Matthew D. Beckman

421 Thomas Building, 461 Pollock Road, University Park, PA 16802
(814) 863-1022 | beckman@psu.edu

ACADEMIC EMPLOYMENT

Penn State University 2016 - Present
Department of Statistics *University Park, PA*

Research Professor (2026 - present)
Director, Consortium for the Advancement of Undergraduate Statistics Educ. (2024 - present)
Associate Research Professor (2022 - 2026)
Assistant Research Professor (2016 - 2022)

Saint Olaf College 2015
Department of Mathematics, Statistics, & Computer Science *Northfield, MN*

Instructor (Spring 2015)
Timeline Note: This was a part-time adjunct faculty position concurrent with full-time employment at Medtronic and PhD candidacy at University of Minnesota

University of Minnesota 2008 - 2009
Department of Educational Psychology *Minneapolis, MN*

Teaching Specialist (Fall 2008; Spring 2009)
Timeline Note: This was a part-time adjunct faculty position teaching one evening course each semester while employed full-time at Medtronic PLC

INDUSTRY EMPLOYMENT

Medtronic, Plc (*Neuromodulation*) 2008 - 2013; 2014 - 2015
Regulatory; Quality; Operations *Minneapolis, MN*

Senior Statistician (2010 - 2013; 2014 - 2015)
Statistician (2008 - 2010)
Responsibilities: Provide eclectic analyses and support for post-market quality, reliability, medical safety, and pre-clinical, manufacturing, microbiology, research & development. Also, develop and co-teach various multi-day professional development workshops on a regular basis.
Timeline Note: I was recruited back to Medtronic in 2014 after I had departed for approximately one-year to pursue an opportunity with Nonin Medical.

Nonin Medical, Inc 2013 - 2014

Senior Biostatistician
Responsibilities: Only Statistician on staff; responsible for statistical leadership in all areas of the company, including design and analysis of clinical, research & development, and manufacturing studies.

Ecolab, Inc 2007 - 2008
Research, Development & Engineering *Eagan, MN*

Statistical Sciences Intern
Responsibilities: Taught and developed training materials for various full-day statistics classes. Provided statistical consulting services to Ecolab colleagues nation-wide.

EDUCATION

Ph.D. Educational Psychology (QME: Statistics Education) 2015
University of Minnesota *Minneapolis, MN*

Dissertation: Assessment of Cognitive Transfer Outcomes for Introductory Statistics Students.
Co-Advisors: Joan Garfield & Robert C. delMas
Timeline Note: Completion of PhD was concurrent with full-time employment at Medtronic PLC and Nonin Medical, Inc.

M.S. Statistics 2008
University of Minnesota *Minneapolis, MN*

Thesis: Equivalence testing in quality control.
Advisor: Douglas M. Hawkins

B.S. Mathematics 2006
Pennsylvania State University *University Park, PA*

TEACHING

Penn State University University Park, PA

STAT 184: Introduction to R	*Fall 2016; (...); Spring 2026*
STAT 200: Elementary Statistics	*Fall 2022; (...); Fall 2025*
STAT 250: Introductory Biostatistcs	*Spring 2016; Fall 2016*
STAT 300: Statistical Modeling I	*Spring 2024*
STAT 380: Data Science w. Statistical Reasoning & Computing	*Spring 2019*
STAT 470W: (Capstone) Problem Solving & Comm. in Statistics	*Fall 2017; (...); Spring 2026*
STAT 501: Regression	*Summer 2018; Summer 2019*
STAT 592: Teaching Statistics	*Spring 2016*
STAT 597: Statistics Education Research Seminar	*Spring 2017; (...); Spring 2022*
PSU 016: First Year Seminar (Statistics & Data Sciences Majors)	*Fall 2016; (...); Fall 2023*

Saint Olaf College Northfield, MN

STAT 212: Statistics for the Sciences	*Spring 2015*

University of Minnesota Minneapolis, MN

EPSY 5261: Introductory Statistical Methods	*Fall 2008; Spring 2009; Fall 2014*

Medtronic, Inc Minneapolis, MN
Instructor for Professional Development Workshops (approx. quarterly) *2008 - 2015*

Preclinical Study Design
Design and Analysis of Experiments
Statistical Methods for Engineers

Ecolab, Inc Eagan, MN
Instructor for Professional Development Workshops (approx. 1-2 per month) *2007 - 2008*

Statistical Process Control
Measurement Systems Analysis
Design of Experiments
Robust Design and Specification Analysis

Secondary Mathematics Education

2006: Corry Area High School (Corry, PA); 9th Grade Algebra (Summer)
2005 (Pre-Service): Plum High School (Plum, PA); Geometry (10th); Precalculus (12th)
2004 (Pre-Service): Mt Nittany Middle School (State College, PA); Algebra (7th); Geometry (8th)

MENTORSHIP

Faculty Mentorship

- (2022 - present) Neil Hatfield, Assistant Research Professor at Penn State
- (2022 - present) Jenny Shook, Assistant Teaching Professor at Penn State
- (2023 - present) V.N. Vimal Rao, Assistant Teaching Professor at Univ of Illinois, Urbana-Champagne
- (2024 - present) Jennifer Broatch, Associate Professor at Arizona State University

PhD Supervision

Elizabeth Eisenhauer Graduated 2022
co-Advisor (with Ephraim Hanks)

