

| | |
|---------------------|---|
| CONTACT INFORMATION | <p>Matt Guthrie University of Connecticut 3046 196 Auditorium Road Storrs, CT 06269</p> <p>Phone: 616.510.6782 Email: guthrie@uconn.edu Website: guthrie.science</p> |
| RESEARCH INTERESTS | Nonlinear Models, Data Visualization Techniques, Physics Education Research and Curriculum Development, and Laser Spectroscopy. |
| EDUCATION | <p>The University of Texas, Austin, Texas USA</p> <p><i>Ph.D.</i>, Physics (2018) Dissertation: <i>Grouping and comparing Texas high schools through machine learning and visualization techniques</i></p> <p>Michigan Technological University, Houghton, Michigan USA</p> <p><i>B.Sc.</i>, Physics (2011) Minors: Astrophysics, Mathematical Sciences Thesis: <i>An Atomic Absorption Filter for Non-Dispersive Raman Spectroscopy</i></p> |
| TEACHING EXPERIENCE | <p>Assistant Professor in Residence <i>Spring 2022 - Present</i> Teaching introductory physics classes at the University of Connecticut. Courses taught include introductory electricity and magnetism for engineering students.</p> <p>Adjunct Professor <i>Fall 2020 - Fall 2021</i> Teaching introductory physics classes at the University of Connecticut, the University of Central Florida, and Three Rivers College. Courses taught include introductory mechanics, introductory electricity and magnetism, and physical science.</p> <p>Instructor <i>Fall 2019</i> Supervisor: Dr. Eduardo Mucciolo —Eduardo.Mucciolo@ucf.edu I taught a large (≈ 300 students) conceptual-based lecture-style physical science class. Duties included developing homework, lecture material, lecture demonstrations, exams, and semester projects, in addition to grading. Topics included introductory mechanics, chemistry, thermodynamics, waves, electricity and magnetism, optics, astronomy and astrophysics, and quantum mechanics.</p> <p>Assistant Instructor <i>Fall 2014 - Spring 2018</i> Supervisor: Dr. Kenneth W. Gentle —k.gentle@mail.utexas.edu I was the assistant instructor for introductory mechanics for physics major laboratory classes. I taught lab classes, oversaw the development of new lab procedures, led weekly lab meetings, and mentored graduate TAs, many of whom had never taught before.</p> <p>Instructor <i>Spring 2016</i> Supervisor: Dr. Joanna Collins —joanna.collins@austin.utexas.edu I planned, wrote curriculum (in-class experiments, lectures, homework, quizzes, and exams), and taught an integrated lab and lecture course in introductory mechanics.</p> <p>Teaching Assistant <i>Fall 2011 - Spring 2014</i> Supervisor: Dr. Anthony J. Bendinelli —anthonybendinelli@gmail.com Teaching assistant for introductory mechanics for physics major laboratory classes. During this time I rewrote the lab manual to make it more accessible to students.</p> <p>Teaching Assistant <i>Summer 2012</i> Supervisor: Dr. Nathan Erickson —nathanwerickson@austin.utexas.edu Teaching assistant for introductory electromagnetism for pre-med students.</p> |

Teaching Assistant*Fall 2008 - Spring 2011*Supervisors: Michael Meyer —mrmeyer@mtu.edu and Dr. Bryan Suits —suits@mtu.edu

Teaching assistant for major and non-major physics laboratory classes. Laboratories ranged from introductory mechanics to advanced majors electronics laboratory.

RESEARCH
EXPERIENCE**The University of Central Florida**, Orlando, Florida USAAdvisor: Dr. Zhongzhou Chen —Zhongzhou.Chen@ucf.edu*Summer 2018 - Summer 2020*

Completed several postdoctoral research projects investigating the relationship between student behavior in online mastery learning homework environments and course outcomes.

