

Colleen Countryman, Ph.D.

Teaching Assistant Professor of Physics
North Carolina State University

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Education

- 2015 Ph.D. **Physics**, specializing in Physics Education Research. North Carolina State University.
GPA 3.55.

Dissertation: *The Educational Impact of Smartphone Implementation on Introductory Mechanics Laboratory Classes*.

Advisors: Dr. Robert Beichner and Dr. Michael Paesler.
- 2010 M.S. **Mathematics**, specializing in Applied Mathematics. Virginia Polytechnic Institute. 2010.
GPA 3.64.
Thesis: *The Use of Schwarz-Christoffel Transformations in Determining Acoustic Resonances*.
Advisor: Dr. Robert C. Rogers. Available at <http://goo.gl/6oVxb>
- 2008 B.A. **Mathematics** (*Magna cum Laude* with Honors). Canisius College, Buffalo, NY. 2008.
GPA 3.90.
- 2008 B.S. **Physics** (*Magna cum Laude* with Honors). Canisius College, Buffalo, NY. 2008.
GPA 3.90.
Liberal Arts Honors Thesis: *The Extent to Which Historical Context Affects the Accomplishments of Scientists and Mathematicians after World War II*.
Advisors: Drs. H. David Sheets (Physics) and Tanya Loughead (Philosophy).

Research Interests

- Current Interests: Physics, Physics Education Research, Mathematics, Mathematics Education, educational technology, higher education, science education, mobile devices, mathcasts, instructional YouTube videos, WebAssign (for Physics Education), online instructional tools, physics instructional labs, gender studies in the sciences, SCALE-UP implementations
- Additional experience: Single-molecule biophysics, FRET techniques, numerical analysis, optimal control, applied partial differential equations, conformal maps, acoustic resonances, paleontology, biodiversity estimates, stratigraphic correlations, traveling salesman problem, applied mathematics, metrics of binary trees

Professional Memberships

- American Association of Physics Teachers, National and North Carolina section
- American Physical Society

Graduate Classes Taken

- **North Carolina State University** 2010–2013
Physics: Graduate Level Quantum Mechanics (2), Advanced Electricity and Magnetism (2), Physical Optics (1), Statistical Physics (1), Nuclear Subatomic Physics (1), Advanced Classical Mechanics (1), Astrophysics (1)
Psychology and Education: Tests and Measurements (1), Trends and Issues in Science Education (1), Special Topics in Education: Sign Language (audited)
Computer Science: Graphics and Interfaces for Mobile Applications (audited)
- **Virginia Polytechnic Institute** 2008–2010
Mathematics: Graduate Level Real Analysis (2), Applied Partial Differential Equations (2), Numerical Analysis (2), Ordinary Differential Equations (2), Finite Difference Methods (1), Calculus of Variations (1), Optimal Control Methods (1)
Physics: Biophysics (1)

Awards, Recognition, and Scholarships

- Best of *The Physics Teacher*, 2014–2015 (North Carolina State University) 2015
- The Outstanding Teaching Assistant Award endowed by Dr. Russell Philbrick (North Carolina State University) 2013
- Best Graduate Student Paper Award at Fall 2012 NCS-AAPT for “MyTech: Measurements using everydaY TECHnologies” (North Carolina State University) 2012
- University Favorite Faculty Award (Virginia Tech) 2010
- Member of Phi Sigma Tau, a Philosophy Honors Society (Canisius) 2008
- Tidd Award for Most Accomplished Graduating Senior in the Mathematics Department (Canisius) 2008

- Most Accomplished Graduating Senior Award in the Physics Department (Canisius) 2008
- Dean's Scholarship (Canisius) 2004

