SCHOOL OF
PUBLIC HEALTH

UNIVERSITY OF MINNESOTA

DIVISION OF BIOSTATISTICS

ANNUAL REPORT 2022-2023

High D–dimer

High IL–6

High nucleocapsid antigen

Low Anti–nucleocapsid antibody

High D–dimer

High IL

15

4

5

4

7

21

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119

37

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2

Table of Contents

Dear Alumni, Students, Colleagues, and Friends of the Division of Biostatistics,

It is once again my pleasure to provide you with an update on annual activities in the Division of Biostatistics. The last academic year was eventful, and I appreciate you taking a few minutes to reflect with me on the achievements of the past year.

The Division of Biostatistics experienced unprecedented growth, adding five new faculty, part of seven new faculty hired during the 2021-2022 hiring cycle. This is the largest group of new faculty in the history of the Division. Included in this group are four new assistant professors: Ben Langworthy, Thierry Chekouo Tekougang (who was also appointed as the Medtronic Faculty Fellow), Steffen Ventz, and Caitlin Ward. They are an excellent group, who will make important contributions to the world-class research and educational programs in the Division. In addition, the Division was able to partner with the Masonic Cancer Center (MCC) to recruit Professor J. Sunil Rao to lead the Biostatistics Core of the Cancer Center. Dr. Rao was previously the Director of the Division of Biostatistics at the University of Miami and is an internationally recognized expert in the analysis of high-dimensional data and health equity statistics. His experience and leadership will be a tremendous asset to the Division and the MCC. In addition, we had three promotions: Erika Helgeson, Tom Murray, and Ashley Petersen were promoted to Associate Professor. Our faculty also continue to be recognized for their outstanding achievements; of note, Lecturer Marta Shore received the President's Award for Outstanding Service for her leadership of the Division's outreach work, and Sandra Safo was awarded the McKnight Land-Grant Professorship, the highest honor for a pre-tenure faculty at the University of Minnesota. Finally, after 50 years in the Division, Jim Neaton retired at the end of the academic year. I often say that Jim is on the Mount Rushmore of clinical trialists and his contributions to the field are too numerous to count. I congratulate Jim on his outstanding career and wish him the best of luck during retirement.

I'd also like to highlight some exciting new research projects led by faculty in the Division of Biostatistics. First, Professor Lynn Eberly is the co-PI of the Research Evaluating Vagal Excitation and Anatomical Links (REVEAL) project, along with several faculty members from the Medical School. REVEAL is a $21 million award to study the functional effects of vagus nerve stimulation. Second, Associate Professor Julian Wolfson will co-lead the Innovative Methods and Data Science Program in the Center for Learning Health System Sciences, along with Rui Zhang from the Department of Surgery. Third, the STRIVE platform, led originally by Professor Jim Neaton and now by Cavan Reilly, and supported by numerous faculty and staff in the Division of Biostatistics, opened for enrollment. The success of these three projects reflects the broader trajectory of the Division's research; the Division remains a global leader in the design and analysis of clinical trials, while also leveraging the opportunities provided by the rise of data science to take a leadership role in larger scientific initiatives on campus.

Enrollment in our graduate programs continued on an upward trend with total enrollment in our graduate programs reaching its highest level in 5 years with total enrollment at 104 students (49 PhD, 45 MS, 10 MPH). Of note, this includes the first cohort of the newly created MPH in Public Health Data Science, which has allowed us to reach a new student population and has expanded the scope of our graduate programs. In the last year, 26 students joined the ranks of our alumni and are now pursuing careers in academia, industry, and government. Our graduate programs continue to be regarded as among the top programs in the field of biostatistics, and our graduate students continue to receive local and national recognition for their achievements.

As many of you know, the Division of Biostatistics established an outreach program - Biostatistics Community Outreach and Engagement (BCOE) - that allows us to make a broader impact on our community beyond our traditional mission related to research and education. BCOE is led by Marta Shore and Anne Eaton, and is composed of faculty, staff, and students in the Division of Biostatistics. A highlight from last year was the outreach event with St. Paul Public Schools, where a group of teachers, instructional coaches, and guidance counselors visited the Division to learn more about biostatistics and public health. The event was a tremendous success and I look forward to BCOE's continued success.

The final announcement of what was a very eventful year is that, after 30 years, the Division of Biostatistics is now under one roof. It took a little longer than we'd hoped, but in June, the Division relocated all our faculty, staff, and students to University Office Plaza (2221 University Ave SE – next to the University's football stadium), which has been home to the CCBR since the late 1980s. It's hard to believe that just a few months ago, my office was in the Mayo Building and I was separated by half of a mile from the CCBR. It's been exciting to see the relocation become a reality and I think it has already brought positive change to the Division.

The Division of Biostatistics attracts some of the top prospective students in the field of biostatistics from prestigious undergraduate institutions throughout the United States and across the globe. Financial support is needed to attract talented students, and we would not be successful without the support of our philanthropic partners. With this in mind, I hope you'll consider making a generous contribution to the Biostatistics Fund (give.umn.edu/giveto/sphbiostat). Contributions to this fund provide us with the resources to recruit and train the future leaders of our discipline in a collegial and supportive environment. Thanks in advance for your ongoing support of the Division of Biostatistics.

I appreciate you taking a few minutes to learn about the accomplishments of the Division of Biostatistics. You can stay engaged with the Division on X (@umnbiostat; formerly Twitter) or in person at our annual receptions at ENAR and JSM – I hope to see you there!

Thanks, and best wishes for the coming year!

Joseph S. Koopmeiners, PhD
Mayo Professor and Head
Division of Biostatistics
School of Public Health
University of Minnesota

DONORS TO THE DIVISION OF BIOSTATISTICS
School of Public Health

We thank our alumni and friends of the Division for their generous support of the Biostatistics Dissertation Fellowship, Jacob E. Bearman Student Achievement Award, Genell Knatterud Biostatistics Clinical Trials Fund, James R. Boen Graduate Fund, John E. Connett First Year Student Award, and the Marcus O. Kjelsberg Clinical Trials Award.

In acknowledgment of our donor's generosity, this list recognizes contributions for the period of July 1, 2022 and June 30, 2023.

RESEARCH HIGHLIGHTS

Grant Activity

In fiscal year 2023 (FY23), the division brought in $20.7 million in grant awards from a total of 108 prime and collaborative grant awards.

Total Grant Dollars Awarded in FY23

- $16,946,736 (Prime Awards)
- $3,760,545 (Collaborative Awards)
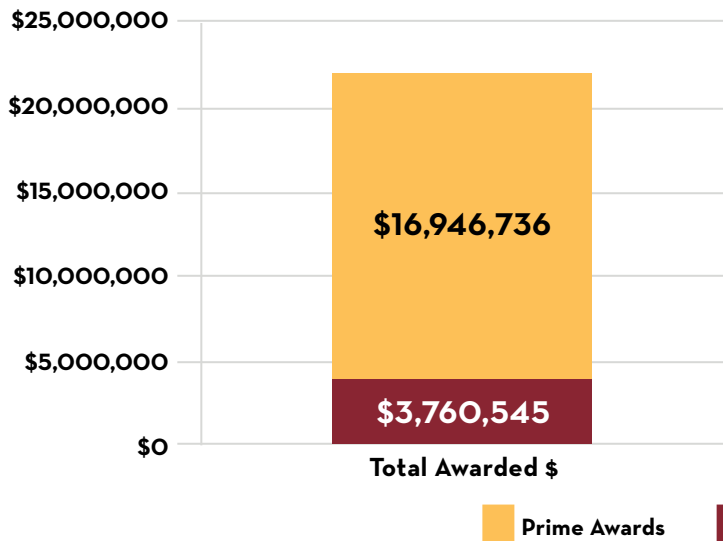
Total Awarded $
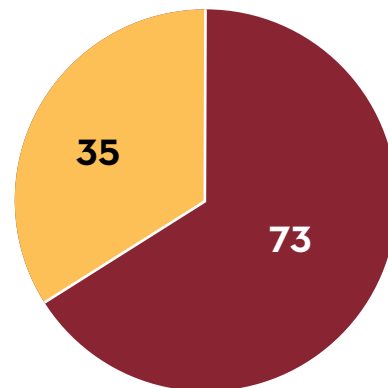
Number of Grants Awarded in FY23

- 35 (Prime Awards)
- 73 (Collaborative Awards)