- Dissertation: *Advances in stochastic models for animal movement and assessment of attitudes toward probability*
- Research Interests: Spatial modeling, especially with applications to ecology; student attitudes toward probability theory
- Employment: Statistician at Westat

Sayali Phadke Graduated 2022
co-Advisor (with David Hunter)

- Dissertation: *Measurement, assessment, and improvement of statistical literacy in relevant contexts*
- Research Interests: Influence of context in statistics and data science education; causal inference
- Employment: Assistant Professor at Penn State Behrend (tenure track)

Susan Lloyd Graduated 2025
co-Advisor (with Nicole Lazar)

- Dissertation: *Leveraging a human-machine collaboration to understand the structure of short-answer student response data*
- Research interests: Formative assessment; educational assessment development; topological data analysis
- Employment: Assistant Professor at Bucknell University (tenure track)

Alyssa Hu Expected graduation: 2025
Advisor

- Dissertation: *Using data to inform computational thinking, and program evaluation of undergraduate statistics curricula*
- Research interests: Computational thinking during data analysis; curriculum evaluation; item-response modeling
- Employment: Lecturer at Monash University (Melbourne, Australia)

PhD Committee Membership

- Kristin Passero (Molecular, Cellular, and Integrative Biosciences); Graduation: 2023
- Emilee Herman (Educational Psychology); Expected graduation: 2026
- Abby Sine (Statistics); Expected graduation: 2026
- Matthew Black (Mathematics Education); Expected graduation: 2026
- Zachary Meyers (Educational Psychology); Expected graduation: 2026

Honors Thesis Advising & Supervision

- Nathan Pechulis (2026). Thesis: *Analyzing the Effectiveness of Design Elements Within Statistical Teaching Apps Through Bayesian Network Analysis.*
- Vineeth Gabbireddy (2023). Thesis: *Evaluating Orderbook Imbalance as a Midpoint Forecaster.*
- Robert Krimetz (2023). Thesis: *Modeling Stock Return Volatility, a Comparative Approach.*
- Justin Huang (2023). Thesis: *A-ManPG for sparse PCA via penalized matrix approximation.*
- Julian Sim (2023). Thesis: *Comparing Efficacy of Secondary School Bell Schedules at Mitigating Infectious Diseases.*
- Kyle Kroboth (2022). Thesis: *Optimizing Roster Composition in Major League Baseball.*
- Grant Hopkins (2022). Thesis: *A Naïve Methodology for Imputing Missing Survey Information due to Survey Skip Conditions.*
- Drew Insley (2022). Thesis: *A Qualitative Approach to Predicting the Success of NFL Draftees.*
- Gregory Westfall (2022). Thesis: *The Expansion-Related Effects of Short-Term, Limited Duration Insurance on Policyholders and the Affordable Care Act Individual Marketplace.*
- Ishan Muzumdar (2020). Thesis: *Long-Term Implications of the Revenue Transfer Methodology on the Affordable Care Act.*

Other Mentorship

- *Graduate Research (Ad hoc Project Supervision)*: Noah Feldman, Elle Tang; Ann Johnson
- *Undergraduate Researchers*: Sean Burke; Ying Yu Ma; John Seifarth; Lingjie Dai; Luke Patterson; Ben Fry; Jack Fiochetta; Zhuangbo Xu; Xinjiu Zhou; Kaitlyn Stocker
- *Schreyer Honors College*: Qianhui Dai; Kate Miller; Nathan Pechulis; Vineeth Gabbireddy; Justin Huang; Kyle Kroboth; Isabella Santori; Julian Sim; R.J. Krimetz; Drew Insley; Gregory Westfall; Grant Hopkins; Shunqi Zhang; Ishan Muzumdar; Jay Yang; Kaitlyn Stocker
- *High School Researcher*: Preston Mischik (Seneca Valley High School)

PUBLICATIONS

student collaborators in **bold**; asterisk (*) indicates undergraduate

Peer-Reviewed

- **Wei, Y.**, Pearl, D. K., Beckman, M. D., and Passonneau, R. J. (submitted). Concept-based Rubrics Improve LLM Formative Assessment and Data Synthesis. Preprint URL: https://arxiv.org/pdf/2504.03877

· Eisenhauer, E., Beckman, M. D., & Hanks, E. M. (in review). Survey of Probability Attitudes.

· Beckman, M. D., **Burke*, S.**, **Fiochetta*, J.**, **Fry*, B.**, **Lloyd, S. E.**, **Patterson*, L.**, & **Tang, E.** (in review). Developing Consistency Among Undergraduate Graders Scoring Open-Ended Statistics Tasks. Preprint URL: https://arxiv.org/abs/2410.18062

· **Lloyd, S. E.**, Hatfield N. J., Beckman M. D, & Lazar, N. (2025). Student Conceptualizations of Confidence Interval Attributes. *Proceedings of the 27th Annual Conference on Research in Undergraduate Mathematics Education.* pp. 1198-1205. URL: http://sigmaa.maa.org/rume/Site/Proceedings.html

· **Hu, A.**, Hatfield, N. J., & Beckman, M. D. (2025). Exploring Individuals' Computational Thinking with Data. *ZDM Mathematics Education, 57*, 119–135. https://doi.org/10.1007/s11858-025-01669-0

· **Hu, A.**, Hatfield, N.J., Beckman, M.D. (2024). Exploring How Undergraduate Students Engage in Computational Thinking with Data. In Cook, S., Katz, B. & Moore-Russo D. (Eds.). *Proceedings of the 26th Annual Conference on Research in Undergraduate Mathematics Education. Omaha, NE.* URL: http://sigmaa.maa.org/rume/Site/Proceedings.html

