

# Bethany S. Fralick

## Curriculum Vitae

February 12, 2016

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### Education

- 2013 Ph.D., Mechanical Engineering, University of South Carolina  
Dissertation: Three-dimensional evolution of mechanical percolation in nanocomposites with random microstructures  
Advisor: Dr. Sarah C. Baxter
- 2009-2010 Purdue University, School of Engineering Education  
Emphasis: Engineering design as hands on experiences; cognitive flexibility; research in how engineering is best taught, learned, and practiced.  
Advisor: Dr. Robin S. Adams
- 2009 M.S., Mechanical Engineering, University of South Carolina  
Thesis: An investigation of mechanical engineering experimental design processes  
Advisor: Dr. Jed S. Lyons
- 2007 B.S., Engineering Management, Manufacturing Specialty, Miami University

### Professional Experience

- 2014-present Assistant Professor of Engineering, Department of Mathematical Sciences  
University of South Carolina Aiken
- 2012-present Adjunct Professor, Department of Mechanical Engineering  
University of South Carolina Columbia
- 2013 Adjunct Professor, Division of Natural Sciences and Engineering  
University of South Carolina Upstate

### Research Experience

University of South Carolina Aiken

- 2014-present Graphical Statics implementation into standard statics curriculum. Tools and concept investigation to further explore student understandings of visual representations.

University of South Carolina

- 2011-2013 Graduate Research Assistant, Department of Mechanical Engineering  
NSF Funded Research  
Micromechanics computer modeling focusing on nanocomposites mechanical percolation. Developed computer code and compiled data to draw significant conclusions with regards to low volume fraction nanocomposites.

- 2007-2008     Researcher/Data Analyst, Department of Mechanical Engineering  
Compiled and analyzed data from K-12 student's perceptions of scientists and engineers. Presented findings at the 2008 American Society of Engineering Education Conference.
- 2008            Graduate Research Assistant/Participant, College of Education and Department of Mechanical Engineering, NSF-Research and Evaluation on Education in Science and Engineering Project. Investigated the research and teaching skill development of graduate students majoring in Science, Technology, Engineering, and Mathematics. Interviewed professors and students and compiled data from GK-12 students
- 2007            Participant Observer, Department of Mechanical Engineering  
NSF-Course, Curriculum, and Laboratory Improvement (CCLI) Project, USC  
Observed lecture and laboratory classes for cues and keywords from student interactions with peers and professor. Interviewed and conducted focus groups with students.
- Purdue University
- 2009-2010     Graduate Research Assistant, School of Engineering Education, NSF Funded Research  
Constructed, validated, and implemented interview protocols with regards to design thinking and how students, professors, and industry persons learn, retain, and apply knowledge.

## **Teaching Experience**

- University of South Carolina Aiken
- 2014-present   Assistant Professor of Engineering, Department of Mathematical Sciences  
ELCT 221 Electrical Circuits I  
ENCP 101 Introduction of Engineering I  
ENCP 102 Introduction of Engineering II  
ENCP 200 Statics  
ENCP 260 Mechanics of Solids  
ENCP 290 Thermodynamic Fundamentals  
ENCP 310 Dynamics  
Semester Load: 5 courses, 15 total contact hours  
Advisee Load: 238 first/second/third year undergraduate students
- University of South Carolina Columbia
- 2014-present   Adjunct Faculty, Summer, Department of Mechanical Engineering  
EMCH 290 Thermodynamic Fundamentals  
ECHE 310 Introduction to Chemical Engineering Thermodynamics
- Fa 2013         Adjunct Faculty, Department of Mechanical Engineering  
EMCH 290 Thermodynamic Fundamentals

Faculty Mentor: Dr. Steve McNeill  
Sp 2012 Instructor, Manufacturing Processes, Department of Mechanical Engineering  
Introduced manufacturing process understanding by creating lectures, assessments, and out of classroom experiences for a class of 44 fourth year students. Held office hours, graded all assessments, and provided review sessions for students.  
Fa 2012 Guest Lecturer, EMCH 377 Manufacturing Processes  
Helped present three lecture topics through lecture and video demonstration.  
2008-2009 Fellow, University of South Carolina and Blythewood Middle School  
NSF-Graduate Teaching Fellows in K-12 Education  
Enriched sixth grade students' learning of STEM concepts and applications through content knowledge. Created and presented unit based lessons with hands on activities two days a week to four classes. Focused on inquiry and student guided interaction.

