

Douglas Armstead

127 Bowers Hall, SUNY Cortland, Cortland, NY 13045

Phone: (607) 753-2919

<http://facultyweb.cortland.edu/douglas.armstead/>
douglas.armstead@cortland.edu

EDUCATION:

University of Maryland at College Park, College Park, Maryland.
Ph.D. in physics, December 2002.

University of Michigan, Ann Arbor, Michigan.
B.S. in physics with honors, 1996.

ACADEMIC APPOINTMENTS:

Assistant Professor, SUNY Cortland, Cortland, New York. Fall 2014 through present.

Coordinator, Westminster College 3-2 Engineering Program, New Wilmington, Pennsylvania. Fall 2008 through Spring 2014.

Assistant Professor, Westminster College, New Wilmington, Pennsylvania. Fall 2007 through Spring 2014.

NSF-REU Summer Faculty Mentor, The College of Wooster, Wooster, Ohio. Summer 2007.

Visiting Assistant Professor, The College of Wooster, Wooster, Ohio. Fall 2006 through Spring 2007.

Lecturer, SUNY College at Oneonta, Oneonta, New York. Fall 2005 through Spring 2006.

ASEE Postdoctoral Fellow, U.S. Naval Research Lab, Washington DC. Spring 2003 through Summer 2005.

TEACHING AND RESEARCH INTERESTS:

Courses that build students as researchers (e.g., Experimental Physics, Computational Physics, Senior Capstone, Senior Independent Study).

Interdisciplinary courses.

Nonlinear dynamics and its application to electronics, mechanics, and fluids.

Alternative energy (solar and wind).

Biophysics.

TEACHING EXPERIENCE:

Advanced Physics Courses Taught

Mechanics, Computational Physics, Experimental Physics, Nonlinear Dynamics, Fluid Dynamics, Electrodynamics, Optics, Advisor Senior Independent Research Projects, and Relativity (Special and General)

Introductory Courses Taught

Calculus based Physics with Laboratory, Algebra based Physics with Laboratory, Environmental Science, Liberal Arts Physics, Astronomy, Introduction to a Liberal Arts Education (Inquiry).

SENIOR CAPSTONE PROJECTS SUPERVISED:

- Andrew Wasil, "A Numerical Study of Plasmon Formation on Conducting Nanospheres using the MEEP Simulation Suite," 2013.
- John-Tyler Soltys, "Construction and Simulation of a Multiplate Spark Chamber," 2012.
- Kurtis Gills, "A Wavelet Analysis of Turbulent Fluid Flow," 2010.
- Mark Amaismeier, "Ducted vs Non-ducted Wind Turbines," 2009.
- Lisa Gayetsky, "Rigidity and pH dependence of β -lactoglobulin spherulite growth," 2008.
- Daniel Tremblay, "Creation of a two-dimensional negative-index-material," 2007.

EXPERIMENTAL PHYSICS PROJECTS SUPERVISED:

- Spring 2011:
 - Will Armentrout and John-Tyler Soltys, "Measurement of Muon Mass using Cosmic Rays."
 - Daniel Giles, "Measuring the Breaking of Surface Tension."
 - Andrew Wasil, "Frequency Response of Shear-Thickening Non-Newtonian Fluids."
 - Christina Erceg, "Soap Film Interference Patterns."
 - Derek Fredrickson, "An attempt to Analyze the Stars at Westminster College: Finding the Threshold of an Ocean Optics Spectrometer."
 - Wesley LaQuaglia and Robert Briggs, "Measuring Flow Instabilities for Kolmogorov Flow."
 - Jeremy Booher, "Instability of dry granular media."
 - Eric Dennis, "Measuring Solar Luminosity."
- Spring 2009:
 - Kevin Mack, "Investigation of Electroadhesion."
 - Stephanie Cumberledge, "Sand Ripple formation in a Water Wave Tank."
 - Kurtis Gills, "Econophysics."

COMPUTATIONAL PHYSICS PROJECTS SUPERVISED:

- Spring 2012:
 - Dan Giles, "Three Body Problem."
 - Ryan Avril, "Calculating Sheer Moments in Trusses."
 - Krysty Mohnke, "Ising Model Calculations."
 - Nick Holiday, "Fire Tube Resonances."
 - Andrew Wasil, "Plinko Probabilities."

- Burke Reimann, “Heteroclinic Tangles.”
- Spring 2010:
 - Jeremy Booher, “Numerical Approach to Understanding Vocal Fold Oscillations.”
 - Will Armentrout, “Three Body Problem.”
 - Miles Walker, “Damped Sound Waves.”
 - Derek Fredrickson, “Analysis of Saturn V Launch from Earth to the Moon.”