· Phadke, S., Beckman, M. D., & Lock Morgan, K. (2024). Examining the Role of Context in Statistical Literacy Outcomes using an Isomorphic Assessment Instrument. *Statistics Education Research Journal, 23*(1). https://doi.org/10.52041/serj.v23i1.529

· **Li, Z.**, **Lloyd, S.**, Beckman, M. D., & Passonneau, R. J. (2023). Answer-state Recurrent Relational Network (AsRRN) for Constructed Response Assessment and Feedback Grouping. *Findings of the Association for Computational Linguistics: EMNLP 2023.* https://doi.org/10.18653/v1/2023.findings-emnlp.254

· **Lloyd, S. E.**, Beckman, M., Pearl, D., Passonneau, R., **Li, Z.**, & **Wang*, Z.** (2022). Foundations for AI-Assisted Formative Assessment Feedback for Short-Answer Tasks in Large-Enrollment Classes. In S. A. Peters, L. Zapata-Cardona, F. Bonafini, & A. Fan (Eds.), *Bridging the Gap: Empowering & Educating Today's Learners in Statistics.* Proceedings of the 11th International Conference on Teaching Statistics (ICOTS-11), Rosario, Argentina. ISI/IASE.

· Derr, T., James, M., Kuny, C., Patel, D., Kandel, P., Field, C., Beckman, M., Hockett, K., Bates, M., Sutton, T., & Szpara, M. (2022). Aerosolized Hydrogen Peroxide Decontamination of N95 Respirators, with Fit-Testing and Virologic Confirmation of Suitability for Re-Use During the COVID-19 Pandemic. *mSphere, 7*(5).

· **Eisenhauer, E.**, Hanks, E. M., Beckman, M. D., Murphy, R., Miller, T., & Katzner, T. (2022). A Flexible Movement Model for Partially Migrating Species. *Spatial Statistics.* https://doi.org/10.1016/j.spasta.2022.100637

· Beckman, M. D., Çetinkaya-Rundel, M., Horton, N. J., Rundel, C. W., Sullivan, A. J., & Tackett, M. (2021). Implementing Version Control With Git and GitHub as a Learning Objective in Statistics and Data Science Courses. *Journal of Statistics and Data Science Education, 29*(1). https://doi.org/10.1080/10691898.2020.1848485

· Agole, D., Baggett, C., Brennan, M. A., Ewing, J. C., Yoder, E. P., Mikoni, S. B., Beckman, M. D., & Epeju, W. F. (2021). Determinants of Participation of Young Farmers with and without Disability in Agricultural Capacity-building Programs Designed for the Public in Uganda. *Sustainable Agriculture Research, 10*(2), 74-86. https://doi.org/10.5539/sar.v10n2p74

- Agole, D., Yoder, E., Brennan, M. A., Baggett, C., Ewing, J., Beckman, M., & Matsiko, F. B. (2021). Determinants of cohesion in smallholder farmer groups in Uganda. *Advancements in Agricultural Development, 2*(1), 26-41. https://doi.org/10.37433/aad.v2i1.73

- Beckman, M. D., & delMas, R. C. (2018). Statistics students' identification of inferential model elements within contexts of their own invention. *ZDM Mathematics Education 50*(7). https://doi.org/10.1007/s11858-018-0986-5

- Beckman, M. D., & delMas, R. C. (2018). Cognitive transfer assessment in post-secondary statistics. In M. A. Sorto, A. White, & L. Guyot (Eds). *Proceedings of the 10th international conference on teaching statistics (ICOTS-10).* Kyoto, Japan.

- Beckman, M. D., delMas, R. C., & Garfield, J. (2017). Cognitive transfer outcomes for a simulation-based introductory statistics curriculum. *Statistics Education Research Journal 16*(2).

Books

- Pearson (2025). *Instructional R manual for Gould/Wong/Ryan: Introductory Statistics: Exploring the World Through Data* (4th ed.). eBook URL: https://media.pearsoncmg.com/ov2/aw/aw_gould_gis4e_24/Rmanual/html/toc.html (*n.b. Work made for hire; publisher holds copyright*)

- Pearl, D. K., Hatfield, N. J., & Beckman, M. D. (2021). *The Book Of Apps for Statistics Teaching (BOAST).* eBook URL: https://shinyapps.science.psu.edu

- Kaplan, D. & Beckman, M., (2020). *Data Computing (2nd ed.).* eBook URL: https://dtkaplan.github.io/DataComputingEbook/

- Beckman, M., Guerrier, S., Lee, J., Molinari, R., Orso, S., & Rudnytskyi, I. (2019). *An Introduction to Statistical Programming Methods with R.* eBook URL: https://smac-group.github.io/ds/ (*authors alphabetical*)

Miscellaneous

- Beckman., M. D. (2024). Data for analysis of consistency among undergraduate graders scoring open-ended statistics tasks. DOI: 10.6084/m9.figshare.27327774

- Li, Z., Lloyd, S.E., Beckman, M.D., and Passonneau, R. J. (2023). I-STUDIO: A Reliable Statistical Automatic Short Answer Assessment Dataset. Penn State Data Commons. https://doi.org/10.26208/JFMP-V777

- Beckman, M. D. (2017) Review of the book Fluke: the Math and Myth of Coincidence. *The American Statistician 71*(3), 285-286.