Legend: Prime Awards / Collaborative Awards

FY23 GRANTS BY AWARD TYPE

Award Type	Prime Awards	Collaborative Awards
CDC		1
DHHS		2
DOD	1	
Foundation	1	2
Industry	1	
NIH Clinical Trial Contract	11	
PCORI	1	
PO1		3
P50		2
RO1	12	44
RO3		1
R18		2
R21		2
R35	1	
R37		1
R61		1
RF1		1
T32	1	1
UO1	3	7
U24		2
U54		1
UG1	1	
UG3		2
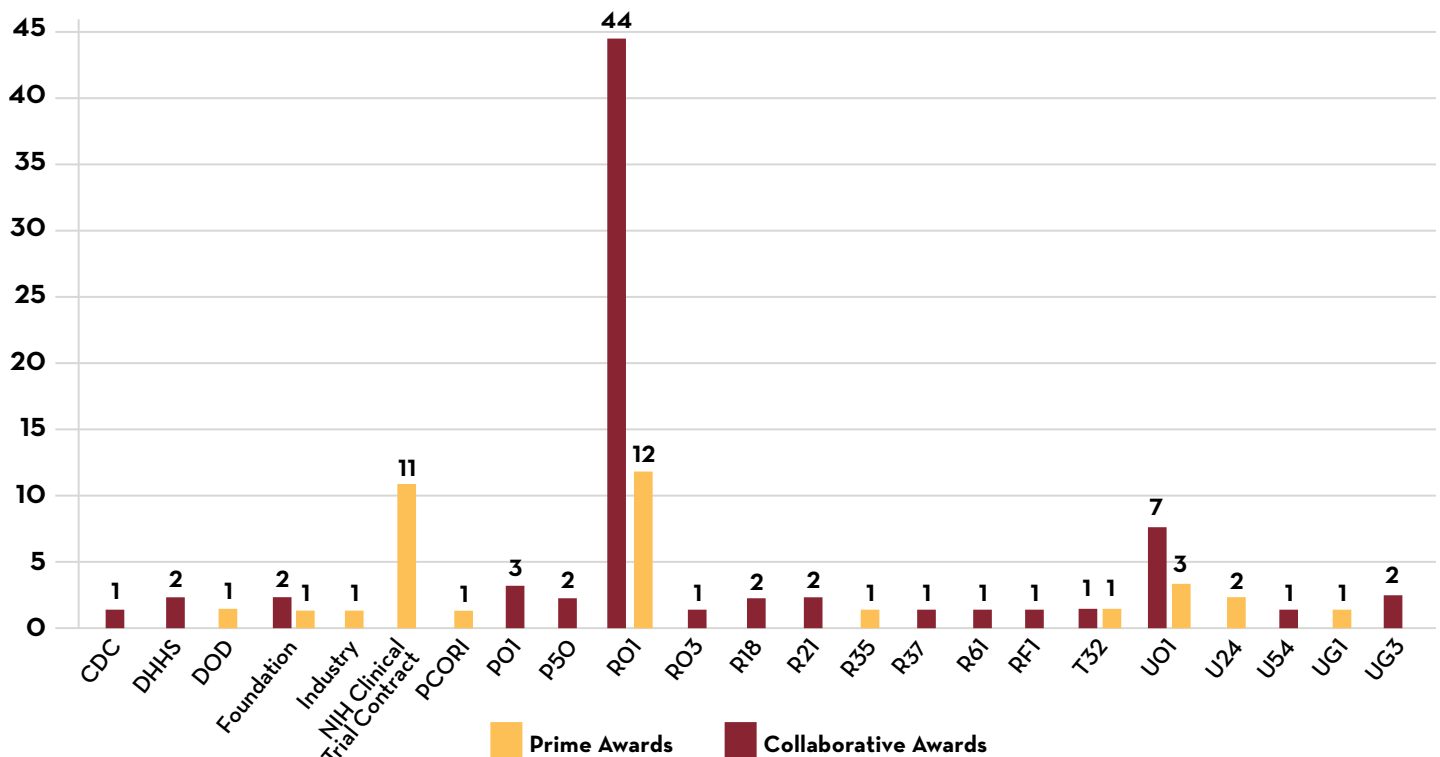
Legend: Prime Awards / Collaborative Awards

Publications

In calendar year 2022, our division faculty continued to be productive in publishing their research with a total of 187 published journal articles.

BIOSTATISTICS FACULTY PUBLICATIONS 2022
187 Total

Statistics in Medicine, 7

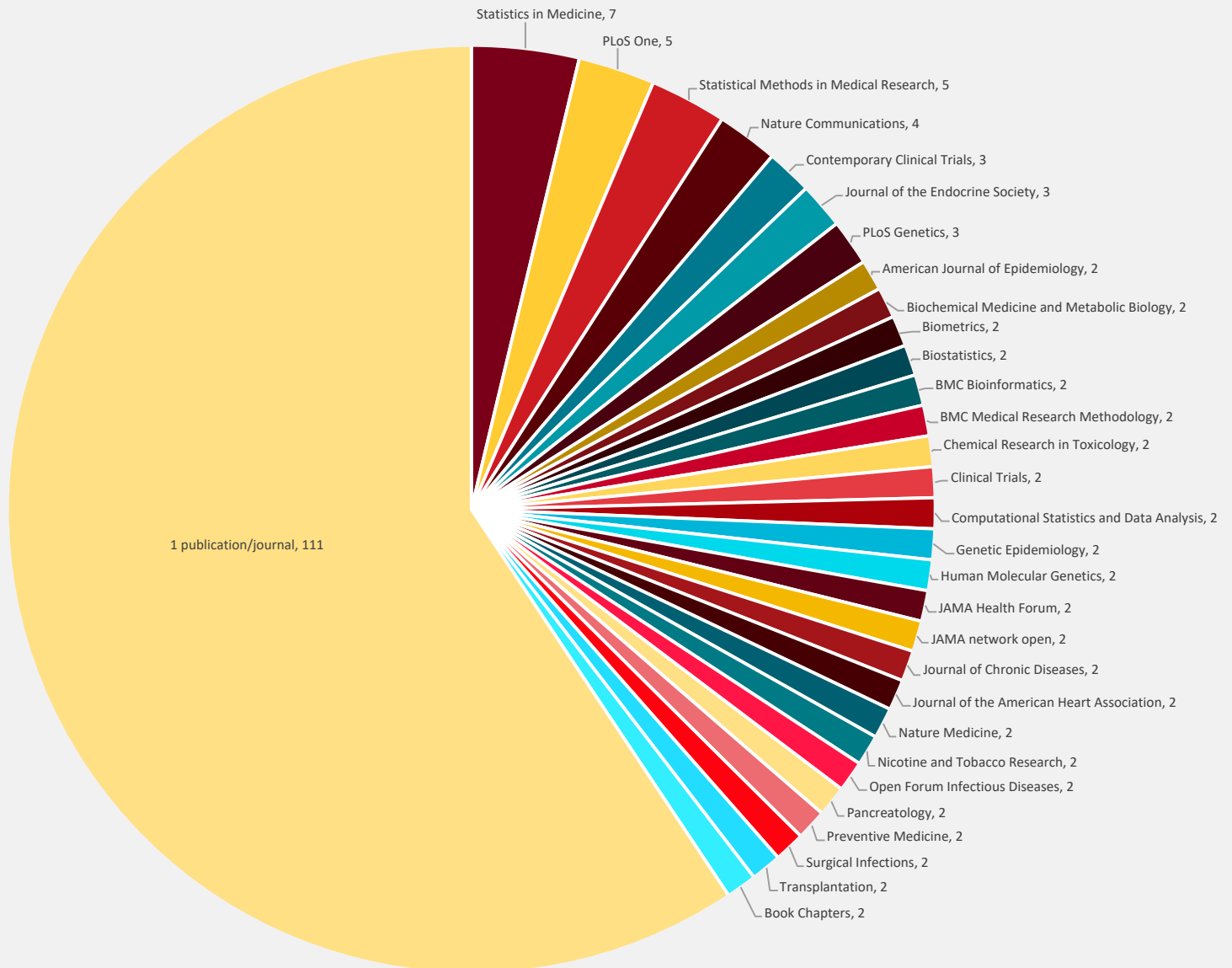PLoS One, 5

Statistical Methods in Medical Research, 5

Nature Communications, 4

Contemporary Clinical Trials, 3

Journal of the Endocrine Society, 3

PLoS Genetics, 3

American Journal of Epidemiology, 2

Biochemical Medicine and Metabolic Biology, 2

Biometrics, 2

Biostatistics, 2

BMC Bioinformatics, 2

BMC Medical Research Methodology, 2

Chemical Research in Toxicology, 2

Clinical Trials, 2

Computational Statistics and Data Analysis, 2

Genetic Epidemiology, 2

Human Molecular Genetics, 2

JAMA Health Forum, 2

JAMA network open, 2

Journal of Chronic Diseases, 2

Journal of the American Heart Association, 2

Nature Medicine, 2

Nicotine and Tobacco Research, 2

Open Forum Infectious Diseases, 2

Pancreatology, 2

Preventive Medicine, 2

Surgical Infections, 2

Transplantation, 2

Book Chapters, 2

1 publication/journal, 111

STRIVE

Just as SARS-CoV-2 rapidly spread around the globe, there is a threat of the next global pandemic arising from potential pathogens such as pandemic influenza or viruses yet undiscovered. Clinical trial infrastructure must be able to meet these emergent threats. Strategies and Treatments for Respiratory Infections and Viral Emergencies (STRIVE) is a platform designed for this. The STRIVE protocol is funded by the National Institute of Allergy and Infectious Diseases (NIAID) and led by Biostatistics faculty and staff at the CCBR in collaboration with nine international coordinating centers in Copenhagen, London, Sydney, France-ANRS, Washington, Hennepin, Nashville, New York and the Veterans Affairs. STRIVE is a master protocol which aims to provide an agile research platform able to investigate strategies and treatments that may improve the health of patients hospitalized with a respiratory infection.