Teaching Experience

- Instructor of Engineering Physics II: Electricity and Magnetism (NC State) 2014
- Teaching Assistant for a SCALE-UP implementation of Engineering Physics I with Dr. Robert Beichner (NC State) 2013
- Substitute lecturer for a *Matter and Interactions* section of Engineering Physics II (NC State) 2013
- WebAssign coder and lab manager for three sections of labs (Engineering Physics I) that were held in the Physics Education Group's Qualitative Education Research Lab (NC State) 2013-2014
- Instructor for "Physics of Energy", part of the summer Duke TIP program for talented high school students (Duke University) 2013
- Editor of Engineering Physics II Laboratory Manual (NC State) 2013
- Teaching Assistant for a SCALE-UP implementation of Conceptual Physics for Future Elementary School Teachers (NC State) 2013
- Lead Teaching Assistant for Engineering Physics II and Algebra-Based Electricity and Magnetism Labs (NC State) 2010-2013
- Math Emporium Teaching Assistant, helping students with Elementary Calculus with Trigonometry (Precalculus), Linear Algebra, Elementary Calculus with Matrices, Geometry and the Mathematics of Design (VT) 2008
- Instructor of Vector Geometry (1), Differential Calculus (2), Multivariable Calculus (2) 2008-2010
- Teaching Assistant for Technology in Education (Canisius) 2005
- Teaching Assistant and Grader for General Physics Labs (Canisius) 2005-2008
- Grader for Calculus I (Canisius) 2005-2006
- Substitute Teacher for Technology class (Nardin Academy, Buffalo, NY) 2007
- Teaching Assistant and Grader for Finite Mathematics (Canisius) 2007-2008
- Private piano instructor 2002-2008
- Tutor in the Math Tutoring Center (Canisius) 2005-2008
- Private tutor for mathematics and physics 2005-present

Research Experience

- Conducted the MyTech study which implements students' smartphones and video analysis software as data collection devices in the instructional mechanics lab (NC State and Meredith College) 2013-present
- Conducted the "mathcasts" study in which the educational impact of brief YouTube videos connecting math and physics concepts was studied (NC State) 2014-present
- Reviewed for *Physical Review Special Topics: Physics Education Research* and *The Physics Teacher* (NC State) 2013-present
- Participated in Inter-Rater Reliability for another Physics Education Research project (NC State) 2013
- Research assistant in the Physics Education Research Group (NC State) 2012-present
- Research assistant in an American Cancer Society-funded Single-Molecule FRET Biophysics project for Keith Weninger, Ph.D. (NC State) 2011-2012
- Research assistant in acoustic resonances with Robert C. Rogers, Ph.D. (VT) 2008-2010
- Research assistant for an NSF-funded paleontology project with Dr. H. David Sheets (Canisius) 2005-2008

Publications

- **Countryman, C. L.** "Using Mathcasts to Facilitate Student Comprehension of Physical Applications of Math Concepts." Manuscript in progress
- **Countryman, C. L.** "The Educational Impact of Smartphone Implementation in Introductory Mechanics Laboratories." (2015, accepted). *PERC 2015 Proceedings*. October 2015. 2015
- Maciel, T. "Smartphones in the Classroom Help Students See Inside the Black Box" regarding, in part, **Colleen Countryman's** instructional smartphone app research (2015). *American Physical Society News*. March 2015. 2015
- **Countryman, C. L.** "Familiarizing Students with the Basics of a Smartphone's Internal Sensors." (2014). *The Physics Teacher*. December 2014. 2014
- **Lanz, C.** "The Use of Schwarz-Christoffel Transformations in Determining Acoustic Resonances" (2010). *Electronic Theses and Dissertations at Virginia Tech*. etd-07082010-083729. 2010

<http://scholar.lib.vt.edu/theses/available/etd-07082010-083729/>

- **Lanz, C.** (2007). *The Extent to Which Historical Context Affects the Accomplishments of Scientists and Mathematicians after World War II.* 2008
Honors Thesis at Canisius College.