- Beckman, M. (2017, August 29). Thoughts on Teaching SBI in a Large Classroom [invited blog post]. Retrieved from https://www.causeweb.org/sbi/?p=1501#more-1501

- Beckman, M., Brown, E., delMas, R., Fry, E., Justice, N., Sabbag, A. (2014, November 21). Simulation-based statistical inference: Different tools for different audiences [invited blog post]. Retrieved from https://www.causeweb.org/sbi/?p=422#more-422

PRESENTATIONS

Seminars, Colloquia, & Talks

· Beckman, M. (2026). [Public Lecture] AI-support for teaching and learning at scale. *Ashtekar Frontiers of Science Lecture Series*. Penn State University.

· Beckman, M. (2026). [Keynote Address] AI-support for teaching and learning at scale. *International Conference on Technology in Collegiate Mathematics*. Houston, TX.

· Beckman, M. (2026). Evaluating NLP tools designed to assist instructors with formative assessment for large-enrollment STEM classes. In "Special Session on Outcomes and Innovations from NSF Undergraduate Education Programs in Mathematical Sciences." *Joint Mathematics Meetings*. American Statistical Association. Washington, DC. https://jointmathematicsmeetings.org/meetings/national/jmm2026/jmm2026-program

· Beckman, M. (2025). [Lightning Talk] AI-support for teaching and learning at scale. *Working group on teaching and learning with data investigation: Supporting transdisciplinary understandings across contexts. 2025 North American Conference on Psychology of Mathematics Education (PME-NA)*. Penn State University.

· Beckman, M. (2025). [Panelist] Call to Action. *Enhancing Statistics Teacher Education with E-Modules (ESTEEM) Summit*. North Carolina State University. Raleigh, NC.

· Beckman, M. (2025). Evaluating NLP tools designed to assist instructors with formative assessment for large-enrollment STEM classes. *NZ Statistical Association Visiting Lecturer Series*. URL: https://www.stats.org.nz/nzsa-visiting-lecturers/
  - University of Auckland. Auckland, New Zealand.
  - University of Otago. Dunedin, New Zealand.
  - University of Canterbury. Christchurch, New Zealand.
  - Victoria University of Wellington. Wellington, New Zealand.
  - Massey University. Palmerston North, New Zealand.

· Beckman, M. (2025). Aligning expectations for the emergent discipline of data science education. *NZSA Visiting Lecture Series*. University of Otago. Dunedin, New Zealand.

· Passonneau, R., **Wei, Y.**, Beckman, M., & Pearl, D. (2025). An AI Ecosystem for Assessing Statistics Reasoning Questions. *AI Horizons Seminar (Teaching and Learning with Technology)*. Penn State University. Virtual. Recording: https://youtu.be/CJI6O4RzBRg?si=27rtlEmFUkMOmtuf&t=1926

· Beckman, M. (2024). Research evaluating NLP tools designed to assist instructors with formative assessment for students in large-enrollment STEM education classes. *Department Seminar (School of Psychology and Neuroscience)*. University of Glasgow. Glasgow, Scotland.

· Beckman, M. (2024). Research evaluating NLP tools designed to assist instructors with formative assessment for students in large-enrollment STEM education classes. *Technology Enhanced Mathematical Sciences Education (TEMSE) Seminar*. University of Edinburgh. Edinburgh, Scotland.

· Beckman, M. (2024). Research evaluating NLP tools designed to assist instructors with formative assessment for students in large-enrollment STEM education classes. *Department Seminar (Mathematics; Virtual)*. Texas State University.

· Beckman, M. (2024). Progress toward NLP-assisted formative assessment feedback. *Joint Statistical Meetings*. American Statistical Association. Portland, OR.

· Beckman, M. (2024). Research evaluating NLP tools designed to assist instructors with formative assessment for students in large-enrollment STEM education classes. *U.K. Conference on Teaching Statistics*. Royal Statistical Society. Manchester, England.

· Beckman, M. (2024). [Plenary Panel] The Future of UKCOTS. *U.K. Conference on Teaching Statistics*. Royal Statistical Society. Manchester, England.

· Beckman, M. (2024). Statistics & Data Sciences Education Research. *PSU Statistics Department Research Day*. University Park, PA.

· Beckman, M. (2023). Progress toward natural language processing (NLP) assisted formative assessment feedback. *SSRI QuantDev Seminar Series*. Penn State Social Science Research Institute. University Park, PA.

· Beckman, M. (2023). Progress toward natural language processing (NLP) assisted formative assessment feedback. *Symposium on Statistics and Data Science Education: Connecting Disciplines*. Statistical Society of Australia & Queensland University of Technology. Brisbane, Australia.

· Beckman, M. (2023). [Keynote Address] Mind the Gap: An incomplete picture of statistics, statisticians, & statistics education. *The Thirteenth International Research Forum on Statistical Reasoning, Thinking, and Literacy (SRTL-13)*. Maleny, Australia.

· Beckman, M. (2023). Foundations for scalable NLP-assisted formative assessment feedback. *Colloquium Sponsored by Montana State University Department of Mathematical Sciences*. Bozeman, MT.

· Beckman, M. (2023). Statistics & Data Sciences Education Research. *PSU Statistics Department Research Day*. University Park, PA.