This master adaptive protocol defines the scientific and operational framework of trials implemented as part of the platform. It allows for individual study-specific patient populations, sample sizes, and primary outcomes and is intended to rapidly assess a multitude of proposed treatments in series or combination against the prevailing standard of care for a variety of respiratory pathogens. This approach is intended to pre-position infrastructure and to facilitate rapid and flexible response with high standards of scientific rigor to support the development of consensus for standard of care. The key to success of master protocols like this will be to ensure appropriate sustainable funding and infrastructure along with a commitment from partnering clinical trial sites to be ready and willing to engage in clinical trials using the platform during both pandemic and non-pandemic times.

The CCBR provides coordination, management and oversight support for studies that occur within this master protocol and collaborates with partners, listed above, who are part of the STRIVE platform. Currently one trial is actively enrolling (Shionogi Protease Inhibitor) and one is under review by the FDA (BMS Immunomodulator Strategy).

REVEAL Project

Congratulations to Lynn Eberly and her co-PIs, John Osborn, Ziad Nahas, Hubert Lim, Sayeed Ikramuddin, and Vaughan Macefield who were awarded a $21 million National Institutes of Health-funded project that will take place over three years called The Research Evaluating Vagal Excitation and Anatomical Links (REVEAL) project. This study includes an interdisciplinary team from multiple departments across the Medical School, the College of Science and Engineering, and the School of Public Health. This project will also support one of our new faculty, Thierry Chekouo, who will serve as a co-investigator, and a biostatistics graduate assistant.

REVEAL aims to study the anatomical connections and functional effects of vagus nerve stimulation, or VNS, which is an FDA-approved treatment for epilepsy and depression. It incorporates a large-scale randomized clinical trial of VNS stimulation settings with up to 144 VNS patients along with three ancillary studies. Together, these studies will assess autonomic, cardiovascular, metabolic, immune, and gastrointestinal function in response to a broad range of VNS parameters. Dr. Eberly's expertise in clinical trials and neuromodulation and Dr. Chekouo's expertise in data integration and machine learning will contribute substantially to this project. The research team intends to generate one of the largest publicly available datasets on VNS function in humans.

Innovative Methods & Data Science Unit

A new unit in the Center for Learning Health System Sciences (CLHSS) at the University of Minnesota was recently established called the Innovative Methods and Data Science (IMDS) unit. This unit is co-led by Biostatistics Division faculty, Julian Wolfson, and Rui Zhang from the Department of Surgery. The focus of this unit is to develop novel computational, statistical, and other data science methods to rigorously quantify associations between novel, mutlimodal big data and health outcomes.

We have a couple of education changes to highlight for academic year 2022-23.

- The Division of Biostatistics enrolled its first 10 students in the newly created MPH in Public Health Data Science – a great start for this new program. This program offers students the opportunity to combine public health and data science into one degree and is designed to accommodate students interested in public health from a wide variety of backgrounds.

- We had a transition in the Director of Graduate Studies (DGS) role. Weihua Guan took over the DGS leadership role from Julian Wolfson, who served in this role for five years. We thank Dr. Guan for taking on this important education leadership role and thank Dr. Wolfson for his excellent work serving as the DGS for the last five years. Dr. Wolfson transitioned into a new leadership role, as the Program Director of the MPH in Public Health Data Science program.

2022-2023 STUDENT AWARDS

Division of Biostatistics Student Awards
The following students were recognized during the 2022-2023 academic years.

Jacob E. Bearman Student Achievement Award
The Bearman Award, presented annually in recognition of outstanding academic and professional achievement, is given in honor of Jacob "Pete" Bearman. Dr. Bearman was a faculty member in the Division from 1953 to 1978, headed the Division from 1956 to 1965, and was a pioneer in clinical trials methods and conduct. Dr. Bearman passed away in 2005.

The 2022-2023 recipient was:
Zhaotong Lin
Zhaotong Lin completed her PhD degree in June 2023 with Dr. Wei Pan as her dissertation advisor. Zhaotong is currently an Assistant Professor in the Statistics Department at Florida State University.

James R. Boen Graduate Award
The James R. Boen Graduate Award was established in honor of retired Biostatistics Professor James R. Boen. Dr. Boen specialized in the art of statistical consulting. This award recognizes biostatistics students whose achievements are strongest in applied biostatistics. Dr. Boen passed away in 2007.

The 2022-2023 recipient was:
Elise Palzer
Elise Palzer successfully defended her PhD in December 2022 with Drs. Eric Lock and Sandra Safo as her dissertation advisors. Elise is currently working in clinical trials at Precision For Medicine.

Sharon Ling Community Engagement Award
This award, established in 2022, annually recognizes a graduate student in the School of Public Health Division of Biostatistics, for their exemplary character and commendable contributions to their community, either within the Division, School, University or broader Twin Cities community. This award was established in honor of Sharon Ling, a biostatistics PhD student who significantly enhanced the lives of her community through her teaching, public health research, volunteerism, and involvement in a variety of university organizations.

The 2023 recipient was **Sarah Samorodnitsky**. Sarah completed her PhD in June 2023 working with Dr. Eric Lock as her dissertation advisor. Sarah was an active leader in the Division of Biostatistics. Sarah is a post-doctoral associate at Fred Hutchinson Cancer Research Center in Seattle.

Biostatistics Research Assistant Award
The Biostatistics Research Assistant Award recognizes outstanding work as a research assistant and acknowledge contribution to the Division's statistical methods and collaborative research mission.

The 2022-2023 recipients were:
Justin Clark
Jialing Liu
Han Lu

Biostatistics Teaching Assistant Award

The Biostatistics Teaching Assistant Award recognizes outstanding service as a teaching assistant and acknowledges contributions to the Division's educational mission.

The 2022-2023 recipients were:

Emma Billmyer
Julia Kancans
Cheng-Chang Wu

Delta Omega

Delta Omega is an honorary society for graduate studies in public health. Delta Omega celebrates excellent academic achievement, devotion to public health principles, and outstanding service in public health.

The 2022-2023 recipients were:

Jessica Butts
Katherine Giorgio
Daniel Waller

Student Poster Awards

Beginning 2022, Biostatistics instituted a new Poster Award. This award highlights the research being done by our students. 3 poster awards were presented in May 2023.

Best poster by a Student in their 1st or 2nd year

Martha Barnard
"Adjacency Matrix Clustering for Sequential Human Activity Data"

Best Poster by a Student in their 3rd year or higher

Jiuzhou Wang
"Multiple Augmented Reduced Rank Regression for Pan-Cancer Analysis"

Audience Favorite Student Poster Award

Zilin Wang
"How to Find Bigfoot"

Can Zhang
"A Bayesian Measurement Error Model for the Analysis of the Effect of Cigarette Filter Ventilation on Biomarker Exposures"

Regional/National and University of Minnesota Student Award Recipients

Congratulations to the following students who won awards at regional and national conferences or from the University of Minnesota.

Student	Organization	Award
Wenhao Cao	*International Chinese Statistical Association (ICSA)*	2023 Honorable Mention, Student Paper Award Competition, ICSA Applied Statistics Symposium
Souradipto Ghosh Dastidar	*Data Institute at the University of San Francisco*	2023 Data Science Conference Student Travel Award
Jonathan Kim	*ENAR*	2023 Distinguished Student Paper Award
Aparajita Sur	*The Gerontological Society of America*	2022 Interdisciplinary Paper Award, Emerging Scholar and Professional Organization
Jiuzhou Wang	*American Statistical Association*	2023 Symposium on Data Science & Statistics Student Travel Award
Jiuzhou Wang	*School of Public Health, University of Minnesota*	2023 SPH 3-Minute Thesis competition, First Place Winner

Degrees were conferred from July 2022 through June 2023.

