Graduate Interdisciplinary Program in Statistics

Annual Report
for the Academic Year July 1, 2010 - June 30, 2011

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Introduction

Chartered by the Arizona Board of Regents in 2006 and commencing full operations in the Fall of 2008, the Graduate Interdisciplinary Program (GIDP) in Statistics at the University of Arizona focuses and enhances statistical training and research across the UA campus. It administers both the M.S. and Ph.D. degrees, as well as a Ph.D. Minor and a 12-unit Graduate Certificate, in Statistics. The Program boasts a diverse and distinguished research faculty who hail from a variety of campus units, including departments in the Colleges of Agriculture & Life Sciences, Engineering, Education, Law, Management, Public Health, Science, Social & Behavioral Sciences, the BIO5 Institute, and the Arizona Research Laboratories. This diversity fuels an intellectually stimulating atmosphere in which modern statistical research is developed and put directly into practice.

The educational goal of the GIDP in Statistics is to train active researchers and practitioners who will work at the forefronts of modern scientific study, and who will develop practical, innovative statistical techniques to advance the associated subject matter. The Program sponsors or co-sponsors a variety of seminars, colloquia featuring distinguished invited speakers, special lecture series, workshops, and conferences.

The University of Arizona is renowned for its atmosphere of flourishing interdisciplinary research. The GIDP in Statistics fits naturally into this environment, encompassing a wide range of transdisciplinary studies in both theoretical and applied statistics. Up-to-date details on the GIDP’s activities are available at the Program website: [http://stat.arizona.edu](http://stat.arizona.edu).

Summary of Activities: July 1, 2010 - June 30, 2011

1. Personnel

   A. Regular Members

   Regular Members of the GIDP in Statistics are those University faculty and staff involved in teaching core Statistics courses, directing M.S. and Ph.D. students in the GIDP, and/or others who have agreed to be significantly active in the Program.

   Lingling An, Ph.D. (Purdue University), Assistant Professor of Biometry.
   Statistical genetics/genomics; Bioinformatics; Data mining and pattern recognition.

   Jacobus J. (Kobus) Barnard, Ph.D. (Simon Fraser University), Associate Professor of Computing Science; Associate Professor of Electrical and Computer Engineering.
   Machine learning; Mathematical modeling of geometric form; Multi-modal data; Statistical applications in computer vision.

   Katherine Y. Barnes, Ph.D. (University of Minnesota), J.D. (University of Michigan), Associate Professor of Law; Director, Rogers Program on Law and Society.
   Bayesian statistics; Causation and selection models; Empirical methods in law; Discrimination; Expert witnesses.
Rabindra N. (Rabi) Bhattacharya, Ph.D. (University of Chicago), Professor of Mathematics. Markov processes; Large sample theory; Statistical shape analysis; Economic theory of growth under uncertainty.

D. Dean Billheimer, Ph.D. (University of Washington), Associate Professor of Biometry; Director, Statistics Consulting Laboratory. Measurement and normalization, Quantitative proteomics, Statistical methods for compositional data.

Zhao Chen, Ph.D. (University of Arizona), Professor of Public Health; Director, Division of Epidemiology & Biostatistics. Research study design; Longitudinal data analysis; Risk assessment.

Peter Chesson, Ph.D. (University of Adelaide, Australia), Professor of Ecology & Evolutionary Biology. Mathematical ecology; Ecological statistics; Stochastic processes; Biodiversity.

Sandy Dall’erba, Ph.D. (University of Pau), Assistant Professor of Geography & Regional Development. Spatial statistics; Spatial econometrics.

Melinda F. (Mende) Davis, Ph.D. (University of Arizona), Research Assistant Professor of Psychology. Latent variable modeling; Measurement of change; Item response theory; Health outcomes research; Statistical consulting.

Scott R. Eliason, Ph.D. (Pennsylvania State University), Associate Professor of Sociology. Categorical data analysis; Maximum likelihood estimation; Causal inference; Social statistics; Mathematical demography.

William G. Faris, Ph.D. (Princeton University), Professor of Mathematics. Stochastic processes; Mathematical statistics.

Ning Hao, Ph.D. (Stony Brook University), Visiting Assistant Professor of Mathematics. High dimensional data; Machine learning; Change point detection.