· **Lloyd, S. E.**, Beckman, M., Pearl, D., Passonneau, R., **Li, Z.**, & **Wang*, Z.** (2022). Foundations for AI-Assisted Formative Assessment Feedback for Short-Answer Tasks in Large-Enrollment Classes. *Eleventh International Conference on Teaching Statistics*. International Statistical Institute. Rosario, Argentina.

· Beckman, M., & Le, L. (2022). Connecting and supporting data science education researchers through the CAUSE Organization. *ACM Conference on International Computing Education Research*. Association for Computing Machinery. Lugano, Switzerland.

· Beckman, M., Çetinkaya-Rundel, M., Dogucu, M., **Dragich*, E.**, *Legacy, C.*, Tackett, M., & Zieffler, A. (2022). Piloting a new assessment tool for data science education researchers. *ACM Conference on International Computing Education Research*. Association for Computing Machinery. Lugano, Switzerland.

· **Lloyd, S. E.**, Beckman, M., Pearl, D., Passonneau, R., **Li, Z.**, & **Wang*, Z.** (2022). Foundations for NLP-Assisted Formative Assessment Feedback for Short-Answer Tasks in Large-Enrollment Classes. *ICSA Symposium*. International Chinese Statistical Association. Gainesville, FL.

· Beckman, M., Desjardens, C., Lendway, L. (2021). Reimagining the Role of EDA in Science and the Classroom. *US Conference on Teaching Statistics*. Consortium for the Advancement of Undergraduate Statistics Education. Virtual Conference (COVID-19). (*80-minute hands-on breakout session*)

· Beckman, M. (2020). Assessment and evaluation tools for the undergraduate statistics major. *Colloquium Sponsored by University of Minnesota Department of Educational Psychology.* Minneapolis, MN.

· Beckman, M. (2020). Version control as a learning objective in statistics courses. *Twin Cities Stat Chat.* Saint Paul, MN. (*90-minute hands-on seminar*)

· Beckman, M. (2019). Novel assessment tools for improving learning: Early lessons from statistics. *Innovative Teaching at Penn State (ITAP) Series sponsored by Schreyer Institute for Teaching Excellence.* University Park, PA.

· Beckman, M. (2020). Implementing Version Control with Git as a Learning Objective in Statistics Courses. *Joint Statistical Meetings.* American Statistical Association. Virtual Conference (COVID-19).

· Beckman, M. (2019). Capstone assessment for the undergraduate statistics major. *Nationally broadcast webinar sponsored by the Consortium for the Advancement of Undergraduate Statistics Education (CAUSE).*

· Sullivan, A, Beckman, M. (2019). Implementing reproducible research in statistics courses using Git/GitHub. *US Conference on Teaching Statistics.* Consortium for the Advancement of Undergraduate Statistics Education. University Park, PA. (*80-minute hands-on breakout session*)

· Beckman, M. (2019). Capstone Assessment Tools for the Undergraduate Statistics Major. *Joint Statistical Meetings.* American Statistical Association. Denver, Colorado.

· Beckman, M. (2018). Effective pedagogy in large-enrollment statistics courses. *Joint Statistical Meetings.* American Statistical Association. Vancouver, Canada.

· Beckman, M., delMas, R. (2018). Assessment of cognitive transfer outcomes for introductory statistics students. *Tenth International Conference on Teaching Statistics.* International Statistical Institute. Kyoto, Japan.

· Beckman, M., delMas, R. (2017). Assessing student understanding of statistical models: Connecting data, chance and context. *The Tenth International Research Forum on Statistical Reasoning, Thinking, and Literacy (SRTL-10).* Rotorua, New Zealand.

· Beckman, M., Kaplan, D. (2017). Teaching authentic data science without pre-requisites. *US Conference on Teaching Statistics.* Consortium for the Advancement of Undergraduate Statistics Education. University Park, PA. (*80-minute hands-on breakout session*)

· Beckman, M. (2017). The interplay of statistical thinking and the scientific method. *Colloquium Sponsored by Westminster College Division of Biological, Chemical and Environmental Sciences.* New Wilmington, PA.

· Beckman, M. (2017). GAISEing at a lecture hall: effective pedagogy in large-enrollment courses. *Joint Statistical Meetings.* American Statistical Association. Baltimore, MD. (*Rountable discussion with lunch*)

· Beckman, M. (2017). Pedagogical considerations for simulation-based inference in a large-enrollment introductory biostatistics course. *Joint Statistical Meetings.* American Statistical Association. Baltimore, MD.

· Beckman, M., Brown, E., Fry, E., Garfield, J., Sabbag, A., Ziegler, L. (2015). The Quest for Good Assessments for Research and Evaluation. *Joint Statistical Meetings*. American Statistical Association. Seattle, WA. (*authors alphabetical*)

· Beckman, M. (2015). Teaching for Transfer in the Statistics Classroom. *Twin Cities Stat Chat*. Saint Paul, MN.

· Beckman, M. (2015). Cognitive Transfer Outcomes for Introductory Statistics Students. *Colloquium Sponsored by Penn State Department of Statistics*. University Park, PA.

· Beckman, M. (2015). Cognitive Transfer Outcomes for Introductory Statistics Students. *Colloquium Sponsored by Cal Poly Department of Statistics*. San Luis Obispo, CA.

· Beckman, M., Keenan, T., (2013). Critique of the Johnson family of transformations to Normality. *Medtronic Statistics Conference*. Minneapolis, MN.

· Beckman, M. (2012). Design and analysis of experiments for pre-clinical research. *Medtronic Statistics Conference*. Minneapolis, MN.

