Ana Maria Kenney

Office: 517 Wartik Building University Park, PA 16802
Phone: (209) 683-9204
Email: ajk5910@psu.edu
Website: https://sites.psu.edu/ajk5910/

EDUCATION

PENNSYLVANIA STATE UNIVERSITY | Ph.D. Statistics and Operations Research

2015-Current | State College, PA
Advisor: Francesca Chiaromonte
Co-advisor: Matthew Reimherr
Thesis: Mixed Integer Programming, Whitening, and Functional Data Analysis: Improving Feature Selection in "Omics" Research

UC DENVER | M.S. Applied Math

2012-2015 | Denver, CO
Advisor: Alexander Engau
Thesis: Optimizing the Control of Hybrid Vehicles Using Model Predictive Control

CSU STANISLAUS | B.S. Math

2010-2012 | Turlock, CA
Summa Cum Laude
Concurrent with High School Diploma

RESEARCH

INTERESTS

I work at the interface of computational statistics/machine learning and large-scale optimization mainly applied to "Omics" sciences but generalizable to other areas. I develop techniques that utilize modern optimization tools for the analysis of large, complex and sometimes frustratingly noisy data – frequently functional/longitudinal in nature. Working with an interdisciplinary group of statisticians, biologists, bioinformaticians and health professionals has instilled a very pragmatic edge to my work. I emphasize stability, robustness, computational efficiency and practical relevance when approaching each project and technique. Additionally, as a trainee of the NIH funded Biomedical Big Data to Knowledge program (B2D2), I received specialized training to tackle challenges posed by working with large amounts of sensitive biomedical data - including scalability and data privacy for ethical use.

Topics: Robust statistics; feature selection/screening; large-scale (non-convex) optimization; functional data analysis; differential privacy; clustering; un-supervised learning; statistical genomics; microbiome research

PUBLICATIONS | * denotes co-first authors

- **Kenney A.**, Chiaromonte F., Felici G. (2020+) MIP-BOOST: Efficient and Effective L_0 Feature Selection for linear regression models. Accepted in the **Journal of Computational and Graphical Statistics (JCGS)**. arXiv:1808.02526.
- Awan J.*, **Kenney A.***, Reimherr M., Slavkovi A. (2019). Benefits and Pitfalls of the Exponential Mechanism with Applications to Hilbert Spaces and Functional PCA. **International Conference on Machine Learning (ICML)**: 375-384. (22% acceptance rate)

PREPRINTS AND PAPERS UNDER REVIEW | * denotes co-first authors

- Insolia L.*, **Kenney A.***, Chiaromonte F., Felici G.,(2020+). Simultaneous Feature Selection and Outlier Detection with Optimality Guarantees. (Under Revision)arXiv:2007.06114.
- Craig S.*, **Kenney A.***, Lin J., Paul I., Birch L., Savage J., Marini M., Chiaromonte F., Reimherr M., Makova K. (2020+) Polygenic Risk Score Based on Weight Gain Trajectories is a Strong Predictor of Childhood Obesity. (Under Revision)bioRxiv 606277.

WORKING PAPERS | * denotes co-first authors

- **Kenney A.**, Chiaromonte F. (2020+) Feature De-Correlation for Variable Selection Using a Relaxed Whitening Approach. (In preparation)
- **Kenney A.***, Craig S.*, Paul I., Birch L., Savage J., Marini M., Chiaromonte F., Reimherr M., Makova K. (2020+) Exploiting Family Dependencies to Explore Biomarkers for Childhood Obesity. (In preparation)

FUNDING AND HONORS/AWARDS

FUNDING AND SUPPORT

2019-present	**Alfred P. Sloan Minority PhD Scholar** $20,000 in professional and research expenses
2019	**Bunton-Waller Fellowship** For promising students from underrepresented backgrounds, covers stipend and tuition
Summer 2018	**Visiting graduate researcher** Sant'Anna School of Advanced Studies (Pisa, IT), covered travel and housing
2017/18/20	**B2D2K** Stipend, tuition, and professional travel assistance provided by the NIH-funded Biomedical Big Data to Knowledge predoctoral training program
2015/2016	**University Graduate Fellowship** The highest tier of university fellowships at Penn State, provides a stipend and tuition assistance to incoming graduate students displaying high research potential
2012-2015	**Lynn Bateman Fellow** Stipend and tuition assistance

HONORS/AWARDS

2019	**SREB travel award** Institute on Teaching and Mentoring hosted by the Southern Regional Education Board
2019	**ASA student/early career travel award** Women in Statistics and Data Science Conference (WSDS)
2018	**ISNPS young investigator travel award** 4th Conference of the International Society for Nonparametric Statistics (ISNPS)
2017	**CGSI travel and housing award** Computational Genomics Summer Institute (CGSI)
2016	**Robert Graham Endowed Fellowship**
2016	**Jack and Eleanor Pettit Scholarship in Science**
2015	**Lynn Bateman Memorial Teaching Award** For excellence in teaching and contribution to the UC Denver Math department
2012	**Inducted into Pi Mu Epsilon** Mathematical Honor Society
2010-2012	**Dean's List** Listed every semester