Doctor of Philosophy (PhD)

Andy Becker
Clustering Methods for Correlated Data
(Advisor: Julian Wolfson)

Sandra Castro-Pearson
Applications of ROC Type Curves in Clinical Trials
(Advisors: Xianghua Luo and Chap Le)

Clara Drew
Analyzing Latent Variables with Observational Data and Applications in Infectious Disease
(Advisor: Cavan Reilly)

Zhaotong Lin
Robust Mendelian Randomization Methods Based on Constrained Maximum Likelihood for Causal Inference
(Advisor: Wei Pan)

Elise Palzer
Multi-source Data Decomposition and Prediction for Various Data Types
(Advisors: Eric Lock and Sandra Safo)

Jennifer Proper
Bayesian Methods for Response-Adaptive Randomization and Drug Repurposing
(Advisor: Tom Murray)

Sarah Samorodnitsky
Bayesian Dimension Reduction and Prediction with Multiple Datasets
(Advisor: Eric Lock)

Master of Science (MS)

Robert Aidoo
Andres Esteban Arguedas Leiva
Seth Bergstedt
Eric Connor
Samira Deshpande
Maria Godinez
Monica Iram
Ziou Jiang
Anthony Johnson
Yi Kang
Chen Ling
Jingqi Liu
Mingming Pan
Abby Vogel
Daniel Waller
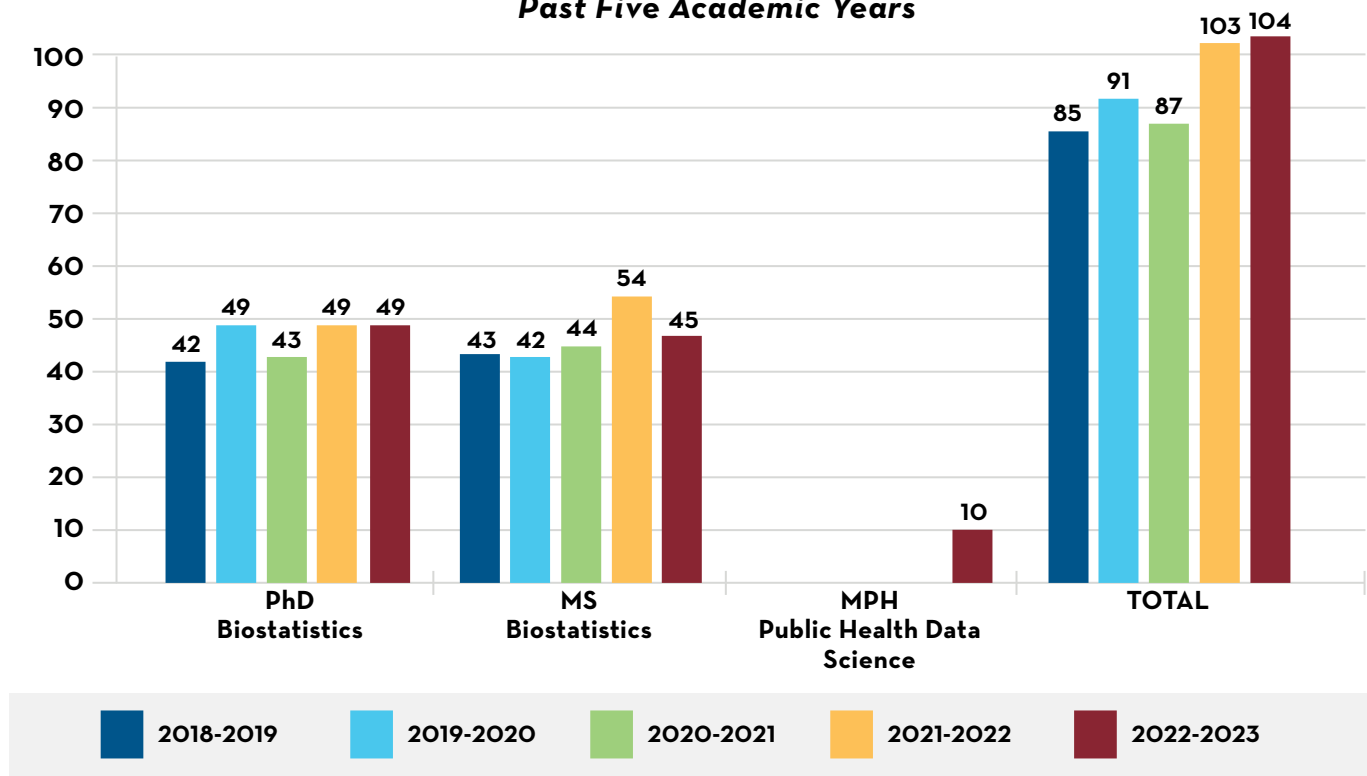**Daniel Whitford**
Yuanqi Yang
Linnea York
Meng Ting Zhao

Applied Biostatistics Certificate

Christi Sullivan

STUDENT ENROLLMENT IN BIOSTATISTICS
Past Five Academic Years

Chart data:

	PhD Biostatistics	MS Biostatistics	MPH Public Health Data Science	TOTAL
2018-2019	42	43		85
2019-2020	49	42		91
2020-2021	43	44		87
2021-2022	49	54		103
2022-2023	49	45	10	104

BIOSTATISTICS COURSE ENROLLMENT

	2020-2021	2021-2022	2022-2023
SPH Service Course Enrollment	829	820	791
Biostatistics Course Enrollment	509	457	557
Total Biostatistics Course Enrollment	1338	1279	1348
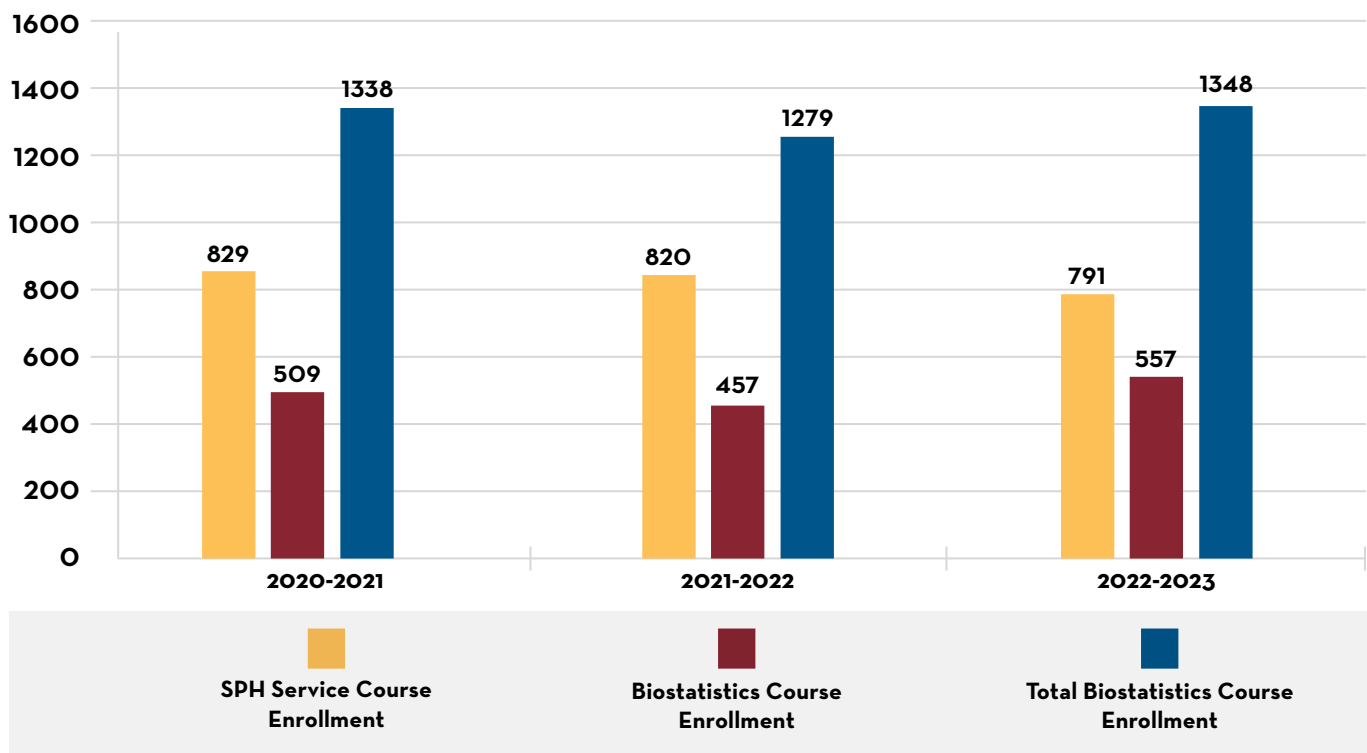
DEI & OUTREACH HIGHLIGHTS

Outreach Event with St. Paul Public School Staff

Biostatistics Community Outreach and Engagement (BCOE) hosted an event for a group of teachers, instructional coaches, and career counselors from St. Paul Public Schools (SPPS) on March 21, 2023. This event, organized by Marta Shore, gave the SPPS staff an opportunity to learn more about the field of biostatistics and public health through conversations with Biostatistics faculty, staff and students about the skills needed to be successful and why they chose this field.

Statistical Consulting at Coon Rapids High School

BCOE had 16 students and 2 faculty members serve as statistical consultants to high school students in Coon Rapids as they conducted research in a virtual world called the Islands. MPH students in Health Data Science and Epidemiology joined MS and PhD students in Biostatistics to help students determine sample size, analysis methods, and how to best present their results. These students have been surveyed about their experience, and we are analyzing the results.

