

## Jill Karen Nelson, Ph.D.

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### ACADEMIC DEGREES

- 2001- 2005      Ph.D. in Electrical Engineering, October 2005  
University of Illinois at Urbana-Champaign  
Thesis: "Mitigating the Effects of Intersymbol Interference:  
Algorithms and Analysis"  
Thesis Supervisor: Prof. Andrew C. Singer  
Thesis Committee: Prof. Bruce Hajek, Prof. Ralf Koetter, Prof. Venu Veeravalli
- 1998-2001      M.S. in Electrical Engineering, May 2001  
University of Illinois at Urbana-Champaign  
Thesis: "Linear Iterative Turbo-Equalization for Dual Channels"  
Thesis Supervisor: Prof. Andrew C. Singer
- 1994-1998      B.S. in Electrical Engineering, May 1998  
B.A. in Economics, May 1998  
Rice University – Houston, TX  
*summa cum laude*

### PROFESSIONAL EXPERIENCE

- Fall 2012 – Present      Associate Professor, Department of Electrical and Computer Engineering  
George Mason University – Fairfax, VA  
Research Focus: Statistical Signal Processing, Classification and Tracking, Signal  
Processing for Wireless Communications
- 2005 – 2012      Assistant Professor, Department of Electrical and Computer Engineering  
George Mason University – Fairfax, VA
- Summer 2008  
Summer 2007      Naval Undersea Warfare Center (NUWC) – Newport, RI  
Fellow, ONR Summer Faculty Research Program  
Developed a stochastic framework to analyze the relative performance of many low-  
cost sensors versus a few sophisticated sensors for detecting targets traveling through  
protected regions of the sea; characterized the effects of variable sensor reliability on  
detection and tracking capabilities.
- Summer 2000      Motorola Labs – Schaumburg, IL  
Summer Intern, Communications Systems Research Lab  
Performed error analysis of EDGE equalizer for 8-PSK modulation scheme; developed  
and implemented algorithms for improving performance of the equalizer.
- Summer 1998      Nokia Research Center – Helsinki, FI  
Summer Intern, Radio Communications Group  
Developed software simulation of iterative Viterbi decoding for turbo-encoded data;  
researched possible improvements in the soft output Viterbi algorithm for more efficient  
use with turbo-codes.

## HONORS AND AWARDS

2012	Invited participant in the National Academy of Engineering (NAE) Frontiers of Engineering Education Symposium
2011	Volgenau School of Engineering Outstanding Teaching Award
2006-2007	Scholar, CAEE Institute for Scholarship on Engineering Education
2001	E. A. Reid Teaching Fellowship, University of Illinois
2000	Olesen Teaching Award Nominee, University of Illinois

## REFEREED PUBLICATIONS

- M. A. Hjalmanson, J. K. Nelson, L. Huettel, W. Padgett, K. E. Wage, and J.R. Buck, "Developing Interactive Teaching Strategies for Electrical Engineering Faculty," *Proceedings of the 2013 ASEE Annual Conference*, Atlanta, GA, June 2013.
- J. K. Nelson and M. A. Hjalmanson, "Students' Understanding of Convolution," *Proceedings of the IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, May 2013.
- M. A. Hjalmanson and J. K. Nelson, "A Content-Driven Collaboration Model for Engineering Faculty Development," presented at the American Educational Research Association Annual Meeting, April 2012.
- J. K. Nelson and M. A. Hjalmanson, "Linking Students' Interest in Electrical Engineering to Conceptual Understanding," *Proceedings of the 2011 ASEE Annual Conference*, Vancouver, BC, June 2011.
- J. K. Nelson, M. A. Hjalmanson, and K. E. Wage, "Using In-Class Assessment to Inform Signals and Systems Instruction," *Proceedings of the IEEE Signal Processing Education Workshop*, Sedona, AZ, January 2011. (Invited)
- K. E. Wage, J. R. Buck, M. A. Hjalmanson, and J. K. Nelson, "Signals and Systems Assessment: Comparison of Responses to Multiple Choice Conceptual Questions and Open-Ended Final Exam Problems," *Proceedings of the IEEE Signal Processing Education Workshop*, Sedona, AZ, January 2011.
- J. K. Nelson, M. A. Hjalmanson, K. E. Wage, and J. R. Buck, "Students' Interpretation of the Importance and Difficulty of Concepts in Signals and Systems," *Proceedings of the IEEE Frontiers in Education Conference*, Washington, DC, October 2010.
- J. K. Nelson and M. Hjalmanson, "Students' Understanding of Sequence and Series as Applied in Electrical Engineering," *Proceedings of the 2009 ASEE Annual Conference*, Austin, TX, June 2009.
- J. K. Nelson, "Work in Progress: Understanding Paths from the Community College to a Four-Year Engineering Program," *Proceedings of the IEEE Frontiers in Education Conference*, Milwaukee, WI, October 2007.
- J. Buck, K. Wage, M. Hjalmanson, and J. K. Nelson, "Comparing Student Understanding of Signals and Systems Using a Concept Inventory, Traditional Exams, and Interviews," *Proceedings of the IEEE Frontiers in Education Conference*, Milwaukee, WI, October 2007.
- J. K. Nelson, "Work in Progress: Project-Based Curriculum for a Graduate-Level Digital Signal Processing Course," *Proceedings of the IEEE Frontiers in Education Conference*, San Diego, CA, October 2006.
- J. K. Nelson, "Using Project-Based Assignments in a Graduate-Level Digital Signal Processing Course," *Proceedings of the IEEE Signal Processing Education Workshop*, Jackson Lake, WY, September 2006.

