Jennifer Broatch
Curriculum Vitae
2021

Work

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Employment

Aug. 2019 - Present	Associate Professor	Arizona State University at the West Campus
Aug. 2017 - Present	B.S. Statistics Program Lead	Arizona State University at the West Campus
Aug. 2019 - 2021	Area Lead - Mathematical Sciences	Arizona State University at the West Campus
Aug. 2012 - 2019	Assistant Professor	Arizona State University at the West Campus
July 2007 - 2019	External Grant Evaluator	Various School Districts
Aug. 2010 - 2012	Visiting Assistant Professor	Arizona State University (ASU)- Tempe
Aug. 2006 - 2009	Graduate Teaching Assistant	Arizona State University - Tempe
July 2006 - 2007	Research Assistant (Summer)	Arizona State University - Tempe
Aug. 2005 - 2006	Research Assistant	ASU - Center for Research in Science, Mathematics, Engineering and Technology
Aug. 2004 - 2005	Adjunct Faculty	Mesa Community College

Education

2009	Arizona State University	Ph.D. Statistics
2000	Arizona State University	B.S. Economics
2000	Arizona State University	B.A. Mathematics

Academic Awards/Honors/Fellowships

2015-2016	Teaching Excellence Award	New College Arizona State University
2009	Robert G. Maule Excellence in Teaching Mathematics Award	SoMSS Arizona State University

Publications

Refereed Journal Articles

17. Dietrich Suzanne W., Goelman Don, Broatch Jennifer, Crook Sharon, Ball Becky, Kobojek Kimberly, Ortiz Jennifer. (2021) "Introducing Databases in Context Through Customizable Visualizations." *Frontiers in Education* Vol. 6, 10.3389/feduc.2021.719134.

16. Dietrich Suzanne W., Goelman Don, Broatch Jennifer, Crook Sharon, Ball Becky, Kobojek Kimberly, Ortiz Jennifer. (2021). "Using Formative Assessment for Improving Pedagogy: Reflections on Feedback Informing Database Visualizations." *ACM Inroads* 11(4) pgs. 27-34.

15. Rowe, Helen I., Sprague,Tiffany A., Broatch,Jennifer, Gruber, Dan, Langenfeld, Debbie, Rivera, Lisa. (2020)"Lessons Learned 5+ Years After Transplanting and Seeding Restoration Sites in the

Sonoran Desert, U.S.A." *The American Midland Naturalist* 184(2):129-148 https://doi.org/10.1637/0003-0031-184.2.129.
Contribution: All statistical analyses and visualizations.

14. Broatch, J., Dietrich, S., and Goelman, D. "Introducing Data Science Techniques by Connecting Database Concepts and **dplyr**," (2019) *Journal of Statistics Education*, https://doi.org/10.1080/10691898.2019.1647768
Contribution: Designed the integration to the statistical package with the existing visualization product of the grant. Creation of active learning opportunities in data science.

13. Irimata, Kyle, Broatch, J., and Wilson, J. (2019) "GMM Regression Models and Feedback with Time Dependent Covariates," *Statistics in Medicine*, Volume38, Issue 12, 30 May 2019, Pages 2171-2183. https://doi.org/10.1002/sim.8099
Contribution: Co-advisor to Ph.D. student Kyle Irimata. I am responsible for the guidance and revision of manuscript.

12. Ken G. Sweat, Pamela A. Marshall, Jennifer L Foltz-Sweat, and Jennifer E. Broatch. "Developing A Course Based Research Experience For Undergraduates: The ASU West Experience,"*Journal of the Arizona Nevada Academy of Sciences* , Aug. 2018, DOI: 10.2181/036.047.0202.
Contribution: First piece of dissemination of the grant materials for NSF i-CURE grant in which I am co-PI.

11. Broatch, J., Green, J., and Karl, A. "RealVAMS: An R package for Fitting a Multivariate Value-added Model (VAM)." *R Journal*. July 2018, Volume 10(1), pgs. 22-30; 5-year Impact Factor: 2.114, Statistics and Probability: Q2
Contribution: Lead and primary author. The manuscript describes the R package written for the developed RealVAMS model used for evaluation of teachers. Dissemination of NSF grant for which I was PI.

10. Rowe, H., Tluczek, M., Broatch, J., Gruber, D., Jones, S., Langenfeld, D., McNamara, P., Weinstein, L. "Comparison of trailside degradation across a gradient of trail use in the Sonoran Desert," *Journal of Environmental Management* Volume 207, 1 February 2018, Pages 292—302 https://doi.org/10.1016/j.jenvman.2017.11.028, 5-year Impact Factor: 4.712, Environmental Sciences: Q1
Contribution: Lead statistician on the project with non-profit organization - McDowell Sonoran Conservancy. Six month statistical project that incorporates many advanced modelling techniques, specifically negative binomial, poisson, and generalized poisson mixed models. I was responsible for all analyses, data visualizations and statistical narrative. This project has led to a partnership for a in-class project (Spring 2018) analyzing additional data collected about birds.

9. De Alcaraz-Fossoul J., Barrot Feixat C., Mancenido, M., Broatch, Jennifer, Roberts, K., Carreras-MArin, C., and Tasker, J. "Ridge width correlations between inked prints and powdered latent fingerprints" *Journal of Forensic Sciences (JFS)* July 2018, Volume 63(4), pgs. 1085-1091. DOI: 10.1111/1556-4029.13656 , 5-year Impact Factor: 1.432, Medicine/Legal: Q3
Contribution: Analysis utilizes mixed models to account for the variation between and among fingers in finger prints. I provided statistical expertise to forensics team and junior statistics faculty, Michelle Mancenido. This is the first publication from the SCRA funded project, and the initial grant proposal to the Department of Justice. We are using these initial results to lay the foundation to revise the proposal for a Department of Justice Grant.

8. Broatch, J. and Karl, A. "Multivariate Generalized Linear Mixed Models for Evaluating and Predicting Team Performance" Special Issue of *Italian Journal of Applied Statistics*. January 2018, Volume 30(2) pgs. 189-211. https://arxiv.org/pdf/1710.05284.pdf
Contribution: Steve Rigdon was guest editor of the special issue (non-invited/full review process) in an effort to broaden the impact of sports statistics abroad. For the manuscript, I worked equally with author Andrew Karl. I provided the statistical model, which is an extension of the multidimensional value-added model I developed for teacher effectiveness.

