The Y-Distribution

Brigham Young University **Department of Statistics** **Vol. XXV June 2024**

From the Chair, Dr. David Dahl

Welcome to the latest issue of the Y Distribution! This past year has been successful and filled with positive developments. Notably, after a half-century, the college was renamed and is now known as the College of Computational, Mathematical and Physical Sciences. Given our foundation in mathematics and our heavy reliance on computational methods, we feel right at home with the new college name.

In our annual pre-graduation exit survey, we ask students to reflect on their educational experience and share their future plans with us. The department and college leadership carefully study the collected responses each year. In particular, we see an increase in students' sense of belonging, largely related to the excellent work of our student club. The Statistics Club organizes social gatherings, career and employment events, and data competitions, with a total of 48 unique events, 65 recruiters/alumni/guests, and 1,750 student experiences (e.g., one student attending three events is three "student experiences") this past year. Undoubtedly, the Statistics Club is one of the best new things happening in the department!

We currently have 446 students whose primary major is in our department. Many students want and need additional assistance formulating their post-graduation plans. You can help our students by joining BYU Connect at:

alumni.byu.edu/byuconnect.

BYU Connect is a "networking and mentoring platform that gives students access to a network of over 12,000 qualified BYU alumni who are willing to help. Alums can serve as quality mentors, help students expand their networks, and play key roles in students' career development before they graduate. Alumni also have the opportunity to network and build relationships with other BYU grads." Your experience (although you may not feel like an expert) surpasses that of current students and they can benefit from your willingness to "go forth to serve."

Highlights of the curriculum include a major revamp of our two-semester theory sequence (headed by Drs. Heiner and Blades) and the creation of a new data visualization class (by Dr. Blades). Also, we are considering the development of a data ethics course and would welcome any insights or suggestions based on your real-life experiences in this area.

Our faculty and staff continue to be recognized for their contributions to the department, college, university and discipline. A full list of these awards can be found on page 4. Dr. Alex Petersen received a highly competitive NSF grant to study "Graphical Modeling of High-Dimensional Functional Data: Separability Structures and Unified Methodology under General Observational Designs."

Drs. Matt Heaton and Garritt Page will both officially be promoted to Professor (i.e., a "full" professor, the highest rank among professors) beginning Fall 2024. They are each making substantial contributions to the department, university, and discipline and their promotions are well deserved. We are excited to have Dr. Michael Christensen join us this summer as an Assistant Professor. Michael is graduating this summer from Duke University and was advised by Dr. Peter Hoff. (And, yes, he is the son of our beloved Dr. William Christensen.) His Ph.D. dissertation was on using network structures to flexibly model areal data. Dr. Dennis Eggett retired in August 2023 and he and his wife Loretta are serving an LDS mission in Pretoria, South Africa as member and leader support missionaries. In this role, they reach out to people who haven't attended church recently, help with the Pathways education program, and attempt to outwit the mischievous monkeys.

We remember our alumni fondly and would love to hear updates on your lives and careers. Please stop in at the West View Building to say "hello!"

DATA SCIENCE AND ACTUARIAL CAREER FAIR

We will be hosting our first Data Science and Actuarial Career Fair September 26, 2024. We will send out all the details and instructions to register in June. If you would like to receive the initial mailing, please reach out to Brian Hartman (hartman@stat.byu.edu).

Data Science + Actuarial Career Fair

BYU Statistics BYU

DEPARTMENT OF STATISTICS

FRIENDS AND ALUMNI OPEN HOUSE BREAKFAST 2024

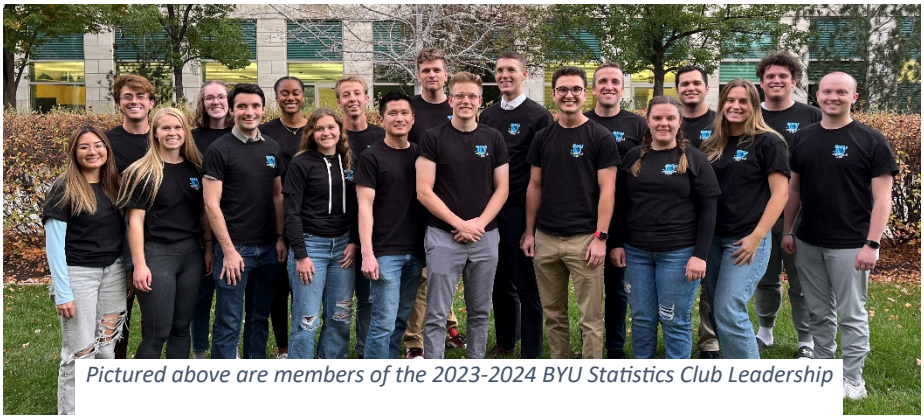
If you are attending JSM 2024 (or are in the Portland, Oregon area), please meet us at our annual Brigham Young University Breakfast. We look forward to seeing you there!