## SPONSORED RESEARCH ACTIVITIES

*Designing Teaching: Scaling up the SIMPLE Design Framework for Interactive Teaching Development*

Role: Co-Principal Investigator (PI: Margret Hjalmanson, Co-PI: Cody Edwards)

Sponsor: National Science Foundation

Time Period: 10/2013 – 09/2016

Funding Amount: \$572,000

*NSF CAREER: Detection and Estimation in Complex and Uncertain Environments*

\*Includes curriculum development element for engineering applications of probability

Role: Principal Investigator

Sponsor: National Science Foundation

Time Period: 12/2010 – 12/2015

Funding Amount: \$449,713

*Encouraging Innovative Pedagogy through Long-Term Faculty Development Teams*

Role: Principal Investigator (Co-PI: Margret Hjalmanson)

Sponsor: National Science Foundation

Time Period: 09/2010 – 08/2012

Funding Amount: \$148,971

*Linking Interest and Conceptual Knowledge in Electrical Engineering*

Role: Co-Principal Investigator (PI: Margret Hjalmanson)

Sponsor: National Science Foundation

Time Period: 09/2008 – 08/2009

Funding Amount: \$88,321

*Nontraditional Routes to Engineering: Understanding the Experience of Community College Transfer Students*

Role: Principal Investigator

Sponsor: Center for the Advancement of Engineering Education (funded by NSF)

Time Period: 07/2006 – 07/2007

Funding Amount: \$2,500

## INVITED PRESENTATIONS

“Educating Engineers to be Innovators,” Invited panelist, National Science Foundation, March 2011.

“Classifying Active Learning Tasks According to Instructional Objectives,” with M. A. Hjalmanson, Lilly Conference on College and University Teaching, Washington, DC, June 2010.

“Formative Assessment Through In-Class Group Problem Solving,” Lilly Conference on College and University Teaching, Newark, DE, April 2009.

## TEACHING EXPERIENCE

### Undergraduate Courses Taught

ECE 460                      Communication and Information Theory  
George Mason University  
Fall 2008, Spring 2010, Spring 2011

ECE 410                      Fundamentals of Discrete Time Signal Processing  
George Mason University  
Fall 2006, Spring 2009

ECE 320	Signals and Systems II George Mason University Fall 2010, Fall 2013
ECE 310	Introduction to Digital Signal Processing University of Illinois at Urbana-Champaign Summer 2002, Summer 2003, Summer 2004
ECE 220	Signals and Systems I George Mason University Spring 2013

#### **Graduate Courses Taught**

ECE 638	Algorithms for Statistical Signal Processing George Mason University Spring 2007
ECE 535	Digital Signal Processing George Mason University Fall 2005, Spring 2006, Spring 2007, Spring 2008, Spring 2009, Fall 2009, Fall 2011, Fall 2012

### **STUDENT SUPERVISION**

#### **Ph.D. Theses Supervised**

Hossein Roufarshbaf, Ph.D., August 2011.