RESEARCH TALKS

INVITED

1. *Confronting Challenges in "Omics" Research Through Functional Data Analysis and Mixed Integer Programming*, **Yu Group at UC Berkeley**, November 2020, Virtual
2. *Finding Biomarkers for Childhood Obesity Using Functional Data Analysis*, **NIST Statistical Engineering Division Seminar**, November 2020, Virtual
3. *Finding Biomarkers for Childhood Obesity Using Functional Data Analysis*, **CMStatistics**, December 2019, London England
4. *Finding Biomarkers for Childhood Obesity Using Functional Data Analysis*, **ENAR**, March 2019, Philadelphia Pennsylvania
5. *Statistical Disclosure Control for Functional PCA*, **CMStatistics**, December 2018, Pisa Italy
6. *Computationally Viable and Effective Feature Selection in L_0 Norm*, **International Conference on Advances in Interdisciplinary Statistics and Combinatorics (AISC)**, October 2018, Greensboro North Carolina

CONTRIBUTED

1. *Simultaneous Outlier Detection and Feature Selection Using Mixed-Integer Programming* (talk), **Society for Advancement of Chicanos/Hispanics & Native Americans in Science (SACNAS) Conference**, October 2020, Virtual
2. *Simultaneous Outlier Detection and Feature Selection Using Mixed-Integer Programming* (talk), **Women in Statistics and Data Science (WSDS)**, October 2020, Virtual
3. *Simultaneous Outlier Detection and Feature Selection Using Mixed-Integer Programming* (talk), **Joint Statistical Meetings (JSM)**, August 2020, Virtual
4. *Feature De-Correlation for Variable Selection Using a Constrained Whitening Approach* (talk), **Women in Statistics and Data Science (WSDS)**, October 2019, Bellevue Washington
5. *Feature Selection in L_0 Norm: A Viable Approach* (talk), **Joint Statistical Meetings (JSM)**, August 2018, Vancouver Canada
6. *Feature Selection in L_0 Norm: A Viable Approach* (talk), **4th Conference of the International Society for Nonparametric Statistics (ISNPS)**, June 2018, Salerno Italy
7. *Feature Selection in L_0 Norm: A Viable Approach* (talk), **Symposium on Data Science and Statistics (SDSS)**, May 2018, Reston Virginia
8. *Efficient Bounds for Best Subset Selection using Mixed Integer Linear Programming* (poster session and speed talk), **Women in Statistics and Data Science Conference (WSDS)**, October 2017, La Jolla California
9. *Efficient Bounds for Best Subset Selection using Mixed Integer Linear Programming* (talk), **Joint Statistical Meetings (JSM)**, August 2017, Baltimore Maryland.
10. *Predicting Random and Rather Erratic Road Conditions* (talk), **SIAM Front Range Student Conference**, February 2015, Denver Colorado.

AT HOME INSTITUTION

At the Penn State University

1. *Polygenic Risk Score Based on Weight Gain Trajectories is Predictive of Childhood Obesity* (talk), **Big Data to Knowledge Retreat**, November 2019, State College Pennsylvania
2. *Using Early Life Growth Trajectories to Construct a Childhood Obesity Genetic Risk Score* (talk), **Genomics Seminar hosted by the Center for Medical Genomics**, February 2019, State College Pennsylvania
3. *Efficient and Effective L_0 Feature Selection* (talk), **Genomics Seminar hosted by the Center for Medical Genomics**, November 2018, State College Pennsylvania
4. *Harnessing Longitudinal Data to Derive a New Genetic Risk Score for Childhood Obesity* (talk), **Big Data to Knowledge Retreat**, April 2018, State College Pennsylvania

At UC Denver

1. *Planning Bus Routes and Bell Times in Denver Public Schools* (talk), **Mathematics Clinic sponsored by the Denver County School District No. 1**, May 2015, Denver Colorado.
2. *Predicting Random and Rather Erratic Road Conditions* (poster session), **Research and Creative Activities Symposium (RACAS)**, April 2015, Denver Colorado.
3. *The Optimal Operation of Hybrid Vehicles Using Stochastic Model Predictive Control* (talk), **Statistics Works in Progress Seminar**, November 2014, Denver Colorado.
4. *Tips for Conducting Literature Searches* (talk), **Graduate Student Seminar**, October 2014, Denver Colorado.