The University of Texas, Austin, Texas USAAdvisor: Dr. Michael Marder —marder@chaos.utexas.edu*Fall 2012 - Summer 2018*

I studied the aggregate behavior of students in the Texas public school system: how their standardized test scores change over time; their demographic information; and causal relationships in the data. I developed multiple methods of sorting students into groups to find exemplary schools in Texas, inform policy, and improve future student scores.

Advisor: Dr. George Shubeita —shubeita@chaos.utexas.edu*Spring - Fall 2012*

Examining microrheology in *Drosophila* embryos through *in vivo* measurements of the viscosity of cytoplasm in the embryos.

Michigan Technological University, Houghton, Michigan USAAdvisor: Dr. Jacek Borysow —jborysow@mtu.edu*Fall 2010 - Spring 2011*

Measured the spread of emission lines resulting from the stimulated emission of cesium atoms in a strong, nonuniform magnetic field (Paschen-Back effect), in an effort to use cesium as an atomic absorption filter.

Advisor: Dr. Brian Fick —fick@mtu.edu*Summer 2010*

Analyzed CCD camera data from the Pierre Auger Cosmic Ray Observatory (Pampa Amarilla, Argentina) in an attempt to derive the approximate cloud cover percentage at a specific time.

PROFESSIONAL
EXPERIENCE**Treasurer, Data Scientist, and Co-founder***Fall 2015 - Present***MiDataLabs**, Lansing, Michigan USA (www.midatalabs.org)

MiDataLabs helps nonprofit organizations analyze data, synthesize knowledge, and visualize information. Our mission is to advance public data literacy, encourage civic engagement, and promote informed decision-making.

Coordinator*Spring 2014 - Spring 2018***University of Texas Physics Education Group** (wikis.utexas.edu/display/physed)Faculty Contact: Dr. Michael Marder —marder@chaos.utexas.edu

I coordinated The University of Texas Physics Education Group. These weekly meetings consisted of presentations by invited speakers and students, roundtable discussions, luncheon meetings, and debates between invited debaters.

Educational Content Development*Summer 2016 - Spring 2017***University Extension**, Austin, Texas USA (www.extension.utexas.edu)Staff Contact: Matthew Boyer —mpboyer@austin.utexas.edu

I designed an online two course physics sequence, covering introductory mechanics, electromagnetism, wave mechanics, relativity, atomic and nuclear physics, and cosmology. The content is conceptual in nature and incorporates simulations (mostly PhET) in lieu of in-class experiments.

Twistthink, Holland, Michigan USA (www.twistthink.com)

Among lab tech responsibilities (such as equipment and product testing, prototype soldering, and general research), I completed two longer-term summer projects:

- 2008 - Developed a system for communication through ultrasonic waves and specialized it to the forklift industry.
- 2009 - Designed a programmable Radio Frequency communication board which controls lights using IEEE 802.15.4 (Zigbee) in a parking garage based on temperature, light intensity incident on the board, and time of day.