· Beckman, M. (2008). Complaint trending for post-market surveillance. *6th Annual Product Complaints Congress for Life Sciences*. Center for Business Intelligence. Washington, D.C.

· Beckman, M. (2008). Statistical analysis for corrective & preventative action (CAPA) effectiveness. *6th Annual Product Complaints Congress for Life Sciences*. Center for Business Intelligence. Washington, D.C.

Workshops

· Post, J., Beckman, M. (2021). Teaching with R: Tidyverse, Markdown, and Shiny Basics. *US Conference on Teaching Statistics*. Consortium for the Advancement of Undergraduate Statistics Education. Virtual Conference (COVID-19). https://www.causeweb.org/cause/uscots/uscots21/workshop/8 (*half-day workshop delivered in two parts*)

Posters

student collaborators in ***bold****; asterisk (*) indicates undergraduate*

· Chow, S-M., et al. (2026). Collaborative Learning in Online and Hybrid Higher Education Learning Environments. *International Meeting of the Psychometric Society*. Seoul, Republic of Korea.

· Broatch, J., & Beckman, M. (2025). Identifying Core Competencies inIntroductory Data Science for a Diverse Student Audience: A National Study. *U.S. Conference on Teaching Statistics*. Ames, IA.

· **Hu, A.**, Hatfield, N., J., Beckman, M., D. (2024). Exploring How Novices and Experts Engage in Computational Thinking with Data. *Joint Statistical Meetings*. American Statistical Association. Portland, OR.

· **Hu, A.**, Hatfield, N., J., Beckman, M., D. (2024). Exploring How Novices and Experts Engage in Computational Thinking with Data. *Electronic Conference on Teaching Statistics*. Virtual.

· **Lloyd, S.**, Beckman, M., D. (2024). Feasibility Study for Developing and Validating an Instrument that Includes Interactions Among Learning Objectives Related to Confidence Intervals. *Electronic Conference on Teaching Statistics*. Virtual.

· **Lloyd, S.**, Beckman, M. (2023). Measuring Statistical Literacy Surrounding Confidence Intervals. *USCOTS Research Satellite*. University Park, PA.

· **Phadke, S.**, Beckman, M., Lock Morgan, K. (2023). Examining the Role of Context in Statistical Literacy Outcomes using an Isomorphic Assessment Instrument. *USCOTS Research Satellite*. University Park, PA.

· **Dragich*, E.**, Beckman, M., Çetinkaya-Rundel, M., Dogucu, M., Legacy, C., Tackett, M., Zieffler, A. (2023). Creating a standardized assessment to measure learning in introductory data science courses. *USCOTS Research Satellite*. University Park, PA.

· Le, L. & Beckman, M. (2023). Connecting and Supporting Statistics and Data Science Education Researchers Through the CAUSE Organization. *International Association for Statistics Education (IASE) Satellite Conference*. Toronto, Canada.

· **Lloyd, S. E.**, Beckman, M., Pearl, D., Passonneau, R., **Li, Z.**, & **Wang*, Z.** (2022). Foundations for NLP-Assisted Formative Assessment Feedback for Short-Answer Tasks in Large-Enrollment Classes. *Joint Statistical Meetings*. Washington, D. C.

· Beckman, M., & Le, L. (2022). CAUSE Research: Connecting statistics and data science education researchers. *Electronic Conference on Teaching Statistics*. Virtual.

· **Lloyd, S. E.**, Beckman, M., Pearl, D., Passonneau, R., **Li, Z.**, & **Wang*, Z.** (2022). Foundations for AI-Assisted Formative Assessment Feedback for Short-Answer Tasks in Large-Enrollment Classes. *Electronic Conference on Teaching Statistics*. Virtual.

· **Eisenhauer, E.**, Beckman, M., Hanks, E. (2022). Survey of Probability Attitudes. *Electronic Conference on Teaching Statistics*. Virtual.

· **Eisenhauer, E.** & Beckman, M. (2021). Survey of Attitudes toward Probability. *US Conference on Teaching Statistics*. Virtual (COVID-19). www.causeweb.org/cause/uscots/uscots21/th-06-survey-attitudes-toward-probability

· **Gong*, Y.**, Pearl, D., Beckman, M., Hatfield, N., & **Zhang*, S.** (2021). The value of Log files of students' interaction with software applications: Replicating a Bayesian Network analysis across multiple years data. *US Conference on Teaching Statistics*. Virtual (COVID-19). www.causeweb.org/cause/uscots/uscots21/program/posters

· **Hu, A.**, Beckman, M., & Pearl, D. (2021). Program Evaluation Through Alignment of Student Perceptions, Outcomes Assessment, and Faculty Perceptions in an Undergraduate Statistics Major. *US Conference on Teaching Statistics*. Virtual. www.causeweb.org/cause/uscots/uscots21/tu-01-program-evaluation-through-alignment-student-perceptions-outcomes-assessment

· McNamara, A., **Legacy, C.**, **Rao, V.**, delMas, R., Zieffler, A., Beckman, M., & **Basner Butler, E.** (2021). Computing in the Statistics Curriculum: Lessons Learned from the Educational Sciences. *US Conference on Teaching Statistics*. Virtual (COVID-19). www.causeweb.org/cause/uscots/uscots21/tu-03-computing-statistics-curriculum-lessons-learned-educational-sciences

· **Zhang*, S.**, Pearl, D., Beckman, M., Hatfield, N., & **Gong*, Y.** (2021). The value of Log files of students' interaction with software applications: Performance Evaluation in Correlation Guessing. *US Conference on Teaching Statistics*. Virtual (COVID-19). www.causeweb.org/cause/uscots/uscots21/program/posters

· **Yan*, W.**, Pearl, D., & Beckman, M. (2019). Assessing Student Conceptual Competencies using Bayesian Networks. *US Conference on Teaching Statistics*. University Park, PA.