James T. (Jake) Harwood, Ph.D. (University of California at Santa Barbara), Professor of Communication. Applied statistics in the social sciences; Hypothesis testing; Moderator and mediator effects.

Keisuke Hirano, Ph.D. (Harvard University), Associate Professor of Economics. Econometrics; Causal inference.

Chiu-Hsieh (Paul) Hsu, Ph.D. (University of Michigan), Assistant Professor of Public Health. Survival analysis; Missing data; Statistical modeling.

Chengcheng Hu, Ph.D. (University of Washington), Assistant Professor of Public Health. High-dimensional data; Survival analysis; Longitudinal data; Missing data; Measurement error.

Christopher S. Johnson, Ph.D. (University of Michigan), Assistant Professor of Educational Psychology. Hierarchical generalized linear models; Repeated measures analysis; Item response theory.

Nicole B. Kersting, Ph.D. (University of California, Los Angeles), Assistant Professor of Educational Psychology.
Measurement and educational assessment; Item response and generalizability theory; Value-added models; Random effects models.

Bonnie J. LaFleur, Ph.D. (University of Colorado Health Sciences Center), Associate Professor of Public Health. Biostatistics; Exact tests/permutation tests; Cancer biology; Genomics.

Zhenqiang (James) Lu, Ph.D. (Purdue University), Statistician, Statistics Consulting Laboratory. Data visualization; Data mining; Computational statistics; Bioinformatics.

Nirav Merchant, M.S. (University of Arizona), Director of Information Technology, Arizona Research Labs. Data mining; Classification; Quality control.

Yue (Selena) Niu, Ph.D. (Princeton University), Assistant Professor of Mathematics. Nonparametric statistics; Semiparametric modeling; Statistical genetics.

Walter W. Piegorsch, Ph.D. (Cornell University), Professor of Mathematics; Professor of Public Health; Professor of Agricultural & Biosystems Engineering; Chair, GIDP in Statistics. Environmental statistics; Quantitative risk assessment; Statistical toxicology; Biometry; History of statistics.

Denise J. Roe, Dr.P.H. (University of California at Los Angeles), Professor of Public Health. Clinical trials; Epidemiological studies; Pharmacokinetics.

Moshe Shaked, Ph.D. (University of Rochester), Professor of Mathematics. Reliability theory; Stochastic modeling; Stochastic orders.

Duane L. Sherrill, Ph.D. (University of Colorado Health Sciences Center), Professor of Public Health; Associate Dean of Research, Mel and Enid Zuckerman College of Public Health. Longitudinal analyses; Respiratory disease assessment; Applied data analyses; Biometry.

Robert J. Steidl, Ph.D. (Oregon State University), Associate Professor of Natural Resources. Quantitative ecology; Dynamics of animal populations; Conservation biology.

Michael Tabor, Ph.D. (Imperial College), Professor of Applied Mathematics; Professor of Physics; Professor of Mathematics; Head, GIDP in Applied Mathematics. Nonlinear growth dynamics; Chaotic dynamical systems; Biomechanical models; Biomathematics.

Daoqin Tong, Ph.D. (Ohio State University), Assistant Professor of Geography & Regional Development. Spatial statistics; Optimization; Geographic information systems (GIS).

Bruce Walsh, Ph.D. (University of Washington), Professor of Ecology & Evolutionary Biology; Professor of Public Health; Adjunct Professor of Plant Science; Adjunct Professor of Animal Science. Biostatistics; Statistical genetics/genomics; Mixed models; Bayesian analysis; Resampling and MCMC methods.

Joseph C. Watkins, Ph.D. (University of Wisconsin), Professor of Mathematics. Stochastic processes; Limit theorems; Statistical applications in the life sciences.
B. Affiliate Members

Affiliate Members of the GIDP in Statistics are those with a general interest in statistical issues who wish to be fully informed of the Program’s operation, and who wish to engage in a limited subset of Program activities. Affiliate members often rotate to Regular status at pertinent intervals, and *vice versa*.

Ronald L. Breiger, Ph.D. (Harvard University), Professor of Sociology. Statistical models for social network analysis; Log-linear models; Log-multiplicative models for contingency tables.

Emily A. Butler, Ph.D. (Stanford University), Assistant Professor of Family Studies & Human Development. Multivariate time-series analysis; Multilevel modeling; Dyadic models; Social-relations modeling.