Thesis: *A Tree Search Approach to Detection and Estimation with Application to Communications and Tracking*

Recipient of Volgenau School of Engineering Outstanding Graduate Student Award, 2011

Jaime Almodovar, Ph.D., December 2012.

Thesis: *Multiple Transmitter Localization using Received Signal Strength Measurements*

#### **Current Doctoral Students**

Weiwei Zhou – Started in August 2007, expected to present Ph.D. proposal in Fall 2011

Thesis topic: Asymptotically optimal equalization for frequency selective channels

Najmeh Nejatimonfared – Started in August 2012

Thesis topic: Cognitive radio and spectrum sensing

Fatemeh Pishdadian – Started in August 2013

Thesis topic: Musical instrument separation via timbre detection

#### **Master's Theses Supervised**

Balvinder Kaur, M.S., August 2012.

Thesis: *Human Skin Detection in Thermal Images*

Fatemeh Pishdadian, M.S., August 2013.

Thesis: *Sequential Detection Techniques for Automatic Music Transcription*

John Thomas, M.S., August 2012.

Thesis: *Algorithms for Multiple Fundamental Frequency Estimation in Music Transcription*

**Undergraduate Research Students Supervised**

Tarek Lahlou – “Radio Transmitter Localization for Health Care Applications in Rural Guatemala”  
 March 2009 – May 2011  
 Research sponsored by GMU Undergraduate Apprenticeship Program  
 Recipient of Volgenau School of Engineering Outstanding Undergraduate Student Award, 2011  
 Now a Ph.D. student at Massachusetts Institute of Technology (MIT)

Jhonny Gutierrez – “Linear Filters for Echo Cancellation”  
 September 2009 – May 2010  
 Research sponsored by NSF Louis Stokes Alliance for Minority Participation (LSAMP) Program

**Master’s Projects Supervised (ECE 698/798)**

Marshall Alphonso, *Chromatic and Polarization Dispersion In Long Haul Fiber Optic Channels*, Fall 2006.

Jeremy Kelly, *Real-Time Pitch Shifting in the Time Domain*, Fall 2009.

Edward Morrow, *Beamforming for Single Antenna Interference Cancellation*, Fall 2011.

**PROFESSIONAL SERVICE****Memberships and Leadership Positions**

Panel Facilitator, “Educating Engineers to be Innovators,” National Science Foundation, 2011  
 Member, Phi Beta Kappa Honor Society  
 Member, Tau Beta Pi Engineering Honor Society  
 Member, Eta Kappa Nu Electrical Engineering Honor Society

**Grant and Fellowship Reviews**

NSF Research in Engineering Education (REE) Program, 2011  
 NSF Course, Curriculum and Laboratory Improvement (CCLI) Program, 2008  
 NSF Graduate Research Fellowship Program, 2007, 2008, 2010

**Conference Submission Reviews**

IEEE Frontiers in Education Conference, 2007  
 ASEE Annual Conference and Exposition, Educational Research and Methods Division, 2006, 2011

**Outreach Activities**

STEM Advisory Committee, E. L. Haynes Public Charter School, Washington, DC.  
 Faculty speaker, TOY Challenge design teams, Fairfax, VA, 2007  
 Faculty representative, Women in Engineering Day, Lockheed-Martin, Manassas, VA, 2006

**UNIVERSITY SERVICE**

Faculty Advisor, IEEE Student Chapter, George Mason University, 2006-present  
 ABET Accreditation Committee, Department of Electrical and Computer Engineering, 2010-present  
 Department Representative, Volgenau School of Engineering Academic Challenges and Enrichment (ACE)  
 Committee, 2008 - present  
 Presenter, GMU Innovations in Teaching and Learning Conference, 2009, 2013  
 Committee on Transforming Undergraduate Education in Science, Mathematics, Engineering, and  
 Technology, George Mason University, 2005-2009  
 Graduate Student Recruitment Committee, Electrical and Computer Engineering Department, George Mason  
 University, 2006-present