7. Comeros-Raynal, M., Polidoro, B., Broatch, J., Mann,B., Gorman,C., Buxton,C., Goodpaster, A., Iwatsuki,Y., McDonald, T., Pollard, D., Russell,B., & Carpenter, K. (2016) "Predictors, Patterns, and Processes of Extinction Risk in Porgies (Family: Sparidae)." *Biological Conservation* 202, pp. 88-98., http://dx.doi.org/10.1016/j.biocon.2016.08.027 5-year Impact Factor: 4.546, Biodiversity Conservation: Q1, Ecology: Q1
Contribution: Conducted the key and novel statistical analysis that is at the core of the results in the paper. This paper is the culminating result of a two-year research project. This paper is the foundation for an expanded project to other species with undergraduate honors student, Megan Woodyard.

6. Kanthaswamy, Sree , Ng, Jillian, Broatch, Jennifer, Short, Jennifer and Roberts, Jeffrey. "Mitigating Chinese-Indian rhesus macaque (Macaca mulatta) hybridity at the California National Primate Research Center (CNPRC)." *Journal of Medical Primatology,* Version of Record online : 28 JUL 2016, Vol. 45 (6), pgs. 333-335, DOI: 10.1111/jmp.12231. 5-year Impact Factor: 0.821, Zoology Sciences: Q3, Zoology: Q3
Contribution: Statistical analysis of reproduction data, specifically a change point analysis.

5. Sweat, Ken G., Broatch, Jennifer, Borror, Connie, Hagan, Kyle and Cahill, Thomas M. (2016)"Variability in Scoville Heat Ratings of Commercially Grown Jalapeño, Habanero and Bhut Jolokia Peppers." *Food Chemistry*, Vol. 210, Nov. 2016, pp. 606-612. 5-year Impact Factor: 4.498, Chemistry -Applied: Q1
Contribution: Non-parametric statistical analysis. Not responsible for the collection of data. This project led to the development of i-CUREs, an NSF-funded project, which I am co-PI.

4. Pivovarova, M.,Amrein-Beardsley, A., & Broatch, J., (2016). Value Added Models: Caveat Emptor. *Statistics and Public Policy*, Vol 3 (1), pgs. 1-9, http://dx.doi.org/10.1080/2330443X.2016.1164641
Contribution: Worked equally with corresponding author Margarita Pivovarova. I provided the statistical insight, while Margarita provided the educational policy implications.

3. Wilson, Natalia, Broatch, Jennifer, Jehn, Megan, & Davis, Charles III. (2015)."National Projections of Time, Cost and Failure in Implantable Device Identification: Consideration of Unique Device Identification Use." *Healthcare: The Journal of Delivery Science and Innovation* 3 (2015), pp. 196-201 . DOI:10.1016/j.hjdsi.2015.04.003
http://www.sciencedirect.com/science/article/pii/S2213076415000408
Contribution: Completed an advanced statistical analysis of the survey results previously published by Wilson and Jehn. This paper focused on the statistical analysis of those results. The article has been well-received by FDA, Pew, and Brookings. It puts"numbers" to the issue of implantable device identification. I prepared all tables, figures and narrative that corresponded to the statistical analysis.

2. Pivovarova, M., Broatch, J., & Amrein-Beardsley, A. (2014). Chetty et al. on the American Statistical Association's recent position statement on value-added models (VAMs): Five points of contention [Commentary]. *Teachers College Record*. Retrieved from http://www.tcrecord.org/content.asp?contentid=17633, 5-year Impact Factor: 1.510, Education and Educational Research: Q2
Contribution: Worked equally with corresponding author Margarita Pivovarova. I provided the statistical insight, while Margarita provided the educational policy implications. (5-yr Impact: 1.19). Work immediately discussed and posted on Diane Ravitch's Blog which has thousands of followers. http://dianeravitch.net/2014/08/11/the-holes-in-the-chetty-et-al-vam-study-as-seen-by-the-american-statistical-association/

1. Broatch, J. and Lohr, S. (2012) "Multidimensional Assessment of Value Added by Teachers to Real-World Outcomes", *Journal of Educational and Behavioral Statistics*, vol. 37, 2: pp. 256-277. 5-year Impact Factor: 1.784, Education and Educational Research: Q2, Social Science, Mathematical Methods: Q2. Number of Citations as of December 31, 2017 =17.
Contribution: Lead and primary author. I was responsible for all aspects of research and manuscript preparation.

Peer-Reviewed Contributed Chapters

3. Green, J., Manski, S. Hansen, T., and Broatch J. (2022) "Descriptive Statistics." International Encyclopedia of Education 4th Edition.

2. Broatch J., Manski, S., and Green, J.(2022) "Value-Added Modeling." International Encyclopedia of Education 4th Edition.

1. Broatch. J. (2019) "Introduction to Basketball." The Oxford Anthology of Statistics in Sports Volume 2: 2005–2009-

Manuscripts Under Review

- Rajeev Agarwal, Mars Eddis-Finbow, Jodie Tam, Qidi Xu*, Samuel Hansen*, Jennifer Broatch, Kimberly J. Bussey. "New Validated Tool to Diagnose Breastfeeding Dysfunction Associated with Ankyloglossia." Submission Under revision for the *Journal of Pediatrics*.

- Woodyard, M.*, Broatch, J., Comeros-Raynal, M., and Polidoro, B. "Classification for Conservation: A Random Forest Model to Predict Threatened Marine Species." Submitted to *Statistics and Public Policy*:.
  Contribution: Emphasizes the statistical analysis and expansion of the analysis from the *Biological Conversation* publication. This work is first-authored by the Undergraduate honors student Megan Woodyard under my supervision.

*Published Proceedings - *indicates an undergraduate student*

- De Alcaraz-Fossoul J., Mancenido, M., Broatch, Jennifer, Soignard, E., Porter, L.*, Shelton, B.*, Silverman, N.*, and Anderson, S.* "3D Imaging Technology to Uncover Changes in Latent Fingerprint Topography in Four Dimensions" *Proceedings of the American Academy of Forensic Sciences (AAFS), 70th Annual Scientific Meeting* Seattle, WA, Feb. 19-24, 2018, pgs. 520. Contribution: Aided in the data analysis and mentor-ship of the 4 undergraduate students on the project.