THE BIG MOVE

In spring 2023, the Division consolidated into a single space at 2221 University Ave SE, University Office Plaza – right next the University's stadium. This is the first time the Division has been in one place in over 30 years. The early returns have been positive, facilitating greater collaboration and a greater sense of community.

YEARS OF SERVICE

2023 Years of Service Honorees

Faculty and staff who have worked at the School of Public Health for five or more consecutive years are recognized for their dedication and service to the school at five-year intervals. The school and our division are fortunate to have very committed staff and faculty. Thank you for your service!

5 Years of Service
Erika Helgeson
Tom Murray
Hanna Root
Sandra Safo
Marta Shore

10 Years of Service
Laura Le
Leslie Long-Simpson
David Vock

15 Years of Service
Kyle Rudser

25 Years of Service
Lynn Eberly
Wei Pan

30 Years of Service
Eileen Denning
Eric Krum
Linda Zenner

40 Years of Service
Gary Collins

50 Years of Service
Jim Neaton

FACULTY HIGHLIGHTS

President's Award for Outstanding Service

Lecturer Marta Shore was awarded the University of Minnesota President's Award for Outstanding Service. Marta is receiving this award for her service to our graduate students as a mental health advocate, her contributions related to DEI and antiracism, and her outreach work with Saint Paul Public Schools and Coon Rapids Public Schools. Congratulations to Marta for this outstanding honor!

McKnight Land-Grant Professor

Congratulations to Sandra Safo who was named a University of Minnesota McKnight Land-Grant Professor. The McKnight Land-Grant Professorship Program is designed to advance the careers of the university's most promising assistant professors who are judged to have the potential to make significant contributions to their departments and to their scholarly fields. Sandra will hold the McKnight Land-Grant Professor designation for a two-year period.

American Statistical Association (ASA) Fellow

Congratulations to Joe Koopmeiners for being selected as one of 2023's Fellows of the American Statistical Association (ASA). Joe's citation is: For outstanding contributions to methodological developments in adaptive clinical trials, early phase trials, tobacco regulatory science, and biomarker validation; for his successful translation of knowledge both to and from high impact collaborative science; for his leadership in academic biostatistics; and for his many contributions to student mentoring and professional service. The ASA Committee on Fellows can elect only up to one-third of one percent of the total association membership as Fellows each year.

FACULTY HIGHLIGHTS

Promotions
Congratulations on the achievements of the following faculty who were promoted:

- **Erika Helgeson, PhD** – Promoted to Associate Professor *(June 2023)*
- **Thomas Murray, PhD** – Promoted to Associate Professor *(June 2023)*
- **Ashley Peterson, PhD** – Promoted to Associate Professor *(June 2023)*

New Faculty Hires
Welcome to our newest faculty members!

- **Benjamin Langworthy, PhD** – Assistant Professor *(July 2022)*
- **Thierry Chekouo Tekougang, PhD** – Assistant Professor *(August 2022)*
- **Steffen Ventz, PhD** – Assistant Professor *(August 2022)*
- **Caitlin Ward, PhD** – Assistant Professor *(November 2022)*
- **J. Sunil Rao, PhD** – Professor *(January 2023)*

JIM NEATON'S RETIREMENT

After 50 years at the University of Minnesota in Biostatistics, Jim Neaton retired on August 1, 2023. We held a retirement celebration event for Jim on July 20, 2023, at the McNamara Alumni Center. We thank Jim for his dedication and many contributions to the division including:

Major contributions to clinical trials research:

- Cardiovascular Disease Research: MRFIT, TOMHS, Prospective Study of Blood Pressure & ESRD
- HIV/AIDS: CPCRA, ESPRIT, INSIGHT (SMART/START)
- EBOLA: PREVAIL
- COVID-19: ACTIV-3/TICO, ITAC, OTAC, STRIVE

Training the next generation of researchers:

- Taught PubH 7420 to over 1,500 students during 34 years of teaching this class
- Oversaw the NHLBI training grant in clinical trials and Summer Institute in Biostatistics (SIBS)
- Numerous clinical mentees

In recognition of Jim's service and contribution to the University and School of Public Health, he has been awarded the title of Professor Emeritus. Congratulations!

Saonli Basu
Professor of Biostatistics
Adjunct Professor, Statistics,
University of Washington
Co-Director, Analytics Core,
The Masonic Institute for the
Developing Brain (MIDB)
Co-Director, Interdisciplinary
Biostatistics Training Program in Genetics and Genomics

M.S., 1998, Statistics, *Indian Statistical Institute, Kolkata, India*
Ph.D., 2005, Statistics, *University of Washington*

Saonli's research interests include statistical modeling of high-dimensional data with applications in statistical genetics, imaging genetics and genomics. In particular, she is interested in correlated data, high-dimensional inference, and risk prediction modeling. Her collaborative work addresses statistical issues in identifying genetic and environmental influences on substance abuse in adolescence, childhood cancer, mental health in multi-ethnic populations.

Ann M. Brearley
Associate Professor of Biostatistics

Ph.D., 1986, Chemistry,
University of Minnesota
M.S., 2008, Biostatistics,
University of Minnesota

Ann Brearley divides her time between collaborative research and teaching. She is a member of the Biostatistical Design and Analysis Center (BDAC) of the Clinical and Translational Science Institute (CTSI) where her collaborative research interests include the design, monitoring and analysis of clinical trials, particularly medical research aimed at helping people in low and middle income countries (LMIC). She develops and teaches in-person and online courses in introductory biostatistics, biostatistical literacy, clinical trials, and consulting. Her own research focuses on enabling excellent research to happen, by educating, mentoring, and developing teaching and learning resources for people on both sides of the interface between biostatisticians and public health and medical researchers, including leading the development of the https://biostats4you.umn.edu/ website. She received the Charles N. Hewitt Creative Teaching Award from the University of Minnesota School of Public Health in 2014.

Thierry Chekouo
Assistant Professor of Biostatistics

Ph.D., 2013, Statistics,
University of Montreal

Thierry Chekouo's research interests are in developing new statistical frameworks for analyzing datasets characterized by high dimensionality and complex structures such as high-throughput genomic, epigenomic, transcriptomic, proteomic and imaging data. He has been broadly interested in Bayesian statistical methods, variable selection, clustering and bi-clustering, functional data analysis, and software development. A special focus is on developing integrative Bayesian models combining different sources of data for biomarker discovery and clinical prediction. Those models can take into account prior biological knowledge in order to better predict clinical outcomes.

Biyue Dai
Assistant Professor of Biostatistics

M.S., 2016, Biostatistics,
University of Iowa
Ph.D., 2019, Biostatistics,
University of Iowa

Biyue Dai is a member of the Coordinating Centers for Biometric Research (CCBR), where she works on several international clinical trials and epidemiological studies related to advanced HIV and HIV-associated meningitis. Her current research activities involve the design, implementation, monitoring and statistical analysis of clinical trials, as well as statistical methods research motivated by data collected through those studies.

Anne Eaton
Assistant Professor of Biostatistics

M.S., 2010, Biostatistics,
University of Minnesota
Ph.D., 2020, Biostatistics,
University of Minnesota

Anne Eaton's research interests include survival analysis, multistate models, and complex censoring and observation processes. She is also interested in clinical trial design and analysis, including dose-finding trials in oncology. She is a member of the Biostatistics Core of the Masonic Cancer Center.

Lynn E. Eberly
Professor of Biostatistics

M.S., 1994, Statistics, *Cornell University*
Ph.D., 1997, Statistics, *Cornell University*

Lynn Eberly's current research interests involve methods and applications for multi-modal medical imaging data, such as MRI, diffusion MRI, functional MRI, and MR spectroscopy, any of which may involve clustered, longitudinal, and functional data. She has particular interest in the areas of neurology/neuroscience, psychiatry/psychology, and endocrinology. Lynn is a collaborator on many projects related to imaging in these areas. She teaches research skills for Biostatistics doctoral students. She was given the Leonard M. Schuman Award for Excellence in Teaching in the School of Public Health in 2002. She is a Fellow of the American Statistical Association and was the inaugural winner of the Biostatistician Mentor of the Year Award in 2016, given by the University's Clinical and Translational Science Institute. Lynn is a member of the inaugural team to be inducted into the University's Academy of Excellence in Team Science, in 2019, for the team's longstanding and impactful research in type I diabetes. Lynn has been the Associate Dean for Faculty Affairs for the School of Public Health since 2020.