Noel A. Card, Ph.D. (St. John's University), Assistant Professor of Family Studies & Human Development. Latent variable modeling; Structural equation modeling; Meta-analysis; Dyadic data analysis.

Andrew C. Comrie, Ph.D. (Pennsylvania State University), Professor of Geography & Regional Development; Associate Vice President for Research; Dean of the Graduate College and Director of Graduate Interdisciplinary Programs. Statistics of climate data; Data reduction; Spatial modeling.

Michael N. Evans, Ph.D (Columbia University), Adjunct Associate Professor of Dendrochronology. Paleoclimatology; Spatiotemporal data analysis; Forward and inverse modeling.

Jonah B. Gelbach, Ph.D. (Massachusetts Institute of Technology), Associate Professor of Economics. Applied microeconometrics; Bootstrap-based inference; Public economics; Law and economics.

Gautam Gowrisankaran, Ph.D. (Yale University), Associate Professor of Economics. Structural econometric modeling; Applied Bayesian econometrics; Estimation of dynamic models.

Thomas G. Kennedy, Ph.D. (University of Virginia), Professor of Mathematics; Professor of Physics. Monte Carlo simulations; Random walks.

Jian Liu, Ph.D. (University of Michigan), Assistant Professor of Systems and Industrial Engineering. Engineering statistics; Statistical quality and reliability engineering; Applied data mining.

Robert S. Maier, Ph.D. (Rutgers University), Professor of Mathematics; Professor of Physics. Applied probability; Mathematical statistics; Limit laws and large deviation theory; Bioinformatics.

Joanna Monti-Masel, D.Phil. (Oxford University), Assistant Professor of Ecology & Evolutionary Biology. Stochastic processes; Bayesian learning models; Theoretical population genetics; Stochasticity in gene expression.

David M. Meko, Ph.D. (University of Arizona), Associate Research Professor of Dendrochronology. Spectral analysis; ARMA modeling; Time series filtering; Regression.

Chris Segrin, Ph.D. (University of Wisconsin), Professor of Communication; Professor of Psychology; Professor of Family Studies; Head, Department of Communication. Meta-analysis; Longitudinal data analysis; Regression analysis; Dyadic data analysis.
C. Staff
Juli Riemenschneider; Program Coordinator

2. Faculty Activities

A. Selected Achievements

Keisuke Hirano (ECON) has been promoted to Professor of Economics.

Katherine Y. Barnes (LAW) and her collaborators in the Law School recently surveyed and interviewed law faculty around the nation about the academic tenure process. They found that while women have come to believe the process is more fair, the same is not true for African-American, Asian-American, Hispanic, and Native American law faculty. The UA News Website gives more on these intriguing findings. See more on Dr. Barnes’ research at http://uanews.org/node/36006

Rabi Bhattacharya (MATH) has re-released his classic book with R. Ranga Rao on Normal Approximation and Asymptotic Expansions, with the addition of some new material, published by the Society for Industrial and Applied Mathematics (SIAM) in their series on Classics in Applied Mathematics.

Melinda F. Davis (PSY) has been named the inaugural Editor of a new open-access scholarly journal, The Journal of Methods and Measurement in the Social Sciences. The journal, created in association with the University of Arizona Libraries, will publish two issues each year focusing on methodology and research design, measurement, and data analysis.

Bonnie J. LaFleur (CPH) has been elected to the Board of Directors of the American Statistical Association (ASA). The ASA Board oversees and directs the activities of the largest organization of professional statisticians in the western hemisphere, and Dr. LaFleur’s election places her in a position to impact greatly the future direction of the statistics profession. She began her duties in January 2011.

Robert S. Maier (MATH) has co-edited a book-length treatment entitled Algorithmic Probability and Combinatorics. The compilation is part of the American Mathematical Society series on Contemporary Mathematics, and it presents research on computational aspects of probability, combinatorics and enumeration.

Walter W. Piegorsch (MATH) is one of the first in the nation to gain accreditation as a Professional Statistician (or PStat®) from the American Statistical Association (ASA). The ASA Accreditation Program was created in 2010 to externally authenticate statistics practitioners' advanced statistical training and knowledge, experience in applying statistical expertise, commitment to ethical standards of statistical practice, and ability to communicate effectively. The new program will serve to benchmark levels of professional development expected of future statisticians.