University of South Carolina Upstate

Fa 2013 Adjunct Professor, Division of Natural Sciences and Engineering  
ENCP 101 Introduction to Engineering I

Miami University

2005-2007 Teaching Assistant, Department of Mechanical and Manufacturing Engineering  
Graded homework for two professors over the two academic years. Courses included Statics and Manufacturing Processes.

## Service

University of South Carolina Aiken

2014-2015 Faculty Search Committee Chair, Department of Mathematical Sciences  
Hiring two new faculty members for Industrial Process Engineering program

Faculty Search Committee Member, College of Sciences and Engineering  
Hiring a new dean for the college

Faculty Search Committee Member, Department of Physics and Chemistry  
Hiring a new faculty member for calculus based physics curriculum

Curriculum Design for new Industrial Process Engineering Program  
Seven new, third and fourth year courses to create a four year degree program

Departmental Course Re-design Committee, Departmental committee  
Course reevaluation for time and section offerings to align with University needs

Engineering Advisory Board Committee Member

Work alongside industry professionals to initiate design for new Industrial Process Engineering Degree program

Faculty Mentor, Magellan Scholar, Undergraduate Research Program  
Nano Copper/Polyester Composite: Synthesis, Structure, and Properties

Faculty Mentor, Independent Study Project, Undergraduate Research  
Investigation of Efficiencies and Economics of Software Testing

Faculty Mentor, Senior Capstone Project, Undergraduate Research  
Distribution Fitting of Elastic Modulus by Volume Fraction for Nano-Composites

Judge, 2015 CSRA Regional Engineering & Science Fair

Mentor, Introduce a Girl to Engineering day sponsored by Savannah River  
Nuclear Lab (SRNL) and the Society of Women Engineers (SWE)

Peer reviewer, ASEE conference papers, Mechanical Engineering Division

### **Publications**

Baxter, S. C., Burrows, B. J., & Fralick, B. S. (2015). Mechanical percolation in nanocomposites: Microstructure and micromechanics. Accepted for publication. *Probabilistic Engineering Mechanics*.

Bourn, R, Fralick, B.S., & Baxter, S.C. (2013). Distributions of Elastic Moduli in mechanically percolating composites. *Probabilistic Engineering Mechanics*, 34, 67-72.

Fralick, B.S., Gatzke, E.P., & Baxter, S.C. (2012). Three-dimensional evolution of mechanical percolation in nanocomposites with random microstructures. *Prob. Eng. Mech.*, 30, 1-8.

Adams, R., & Fralick, B. (2010). *Work in Progress: Identifying Student Conceptions of Design Using a 6 Most and Least Important Assessment Tool*. Paper presented at the ASEE/IEEE Frontiers in Education Conference, Washington, D.C.

Fralick, B., & Lyons, J. (2010). *Student Attitudes Towards Designing Experiments*. Paper presented at the American Society of Engineering Education Annual Conference, Louisville, KY.

Fralick, B., Kearn, J., Thompson, S., & Lyons, J. (2009). How Middle Schoolers Draw Engineers and Scientists. *Journal of Science Education and Technology*, 18(1), 60-73.

Fralick, B. S. (2009). *An Investigation of Mechanical Engineering Experimental Design*. M.S., University of South Carolina, Columbia, SC. (AAT 1467345)

Lyons, J., Fralick, B., & Kearn, J. (2009). *A Survey of Middle-School Students' Attitudes Toward Engineers and Scientists*. Paper presented at the American Society of Engineering Education Annual Conference, Austin, TX.

## **Professional Presentations**

“Revisiting Graphical Statics” Sarah C. Baxter, Ann Johnson, & Bethany S. Fralick, ASEE Annual Conference & Exposition, Seattle, WA, 14-17 June 2015.

“The Evolution of Mechanical Percolation in Nanocomposite with random periodic microstructures” Bethany S. Fralick & Sarah C. Baxter, Mechanics of Nano, Micro and Macro Composite Structures, Politecnico di Torino, 18-20 June 2012.

“Student Attitudes Towards Designing Experiments” Bethany S. Fralick & Jed S. Lyons, American Society of Engineering Education Annual Conference & Exposition, Louisville, 20-23 June 2010.

“How Middle Schoolers Draw Engineers and Scientists” Bethany S. Fralick & Jed S. Lyons, American Society of Engineering Education Annual Conference & Exposition, Pittsburgh, 22-25 June 2008.

## **References**

Sarah C. Baxter, Ph.D.  
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