RESEARCH EXPERIENCE:

Westminster College

Nonlinear Dynamics

- Collaborated with student Wesley LaQuaglia to study instability in the furling behavior of a Bergy type wind turbine; work led to a student presentation at NCUR in Ogden, UT.

Alternative Energy

- Designed, gained regulatory approval for, and installed 2.9kW grid tied photovoltaic system and collecting data on energy production in western Pennsylvania.
- Collaborated with student Wesley LaQuaglia and faculty member Helen Boylan to measure wind speed at the proposed tower height for a demonstration wind turbine using a tethered weather balloon.

Biophysics

- Collaborated with student Lisa Gayetsky to study of rigidity and pH dependence of β -lactoglobulin spherulite growth.

The College of Wooster

Biophysics

- Collaborated with student Eric Hardin to model β -lactoglobulin spherulites using Mathematica so that we might infer their structure based on polarized microscopy images of them taken by Oxford University graduate student Kristin Domike.

Nonlinear Dynamics

- Collaborated with student James Daniels to independently construct the multiple time scale electronic circuit that I analyzed as a post-doctoral fellow at the U.S. Naval Research Lab.
- Collaborated with student Daniel Tremblay and U.S. Naval Research Lab research scientist Fredric Rachford on College of Wooster Independent Study Thesis investigating negative index of refraction materials through computer simulations.

ASEE Postdoctoral Fellow, U.S. Naval Research Lab, Washington DC.

Nonlinear Dynamics (Chaos Theory)

- Constructed a computer cluster and ported finite difference time domain

software written for a single machine for use on the cluster.

- Performed computer simulations to search for a practical method of making negative index of refraction materials.
- Analyzed multiple time scale electronic circuits with an emphasis on disruptive behaviors.

Graduate Research Assistant, University of Maryland.

Nonlinear Dynamics (Chaos Theory)

- Ph.D. thesis research on the chaotic properties of Hamiltonian systems, i.e., “stickiness,” in the context of billiards.
- Studied anomalous diffusion in billiards, a random-looking transport that spreads particles qualitatively more quickly than normal diffusion.
- Extended a graphical user interface and computer simulation of a naval crane rigging that passively controls payload oscillations.

Other graduate and undergraduate research topics:

- *General Relativity*: Used Mathematica’s symbolic algebra abilities to study differential equations constraining the evolution of black holes embedded in space-time.
- *Plasma Physics*: Did experimental work including alignment, tuning, and calibration of a ruby laser; machined experimental apparatus and debugged data acquisition programs.
- *Condensed Matter*: Analyzed the validity of an approximation in previous computer simulations, designed and installed an automatic liquid nitrogen refilling system for an ultra-high vacuum system in the lab.
- *Astrophysics*: Wrote light intensity-analyzing programs.

PROFESSIONAL PRESENTATIONS:

- Presented a poster on the furling dynamics of small wind turbines at the Dynamics Days Conference in Denver, CO, 2013.
- Student presented the talk “Modeling the Furling Transition of Bergey Wind Turbines”, W. LaQuaglia and D. N. Armstead
- Student presented the poster “Rigidity and pH dependence of β -lactoglobulin sphereulite growth”, L. Gayetsky and D. N. Armstead at the joint meeting of the Ohio and western Pennsylvania sections of American Physical Society at Youngstown State University, 2008.
- Presented a poster on low frequency switching in a transistor amplifier at the Experimental Chaos Conference in Florence, Italy, 2004.
- Presented a poster on low frequency switching in a transistor amplifier at the Dynamics Days Conference in Chapel Hill, NC, 2004.
- Presented a poster on low frequency switching in a transistor amplifier at the Gordon Research Conference on Nonlinear Science in Tilton, NH, 2003.
- Presented a poster on anomalous diffusion at the Dynamics Days Conference in Baltimore, MD, 2002.

- Presented a talk on anomalous diffusion at the Society of Industrial and Applied Mathematics Conference in Snowbird, UT, 2001.