Chris Segrin (COMM) has authored a book chapter detailing the social aspects of depression. His research has found that not only do depressed people sometimes lack social skills, but the way in which their relationships operate can contribute to increased feelings of depression. “We find that the relationship between social skills and depression is robust,” said Dr. Segrin, a behavioral scientist and Head of the Department of Communications, who has conducted numerous studies on interpersonal relationships and mental health. “They are being cast aside by their social network. This actually maintains their depressive state.” See more on Dr. Segin’s research at http://uanews.org/node/32452
B. Faculty Committees

The GIDP in Statistics functions through the efforts of its Regular and Affiliate Faculty who serve on standing and ad hoc Faculty Committees of the Program. Standing Committees are established by rule of the Program's Bylaws.

The Executive Committee (EC) is appointed by and responsible to the Director of Graduate Interdisciplinary Programs. The EC serves as the executive, administrative, and policy-making board for the Statistics GIDP:

Chair: Walter W. Piegorsch (Mathematics)
Vice-Chair: Katherine Y. Barnes (Law)
Rabi Bhattacharya (Mathematics)
D. Dean Billheimer (Agricultural and Biosystems Engineering)
Duane L. Sherrill (Epidemiology and Biostatistics)
Joseph C. Watkins (Mathematics)

Recruiting & Admissions (R&A) Committee
Chair: Joseph C. Watkins (Mathematics)
Bonnie J. LaFleur (Epidemiology and Biostatistics)
Walter W. Piegorsch (Mathematics), ex officio

Curriculum Committee
Chair: Duane L. Sherrill (Epidemiology and Biostatistics)
J. Bruce Walsh (Ecology & Evolutionary Biology)
Walter W. Piegorsch (Mathematics), ex officio

Colloquia & Forums (C&F) Committee
Chair: D. Dean Billheimer (Agricultural and Biosystems Engineering)
Walter W. Piegorsch (Mathematics), ex officio

Examinations Committee
Chair: Rabi Bhattacharya (Mathematics)
Moshe Shaked (Mathematics)
Walter W. Piegorsch (Mathematics), ex officio

C. New Faculty Recruits in 2010-2011

No new faculty members were recruited to the GIDP from external institutions in 2010-2011.

3. Graduating Students

A. Ph.D.
none

B. M.S.
Colin G. Dawson, May 2011
Alissa A. Wickens, May 2011
C. Graduate Certificate
Jorge Lara Alvarez, May 2011
Ann Manziello, May 2011

4. Active Graduate Students

A. First year
1. Ph.D.
   Fang Fang, M.S. (University of North Carolina, Wilmington)
   David Rockoff, M.S. (Iowa State University)
   Yue Zeng, M.S. (University of Delaware)

2. M.S./Ph.D.
   none

3. M.S.
   William Degnan, M.S. (National Technological University), M.B.A. (University of Arizona)
   Ian Goldstein, B.A. (Macalester College)
   Nellie Sonya Gopaul, B.S. (Pennsylvania State University)
   Isaac Jenkins, B.A. (University of Arizona)

B. Second year
1. Ph.D.
   Qijun (Steve) Fang, M.S. (University of North Carolina, Wilmington)
   Hyeonju Kim, M.S. (University of New Mexico)

2. M.S./Ph.D.
   none

3. M.S.
   Colin G. Dawson, Ph.D. (University of Arizona)
   Philip Stevenson, M.Ed. (University of Arizona)
   Alissa A. Wickens, B.A. (Providence College)

C. Third year
1. Ph.D.
   John S. Bear, M.S. (California State University-East Bay)

2. M.S./Ph.D.
   Wenhai Chen, B.S. (Beijing University of Posts and Telecommunications)

3. M.S.
   Benjamin Pope, B.S. (University of California-San Diego)

D. Fourth year
   none
E. Graduate Certificate
Brian Hallmark, M.S. (University of Arizona)
Jorge Lara Alvarez, B.S. (Centro de Investigacion y Docencia Economicas, Mexico)
Dominic D. LaRoche, B.S. (University of Maryland, College Park)
Ann Manziello, B.S. (University of Arizona)
Rachel Perez, B.S. (University of Arizona)

F. Awards
David Rockoff was awarded the 2011 First-Year Student Award in Statistics, by the GIDP. The award recognizes superior academic achievement by a Statistics student completing her/his first year.