· Wu, J., Lai, C., Beckman, M., Raike, R., Gupta, R., Abosch, A., & Nelson, D. (2013). Video-motion detection for objectively quantifying movements in patients with Parkinson's disease. *17th International Congress of Parkinson's Disease and Movement Disorders.* Movement Disorder Society. Sydney, Australia.

· Doe, B., Fontecchio, J., Beckman, M., Depre, J., Boulware, S., & Keenan, T. (2012). Visual management system for manufacturing yield SPC data. *Medtronic Science and Technology Conference.* Minneapolis, MN.

· Holland, M., & Beckman, M. (2011). Statistical methods for monitoring rare adverse events. *Neuromodulation Innovation Week.* Minneapolis, MN.

SPONSORED RESEARCH, FUNDING, ETC.

Federal Research Grants

Principle Investigator 2026 - 2029
NSF EDU Core Research (ECR: Core) *Pending*

Title: Formative Assessment Strategy Theory with Artificial Intelligence (FAST with AI).
Budget: $1,500,000
co-PIs: ChanMin Kim; Wenpeng Yin; Neil Hatfield; Anna Fergusson.

Subaward PI 2024 - 2027
NSF Mid-Career Advancement (Directorate for STEM Education) *NSF Award #2423026*

Title: MCA: Cultivating a Leader in Statistics and Data Science Education through Strategic Partnerships
Subaward Budget: $88,273
Primary Award PI: Jennifer Broatch (Arizona State University).
Primary Award Budget: $331,452

Co-Investigator 2024 - 2026
NSF Improving Undergraduate STEM Education (IUSE: EDU) *NSF Award #2417294*

Title: Fostering Engaged Team-Based Learning in Asynchronous Online and Hybrid Learning Environments
Budget: $400,000
PI: Sy-Miin Chow (PSU Health & Human Development).

Principle Investigator 2023 - 2025
NSF Improving Undergraduate STEM Education (IUSE: EDU) *NSF Award #2236150*

Title: Project CLASSIFIES (Common Language Assessment in Studying Statistics with Instructional Feedback and Increased Enrollment Scalability)
Budget: $300,000
co-PIs: Dennis Pearl (Penn State University), Rebecca Passonneau (Penn State University).

Indepedent Evaluator 2023 - 2027
NSF Improving Undergraduate STEM Education (IUSE: EDU) *NSF Award #2235355*

Title: Expanding and assessing the art and practice of statistical thinking in post-secondary courses

Budget: $800,000

PI: Nathan Tintle (Superior Statistical Research, LLC) and co-PIs: Beth Chance (Cal Poly), Soma Roy (Cal Poly), Karen McGaughey (Cal Poly), and Todd Swanson (Hope College).

Internal Seed Grants, etc.

Principle Investigator 2025 - 2026
Center for Socially Responsible Artificial Intelligence (CSRAI) *Award #025243*

Title: Diversity Track: Comparative analysis of AI models and human judgments for evaluation of student writing with and without non-normative use of English language.

Budget: $24,620

co-PIs: Rebecca Passonneau; ChanMin Kim; Dennis Pearl.

Tombros Fellowship 2017 - 2018
Center of Excellence in Science Education (Penn State University)

Title: Comprehensive Assessment of Curricular Goals for the Undergraduate Statistics Major

Budget: $20,279.45

Collaborators: Kirsten Eilertson (Penn State); Kari Lock Morgan (Penn State); Paul Roback (St Olaf College); Jennifer Kaplan (Univ. of Georgia); Beth Chance (Cal Poly); Allan Rossman (Cal Poly); Nick Horton (Amherst College)

Other Initiatives & Support

NZSA Visiting Lecturer 2025
New Zealand Statistical Association

Description: Travel support for national speaking tour.

Budget: $2,000 (NZD)

Seed Funding for Strategic Collaboration (co-PI) 2025
University of Auckland (NZ)

Title: Writing the future for youth in STEM education: An international collaboration exploring AI, evolving technologies, and personalized engagement at scale from a social constructivist perspective

PI: Anna Fergusson (University of Auckland)

Budget: $20,000 (NZD)

Faculty Travel Award 2025
Penn State Global Programs

Title: University of Auckland (NZ): Collaboration investigating AI assistance for instructors providing assessment feedback to students in large classes

Budget: $2,500

ASA Member Initiative Grant 2022
ASA Section on Statistics & Data Science Education

Title: CAUSE Research Resource Page Development

Budget: $1,000

Collaborators: Doug Whitaker (Mount Saint Vincent Univ.); Laura Le (Univ. of Minnesota)

SERVICE

Contributions to Profession

Consortium for Advancement of Undergraduate Statistics Education (CAUSE)

- Executive Director (2024 - present; nominated/appointed by national advisory board)
- co-Associate Director for Research (2021 - 2024; appointed by Executive Director)
- co-Chair of CAUSE Research Advisory Board (2021 - 2024)
- Organized CAUSE Research Satellite Conferences (2021; 2023)
- USCOTS Program Committee (2023; ex-officio 2025)
- eCOTS Program Committee (ex-officio 2026)