PUBLICATIONS:

- “Investigating the inner structure of irregular β -lactoglobulin spherulites”, K. R. Domike, E. Hardin, D. N. Armstead, and A. M. Donald, The European Physical Journal E **29**, 2 p173-182 (2009).
- “Simulations of Ferrite-Dielectric-Wire Composite Negative Index Materials”, F. J. Rachford, D. N. Armstead, V. Harris, and C. Vittoria, Physical Review Letters **99**, 057202 (2007).
- “Analysis of Multiple Time Scales in a Transistor Amplifier”, D. N. Armstead and T. L. Carroll, Physical Review E **71**, 036208 (2005)
- “Power Law Decay and Self-Similar Distributions in Stadium-Type Billiards”, D. N. Armstead, B. R. Hunt, E. Ott, Physica D **193**, 96 (2004).
- “Anomalous Diffusion in Infinite Horizon Billiards”, D. N. Armstead, B. R. Hunt, E. Ott, Physical Review E **67**, 021110 (2003).
- “Long Time Algebraic Relaxation in Chaotic Billiards”, D. N. Armstead, B. R. Hunt, E. Ott, Physical Review Letters **89**, 284101 (2002).

PEER REVIEW:

- Reviewed article for Physica D, Summer 2009.

GRANT PROPOSALS:

- American Physical Society ”Travel Grants for Women Speakers Program” 2012.
- Substitute physics representative to HHMI grant writing committee.

WORKSHOPS (given):

- Directed a workshop that culminated in the installation of a wind turbine at the Westminster College Field Station, October 2013.
- Presenting member of the CUR interactive session: ”Preparing Women for Success in STEM Graduate Education” at the CUR conference at The College of New Jersey in Trenton, NJ, Summer 2012.
- Presented a session on solar power at Westminster College Sustainability in Motion workshop, October 2010.
- Moderator for a workshop organized by Sandra Webster titled “Finding the Fit of Undergraduate Research in Early Career Faculty Development” at the Council on Undergraduate Research (CUR) at Weber State in Ogden, UT, Summer 2010.
- Organized and executed faculty webpage design session using SeaMonkey at Westminster College Fall Faculty Workshop, 2009.
- Spearheaded and led community photovoltaic installation workshop, Westminster College Field Station, Summer 2010.
- Organized and executed faculty webpage design session using SeaMonkey, Westminster College Spring Faculty Workshop, 2010.

WORKSHOPS (attended):

- Participant in Westminster College Inquiry workshops: the first-time Inquiry instructor workshop (Summer 2011), first year program workshop (Summer 2011 and 2012), periodic intrasemester lunch discussions (Fall 2011 and 2012), and post-semester debriefing (Spring 2012 and 2013).
- Participant in the Westminster College Environmental Science Assessment workshop which assessed the environmental science major and identified essential addition for the program, most notably the need for introductory and advanced Geology, May 2011.
- Participant in the Sustainable Energy Fund Conference on Wind Power at Lafayette College in Easton, PA, July 2009.
- Participant in Council on Undergraduate Research dialogs on grant writing which provided an opportunity to interact with grant agency officers and experienced grant reviewers. I also attended the program “The Art of Grantsmanship.” Both events were in Alexandria, VA, April 2009.
- Participant in NSF-sponsored American Physical Society/American Association of Physics Teachers new physics faculty workshop in College Park, MD, June 2008.

INVITED FORUM PARTICIPANT:

- Forum on Local Impacts of Hydraulic Fracturing of Marcellus Shale, Westminster College, Spring 2012.

HONORS BOARD PARTICIPANT:

- William Armentrout, “Westminster’s First Light: The Calibration and Implementation of an Apparatus to Study Exoplanetary Systems,” advised by Thomas Oberst, 2012.
- Nathan Barefoot, “Photocatalytic Reduction of Carbon Dioxide through the use of Metal Porphyrins: Inspired by Chlorophyll,” advised by Peter Smith, 2011.

ACADEMIC SERVICE:

- Physics Department-Specific:
 - Assisted with the rewriting of the Westminster College Physics curriculum, Fall 2008 and Spring 2009.
 - Assisted with various faculty searches Fall 2008, Spring 2009, Fall 2010, and Spring 2011.
 - Initiated and hosted annual physics picnic Spring 2011 and 2012.
 - Presented journal club talks Fall 2011 and Spring 2012.
 - Faculty advisor to student-run Westminster College Planetarium, Fall 2008.
- College-Wide:
 - Member of Undergraduate Research Advisory Committee.
 - Member of Student Live and Athletics Council, Outcomes Assessment Advisory Council, Instructional Resources Council, Environmental Science Committee, Civic Engagement Council, Academic Standards Committee, leader

- of the ad hoc bicycle rack committee, treasurer for local chapter of AAUP.
- Active participant in Middle State Accreditation review process, Spring 2011.

COMMUNITY SERVICE:

- Volunteer math/science enrichment sessions and demonstrations for local pre-school, elementary school, high school and community groups.

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS:

- Member of the American Physical Society.
- Member of the Council on Undergraduate Research.
- Member of and local treasurer for the American Association of University Professors.