Ian Goldstein was awarded a Statistics Graduate Fellowship by the Graduate College, to help support his studies in 2010-2011.

5. Graduate Student Assistantships

A. Teaching Assistants
William Degnan, ISTA 116 (Spring 2011)
Colin Dawson, ISTA 116 (Spring 2011)
Ian Goldstein, MATH 111 (Fall 2010), MATH 111 (Spring 2011)
Nellie Gopaul, NATS 102 (Spring 2011)
Hyeonju Kim, MATH 466 (Fall 2010)
David Rockoff, MATH 112 (Fall 2010), MATH 112 (Spring 2011)

B. Research Assistants (Source/Project and Supervisors)
John S. Bear, Statistics Consulting Laboratory (Billheimer)
Wenhai Chen, iPlant Collaborative (Billheimer)
Colin Dawson, Learning to Recognize Agent Activities and Intentions (P. Cohen)
Fang Fang, A Bayesian Approach to Selection Bias Applied to Racial Profiling (Barnes)
Nellie Gopaul, HuGER (Piegorsch – Fall 2009)
Isaac Jenkins, UA ThinkTank (S. Hunter)
Hyeonju Kim, ATI (D. Madden)
Philip Stevenson, Statistics Consulting Laboratory (Billheimer)
Alissa Wickens, Model Selection for Benchmark Analysis in Quantitative Risk Assessment (Piegorsch)
Yue Zeng, Introduction to Next-Generation Sequencing Technology and Its Applications (An)

C. Other
Qijun (Steve) Fang, Roche/Ventana Medical Systems Graduate Assistantship in Statistics (Piegorsch/ Ranger-Moore)

6. Graduate Student Publications


### 7. Statistics Colloquia

#### A. Fall 2010

**Monday, 30 August 2010:** Closed and exact sequential and multistage inference with binary response  
**Roland C. Deutsch,** Department of Mathematics & Statistics, University of North Carolina–Greensboro  
12:00 pm, Student Union Memorial Center (SUMC), Presidio Room  
Sponsor: Statistics GIDP

**Monday, 13 September 2010:** The association of insurance-based wellness incentives with hospitalizations and medical care use  
**Gautam Gowrisankaran,** Department of Economics, University of Arizona  
12:00 pm, Student Union Memorial Center (SUMC), Presidio Room  
Sponsor: Statistics GIDP

**Monday, 11 October 2010:** Everything you know about randomization is wrong: Part I  
**Mikel Aickin,** Department of Family & Community Medicine, University of Arizona.  
12:00 pm, Student Union Memorial Center (SUMC), Presidio Room  
Sponsor: Statistics GIDP

**Monday, 8 November 2010:** Changepoints in climatology  
**Robert B. Lund,** Department of Mathematical Sciences, Clemson University  
12:00 pm, Student Union Memorial Center (SUMC), Presidio Room  
Sponsor: Statistics GIDP

#### B. Spring 2011

**Wednesday, 19 January 2011:** Statistical risk benchmarking in environmental risk assessment  
**Walter W. Piegorsch,** GIDP in Statistics, University of Arizona  
12:00 pm, Sol Resnick Meeting Room, Water Resources Research Center (WRRC)  
Sponsor: Statistics GIDP and Water Resources Research Center

**Monday, 16 February 2011:** Impossibility results for nondifferentiable functionals  
**Keisuke Hiran**, Department of Economics, University of Arizona  
12:00 pm, Student Union Memorial Center (SUMC), Santa Cruz Room  
Sponsor: Statistics GIDP
Monday, 23 March 2011: A mixed effects model for longitudinal social network data
Anton Westveld, Department of Mathematical Sciences, University of Nevada–Las Vegas
12:00 pm, Student Union Memorial Center (SUMC), Presidio Room
Sponsor: Statistics GIDP

Monday, 22 April 2011: Emulating the nonlinear matter power spectrum for the universe
David Higdon, Statistical Sciences Group, Los Alamos National Laboratory
4:00 pm, Room 501, Mathematics Bldg.
Sponsor: Applied Mathematics GIDP and Statistics GIDP