Presentations

- **Countryman, C. L.** “Making Real World Connections in Mechanics Labs using Smartphones” (anticipated October 17, 2015). Contributed talk at the NCS-AAPT meeting hosted by Davidson College. 2015
- **Countryman, C. L.** “MyTech App: BYOD to Physics Labs” (anticipated October 15, 2015). Contributed talk at at the UNC CAUSE Conference in Winston-Salem, NC. 2015
- **Countryman, C. L.** “The Effect of Reading Quizzes for Introductory Physics Courses” (July 29, 2015). Poster presentation at the 2015 AAPT (American Association of Physics Teachers) Summer Meeting. 2015
- **Countryman, C. L.** “The Educational Impact of Smartphone Implementation in Introductory Mechanics Laboratories” (July 29, 2015). Contributed talk at the 2015 AAPT (American Association of Physics Teachers) Summer Meeting and poster at the PERC (Physics Education Research Conference). 2015
- **Countryman, C. L.** “Women in Physics, and How I Became One” (May 26, 2015). Talk at Nardin Academy High School, Buffalo, NY. 2015
- **Countryman, C. L.** “Creating Supplemental Videos to Bridge the Math-Physics Gap” (April 14, 2015). Poster presentation at the Teaching and Learning Symposium at North Carolina State University. 2015
- **Countryman, C. L.** “The Educational Impact of Smartphone Implementation in Introductory Mechanics Laboratory Classes” (March 28, 2015). Contributed talk at the Spring 2015 NCS-AAPT meeting hosted by Wake Forest University. 2015
- **Countryman, C. L.** “An Introduction to Physics Education Research” (March 25, 2015). Talk for the Women in Physics group at North Carolina State University. 2015
- **Countryman, C. L.** “Gender Issues in Physics Education” (January 16, 2015). Leader of Round-Table Discussion at the APS (American Physical Society) Conference for Undergraduate Women in Physics at Duke University. 2015
- **Countryman, C. L., Paesler, M. A., Sams, W. R.** “MyTech: Using Smartphones in Physics Labs” (October 28, 2014). Poster presentation at 2014

Bridging the Gap Conference on Uniting North Carolina K-16 STEM Education organized by the North Carolina Association for Biomedical Research.

- Sams, W. R., **Countryman, C. L.**, Paesler, M. A. “Portable Labs and Online TAs in Introductory Physics” (October 28, 2014). Poster presentation at Bridging the Gap Conference on Uniting North Carolina K-16 STEM Education. 2014
- **Countryman, C. L.**, Paesler, M. A., Sams, W. R. “How I Met Your Motherboard: Integrating Smartphones into Classrooms” (July 30, 2014). Presentation at 2014 AAPT (American Association of Physics Teachers) Summer Meeting hosted by the University of Minnesota. 2014
- Sams, W. R., **Countryman, C. L.**, Paesler, M. A. “Results from eTALK: Effects of Real-Time Distance Labs” (July 30, 2014). Presentation at 2014 AAPT (American Association of Physics Teachers) Summer Meeting. 2014
- **Countryman, C. L.**, Paesler, M. A., Sams, W. R. “MyTech: Using Smartphones in Physics Labs” (July 31, 2014). Poster presentation at 2014 PERC (Physics Education Research Conference) hosted by the University of Minnesota. 2014
- Sams, W. R. and **Lanz, C.** “eTALK Results: In-Depth Study of Synchronous Distance Labs” (July 31, 2013). Poster presentation at 2014 PERC. 2014
- Sams, W. R. and **Lanz, C.** “Portable Labs and Smartphones in Introductory Physics Labs” (July 18, 2013). Poster presentation at 2013 PERC (Physics Education Research Conference). 2013
- Foote, K. and **Lanz, C.** “SCALE-UP Your Teaching without Overhauling Your Classroom!” (April 20, 2013). Workshop presented by Kathleen Foote and Colleen Lanz at Spring 2013 NCS-AAPT meeting hosted by Meredith College, Raleigh, NC. Abstract available here: <http://www.physics.ncsu.edu/ncsaapt2013/program.pdf>. 2013
- **Lanz, C.** “MyTech: Measurements using everydaY TECHNOLOGIES” (November 17, 2012). Poster presentation at Fall 2012 NCS-AAPT meeting hosted by High Point University, High Point, NC. Abstract available here: <http://physics.highpoint.edu/~mdewitt/ncsaaptf12/documents/Fall2012-Program.pdf> 2012
- Izard, Z., **Lanz, C.**, Melchin, M., Finney, S. C., Mitchell, C., and Sheets, H. D. (2008, March). *Effects of Varying Methods of Composite Timescale Formation on Biodiversity Estimates*. Presented at the Northeastern Geological Society of America (GSA) Conference in Buffalo, NY and 2008