- Nguyen, D.*, Perez, C.*, Shaban, B.*, Suchoza, Kayla, Broatch, J. and Foltz-Sweat, J. *The Effect of Flower Color on Bee Foraging Proceedings of the Arizona-Nevada Academy of Science, 61st Annual Meeting, page 25* Phoenix, AZ, April 24, 2017.
  Contribution: Co-Mentored with Jennifer Foltz-Sweat the research of an interdisciplinary team of biology and statistics undergraduate students.

- Trudel, A.*, Sandrin, S., Short-Meyerson, K., Munden, S.*, and Broatch, J. "The Influence of Parent STEM Experience on Children's Interests in, and Understanding of, STEM Majors and Careers." A paper for the Association of Science Teacher Education International Conference, Reno, NV, January 2016.

- Broatch, J. (2014)"Estimating the Impact of "Real World Outcomes" on Teacher Effectiveness Measurements - Initial Results from RealVAMs Project NSF - DRL #1336027", August 2014; *In JSM Proceedings, Statistics Education Section*, pages 2176-2184. Alexandria, VA: American Statistical Association.

- Landlais, B.*, Howard, J.*, Dern, R.*, Hackney, J. and Broatch, J. "Statistical Analysis of Microarray Data: Identification of Differentially Expressed Genes following injury in the Fruit Fly." *Proceedings of the Arizona-Nevada Academy of Science, 58th Annual Meeting,* Flagstaff, AZ, April 12, 2014.
  Contribution: Mentored the research of the undergraduate students (*)

- Contreras-Rodriguez, J.*, Leek, T.*, Hussain, S.*, Hackney, J. and Broatch, J. "Elucidation of Changes in Metabolism and Gene Expression in Response to Localized Tissue Damage in D. Melanogaster." *Proceedings of the Arizona-Nevada Academy of Science, 58th Annual Meeting,* Flagstaff, AZ, April 12, 2014.

Contribution: Mentored the research of my undergraduate students (Landlais, B.*, Howard, J.*, Dern), who assisted in the statistical analysis of the project.

- Sanchez, D.*, Polidoro, B. and Broatch, J. "Identification of Threat Factors Impacting 141 Fish Species of Sparidae Family Present Globally." *Proceedings of the Arizona-Nevada Academy of Science, 58th Annual Meeting*, Flagstaff, AZ, April 12, 2014.
  Contribution: Mentored the research of the undergraduate student(*)
- Broatch, J. "Keeping the Statistician in Statistics Education", August 2013; *In JSM Proceedings, Statistics Education Section*. Alexandria, VA: American Statistical Association.

Conference Presentations

- Competitively Selected Presentations
  - "Designing Introductory Statistics Courses for a 21st Century Student." American Mathematical Association of Two-Year Colleges (AMATYC) Annual Conference. Phoenix, AZ. October 2021. `https://cdn.ymaws.com/amatyc.org/resource/resmgr/2021_conference_proceedings/s122_designing_introductory_.pdf`
  - "Designing Introductory Statistics Courses for a 21 st Century Demographic." United States Conference on Teaching Statistics (USCOTS). Virtual. July 2021. `https://www.causeweb.org/cause/uscots/uscots21/1e-designing-introductory-statistics-courses-21st-century-demographic`
  - "RealVAMS: Incorporating 'Real World Outcomes' in Value-Added Models (VAMs)", Conference on Statistical Practice, February, 2016.
    "Workshop" presentation: 45 - minute workshop style presentation to an audience of about 200 people. Paired with Tim Hesterburg of Google.
  - "Value Added Models - A Primer and Discussion". Joint Statistical Meetings (JSM), Seattle, August 2015.
    Invited panel: Panel selected for a national press release and highlighted by the American Statistical Association. Less than 7% of all presentations at JSM are invited.
  - "Incorporating "Real World Outcomes" in Value-Added Models (VAMs)," Presented at the National Council on Measurement in Education Annual Meeting (NCME) Chicago, April 2015. Peer reviewed and competitively selected (less than 10% selected).
  - "Tossing the Tables: Using RStudio to Adapt to Student Learning Styles through Evolving Technology," United States Conference on Teaching Statistics (USCOTS), Cary, NC, May 2013.
    Breakout Session Presentation: Competitively selected workshop style presentation.
  - 'Multidimensional Assessment of Value Added by Teachers to Real-World Outcomes" for a special paper session on "Recent Developments in Value-added Models" for Joint Statistical Meetings (JSM), San Diego, CA August 1, 2012.
    Invited Presentation: Invited by the editors of the Journal of Educational and Behavioral Statistics to give talk. Less than 7% of all presentations at JSM are invited.
- Oral Presentations
  - "The Great P-Value Debate." Joint Statistical Meetings (JSM) 2020. July 2020. Virtual presentation.
  - "Design and Analysis of Experiments for an Undergraduate Research Experience." Consortium for the Advancement of Undergraduate Statistics Education (CAUSE) Webinar. 11/13/2018 Link to recorded webinar: `https://www.causeweb.org/cause/webinar/teaching/2018-11`
  - "Helping All Students Properly Design and Analyze Experiments," Joint Statistical Meetings 2018. SPEED session.
  - "Interdisciplinary Course Based Undergraduate Research Experiences," Gordon Research Conference Visualization in Science and Education. Refereed/Competitively Selected, 08/2017. Presented by Pamela A. Marshall.

  - "Involving Statistics Students in Course Based Undergraduate Research Experiences (CUREs)," Joint Statistical Meetings, Baltimore, August 2017.
  - "RealVAMS: Getting Real-World Value from Value Added Models", Session on Educational Analytics. Joint Statistical Meetings, Chicago, August 2016.
  - TEAMS Project Webinar. "RealVAMS: Incorporating "Real World Outcomes" in Value-Added Models (VAMs) a Demonstration of the RealVAMS Package," Presented on the Math Science Partnership Network (MSPnet) to Support and Enrich the evaluation of MSP projects. October 2015.
  - "National Projections of Time, Cost and Failure in Implantable Device Identification: Consideration of Unique Device Identification Use."2015 Annual Meeting of the American Academy of Orthopaedic Surgeons. 2015 AAOS Annual Meeting in Las Vegas, Nevada, March 24-28. Presented by Natalia Wilson.
  - "The Impact of 'Real World Outcomes' on Teacher Effectiveness Measurements." Topic Contributed Panel, Joint Statistical Meetings, Boston, August 2014.
  - "New Face of Statistics Education." Topic Contributed Panel, Joint Statistical Meetings, Montreal, August 2013.
  - "Multidimensional Assessment of Value Added by Teachers to Real-World Outcomes." Graduate Student Colloquium- Arizona State University-Tempe. October 2012.