PUBLICATIONS

1. Kyle M. Whitcomb, **Matthew W Guthrie**, Chandralekha Singh, and Zhongzhou Chen. Improving accuracy in measuring the impact of online instruction on students' ability to transfer physics problem-solving skills. *Phys. Rev. Phys. Educ. Res.*, 17:010112, Mar 2021 ([doi:10.1103/PhysRevPhysEducRes.17.010112](https://doi.org/10.1103/PhysRevPhysEducRes.17.010112))
2. **Matthew W Guthrie**, Tom Zhang, and Zhongzhou Chen. A tale of two guessing strategies: interpreting the time students spend solving problems through online log data. In *Physics Education Research Conference 2020*, PER Conference, pages 185–190, Virtual Conference, July 22-23 2020 ([doi:10.1119/perc.2020.pr.Guthrie](https://doi.org/10.1119/perc.2020.pr.Guthrie))
3. Zhongzhou Chen, Mengyu Xu, Geoffrey Garrido, and **Matthew W Guthrie**. Relationship between students' online learning behavior and course performance: What contextual information matters? *Phys. Rev. Phys. Educ. Res.*, 16:010138, Jun 2020 ([doi:10.1103/PhysRevPhysEducRes.16.010138](https://doi.org/10.1103/PhysRevPhysEducRes.16.010138))
4. **Matthew W Guthrie** and Zhongzhou Chen. Comparing student behavior in mastery and conventional style online physics homework. In *Physics Education Research Conference 2019*, PER Conference, Provo, UT, July 24-25 2019 ([doi:10.1119/perc.2019.pr.Guthrie](https://doi.org/10.1119/perc.2019.pr.Guthrie))
5. Zhongzhou Chen, Kyle M. Whitcomb, **Matthew W Guthrie**, and Chandralekha Singh. Evaluating the effectiveness of two methods to improve students' problem solving performance after studying an online tutorial. In *Physics Education Research Conference 2019*, PER Conference, Provo, UT, July 24-25 2019 ([doi:10.1119/perc.2019.pr.Chen](https://doi.org/10.1119/perc.2019.pr.Chen))
6. Geoffrey Garrido, **Matthew W Guthrie**, and Zhongzhou Chen. How are students' online learning behavior related to their course outcomes in an introductory physics course? In *Physics Education Research Conference 2019*, PER Conference, Provo, UT, July 24-25 2019 ([doi:10.1119/perc.2019.pr.Garrido](https://doi.org/10.1119/perc.2019.pr.Garrido))
7. **Matthew W Guthrie** and Zhongzhou Chen. Adding duration-based quality labels to learning events for improved description of students' online learning behavior. In *Proceedings of the 12th International Conference on Educational Data Mining, EDM 2019, Montréal, Canada, July 2-5, 2019*, 2019 ([dblp:conf/edm/GuthrieC19](https://dblp.org/conf/edm/GuthrieC19))
8. Gerd Wagner and **Matthew W Guthrie**. Demystifying the Lagrangian of classical mechanics [submitted for publication] ([arXiv:1907.07069](https://arxiv.org/abs/1907.07069))
9. Gerd Wagner and **Matthew W Guthrie**. Demystifying the Lagrangian formalism for field theories [in preparation] ([arXiv:2005.11393](https://arxiv.org/abs/2005.11393))
10. Gerd Wagner and **Matthew W Guthrie**. Demystifying the Lagrangians of special relativity [in preparation] ([arXiv:2108.07786](https://arxiv.org/abs/2108.07786))
11. Zhongzhou Chen and **Matthew W Guthrie**. Measuring the effectiveness of learning resources via student interaction with online learning modules [in preparation] ([arXiv:1903.08003](https://arxiv.org/abs/1903.08003))
12. **Matthew W Guthrie** and M. P. Marder. Poverty concentration is an effective predictor of aggregate test score performance (except when it isn't) [in preparation]
13. **Matthew W Guthrie**. *Grouping and comparing Texas high schools through machine learning and visualization techniques*. PhD thesis, 2018 ([doi:10.15781/T2CR5NW6C](https://doi.org/10.15781/T2CR5NW6C))

SELECTED
PRESENTATIONS

July 2021 - *Improving group work in studio-style physics courses* - AAPT 2021, Virtual Conference - Making high-level changes to studio-style physics in order to promote more inclusive and productive group work.

July 2020 - *Direct observation of student behavior in online learning modules* - AAPT and PERC 2020, Virtual Conference - Interpretation of student behavior in online learning platforms based on clickstream data and observed in-person homework sessions.

July 2019 - *Comparing student behavior in mastery and conventional style online physics homework* - AAPT and PERC 2019, Provo UT - Presenting results from an A/B experiment wherein students were assigned homework in Mastery Learning-based or Traditional conditions.

July 2019 - *Adding duration-based quality labels to learning events for improved description of students' online learning behavior* - Educational Data Mining 2019, Montreal QC - An investigation into student behavior while completing online homework assignments.

September 2018 - *Poverty concentration is an effective predictor of aggregate test score performance (except when it isn't)* - UCF's discipline-based education research seminar, Orlando FL - showing how some exceptions to expected relationships in educational data can be identified.