BYU Statistics Club

Dr. Brian Hartman has been the faculty advisor of the BYU Statistics Club with Jackson Passey as the student president. They summarize this year's activities as follows:

This past year, the BYU Statistics Club sought to improve both academic growth and rapport for all its students. The association hosted 40+ events with 1,800 total attendances over both Fall and Winter semesters. These activities included socials, game nights, resume and interview workshops, a case study competition, panels from industry professionals, recruiting info sessions, and graduate school prep classes. The active involvement from leadership in hosting these events welcomed 80 new students to the association, growing the size of the student body to about 250 active members (about a 50% increase from the beginning of the year). We were also grateful for the many academic groups we were able to collaborate with this year, including the Data Science Club, Sports Analytics Association, and the STEM Alliance. The club has started the following activities since it was reinstated:

1. A Careers in Data seminar series in which industry professionals speak to club members twice a month and share insights about how learning statistics can benefit them now and in the future.
2. A student mentoring program in which student mentors are available to advise and support other students.
3. A data competition in which groups of students analyze data and present their findings to a panel of industry judges.
4. A volunteering program in which students have volunteered for a department end-of-semester breakfast, several university fairs, and a community outreach program



Pictured above are members of the 2023-2024 BYU Statistics Club Leadership

Student Sample

Below you will find glimpses into a few of our students' experiences in the Department of Statistics.

Camilla McKinnon: Serving in the statistics club has allowed me the opportunity to make incredible friends within the major. I've connected with faculty and professionals in the field while helping my peers to do the same. As the vice president, I planned various enrichment activities like an internship extravaganza, a Women in Statistics luncheon, and a case study competition. It was rewarding to play a role in launching these activities and building belonging in our department.

Grant Nielson: This year the statistics club put on a showing of *Moneyball* and asked me to give a quick presentation on the statistical elements of the movie. This film inspired me to study statistics and to pursue my dream of working in sports analytics, so it was fun sharing my passion with everyone in an educational way. My biggest takeaways from this experience are that a simple model, if well-reasoned, can be powerful; and that sometimes we are hitting home-runs in our education/career without realizing it. I'm grateful for the statistics club and department that have empowered me to explore my interests!

Jackson Passey: My time with the BYU Statistics Department last year has been phenomenal. Over the past few years, I have served in many roles within the department, including as a STAT 121 TA, a research assistant with Dr. William Christensen, and, as of last year, the student president of the BYU Statistics Club. I have also been able to meet many students and TAs with various interests in statistics from my classes, including those aspiring to work in machine learning, sports analytics, business strategy, and research. The culmination of diverse backgrounds, skills, and aspirations led me to appreciate both the study of statistics and the BYU community that provides these enriching experiences. I have thoroughly enjoyed my last year's work as a research assistant under Dr. William Christensen and in collaboration with 2nd Year Masters student Anne Shurtz. Their expertise and knowledge have supported me as we tackled difficult problems requiring critical statistical thinking, including machine learning models to project the movement of a device for the knee and performing inference on a nutritional study aimed to determine the effects of aspartame (artificial sweetener) on cognitive function within a hierarchical framework. Each of these projects were able to contribute to publications in their respective fields of study (engineering and nutritional science). Finally, I was grateful to dive deeper into learning certain methodologies and techniques from my studies outside of traditional coursework, including mixed models, splines, Bayesian Additive Regression Trees, and Principal Component Analysis.

Chole Walcott: Being a member of the leadership of the Statistics Club has provided me with an avenue for collaboration with

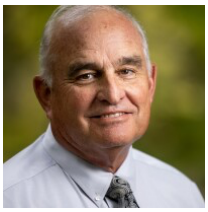
my peers outside of our regular classroom environment. Organizing events such as the Women in Statistics luncheon which brought together female students, faculty, and alumni, allowed me to gain invaluable leadership experience. The event provided a welcoming environment to build relationships with women in the Statistics field. The communication, problem-solving, and event-planning skills I developed in combination with the knowledge I am gaining from my classes will undoubtedly benefit me in the pursuit of my actuarial career.