American Statistical Association (ASA)
Section on Statistics and Data Science Education

- Executive-At-Large (elected; 2025-2027)

International Association for Statistics Education (IASE)
Education Section of International Statistical Institute (ISI)

- International liaison for catalog of all doctoral dissertations in statistics education (2022 - present)
- Chair of ICOTS Subcommittee; Topic 6: Statistics education across & into disciplines (2024 - 2026)

Conference Board of the Mathematical Sciences (CBMS)

- Statistics Representative for NSF-Funded National Survey of U.S. departments in the mathematical sciences (2025)

International Research Collaboration for Statistical Reasoning, Thinking, & Literacy

- Local organizer of 14th International Resarch Forum on Statistical Reasoning, Thinking, & Literacy hosted in State College, PA (2025)
- Statistician-in-Residence for SRTL-13 in Maleny, Australia (2023)

Guest Editor for Special Issue

- Statistics Education Research Journal (2025 - 2027)

Associate Editor

- Statistics Education Research Journal (2023 - present)

Association for Computing Machinery (ACM)
Special Interest Group, Computer Science Education (SIGCSE)

- DataEd'23 Program Committee (2023)

National Science Foundation (NSF)
Directorate for STEM Education

- Panelist (January 2023)

International Examiner (PhD)

- Rachel Passmore (Statistics); University of Auckland (NZ); Graduation: 2024

Journal Refereeing

- *Statistics Education Research Journal*

- *Journal of Statistics & Data Science Education*
- *ZDM–International Journal of Mathematics Education*
- *Technology Innovations in Statistics Education*
- *Journal of Research in Mathematics Education*
- *Teaching Statistics*
- *American Journal of Distance Education*
- *The American Statistician*
- *Education Sciences*

Contributions to University

Chair of Undergraduate Curricula (Department of Statistics)
formerly known as Director of Undergraduate Programs

- Department contact for data sciences major–statistical modeling option (2018 - 2024)
- Faculty-in-charge for undergraduate statistics major & minor programs (2016 - 2024)

Nittany Data Labs (Undergraduate Data Dcience Club)

- Founding Faculty Advisor (Fall 2017 - 2024)

Undergraduate Education Advisory Committee (Eberly College of Science)

- Representative for Department of Statistics (Spring 2016 - 2022)

Culture & Diversity Committee (Department of Statistics)

- ECoS Ombudsperson (Spring 2018 - 2021)
- Department committee member (Spring 2018 - 2021)

ASA DataFest at Penn State (Statistics/Data Science Competition)

- Faculty liaison to American Statistical Association
- Faculty liaison to corporate sponsors

Representative for Recruitment/Retention Events (Department of Statistics)

- Spend a Summer Day (Spring 2016 - 2021)
- For the Glory (Spring 2016 - 2021)
- Student Orientation ("NSO"; New, Transfer & International; Spring 2016 - 2021)
- Millenium Scholars Program (Spring 2016 - 2021)

AWARDS & HONORS

Waller Education Award 2025
American Statistical Association

National award for innovation in the instruction of elementary statistics and/or data science. (Website: https://www.amstat.org/your-career/awards/waller-awards)

NZSA Visiting Lecturer 2025
New Zealand Statistical Association

"The New Zealand Statistical Association coordinates and provides some financial support for a tour of New Zealand universities by a distinguished overseas statistician.... Usually this person, known as the NZSA Visiting Lecturer, will spend two to three days at each of the six main university centres, and give at least two lectures at each place: one for a general audience, and one more

closely tied to their own particular research interests." (Website: https://www.stats.org.nz/nzsa-visiting-lecturers/)

Shayle Searle Visiting Fellow 2025
Victoria University *Wellington, NZ*

Sponsored seminar and visit to Department of Statistics.

Statistician-in-Residence 2023
13th International Research Forum on Statistical Reasoning, Thinking, & Literacy *Maleny, Australia*

This recognition included opening keynote presentation at SRTL-13, travel support and accommodations for the event. In addition to keynote, this role is invited to provide technical/statistical perspective on program of educational research for K-16+ learning and pedagogy throughout the forum.

Tombros Fellowship 2017
Penn State Center of Excellence in Science Education

"The Martarano Leadership Fellows Program (formerly known as the Tombros Fellows Program) is intended to provide professional development opportunities for faculty in the Eberly College of Science." (Website: https://science.psu.edu/offices-and-centers/cese/awards-and-fellows)

Nonin Wins 2014
Nonin Medical, Inc *Plymouth, MN*

Nominated for *NONIN WINS* company-wide recognition award for outstanding contribution to publishable research with physician partners at the University of Minnesota.

High-Potential / Pivotal Employee Recognition 2009 & 2013
Medtronic, PLC *Minneapolis, MN*

Presented with a long-term incentive awards on two separate occasions. This includes recognition presented in 2009 for technical support of regulatory compliance for Medtronic's Neuromodulation business, and again in 2013 for contributions to manufacturing & operations.

Pre-Professional Honors and Recognition various

- Graduated with "High Distinction" for achieving class rank in top 4% of Eberly College of Science at Penn State.
- Selected as one of 18 inductees to Skull & Bones Senior Honor Society in recognition of leadership and service to university community.
- Recognized by Student-Athlete Advisory Board and featured in *Penn Stater* Magazine for achieving the highest cumulative GPA of any active varsity athlete.
- Eagle Scout Award