SERVICE AND OUTREACH

Current	**Reviewer** Annals of Applied Statistics Journal of Econometrics & Statistics
Fall 2020-present	**Student representative** Graduate Educational Equity Programs Advisory group
Summer 2020-present	**Senator** Student Life Committee for the Faculty Senate at Penn State
Summer 2020-present	**Incoming Trainee Student Mentor** Senior B2D2K trainee mentor for incoming members

July 2020	**Session chair** Joint Statistical Meetings (JSM)
February 2020	**Panel member/mentor** Prospective Penn State Millennium Scholars in Math and Statistics
August 2019	**Panel member** Pre-doctoral graduate trainee panel for programs at Penn State
August 2019	**Panel member** Graduate student panel for incoming graduate students at the Statistics Department at Penn State
Fall 2019	**Lead organizer** The annual Big Data to Knowledge Retreat held at the Penn State University
2019	**Trainee Coordinator** B2D2K trainee meetings at the Penn State University
Spring 2018	**Co-organizer** The annual Big Data to Knowledge Retreat held at the Penn State University
Spring 2017	**Student organizer** The 2017 Rao Prize Conference held in the Statistics Department at Penn State
2014-2015	**Graduate student representative** The graduate committee at the UC Denver
2014	**Co-organizer** The Graduate Student Seminar at UC Denver
2014-2015	**Teaching mentor** Conducted teaching observations and advised new teaching assistants at UC Denver
2013-2015	**Co-organizer** Bi-annual study hall for the Mathematical and Statistical Sciences at UC Denver

TEACHING EXPERIENCE

INSTRUCTOR (FULL RESPONSIBILITY)

MATH 2830, **Introductory Statistics** (Fall 2014, Spring 2015), UC Denver, Basic statistical concepts, summarizing data, probability concepts, distributions, confidence intervals, hypothesis testing.

MATH 1110, **College Algebra** (Summer 2014), UC Denver, Topics in algebra designed for students who intend to take the calculus sequence. Functions, domains, ranges, graphs, data scatter plots and curve fitting, solving equations and systems of equations, polynomial functions, rational functions, and selected other topics.

MATH 1080, **Polynomial Calculus** (Spring 2014), UC Denver, A one-semester course in single-variable calculus. Topics include limits, derivatives, differentiation rules, integration and integration rules. Emphasis is on applications to business and social sciences.

MATH 1070, **Algebra for Social Sciences and Business** (Fall 2013, Summer 2013), UC Denver, Topics in algebra designed for students who intend to take business calculus. Functions, graphs, scatter plots, curve-fitting, solving systems of equations, polynomial and rational functions, and selected other topics.

GUEST LECTURER

MCIBS 556, **Computation, Bioinformatics, and Statistics Practicum** (Fall 2019), Pennsylvania State University, A required graduate course for PhD in Bioinformatics & Genomics. Taught an introduction to modern feature selection approaches including pros/cons and available software.

MCIBS 556, **Computation, Bioinformatics, and Statistics Practicum** (Fall 2018), Pennsylvania State University, A required graduate course for PhD in Bioinformatics & Genomics. Taught an introduction to feature selection using the L_0 norm and mixed integer programming.

TEACHING ASSISTANT

STAT 500, **Applied Statistics** (Fall 2016), Pennsylvania State University, Descriptive statistics, hypothesis testing, power, estimation, confidence intervals, regression, one- and 2-way ANOVA, Chi-square tests, diagnostics (graduate course).

STAT 200, **Elementary Statistics** (Spring 2017), Pennsylvania State University, Descriptive statistics, frequency distributions, probability, binomial and normal distributions, statistical inference, linear regression, and correlation (undergraduate).

MATH 1110, **College Algebra** (Fall 2012/Spring 2013), UC Denver, Topics in algebra designed for students who intend to take the calculus sequence. Functions, domains, ranges, graphs, data scatter plots and curve fitting, solving equations and systems of equations, polynomial functions, rational functions, and selected other topics.

MATH 1070, **College Algebra** (Spring 2012), CSU Stanislaus, Review of basic algebraic topics and basic analytic geometry, complex numbers, functional notation, graphs, polynomials and rational functions, exponential and logarithmic functions, systems of equations, and conic sections.

TUTOR

Math Education Resource Center - MERC Lab (Fall 2012/Spring 2013), UC Denver, tutored walk-ins for all undergraduate mathematics courses.

Mathematics Tutoring Lab (Spring 2011-Spring 2012), CSU Stanislaus, tutored walk-ins for all undergraduate mathematics courses.

PROFESSIONAL SOCIETIES AND STUDENT ORGANIZATIONS

ASA - American Statistical Association

IMS - Institute of Mathematical Statistics

INFORMS - Institute for Operations Research and the Management Sciences

LSAMP - Alliance for Minority Participation at CSU Stanislaus

MEGA - Multicultural Engineering Graduate Association at Penn State

Pi Mu Epsilon - Mathematical Honor Society

SACNAS - Society for Advancement of Chicanos/Hispanics and Native Americans in Science

COMPUTER SKILLS

Programming languages
Bash, C++, MATLAB, Julia, Python (including keras), R, SQL
Software
AMPL, AIMMS, Apache Pig and Spark, CPLEX, GUROBI, IMPUTE2, Lingo, Mathematica, PLINK, Sagemaker, SAS, SHAPEIT, and Simio