Professor Sample

Dr. Candace Berrett: Candace continues to love all things data and environmental statistics. She is working on several exciting projects including: models to account for over-, under-, and varying-dispersed count response data, including a generalized Poisson model and a discrete log normal model (joint work with former MS student Easton Huch); looking closely at how spatial confounding became a concern and how current proposals do not resolve the issues as broadly as they purport (joint work with Dr. Kori Khan); computational improvements for the spatio-temporal factor analysis model (joint work with current MS student Adam Simpson); and deep-dive explorations of harmful algal blooms in water bodies across Utah (joint work with Dr. Hannah Bonner and recent BS graduate Justin Ross). She is serving in the statistics community as the EnviBayes chair and SBSS chair-elect. She is also currently serving in the department as Associate Chair and Graduate Coordinator, seeking to make the department and programs better for all. Her favorite class to teach continues to be "Intro to Bayesian Statistics" and students continue to be the highlight of her work.

Dr. William Christensen: This year, Dr. Christensen is serving as the Chair of the ASA's Section on Statistics and the Environment (ENVR). They continue their focus on mentoring, outreach, and opportunities for professional development. He is co-chair of the organizing committee for ENVR's biennial workshop. This year's conference will be held at the National Center for Atmospheric Research (NCAR) in Boulder, Colorado with the theme of "Spatial Data Science for the Environment."

As Education Outreach Coordinator for the Utah Chapter of ASA, he coordinates an annual outreach effort to local high schools wherein local high school mathematics and statistics teachers are invited to have a statistician visit their class to talk about statistics as a discipline and careers in statistics. He and former students are publishing new methods for identifying hotspots of infection in a viral outbreak. These methods were developed while helping to monitor the effect of COVID-19 on the BYU student population, and will appear in *PLOS One*. Students in his applied statistics research group continue to publish collaborative work with researchers in nutrition and exercise science.



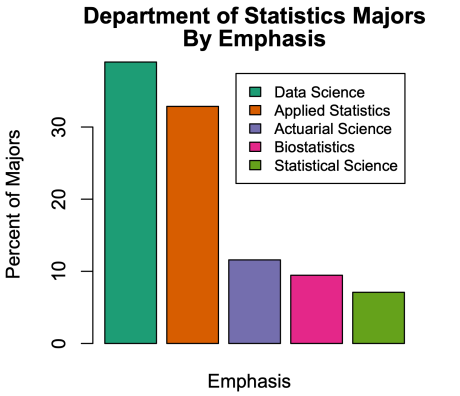
Dr. Gil Fellingham: This past fall, Dr. Fellingham accepted an assignment from the American Statistical Association to become Editor-in-Chief of the "Journal of Quantitative Analysis in Sports". Although he has been involved with this journal since its inception as both an Associate Editor and reviewer, this new assignment is much more time consuming. He continues to do research on human performance (sports) using Bayesian and nonparametric Bayesian methods. He still loves to teach and interact with the students and wants to encourage any former students to drop by whenever they are in town.

Dr. Richard Warr: This academic year has been productive for Dr. Richard Warr. During the first half of this year, he was on professional development leave at Pontificia Universidad Católica de Chile where he started a few collaborative research projects in the general area of Bayesian nonparametric modeling. Upon his return, he finished a two-year project which developed traffic safety performance functions, based on a grant from the Utah Department of Transportation. In the Winter semester he taught two courses, one was a newer version of the introductory probability course, and the other was a Bayesian reliability course he has taught several times. This year he also had five articles accepted for publication. He is currently serving as the department's curriculum committee chair.

Fast Facts

Number of Majors: 446

Number of Graduates 2023-24 Academic Year: 152



New Staff

Alexia Wells joined our department in Winter 2024. She is our new course coordinator. With the new revisions to our Stat 121 course, Alexia has taken a huge responsibility to help manage that course. Thank you, Alexia!

Awards

We have wonderful faculty and staff in the BYU Department of Statistics; these awards are just a glimpse of their greatness. Here are a few of our recent recognitions.

DEPARTMENT

Excellence in Scholarship Award
Garritt Page: September 2023
Alex Petersen: September 2023

Alvin C. Rencher Fellowship
Brian Hartman: September 2023
Richard Warr: September 2023

Excellence in Citizenship Award
Scott Grimshaw: September 2023
Dennis Tolley: September 2023

COLLEGE

Mentoring Award
Brian Hartman: April 2024

Discovery Award
Alex Petersen: April 2024

Outstanding Staff/Administrative Employee Award
Kimri Mansfield: April 2024

UNIVERSITY

Early Career Teaching Award
Matt Heaton: September 2023

SAERA AWARD
Brandon Smith: April 2024

We are very proud of all our faculty and staff and grateful for their hard work!