Mark Fiecas
Associate Professor of Biostatistics

Ph.D., 2012, Biostatistics,
Brown University

Mark's methodological research interests include time series analysis, spatio-temporal models, and estimating high-dimensional parameters. He is also interested in neuroimaging studies and imaging genetics. He is actively involved in a number of research projects with the Department of Psychiatry and Behavioral Sciences. He is co-director of the Analytics Core at the Masonic Institute of the Developing Brain.
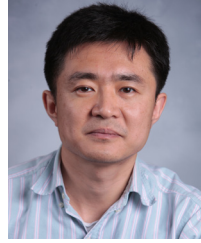
Weihua Guan
Associate Professor of Biostatistics
Director of Graduate Studies

M.S., 2001, Statistics, *Texas A&M University*
Ph.D., 2010, Biostatistics,
University of Michigan

Weihua Guan has research interests in statistical genetics, and identification of genes involved in complex diseases and traits, with special interests on developing statistical and analytical methods for the genetic and epigenetic data using new high-throughput technologies.

Erika Helgeson
Associate Professor of Biostatistics

Ph.D., 2017, Biostatistics,
University of North Carolina

Erika Helgeson's methodological research interests include statistical machine learning and nonparametric methods for complex, high-dimensional data. Her applied research interests include transplantation, COPD, and oral health.


James S. Hodges
Professor of Biostatistics

M.A., 1986, Public Affairs,
University of Minnesota
Ph.D., 1985, Statistics,
University of Minnesota

Jim has collaborated with researchers in many areas of health care including endocrinology, dentistry, neurology, infectious diseases, cardiovascular diseases, psychology/psychiatry, cancer, rheumatology, nephrology, and gastroenterology as well as researchers in sociology, demography, marketing, wildlife management, ornithology, horticulture, combat analysis, military logistics, simulation models, and airport safety. His main statistical research area now is causal inference applied specifically to meta-analysis.
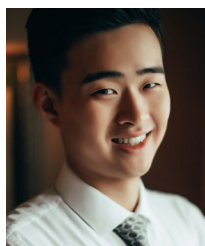
Jue (Marquis) Hou
Assistant Professor of Biostatistics

M.S., 2013, Statistics,
University of Illinois at Urbana-Champaign
Ph.D., 2019, Mathematics,
University of California San Diego

Jue Hou's research interests span across survival analysis, high-dimensional regression and causal inference. His methodological and theoretical research is motivated by the common challenges in mining large biomedical data for precision medicine, including missing/imprecise data, sampling/confounding bias and post model selection inference. His application research focuses on the risk/prognosis prediction and treatment effect assessment using electronic health records data for a wide range of diseases, including cancers, obesity, type 2 diabetes, multiple sclerosis, and rheumatoid arthritis.

Jared Huling
Assistant Professor of Biostatistics

Ph.D., 2017, Statistics,
University of Wisconsin-Madison

Jared Huling's research interests focus on the development of causal inference, precision medicine, and statistical/machine learning methodology for the analysis of complex observational studies. He is particularly interested in addressing various forms of population and effect heterogeneity with the aim of improving patient health outcomes. His work in this area has involved applications in health system risk modeling, in personalizing health system intervention enrollment decisions, and comparative effectiveness through use of Electronic Medical Records.

Joseph Koopmeiners
Professor of Biostatistics
Division Head

M.S., 2004, Biostatistics,
University of Minnesota
Ph.D., 2009, Biostatistics,
University of Washington

Dr. Koopmeiners's research interests include Bayesian methods for clinical trials, causal inference, and biomedical imaging. His statistical methods research is strongly motivated by his collaborations related to cancer research and other areas. Current projects include leading the Biostatistics and Data Management Core for a multi-institution program project in the area of tobacco regulatory science and the development of imaging technology as a diagnostic tool for prostate cancer.

Benjamin Langworthy
Assistant Professor of Biostatistics

Ph.D., 2020, Biostatistics,
University of North Carolina

Ben Langworthy's methodological research interests include competing risks survival analysis, clustered data, and causal inference. He has worked on a wide range of collaborative areas which include oncology, home and community based services for patients with Alzheimer's and related dementias, improving hospital outcomes for high risk patients, and pediatric medicine.

Chap T. Le
Distinguished Professor of Biostatistics
Director of Biostatistics
Masonic Cancer Center
- University of Minnesota

M.A., 1971, Mathematics,
California State University - Fresno
Ph.D., 1978, Statistics,
University of New Mexico

Dr. Le teaches PubH 7405 (Biostatistics Inference I) and PubH 7470 (Study Designs in Biomedical Research), both in the fall semesters and short course, PubH 6432 (Selected Topics in Clinical and Translational Research) in the summer. His collaboration has focused on analyses of survival and categorical data from clinical and translational research projects. His methodological research interests include epidemiological methods, crossover designs, survival analysis, logistic regression, correlated binary data, ordered alternatives, ROC curves, the design and analysis of in vitro experiments for studying cancer drugs (chemo combination therapies) and, recently, personalized medicine, ROC curve as applied to survival analysis, ROC curve as applied to propensity scores.

Dr. Le is the author of many research articles and several textbooks: Fundamentals of Biostatistical Inference (1992), Health and Numbers (1995, 2001, and 2010), Applied Survival Analysis (1997), Applied Categorical Data Analysis (1998),

Introductory Biostatistics (2003, 2016 – Second Edition with Lynn Eberly), and Statistics Quick Reference Guide (2007), Categorical Data and Translational Research (2010). See the full list of publications on Google Scholar:https://scholar.google.com/citations?hl=en&user=1C3d6y8AAAAJ&view_op=list_works&sortby=pubdate

Eric Lock
Associate Professor of Biostatistics

Ph.D., 2012, Statistics,
University of North Carolina

Eric's research concerns the analysis of high-dimensional and complex data, with a focus on applications in genomics and molecular biology. His particular interests include the integration of multi-source data, tensor methods for multi-way data, exploratory factorization and clustering methods, and Bayesian nonparametric inference.

Xianghua Luo
Professor of Biostatistics

M.S., 2000, Quaternary Geology,
Peking University
Ph.D., 2005, Biostatistics,
Johns Hopkins University

Xianghua Luo's research interests include methods and applications for recurrent event data, survival data, and longitudinal data; design and analysis of clinical trials. Collaborations include cancer research, blood and marrow transplantation (BMT), tobacco use and smoking cessation. Dr. Luo is a member of the Biostatistics Core of the Masonic Cancer Center.

Andy Mugglin
Research Associate Professor of Biostatistics

Ph.D., 1999, Biostatistics,
University of Minnesota

Andy Mugglin's research interests include clinical trials, Bayesian, adaptive, and other innovative clinical trial designs; Bayesian hierarchical modeling, spatio-temporal modeling, and computing. He also consults

extensively in clinical study design for the medical device and pharmaceutical industries and serves on Data Monitoring Committees for various ongoing clinical trials.

Thomas Murray
Associate Professor of Biostatistics

M.S., 2011, Biostatistics,
University of Minnesota
Ph.D., 2014, Biostatistics,
University of Minnesota

Thomas Murray's methodological research is motivated by his collaborative work in clinical trials. His interests include Bayesian adaptive designs for early phase clinical trials, methods for leveraging real-world data to improve efficiency of randomized clinical trials, and design considerations and analysis methods for personalized decision-making using data from randomized clinical trials. The latter includes methods for developing adaptive treatment strategies using data from sequential multiple assignment randomized trials. He has collaborated in the applied areas of cardiology, nephrology, neurology, oncology and infectious disease.

James D. Neaton
Professor of Biostatistics

M.S., 1970, Biometry,
University of Minnesota
Ph.D., 1984, Biometry,
University of Minnesota

Jim Neaton's research interests are in the design and conduct of clinical trials. He currently is the leader of a large international clinical trials network called INSIGHT that is studying treatments for HIV and other infectious diseases, including COVID-19. He is also actively involved trials for the prevention and treatment of Ebola virus disease in West Africa. He serves on data monitoring committees for studies sponsored by the National Institutes of Health and the pharmaceutical and device industry. He is Fellow of the American Statistical Association and the Society for Clinical Trials.
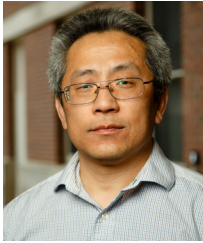
Wei Pan
Professor of Biostatistics

M.S., 1995, Statistics,
University of Wisconsin, Madison
Ph.D., 1997, Statistics,
University of Wisconsin, Madison

Wei Pan has research interests in statistical genomics and genetics, neuroimaging data analysis, machine learning and data mining. He has taught courses on survival analysis, categorical data analysis, linear models and generalized linear models, microarray data analysis, statistical learning and data mining.

Ashley Petersen
Associate Professor of Biostatistics

Ph.D., 2016, Biostatistics,
University of Washington

Ashley Petersen's research focuses on pedagogical innovations in statistics education and collaborative research in ovarian cancer screening, tobacco prevention and cessation, dentistry, and other areas of public health and medicine. She has developed methods within the area of statistical learning and now focuses on the application of these. She is a member of the Biostatistics Core of the Masonic Cancer Center, where she collaborates with investigators on a range of applications.