July 2018 - *Understanding Standardized Test Scores Using Machine Learning and Longitudinal Analysis* - AAPT 2018, Washington D.C. - Describing the relationship between high school demographic information and test score performance in Texas high schools.

April 2018 - *Grouping and comparing Texas high schools through machine learning and visualization techniques* - Ph.D. defense presentation at The University of Texas.

September 2017 - *The Great American Eclipse*, a discussion of the August 2017 solar eclipse, the educational opportunities it facilitated, and some of the exciting research which was possible due to the countrywide transit. Presented to the UT Physics Education Group.

July 2017 - *Improving Texas School Comparison Groups via Modern Clustering Techniques* - AAPT 2017, Cincinnati OH - Application of machine learning techniques to Texas high school comparison groups.

April 2016 - *Test Scores, Visualizations, and Networks*, an overview of my investigation into the strange world of standardized test score analysis. Presented to the UT Center for Nonlinear Dynamics.

October 2015 - *Why Do We Even Teach Physics Labs?*, presentation to UT Physics Education Group summarizing arguments for and against continuing to teach physics in laboratory settings.

July 2015 - *Longitudinal Flow of Student Test Scores at the Campus Level* - AAPT 2015, College Park MD - Presenting novel representations of students' standardized test scores over time.

April 2011 - *An Atomic Absorption Filter for Non-Dispersive Raman Spectroscopy*, presentation of undergraduate research to Michigan Technological University's physics department.

October 2010 - *An Undergraduate Experiment Examining the Zeeman Effect in Cesium* - SPS Zone Meeting, Ypsilanti MI - Independent research developing an advanced lab experiment.

GRANTS,
HONORS, AND
CERTIFICATIONS

Course Development Grant: PHYS 1010Q, Erin Scanlon (PI), **Matthew W. Guthrie** (Co-PI), Kenneth Perez (Co-PI), UConn General Education Oversight Committee, 2022 — \$7,500

Supporting Inclusive Group Work in Studio-Style Physics Courses, Erin Scanlon (Co-PI), Xian Wu (Co-PI), and **Matthew W. Guthrie** (Senior Project Personnel), University of Connecticut College of Liberal Arts and Sciences Scholarship of Teaching and Learning program, 2021-2022 —\$30,000

Referee for Physical Review Physics Education Research, The Physics Teacher

[Commendation Letter for Excellence in Teaching](#) from the Office of the Provost at University of Connecticut, Fall 2020

[Inclusive Classrooms Leadership Certification](#), March 2018

[Clock Award recipient](#) from the UT Austin Department of Services for Students with Disabilities, May 2013

Elected *Vice President*, Society of Physics Students (Michigan Tech Chapter) 2008 through 2011. During this time, we were recognized multiple times by the national SPS community, winning the [Blake Lilly prize](#) and being selected as a Distinguished SPS Chapter twice [1][2].

OUTREACH

Participated in Family Physics Night at Texas Lutheran University Spring 2012, Fall 2013, Fall 2014, Fall 2015, and Fall 2016.

Instructed portions of the nanotechnology class of Michigan Technological University's Summer Youth Programs (2011) under the supervision of Dr. John Jaszczak (jaszczak@mtu.edu).

Helped organize and direct Family Physics Night from 2007 through 2011 in the Keweenaw Peninsula of Michigan. Physics undergraduates spend one night a semester showing demonstrations and teaching local primary school students about fun and interesting topics in physics.

Participated (from 2008 to 2011) in the Physics display of the Western Upper Peninsula Science Fair held at Michigan Technological University's Memorial Union Building every Spring. The usual age of children attending this is kindergarten - 9th grade.

COMPUTER SKILLS

Languages and Software: Advanced proficiency in Python, MATLAB, Mathematica, L^AT_EX, Microsoft Office Suite, Adobe Creative Suite, and Audacity. Intermediate proficiency in Java, C, Tableau, MySQL, SPICE, SAS, PHP, and R.

Operating Systems: Microsoft Windows, Linux, Mac