46th Annual Summer Institute of Applied Statistics

Practical Neural Deep Learning and "AI" Methods for Statisticians: An Introduction with Examples in R

We are honored to have **Dr. Chris Wikle**, Curators' Distinguished Professor and Chair for the Department of Statistics at the University of Missouri, as our presenter at this year's institute. His presentation will include an introduction to stochastic gradient optimization and concepts in regularization and dimension reduction, followed by discussion of the basic suite of neural models: feed forward neural networks, convolutional neural networks, recurrent neural networks, generative models, attention, and transformers. We will also discuss uncertainty quantification and approaches for explaining the inputs that are important for prediction and classification in these black box implementations. Time permitting, he will discuss some recent hybrid statistical/neural implementations such as neural Bayes estimation and deep reservoir models. The course will focus on concepts and modeling intuition and will include hands-on implementation with labs based on **torch** for R, with examples from different areas of application. This year's summer institute will occur **June 20-21, 2024.** If you would like to attend, please register for the conference by **June 14th, 2024.** For more information on the schedule of SIAS and to register, visit **statistics.byu.edu/sias**.

Dean's List 2023

Winter 2023

Jarom Asher
Tyler Barlow
James Christensen
Miles Cottrell
Davis Dowdle
Kaden Franklin
Devan Gwynn
Jacob Johnson
Eli Ladle
Danika Lasson
Connor Nesbit
Nathan Nielson
Carson Payne
Benjamin Richards
Sienna Shepherd
Kolten Smith
Brylee Wilcox
Joseph Wilson
Ryan Wolff
Samuel Balls
Scott Brown
Landon Collins
Sedona Dettwiler
Mary Ebbert
Jared Grooms
Ty Hawkes
Dallin Johnston
Beth Larsen
Emily Logan
Sydney Neslen
Jackson Passey
Seth Peacock
Zachary Sabey
Jacob Smith
Daniel Sumsion
Alyssa Wilson
Samuel Wise
Matthew Zollinger

Spring 2023

Benjamin Dahl
Jared Elison
Connor Nesbit
Jenna Worthen
Lucy Dornon
Nathan Nelson
Matthew Wilson

Summer 2023

Elijah Davis
Jaden Earl

Fall 2023

Nicloas Anderson
Tyler Barlow
Brennon Beecher
Haley Briggs
Cameron Chamberlain
Braden Critchfield
Elijah Davis
Shaelyn Eldredge
Kaden Franklin
Jarom Asher
Elijah Barnes
Catherine Bjorkman
Averi Carlson
Caleb Christensen
Paul Crowley
Benjamin Edwards
Maxwell Fairbourne
Jessica Hales
Ty Hawkes
Yu-Ho Huang
Samuel Kirkham
Callie Lunt
Connor Meredith
Sydney Neslen
Carson Ordyna
Seth Peacock
Logan Pedersen
Scott Preston
Cooper Riggs
Daniel Sumsion
Emma Van Tassell
Matthew Walker
Ryan Wolff
Talmage Hilton
Mason Keep
Anthony Lapicola
Andrew McKenzie
Ellie Morrison
Nathan Nielson
Carson Payne
Brett Pedersen
Patric Platts
Samantha Richardson
Jacob Smith
Emilia Tolley
Nicholas Vorster
Brylee Wilcox

2023-2024 Seminar Speakers

During Fall '23 and Winter '24 semesters, we were pleased to have many great presenters at our Thursday Seminar series.

Those who presented during **Fall 2023** included:

Abhirup Datta (Johns Hopkins University): Combining Machine Learning with Gaussian Processes for Geospatial Data

Kimberly F. Sellers (NC State University): Dispersed Methods for Handling Dispersed Count Data

Alex Franks (UC Santa Barbara): Sensitivity to Unobserved Confounding in Studies with Factor-structured Outcomes

Alex Petersen (BYU): Graphical Modeling for Multivariate Functional Data

Jeffrey S. Morris (UPenn School of Medicine): Quantile Functional Regression for Distributional Regression of Biomedical Imaging Data

Huiyan Sang (Texas A&M): Graph Random Partition Models for Clustering, Classification, and Regression of Spatial and Network Data

David Arthur (Purdue): Bayesian Methods for Small Sample Psychometrics

Godwin Osabutey (University of Bologna, Italy): From Ising Block Model to Bayesian Inference: Limit Theorems and Parametric Analysis.