J. Sunil Rao
Professor of Biostatistics
Director of Biostatistics,
Masonic Cancer Center

M.S., 1991, Biostatistics,
University of Minnesota
Ph.D., 1994, Biostatistics,
*University of Toronto*

J. Sunil Rao's research focuses on developing new statistical methods for modeling complex data that can cover a range of possibilities from cancer genomics to contextual data and health disparity estimation. This has included work on high dimensional modeling, mixed model prediction, model selection, small area estimation, bump/mode hunting, and active information.

Cavan Reilly
Professor of Biostatistics

M.A., 1995, Economics,
New School for Social Research
M.A., 1996, Statistics, *Columbia University*
Ph.D., 2000, Statistics, *Columbia University*

Cavan Reilly has research interests in a variety of areas including clinical trials and in the clinical application of high dimensional biological assays. He primarily works on problems in infectious diseases including COVID-19, Ebola virus disease, and HIV/AIDS.
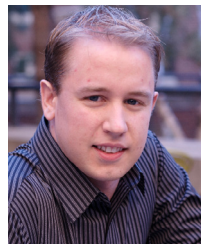
Kyle Rudser
Professor of Biostatistics

M.S., 2005, Biostatistics,
University of Washington
Ph.D., 2007, Biostatistics,
University of Washington

Kyle Rudser's research interests include the design, monitoring, and analysis of clinical trials, survival analysis, longitudinal analysis, and nonparametric approaches. He is Director of the Biostatistical Design and Analysis Center (BDAC), a group that is part of the Clinical and Translational Science Institute (CTSI), which is involved in a wide variety of collaborative projects with clinical and translational science investigators throughout the Schools of Medicine, Nursing, Dentistry, and Public Health and Colleges of Pharmacy and Veterinary Medicine. He also leads the Scientific and Data Coordinating Center for the Prevention of Lower Urinary Tract Symptoms (PLUS) Research Consortium and the biostatistical support for the Center for Pediatric Obesity Medicine in the Department of Pediatrics.

Sandra Safo
Assistant Professor of Biostatistics

Ph.D., 2014, Statistics,
University of Georgia

Sandra Safo is interested in developing supervised and unsupervised statistical and machine learning methods for data integration, classification, clustering, and prediction with applications to HIV, chronic obstructive pulmonary disease (COPD), cardiovascular disease (CVD), and other complex diseases.

Lianne Siegel
Assistant Professor of Biostatistics

Ph.D., 2021, Biostatistics,
University of Minnesota

Lianne Siegel's methodological research interests include multivariate and network meta-analysis, and the design and analysis of clinical trials. She is especially interested in individual participant data meta-analysis and the design and analysis of pragmatic clinical trials, including cluster randomized trials. She is currently supporting trials assessing interventions related to COVID-19 and traumatic brain injury.

Steffen Ventz
Assistant Professor of Biostatistics

MPhil, 2010, Statistics,
Bocconi University, Milan, Italy
Ph.D., 2013, Statistics,
Bocconi University, Milan, Italy

Steffen Ventz's methodological research interests include Bayesian statistics, statistical decision theory and optimal design of sequential experiments, response adaptive clinical trial designs, meta-analyses, transfer- and federate-learning. His applied research focuses on oncology, infectious diseases, and comparative effectiveness research.

David Vock
Associate Professor of Biostatistics
McKnight Presidential Fellow

M.Stat., 2009, Statistics,
North Carolina State University
Ph.D., 2012, Statistics,
North Carolina State University

David develops methods for in causal inference — a set of statistical tools used to determine the effect of an intervention from observational data – and dynamic treatment regimes, which are used to evaluate and advance personalized treatment strategies. Much of his methodological work has been motivated by applications in organ transplantation, regulatory tobacco science, and oncology. David is an expert in the design and analysis of sequential multiple assignment randomized trials, a type of trial design to study dynamic treatment regimes, and currently serves as the lead statistician for four SMARTs including trials to test adaptive treatment strategies in pediatric obesity, smoking cessation, and adolescent depression.

Caitlin Ward
Assistant Professor of Biostatistics

M.S., 2018, Biostatistics, *University of Iowa*
Ph.D., 2021, Biostatistics, *University of Iowa*

Caitlin Ward's methodological research focuses on the development of Bayesian models in settings with complex or correlated data, such as spatio-temporal disease mapping, latent growth modeling, and infectious disease epidemiology. She is also interested in improving computational techniques for implementing these methods. She has collaborated across a wide array of disciplines, including nursing, neuroradiology, communication sciences, and veterinary medicine.

Julian Wolfson
Associate Professor of Biostatistics

Ph.D., 2009, Biostatistics,
University of Washington

My research interests include causal inference and statistical machine learning for complex data. I apply causal inference methods to understand the biological pathways underlying treatment and discover surrogate endpoints. I develop statistical machine learning tools for making predictions from complex datasets, including large-scale electronic health record data and sensor data from mobile devices. I am also a consulting statistician for several ongoing clinical trials.

2022-2023 GRADUATE FACULTY MEMBERS

Tianzhong Yang
Assistant Professor of Biostatistics

M.P.H, 2012, Biostatistics and Epidemiology, *Boston University*
Ph.D., 2018, Biostatistics, *University of Texas Health Science Center at Houston*

Tianzhong's research interest lies in genetic epidemiology and statistical genetics. She has been working on methodology development related to gene-by-environment interaction analysis, high-dimensional mediation analysis, multiple-trait analysis, and integrative analysis of omics data. She is also a member of the Childhood Cancer Genomics Group, where she collaborates to study pediatric cancer etiology and outcome.
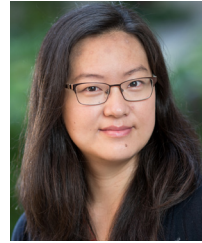
Lin Zhang
Associate Professor of Biostatistics

M.S., 2007, Biology, *Texas A&M University*
Ph.D., 2012, Statistics, *Texas A&M University*

Lin's primary research interest is methodology development for high-dimensional medical imaging and genetic data analysis. Her research covers spatial and spatiotemporal modeling, functional data analysis, and graphical modeling, and Bayesian feature selection.

2022-2023 INSTRUCTORS

Laura Le
Lecturer, Biostatistics

M.S., 2008, Statistics, *University of Minnesota*
Ph.D., 2017, Statistics Education, *University of Minnesota*

Laura Le teaches several biostatistical service courses, both in-person and online, including PubH 6414 (Biostatistical Literacy), PubH 6450 (Biostatistics I), PubH 6451 (Biostatistics II), and PubH 7461 (Exploring and Visualizing Data in R). Laura received a B.A. degree in Mathematics and Statistics from Luther College and finished her Ph.D. in Educational Psychology, specializing in Statistics Education, from the University of Minnesota, Twin Cities. She is passionate about researching how students learn statistics in order to improve the teaching of statistics.


Marta Shore
Lecturer, Biostatistics

M.S., 2007, Statistics, *University of Minnesota*

Marta Shore began her career in biomedical research. But she soon realized that data analysis was her favorite part of her job, so she decided to go back to school in statistics. After finishing her master's degree in statistics in 2007, she took a job as an adjunct instructor in the School of Statistics. She taught part or full time from 2008-2015, and was an undergraduate academic adviser from 2012-2015. While teaching, she had the opportunity to perform analyses on survey data, including surveys of learning styles. In 2015, she took a position as a statistician for the Minnesota Pollution Control Agency. At this agency, she was able to perform analyses to help determine water quality standards, monitor water quality, improve water quality monitoring, predict solid waste production, and determine mercury risk in schools. She returned to teaching in 2017 and continues to consult on survey analysis. In addition to teaching introductory biostatistics courses to non-biostatisticians, she currently also serves as the co-chair of the Biostatistics Community Outreach and Engagement (BCOE) committee. She also has several roles in SPH, including coordinating the SPH Mental Health Advocates group, serving on the SPH DEI action alignment team and the SPH EDIT 2.0 committee. In 2023, she won the President's Award for Outstanding Service.
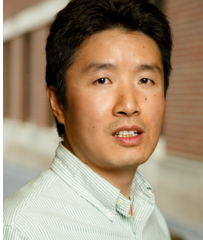
Haitao Chu
Professor of Biostatistics

M.D., 1995, Preventive Medicine,
West China University of Medical Sciences
M.S., 2002, Biostatistics, *Emory University*
Ph.D., 2003, Biostatistics, *Emory University*

Haitao Chu's research interests include: evidence-based medicine; meta-analysis; precision medicine; epidemiology methods; latent class models; statistical methods for mismeasured, missing, and correlated data; statistical methods for survival and longitudinal data; statistical methods for observational studies and randomized clinical trials; and applied Bayesian methods. His application research interests focus on infectious diseases, cancer, cardiovascular disease and injury prevention.