- Poster Session

  - "Wastewater Sludge and Accompanying Changes on Soil Microbiomes." Kathryn Drzewiecki*, David Stettler*, Jennifer Broatch, and Pamela A. Marshall. Annual Biomedical Research Conference for Minority Students (2017). Phoenix, AZ.
    - Product of the NSF CURE grant.
  - "Databases! A Web-Based Introduction to the Data Science Techniques of Database Querying and Design," United States Conference on Teaching Statistics (USCOTS), State College, PA, 5/2017. (Peer reviewed)
    -Dissemination of the NSF grant with Suzanne Dietrich (PI).
  - "CURE as a Research Experience for All: Preparing the Future STEM Workforce," NSF-Funded NimBioS Workshop, Knoxville, Tennessee 3/2017.
    - Dissemination of initial NSF-project results.
  - "Making Changes with Technology in Mathematical Statistics," Virtual Poster: Electronic Conference on Teaching Statistics (eCOTS). Presented with Jennifer Green. May 2016.

Products/Computer Software

- 'Statistics Curriculum- 'Introductory Statistics - Analyzing Data with Purpose." Lead Author. Developed with the Charles A. Dana Center at the University of Texas at Austin.

- iCURE Workshop `https://www.youtube.com/channel/UCRQMSxAtwWLqqjEhmIdq2vQ`. Materials from the culminating workshop of the iCURE IUSE Grant, which was attended by colleagues across the world.

- Water Resources Shiny App, El-Ham Ismail* and Jennifer Broatch: User-friendly App to retrieve historical water resource based on field and research specifications. Created to the specifications of the Parsons Field Institute Associate Director at the McDowell Sonoran Conservancy.

- R Package: RealVAMS, Andrew Karl and Jennifer Broatch, "RealVAMS: Multivariate VAM Fitting", Downloaded at: `http://cran.r-project.org/web/packages/RealVAMS/index.html`.
  Description: Fits a multivariate VAM with normally distributed test scores and a binary outcome indicator. This work was supported by National Science Foundation Grant #1336027.

- RealVAMS Shiny App: User-friendly App to execute RealVAMS package without coding. `https://jbroatch.shinyapps.io/RVAMSapp/`
- R Package: RealVAMS, Andrew Karl and Jennifer Broatch, "RealVAMS: Multivariate VAM Fitting", Downloaded at: `http://cran.r-project.org/web/packages/RealVAMS/index.html`.
  Description: Fits a multivariate VAM with normally distributed test scores and a binary outcome indicator. This work was supported by National Science Foundation Grant #1336027.
- R Package: mvglmmRank, Andrew Karl and Jennifer Broatch, "mvglmmRank: Multivariate Generalized Linear Mixed Models for Ranking Sports Teams", Downloaded at: `http://cran.r-project.org/web/packages/mvglmmRank/index.html`.
- Statistics Customization for Database for Many Majors Visualizations `http://databasesmanymajors.faculty.asu.edu/`.

External Funding

Funded External Proposals

Total Awarded: $2,660,984.00; Total Investigator Recognition: $323,199.65

Title:	**"Building Capacity: Reinventing the Common CURE at two-year HSIs: Integrating Research, Mentoring, and Industry Collaborations to Improve STEM Student Recruitment, Retention and Success (STEM-CUREs)"**
Principal Investigator:	
Role:	Senior Personnel
Sponsor:	National Science Foundation
Investigator Recognition:	$16,876.94 - 19% of $88,826.00
Project dates:	1/1/19 - 12/31/22
Responsibilities:	As senior personnel, I am responsible for applying my RealVAMS model in the evaluation of the program.
Title:	**"Collaborative Research: TRAIN (TRAnsfer to Interdisciplinary Natural sciences): A Community College-University Consortium to Increase Community College Student Transfer and Success"**
Principal Investigator:	Todd Sandrin
Role:	Senior Personnel
Sponsor:	National Science Foundation
Investigator Recognition:	$62,568.45 - 3% of $2,085,615.00
Project dates:	8/1/17 - 7/31/22
Responsibilities:	As senior personnel, I am responsible for mentoring TRAIN scholarship students.
Title:	**"Obesity and Irritable Bowel Syndrome (IBS): Assessment of Co-morbidity and Interactions with Gut Microbiota, Vitamin D and Serotonin Levels"**
Principal Investigator:	Todd Sandrin
Co-PI:	Peter Jurutka and Jennifer Broatch
Sponsor:	Mayo Clinic: Ken and Linda Morris Weight and Wellness Solutions Program Awards
Investigator Recognition:	$9,899.01 - 33% of $29,997.00
Project dates:	10/1/17 - 9/1/18
Responsibilities:	As co-principal investigator, I am responsible for the evaluation of the co-morbidity and interactions proposed in the project.

Title:	**"CURE as a Research Experience for All: Preparing the Future STEM Workforce"**
Principal Investigator:	Pamela Marshall
Co-PI:	Jennifer Broatch, Ken Sweat, Anthony Falsetti, Jennifer Foltz-Sweat
Sponsor:	National Science Foundation: IUSE-Engaged Student Learning: Design & Development
Investigator Recognition:	$74,230.25 - 25% of $296,921.00
Project dates:	8/1/16 - 7/31/19
Responsibilities:	As co-principal investigator, I am responsible for the integration of statistics in science CUREs as well as the internal evaluation of the program effectiveness. Project website: `http://marshall.labs.asu.edu/icures`

Title:	**"Collaborative Research: REALVAMs- Getting Real-World Value From Value Added Models"**
Principal Investigator:	Jennifer Broatch
Sponsor:	National Science Foundation: DRL-1336027
Investigator Recognition:	$159,625.00 - 100% of $159,625.00
Collaborators:	Jennifer Green (Montana State) and Walter Stroup (University of Nebraska)
Project dates:	10/1/13 - 3/31/17
Responsibilities:	As principal investigator, I was responsible for the project design and ongoing implementation of all aspects.

Title:	**"Collaborative Research: Databases For Many Majors: Customizable Visualizations To Improve Stem Learning "**
Principal Investigator:	Suzanne Dietrich
Sponsor:	National Science Foundation NSF DUE-1431848/DUE-1431661
Project dates:	September 2014 - August 2017*
Role:	Senior Personnel
Percent Recognition:	10%*
Responsibilities:	*Joined project in 2016 and was not responsible for submission. Created a statistical application for visualizations. Additionally, I have helped evaluate the effectiveness of the visualizations.