- PRI's Second Annual Summer Symposium at the Museum of the Earth, Ithaca, NY with abstract available at <http://goo.gl/NLX00>.
- **Lanz, C.** (2008, April). *Aspects of the Nonlinear Geometry of Complete Binary Trees*. Presented at the Ignatian Scholarship Day at Canisius College, Buffalo, NY. 2008
 - **Lanz, C.** (2007). *Comparing Mathematical Methods of Range Extension*. Presented at a seminar for Paleontology Department at University of Buffalo and Hudson River Valley Undergraduate Math Conference hosted by St. Lawrence University, Canton, NY. 2007
 - **Lanz, C.** (2007). *Farey Sequences, 2x2 Matrixes and Hyperbolic Polygons: A Discussion of Ravi Kulkarni's "An Arithmetic-Geometric Methods in the Study of the Subgroups of the Modular Group."* Presented at the Hudson River Valley Undergraduate Math Conference at Siena College, Loudonville, NY and at a Math Department Seminar at Canisius College, Buffalo, NY with abstract available at <http://goo.gl/0tBzq>. 2007
 - Sheets, H. D., **Lanz, C.**, Izard, Z., Finney, S. C., Melchin, M. J., and Mitchell, C. (2007, October). *Approaches to Characterizing and Comparing Stratigraphic Correlations, as Applied to Biodiversity*. Paper presented at the Geological Society of America Denver Annual Meeting in Denver, CO. 2007
 - Sheets, H. D., **Lanz, C.**, Melchin, M., Finney, S. C., and Mitchell, C. (2006, October). *An initial approach to the estimation of uncertainty in biodiversity estimates obtained from composite sections, with an example from the Hirnantian Mass Extinction*. Paper presented at GSA convention at St. John Fisher College, Philadelphia, PA and for a Math Seminar at Canisius College, Buffalo, NY with abstract available at <http://goo.gl/9MpyI>. 2006

Service

- Trainer at Physics Teaching Assistant Preparation Workshops (NC State) 2012-2014
- "Physics Education Resources Parents of High School Students Can Use at Home" workshop leader for Cary Homeschool Co-Op 2014
- Judge in Lacy Elementary Science Fair in the Engineering and Technology Category (Lacy Elementary School, Raleigh, NC) 2014
- Ambassador for Girl Scouts of the USA's "Technoquest" (Meredith College, Raleigh, NC) 2012-2013
- Event organizer and journal club leader for Women in Physics group (NC State) 2013-present

- Secretary of Graduate Physics Student Association (NC State) 2013–2014
- Planned and coordinated Prospective Graduate Student Weekend visits (NC State) 2011–2013
- Pianist in Top Jazz Ensemble and Big Band (Canisius, VT) 2007–2010
- Member, Treasurer, Event Coordinator then President of Math Club (Canisius) 2004–2008
- Judged projects at NAACP Afro-Academic, Cultural, Technological and Scientific Olympics in the Chemistry/Biochemistry Category 2008

Programming Experience

- FORTRAN, C, C++, Mathematica, COMSOL, MATLAB, VPython, WebAssign and LiveCode

Professional Development

- Attended “College of Science Course Redesign” Workshop for redesigning introductory physics courses (NC State) 2015
- Attended “Fun with Hardware in the Classroom” Workshop on Arduino devices (North Carolina School of Science and Math) 2014
- Attended Getting Started with 3D Printing Workshop (NC State) 2013
- Attended Classroom-Flipping Workshop (NC State) 2012
- Passed Ph. D. Candidacy Qualification Examinations in Quantum Mechanics, Classical Mechanics, and Electricity and Magnetism 2011
- Received Teaching Certification from Virginia Tech Math Department 2008
- Passed Applied Partial Differential Equations Preliminary Examination 2009