Michael Christensen (Duke): Utilizing Network Structure to Flexibly Model Areal Data

Those who presented during **Winter 2024** included:

Matt Koslovsky (Colorado State University): Accommodating Measurement Error in Multivariate compositional Count Data with Applications to Microbiome Research

Cameron Bale (Drexel University Lebow College of Business): Can We Protect Time Series Data While Maintaining Accurate Forecasts?

Brian Hartman (BYU): Personal Finance and Financial Independence

Matthew Heaton (BYU): Adjusting for Spatial Correlation in Machine and Deep Learning

Trevor Harris (Texas A&M): Climate Models, Variables & Projections

Lane Muranaka (BYU Career Director for Computer Science, Math, and Statistics): A Salary Negotiation Discussion-Resources, Tactics, and Strategies

Jyotishka Datta (Virginia Tech): Global-Local Shrinkage Priors: An Overview and New Directions

Amy Herring (Duke): Bayesian Learning of Clinically Meaningful Disease Phenotypes

Xinyi "Lucy" Lu (Utah State): Latent Trajectory Models for Spatio-temporal Ecosystem Dynamics

We are grateful to be able to have experts come to share their knowledge and experiences with our faculty and students. We would like to thank all of those who participated in our seminars. For more information on each seminar visit: **statistics.byu.edu/seminars**.

2024 Master's Graduates and Projects

Elissa Bailey (Dr. David Dahl): Structure Learning of Bayesian Networks from Posterior Sample Inference

Andrew Cannon (Drs. Jared Fisher and Gil Fellingham): Analyzing the Effects of NBA Head Coaches

Logan Clarke (Dr. Matthew Heaton): Analysis of Predictive Machine Learning Models

Benjamin Dahl (Dr. Matthew Heaton): Modeling Crash Risk on Roadway Networks using Bayesian Additive Regression Trees

Brigham Halverson (Dr. Matthew Heiner): Hierarchical Absorbing Markov Chains with Application in Class-Specific Combat Dynamics

Ryan Hilton (Dr. Alex Petersen): A Comparison of Methods to Summarize Functional Brain Connectivity Networks

Emily Jensen (Dr. Rich Warr): Scalable Nonstationary Space-Time Point Process Model for Traffic Accident Data using Spatial Warping

Spencer Kimball (Dr. Gil Fellingham): Predicted Gait Initiation in Real Time

Tiffany Love (Dr. Dennis Tolley): Template Matching and Mixed Modeling in Observational Data

Elizabeth Patterson (Drs. Jared Fisher and Dennis Tolley): Comparing Computational Strategies and Evaluating the Predictive Capability of the Grade of Membership Model

Christina Rhees (Dr. Matthew Heaton): A Comparison Between Non-linear and Linear Spatial Downscaling Techniques using Geographically Weighted Neural Networks

Anne Shurtz (Dr. William Christensen): Estimating Knee Angle from Noisy Sensors

Daniel Smith (Drs. Matt Heaton and Phil White): Crash Severity Prediction and Systematic Highway Safety Analysis using Bayesian Methods

Megan Smith (Dr. Shannon Tass): Analysis of Mental Health Related Emergency Department Visits in Utah

Colton Syndergaard (Dr. Brian Hartman): Mortality Curve Clustering

Tess Syndergaard (Dr. Natalie Blades): Global Statistical Test for Alzheimer's Disease

Tyler Ward (Dr. Garritt Page): Analyzing Shot Location in Tennis using Bayesian Modeling

John Whetton (Dr. David Dahl): Writing R Extensions in Rust

Make a Gift

Exciting things are happening in the Department of Statistics. As we strive to achieve the department's goal to help students develop their intellect and faith, our faculty teach the latest new concepts and skills, and administration and staff encourage and serve students. All help strengthen testimonies of Jesus Christ.

Your support helps this happen. Each donation makes a difference, no matter the size. Every penny goes directly to student research funding and scholarships. Please make a gift and continue the tradition of giving back.

Scan the QR code to make a donation, or visit our website at statistics.byu.edu (under the alumni & friends tab)

Alumni and Friends of BYU Statistics

Recruit an Intern or a Graduate

Send an email to career.placement@stat.byu.edu with the job description, qualifications, and how to apply for the position. The information you provide will be forwarded to students and/or recent graduates of the Department of Statistics and posted on our website.

Get connected on:

If you haven't already, create a professional profile for yourself on LinkedIn: Alumni and Friends of BYU Statistics / Actuarial Science. Stay up to date!

Like us on Facebook at: facebook.com/byustatistics

Follow us on Instagram: byustatistics

Please keep us up to date with your contact information!

To update your address, email statsec@stat.byu.edu

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