Pending External Proposals

Title:	**"Collaborative Research- Data in Action: Building Capacity for Data-Informed Decision Making "**
Principal Investigator:	Jennifer Broatch (Co-PIs - Jennifer Green, Michigan State University and Wendy Smith, University of Nebraska-Lincoln)
Sponsor:	National Science Foundation
Project dates:	August 2022* - July 2026
Role:	PI
Investigator Recognition:	100% of ASU portion $386, 380
Responsibilities:	Creation of professional development materials for data-informed decision making. Equally responsible for grant activities with other PIs.

Unfunded External Proposals

Title:	**"Collaborative Research- Data in Action: Building Capacity for Data-Informed Decision Making "**
Principal Investigator:	Jennifer Broatch (Co-PIs - Jennifer Green, Michigan State University and Wendy Smith, University of Nebraska-Lincoln)
Sponsor:	National Science Foundation
Project dates:	August 2022* - July 2026
Role:	PI
Investigator Recognition:	100% of ASU portion $198,966
Responsibilities:	Creation of professional development materials for data-informed decision making. Equally responsible for grant activities with other PIs.
Title:	**"Improving The Efficacy And Breadth Of Cybersecurity Talent Creation Efforts "**
Principal Investigator:	Kim Jones
Sponsor:	National Science Foundation NSF
Project dates:	July 2018 - June 2021
Role:	co-PI
Investigator Recognition:	$149,442.90 - 30% of $498,143.00
Responsibilities:	Key member of the Interdisciplinary team to support cybersecurity and integrate statistical concepts and students in the program.
Title:	**"Quantification Of Latent Fingerprint Aging With 3D Imaging And Spatio-Temporal Analysis "**
Principal Investigator:	Josep De Fossul
Sponsor:	Department of Justice (DoJ)
Project dates:	January 2018 - December 2019
Role:	co-PI
Investigator Recognition:	$75,560.20 - 20% of $377,801.00
Development:	We are currently collecting more baseline data for re-submission to the DoJ. My role is continued as statistical support for forensic science team.
Title:	**"Collaborative Research: TRAIN (TRAnsfer to Interdisciplinary Natural sciences): A Community College-University Consortium to Increase Community College Student Transfer and Success"**
Principal Investigator:	Todd Sandrin
Role:	Senior Personnel
Sponsor:	National Science Foundation
Investigator Recognition:	$61,913.37 - 3% of $2,063,779.00
Project dates:	8/1/17 - 7/31/21
Development:	Revised and eventually funded.
Title:	**"A Kappa Statistic (I^2 Kappa) to Assess 'Inter-Indicator' Consistency: Using Multiple Measures of Teacher Effectiveness to Better Measure and Understand "Value-Added"**
Principal Investigator:	Audrey Beardsley
Role:	Co-Principal Investigator
Sponsor:	National Science Foundation (NSF)
Investigator Recognition:	$93,193.80 - 30% of $310,646.00
Project dates:	7/1/16 - 6/30/18
Development:	The proposal received decent reviews with a really strong encouragement to re-submit and led to an educational policy manuscript and opportunities for future research in policy implication of the VAMs.

Title:	**"Curing Limited Undergraduate Research Opportunities With I-Cures: Interdisciplinary Course-Based Undergraduate Research Experiences "**
Principal Investigator:	Pamela Marshall
Role:	Co-Principal Investigator
Sponsor:	National Science Foundation (NSF)
Investigator Recognition:	$125,379.66 - 21% of $597,046.00
Project dates:	1/1/16 - 12/31/18
Development:	Revised and eventually funded.

Title:	**"Collaborative Research: Dimensions: Linking Genetic, Functional, And Phylogenetic Consequences Of Localized Marine Extinctions "**
Principal Investigator:	Beth Polidoro (Ken Carpenter)
Role:	Co-Principal Investigator
Sponsor:	National Science Foundation (NSF)
Investigator Recognition:	$120,228.50 - 50% of $240,457.00
Project dates:	1/1/16 - 12/31/2020
Development:	Lead to a manuscript in Biological Conservation and a partnership for my undergraduate students for research.

Title:	**"A Kappa Statistic (I^2 Kappa) to Assess "Inter-Indicator" Consistency: Using Multiple Measures of Teacher Effectiveness to Better Measure and Understand "Value-Added"**
Principal Investigator:	Audrey Beardsley
Role:	Co-Principal Investigator
Sponsor:	DOEd - Institutes of Educational Sciences (IES)
Investigator Recognition:	$180,000.60 20% of $900,003.00
Project dates:	6/1/15 - 5/30/18
Development:	The proposal received decent reviews with a really strong encouragement to re-submit and led to an educational policy manuscript and opportunities for future research in policy implication of the VAMs.

Title:	**"Analysis of an Injury Response Checkpoint Influencing Developmental Timing"**
Principal Investigator:	Jennifer Hackney
Role:	Co-Principal Investigator
Sponsor:	HHS-NIH-NICHD
Investigator Recognition :	$65,143.35 - 15% of $434,289.00 (Revision-2013)
Investigator Recognition :	$115,016.25 - 25% of $460,065.00(Original Submission -2012)
Project dates:	7/1/14 - 6/30/17
Development:	This proposal has led to a valuable collaboration with Jennifer Hackney and her lab. Statistics and biology students have collaborated and presented research that resulted from this proposal.

Title:	**"Experiential Undergraduate Introduction To RNA-Seq Analysis: Identification Of Differentially Expressed Genes Following Injury In The Fruit Fly "**
Principal Investigator:	Jennifer Broatch
Sponsor:	American Statistical Association
Total Requested:	$1,546.00 - 50% of $3,092.00
Project dates:	1/20/14 - 5/1/15
Development:	This was a small scale attempt to procure funding for an expensive RNA-Seq analysis for our (Hackney and Broatch) mutual students to analyze that led to future collaborations.

Title:	**"Multidimensional Estimates Of Teacher Value Added"**
Principal Investigator:	Jennifer Broatch
Sponsor:	National Academy Of Education
Total Requested:	$25,000
Project dates:	2/1/13 - 1/31/14
Development:	This unfunded project led to the ideas for the funded NSF project.

