for Leadership
- Phi Kappa Phi– lifetime membership
- Dean's List: 1997 – 2001

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GRANTS

- Vanderbilt Graduate School–Recipient of travel award to attend AMS National Meetings in New Orleans, LA, January 2007.
- Society for Mathematical Biology (SMB)–Recipient of travel award to attend the annual meeting for SMB held jointly with the Society for Industrial and Applied Mathematics Life Sciences conference held in Raleigh, NC, Summer 2006.
- Association for Women in Mathematics (AWM)–Recipient of travel award to attend AWM workshop held jointly with the Annual meeting of the Society for Industrial and Applied Mathematics held in Boston, MA, Summer 2006.

PROFESSIONAL AFFILIATIONS

- Member of American Mathematical Society
- Member of Association for Women in Mathematics
- Member of Society for Mathematical Biology
- Member of Society for Industrial and Applied Mathematics

COMPUTER SKILLS

- Microsoft Word, Excel, Powerpoint, Outlook
- MATLAB, SIMULINK, Mathematica, LaTEX, and SPLUS

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REFERENCES

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Jo Ann W. Staples
Senior Lecturer and Director of Teaching
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