Mariza de Andrade
Adjunct Professor
Mayo Clinic Cancer Center
Professor of Biostatistics
Mayo Clinic College of Medicine

M.Sc., 1978, Statistics, Institute of Pure and Applied Mathematics, *Rio de Janeiro, Brazil*
M.Sc., 1988, Biostatistics, *University of Washington, Seattle, WA*
Ph.D., 1990, Biostatistics, *University of Washington, Seattle, WA*

Mariza de Andrade's research interests include admixture mapping, and methods for diagnostic, longitudinal and multivariate traits for linkage analysis of quantitative phenotypes using variance components approach, and extending these methods for association studies using family and population-based data. Mariza is also involved in a wide range of genome-wide association studies using family and case-control designs for complex disorders from various networks: Genes. Environment Association. Studies (GENEVA), Cohorts for Heart & Aging Research in Genomic Epidemiology (CHARGE), Electronic Medical Records & Genomics (eMERGE), Genetic Epidemiology Network of Atherosclerosis (GENOA), and Genetic Epidemiology of Lung Cancer Consortium (GELCC). She is an active collaborator with various investigators at Mayo Clinic, the Universities of Michigan and Cincinnati, MD Anderson Cancer Center in Houston, TX, and University of Sao Paulo, Sao Paulo, Brazil.

Sue Duval
Professor of Medicine and Biostatistics

Ph.D., 1999, Biostatistics, *University of Colorado Health Sciences Center*

Statistical methods in epidemiology, meta-analysis methods and their applications, publication bias, evidence-based healthcare, systematic review methods, resuscitation medicine, peripheral artery disease and cardiovascular disease epidemiology.

Birgit Grund
Professor of Statistics

M.S., 1982, Math/Statistics,
Humboldt-Universität (Berlin)
Ph.D., 1987, Math/Statistics,
Humboldt-Universität (Berlin)

Birgit Grund has research interests in the design, conduct and analysis of clinical trials, with applications in AIDS research, Ebola vaccine trials, and COVID-19.

Tim Hanson
Affiliate Professor of Biostatistics

M.A. Mathematics, 1996,
University of New Mexico
Ph.D. Statistics, 2000,
University of California, Davis

Tim Hanson's methodological research includes Bayesian nonparametric models, adaptive RCT design, spatiotemporal survival analysis, diagnostic screening without a gold standard & ROC models, semiparametric mixed models, models incorporating moment constraints, causal inference, missing data, competing risks & multi-state models, and hierarchical mixture models. Tim is strongly motivated by real problems and data.

Theodore Lystig
Adjunct Assistant Professor of Biostatistics

M.S., 1998, Biostatistics,
University of Washington
Ph.D., 2001, Biostatistics,
University of Washington

Ted Lystig's research interests include design and analysis of clinical trials for medical devices, active surveillance, signal detection, evidence synthesis, multiple testing, statistical genetics, goodness of fit for longitudinal data, and hidden Markov models.

Richard F. MacLehose
Professor of Epidemiology and Community Health

Ph.D., 2005, Epidemiology, *University of North Carolina at Chapel Hill*

Dr. MacLehose is an epidemiologic methodologist. He collaborates on a range of applied research ranging from cardiovascular to cancer epidemiology. His methodological research focuses uses Bayesian methods and focuses on development of methods for quantitative bias analysis in epidemiologic research.

Sumithra Mandrekar
Adjunct Professor
Professor of Biostatistics - College of Medicine, Mayo Clinic

Ph.D., 2002, Interdisciplinary - Statistics, Psychology, Internal Medicine and Biomedical Engineering, *The Ohio State University*

Dr. Mandrekar is Professor of Biostatistics and Oncology at Mayo Clinic, Rochester MN; and is the Group Statistician for the Alliance for Clinical Trials in Oncology. She is widely recognized for significant contributions to the statistical methodology for the design, conduct and analysis of clinical trials, particularly in oncology; for leadership in clinical trials and data management coordination at Mayo Clinic and the Alliance for Clinical Trials in Oncology; for leadership on national and international steering committees and advisory panels related to cancer, including the National Cancer Institute Clinical and Translational Advisory Committee (CTAC). She is a fellow and past president of the Society for Clinical Trials. Dr. Mandrekar's primary research interests include adaptive dose-finding early phase trial designs, designs for predictive biomarker validation, and general clinical trial methodology related to conduct of clinical trials and identification of alternative cancer clinical trial endpoints.
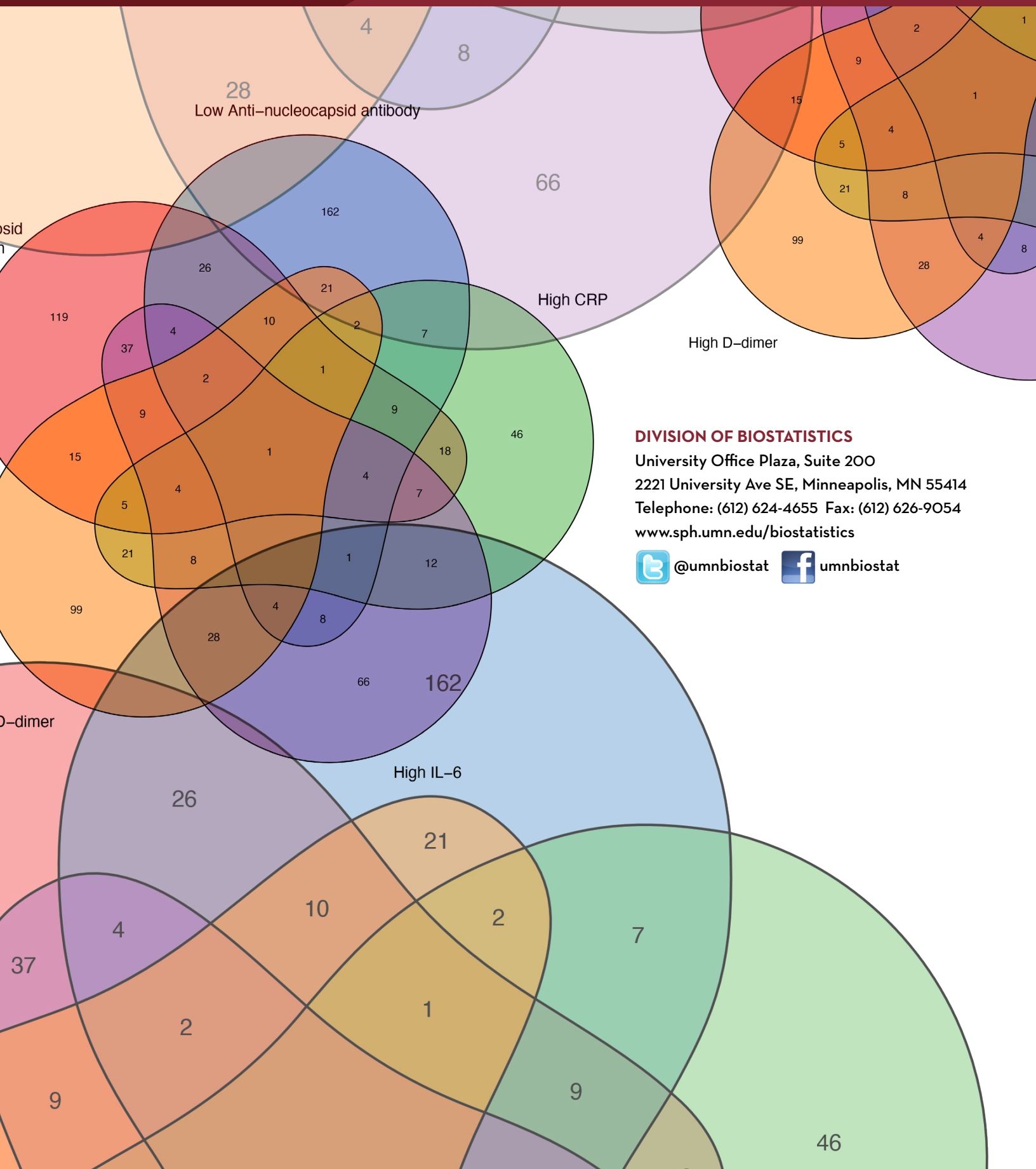
David Nelson
Adjunct Assistant Professor
Associate Professor of Medicine
Senior Statistician, Center for Chronic Disease Outcomes Research
Minneapolis VA Medical Center

M.S., 1994, Statistics, *University of Minnesota*
Ph.D., 1998, Statistics, *University of Minnesota*

David Nelson is developing methods for inference in observational studies and model diagnostics using sufficiency and propensity theory. He also is interested in stepwise Bayes methods for finite population sampling and nonparametric statistical analysis.

4

8

28

Low Anti–nucleocapsid antibody

66

2

9

15

1

4

5

162

osid

26

21

10

2

7

High CRP

21

8

4

119

4

37

2

1

9

High D–dimer

99

28

15

9

18

46

4

7

5

8

1

12

21

99

4

28

D–dimer

66

162

High IL–6

26

21

4

37

10

2

7

2

1

9

9

46