Title:	**"I-Stats: Integrated Statistics Professional Development"**
Principal Investigator:	Jennifer Broatch
Sponsor:	NSF-EHR
Total Requested:	$810,618
Project dates:	7/1/13 - 6/30/16
Development:	This proposal has led to a valuable collaboration with the Chandler Unified School District and Maricopa County Educational Services Agency. In the future, I expect to expand my statistics education research into professional development for middle school and high school teachers.

Internal Grants

Funded Internal Grants

Title:	**"Analyzing The Degradation Of Fingerprints By 3-D Imaging Technology"**
Principal Investigator:	Jennifer Broatch
Co-PI:	Michelle Mancenido, Josep De Alcaraz-Fossou, Emmanuel Soignard
Sponsor:	Internal: New College- Scholarship, Research And Creative Activities (SRCA) Grant
Investigator Recognition:	$2500 - 25% of $10,000.00
Project dates:	6/1/17 - 5/31/18
Responsibilities:	Assist the newly hired Junior faculty Michelle Mancenido in establishing interdisciplinary connections and research and apply my expertise in mixed models to the analysis. Led to re-submission to NIJ.

Title:	**"Bringing Real VAMS to the Real World"**
Principal Investigator:	Jennifer Broatch
Sponsor:	Internal: New College- Scholarship, Research And Creative Activities (SRCA) Grant
Investigator Recognition:	$5,000 - 100% of $5,000.00
Project dates:	6/1/16 - 5/31/17
Responsibilities:	Seed grant to create a web-based "app" to execute the RealVAMS project model.

Unfunded Internal Proposals

Title:	**"Project PLOT: Promoting the Statistical Literacy Of Arizona's Teachers"**
Principal Investigator:	Jennifer Broatch
Sponsor:	Internal- Women and Philanthropy Grant
Investigator Recognition:	$11,023 - 100% of $11,023
Project dates:	6/1/17 - 5/30/18
Development:	Project proposed to develop a professional development for teachers 6-12 and led to collaborations for workshops sponsored by the AZ Department of Education.

Courses Taught

Courses Taught at ASU West

Year	Semester	Delivery	Course	Course Title	Enrollment
2021	Fall	Classroom	STP 311	Regression and Time Series Analysis	13
2021	Fall	Classroom	STP 485	Statistics Capstone	7
2021	Spring	Individual	STP499	Individualized Instruction	1
2020	Fall	Classroom	STP 311	Regression and Time Series Analysis	18
2020	Fall	Classroom	STP 485	Statistics Capstone	12
2020	Fall	Classroom	LSC394	STEM Success	26
2019	Fall	Classroom	STP 485	Capstone Project Leader	2 of 10
2019	Fall	Classroom	STP 280	Probability & Statistics for Researchers	30
2019	Fall	Classroom	STP 311	Regression and Time Series Analysis	15
2019	Spring	Classroom	LSC394*	STEM Success	9
2019	Spring	Classroom	STP 450	Non-Parametric Statistics	16
2019	Spring	Classroom	STP 427	Mathematics Statistics	11
2018	Fall	Individual	STP499	Individualized Instruction	2
2018	Fall	Classroom	STP 485	Capstone (co-taught) Project Leader	2 of 10
2018	Fall	Classroom	STP 280	Probability & Statistics for Researchers	30
2018	Fall	Classroom	STP 311	Regression and Time Series Analysis	15
2018	Spring	Classroom	STP 485	Capstone (co-taught) Project Leader	2 of 10
2018	Spring	Individual	STP493	Honors Thesis	1
2018	Spring	Classroom	STP 450	Non-Parametric Statistics	7
2018	Spring	Classroom	STP 281*	Stats Analysis for Researchers	24
2017	Fall	Individual	STP499	Individualized Instruction- CURE	1
2017	Fall	Individual	STP499	Honors Directed Study	1
2017	Fall	Classroom	STP 280	Probability & Statistics for Researchers	33
2017	Fall	Classroom	STP 311	Regression and Time Series Analysis	8
2017	Spring	Classroom	STP 485	Capstone (co-taught) Project Leader	3 of 8
2017	Spring	Classroom	STP 450	Non-Parametric Statistics	9
2017	Spring	Classroom	STP 311	Regression and Time Series Analysis	14
2016	Fall	Individual	STP499	Individualized Instruction- CURE	2
2016	Spring	Classroom	STP 485 †	Capstone (co-taught with Dr. Berger)	10
2016	Spring	Classroom	STP 311 †	Regression and Time Series Analysis	14
2015	Fall	Classroom	STP 280	Probability & Statistics for Researchers	20
2015	Fall	Classroom	STP 427*	Mathematics Statistics	10
2015	Spring	Classroom	STP 450	Non-Parametric Statistics	12
2015	Spring	Classroom	STP 311	Regression and Time Series Analysis	13
2014	Fall	Classroom	STP 280	Probability & Statistics for Researchers	18
2014	Fall	Online	STP 226	Elements of Statistics	203
2014	Spring	Classroom	STP 450**	Non-Parametric Statistics	2
2014	Spring	Classroom	STP 311**	Regression and Time Series Analysis	4
2013	Fall	Classroom	STP 280	Probability & Statistics for Researchers	15
2013	Spring	Online	STP 226	Elements of Statistics	126
2012	Fall	Classroom	STP 280**	Probability & Statistics for Researchers	6

*New course preparation
*Course developed and taught for the first time at ASU
†Course taken over in week 5 for Dr. Borror.

Previous Courses Taught at ASU- Tempe Campus

Year	Semester	Delivery	Course	Course Title	Enrollment
2012	Spring	Internet	STP 420	Introductory Applied Statistics	74
2012	Spring	Internet	STP 420	Introductory Applied Statistics	10
2012	Spring	Classroom	STP 429	Experimental Statistics	35
2011	Fall	Classroom	STP 532	Applied Nonparametric Statistics	18
2011	Spring	Classroom	STP 420	Introductory Applied Statistics	58
2011	Spring	Classroom	STP 429	Experimental Statistics	32
2010	Fall	Classroom	STP 420	Introductory Applied Statistics	43
2010	Fall	Classroom	STP 532	Applied Nonparametric Statistics	20

Student Mentoring

Undergraduate

- Faculty mentor- NCUIRE (The New College Undergraduate Inquiry & Research Experiences):
  - Fall 2017-Spring 2018: Scholarship: "Classification for Conservation: A Random Forest Model to Predict Threatened Marine Species."
  - Spring 2017: Team Award:"The Effect of Flower Color on Bee Foraging."
  - Spring 2017: Research Assistant: "Data Science: Extracting Knowledge from the World Around Us."
  - Fall 2015: Research Assistant: "The Influence of Parent STEM Experience on Children's Interests in, and Understanding of, STEM Majors and Careers."
  - Spring 2015: Research Assistant: "A Comparison Of Arraystar And The Open-Source Software R For The Statistical Analysis Of Microarray Data."
  - Summer 2014: Scholarship: "Identification of Threat Factors and Similarities among Potentially Threatened Marine Fish Species"
  - Spring 2014: Research Assistant: "Identification of Threat Factors Impacting 1400 Fish Species of Bony Fish Present in Eastern Central Atlantic"
  - Spring 2014: Team Award: "Statistical Analysis of Microarray Data: Identification of Differentially Expressed Genes following Injury in the Fruit Fly"
  - Spring 2013: Research Assistant: "Do Ballparks add 'Value' to a Player's Performance?"
- Individualized Instruction:
  - Spring 2021: Student evaluated data for a local Pediatrician resulting in a submission for publication.
  - Spring 2019: I instructed a statistics student in conjunction with the McDowell Sonoran Conservancy to create a statistical application that retrieves and analyzes water resources for field researchers.
  - Fall 2017: I instructed a statistics student as a part of the CURE project. The students participated in an interdisciplinary team that analyzed data collected in LSC 388: Research Fundamentals for the Natural Sciences, Topic: Bee Ecology in Urban and Wild Habitats.
  - Summer 2017: LSC388 I instructed two statistics students as a part of the CURE project. The students participated in an interdisciplinary team that analyzed data collected in LSC 388: Topics in Environmental Microbiology. Students' presented project entitled "Wastewater Sludge and Resulting Changes on Soil Microbiome" at the Annual Biomedical Research Conference for Minority Students (ABRCMS).

  - Fall 2016: I instructed two statistics students as a part of the CURE project. The students participated in an interdisciplinary team that analyzed data collected in LSC 388: Research Fundamentals for the Natural Sciences, Topic: Bee Ecology in Urban and Wild Habitats.

- Datafest - DataFest is a celebration of data in which teams of undergraduates work around the clock to find and share meaning in a large, rich, and complex data set.
  - Inaugural ASU DataFest 2018: official mentor for 11 students participating in DataFest. My mentored teams won 3 of 4 awarded prizes:
    * Best in Show
    * Best Business Value/Insight
    * Best Use of External data
  - ASU DataFest 2019: official mentor for 10 students participating in DataFest. My mentored teams won:
    * Best Use of External data

Undergraduate Honors

- Thesis Advisor: Thesis completion Spring 2018. This student will be the first Barrett, the Honors College student to complete a Statistics Honors Thesis.
  - Oscar Goodloe (co-advisor): "Applications of Deep Neural Networks to Neurocognitive Poetics: A Quantitative Study of the Project Gutenberg English Poetry Corpus." Spring 2019.
  - Megan Woodyard. Thesis title: "Classification for Conservation: A Random Forest Model to Predict Threatened Marine Species."Spring 2018.
- Course Honors Credit: STP280 (Fall 2012, 2013, 2014, 2015, 2017, 2018), STP311 (Fall 2017, 2018, Spring 2016)
- Thesis Advisor, Thesis Title: "Comparison of Longitudinal Binary Models with Time-dependent Covariates," Graduated: Spring 2012 (Tempe Campus).

Graduate

- Doctoral committee member: Kyle Irimata - "Three Essays on Correlated Binary Outcomes: Detection and Appropriate Models" graduation Spring 2018. Kyle is currently a Mathematical Statistician at the US Census Bureau. `https://www.census.gov/research/researchers/profile.php/cv_profile=4065&cv_submenu=`
- Master's committee member, Thesis Title: "Predictive Modeling Of Semester Performance With Multiple Memberships And Bayesian Estimates," Graduation Spring 2016.
- Master's committee member, Thesis Title: "Modeling Hotel Industry Reviews With Hierarchical Structures," Graduation Spring 2016.
- Master's committee member, Thesis Title: "Measurement Systems Analysis Studies: A Look at the Partition of Variation (POV) Method," Graduation Winter 2015.
- Doctoral committee member: "A Test and Confidence Set for Quadratic Growth Curves," Graduation Summer 2015.
- Master's committee member, Thesis Title: "Changes in the Residential Class Consumption Following a Rooftop Solar Installation," Graduation Summer 2015.
- Master's committee member, Thesis Title: "Sources of Correlation on a Hierarchical Regression Model," Graduation Summer 2014.

- Master's committee member, Thesis Title: "Comparing Neural Network and Logistic Regression in Analyzing Data with Presence of Multicollinearity using SAS Procedures," Graduation Summer 2014.
- Dissertation Committee Member - Emily Schartz, Ph.D. Music ,Thesis Title: " The Difference In Attributions Of Success And Failure, Out-Of- Class Engagement, and Predictions of Future Success of Middle School Band Students in Open and Closed Composition Tasks," Graduation: May 2014. Role: I provided guidance and analysis for the survey conducted during Emily's research.
- Dissertation Committee Member - Arturo Valdivia, Ph.D. Statistics, Thesis Title: "Alternative Methods via Random Forest to Identify Interactions in a General Framework and Variable Importance in the Context of Value-Added Models," Graduation: May 2013

Service

Professional Service

- Lead Author: Introductory Statistics: Analyzing Data with Purpose via the Dana Center Mathematics Pathways at University of Texas at Austin.(2020-Present) Recruited from a national pool of statistics educators to modernize the statistics curriculum.
- ADVISOR to Delaware.
- ASA Statistics Education Section Mentoring Committee 2019-Present: Executive committee member. Committee supports member pairs mentorship of all aspects of their academic career.
  - 2020-2021: Mentor to Charlotte Bolsh- Midwestern University. Meet 1-2 times per month to discuss issues pertaining to junior faculty.
- CAUSE Board of Directors: (1/2019-Present) CAUSE: Consortium for the Advancement of Undergraduate Statistics Education is a national organization whose mission is to support the advancement of undergraduate statistics education. `https://www.causeweb.org/cause/`
- National Data Visualization Poster Coordinator: (Coordinator 2019-present Judge 2018) Collect and organize the national data visualization poster competition for students K-12. Started virtual competition and revised rubrics. This event is jointly sponsored by the American Statistical Association (ASA) and the National Council on Teachers of Mathematics (NCTM). `https://magazine.amstat.org/blog/2019/08/01/2019posterproject/?utm_source=informz&utm_medium=email&utm_campaign=amstatnews&_zs=JxWOe1&_zl=js936`
- Beyond AP Statistics - Presenter and Host of event (July 2018)- Presented a statistical workshop for High school teachers across the country in conjunction with the American Statistical Association.
- Secretary/Treasurer of the Statistical Education section of the American Statistical Association - National election. 2 year term beginning January 2019.
- Associate Editor (2017-present): *Journal of Quantitative Sports Analysis*.
- Manuscript Review for journals (2012-present): (2019) ACM Transactions on Computing Education, *American Educational Research Journal*, *Statistics, Politics, and Policy*, *Journal of Educational and Behavioral Statistics*, *Journal of Research on Educational Effectiveness*, and *Educational Policy Analysis Archives*.
- Joint Statistical Meetings 2015 Program Committee (Section of Councils Representative)
- Statistics Content Expert- United States Census Bureau's Statistics in Schools project (2015-2016): Evaluate statistics lessons for K-6 for statistical accuracy and adherence to statistical standards for national distribution (`http://www.census.gov/census-sis/`).

- Professional Development Presenter- One day statistics content and pedagogical workshop for high school and middle school teachers. Arizona Department of Education (2015), Glendale High School District (2016).

- External Grant Evaluator for multiple United States Department of Education (USDoE): Math Science Partnership (MSP) Grants *Evaluation of summer educational interventions (data collected in June and evaluated in July for all projects)
  Chandler Unified School District: Chandler Intel Mathematics Academy- Response to Intervention (2013-2015), Science Matters (2014-2015), Chandler Intel Mathematics Academies (2009-2011), and Physical Science Investigators and Chandler Science Investigators (2007-2008)
  Maricopa County Education Service Agency: FOCUS: Formative Assessment Opportunities and Content Training Using a Systematic approach (2015)
  Gila County Education Service Agency: GEORG: Gila Energy and Organisms (2015), FAMUS (2016-2018)
  Crane Unified School District: Intel Math (2015, 2017-2018)
  Agua Fria School District: SIMPLE - Integration of Math and Science (2016-2018)
  Paradise Valley Unified School District: Intel Math (2016-2017)
  Washington Elementary School District: Intel Math (2015-2017)

  - The evaluation for the projects in 2009/ 2010 were recognized as meeting the highest standard of rigor in evaluation (2 of 55 national projects recognized). There were more than 2000 projects that are reviewed for rigor. My evaluation reports are used as exemplars.
  - I provided general statistical support for the projects, including experimental design, data analysis and methodology development. Including the preparation of the evaluation portion of the annual report for submission to the state of Arizona and United States Department of Education. The evaluation analyzed the impact of the program on teacher practice, teacher knowledge and student achievement, and worked closely with the district's grant administrators to ensure project success, by providing informative assessment results.

- Special award judge for the American Statistical Association at the International Science and Engineering Fair (ISEF) Spring 2013.

University/School Service

- DataFest 2021 Committee member: Assist in the organization of DataFest 2021.

- Mathematical Sciences Area Lead (2019-present)- Responsibilities include the creation of the class schedule, curricular changes, advising liaison, marketing and recruitment assistance, peer evaluation, and member of MNS leadership team.

- BS Statistics Program Lead (2017-present)- Responsibilities include the creation of the class schedule, curricular changes, program assessment, advising liaison, marketing and recruitment assistance, ad hoc advisement of students, and collaborate with Director to cultivate external partnerships.

- Tenure-track Statistics Search committee member (2017-2018)- Resulted in successful hire of Yunpeng Zhao.

- Program Assessment (2015-Present) - Completed the University required program assessment for the BS Statistics program.

- Road to the University Presenter (2016) - Gave a 30 minute presentation of the statistics program and discipline to promote the program at West.

- Informal committee member of the Statistics Search Committee (2016-2017)- although I am not a formal "member" of the committee since I was on course release in the fall, I have participated in candidate selection and interviews.

- ACETS Evaluation Member- AZ Course Equivalency Tracking system (2015-Present) - From 2015-2016, I reviewed both math and statistics courses for equivalency and transfer credit. Starting in fall 2016, I review only statistics courses. Attend bi-annual state-wide ACETS transfer success meetings.
- Committee member (2015-2017) New College Representative - Curriculum and Academic Programs Committee (CAPC)
- Committee member (2016-2018) MS Committee - develop a Masters of Science degree that reflects the interdisciplinary nature of our School.
- Committee member (2013-2015) Summer Reading - selects book revelent to University theme to be read by incoming Freshman.
- Committee member (2014-2015) Teaching Evaluation - reviews current teaching evaluation metric and will suggest alternate wording for evaluation questions.
- Stat Club Faculty Adviser (2014-Present) - established an undergraduate statistics club to help promote student leadership in the field of statistics.

Community Service

- AZ State Department of Education - High School Standards Committee member (2016-2017). Role: I was responsible for ensuring that the statistical portions were written accurately and appropriately during the revision of the high school math standards.
- AZ State Department of Education Advanced Mathematics Committee member (2017-present). Role: Assist in the development for standards to include a "advanced mathematics" course that aligns with career and college readiness.
- Arizona/ International Science and Engineering Fair- (High School Students) (2012-2016)
  - Fall - Present a statistical workshop to assist students in their presentations
  - Spring - Judge presentations at both state events. Provide feedback to participants and invite to local American Statistical Association meeting for further award.
- Workshop Developer (2014) - Developed a statistics and sports themed workshop for the Sport STEM Camp, a set of theme-based workshops for students who are currently in grades 5-9. I developed the workshops and a statistics student taught the camp. Project was sponsored by a grant from the Women & Philanthropy group of the ASU Foundation. PI: Susannah Sandrin.
- Open Door (2014-2016): provided a statistical activity for community event.
- Workshop Developer (2015)- Developed a statistics themed workshop for the ExSciTE project, a set of theme-based workshops for students who are currently in grades 5-9, sponsored by a grant from the Women & Philanthropy group of the ASU Foundation. PI: Susannah Sandrin.

Professional Organizations

- Member: American Statistical Association, Faculty Women's Association, American Mathematical Association of Two Year Colleges