Patrick Breheny

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Iowa City, IA 52242

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Education

2006-2009	University of Iowa Ph.D., Biostatistics. *Received July 2009.*	Iowa City, IA
2004-2006	University of Iowa M.S., Biostatistics. *Received May 2006.*	Iowa City, IA
2002-2004	Iowa State University M.S., Biochemistry. *Received August 2004.*	Ames, IA
1998-2002	Iowa State University B.S., Mathematics, with honors. *Received May 2002.* B.S., Physics, with honors. *Received May 2002.*	Ames, IA

Research Interests

- Methods for analyzing high-dimensional data
- Methods and algorithms for penalized likelihood models
- Analysis of genomic and genetic data
- Computational statistics

Employment

2017-Present	University of Iowa Associate professor, Department of Biostatistics	Iowa City, IA
2013-2017	University of Iowa Assistant professor, Department of Biostatistics	Iowa City, IA
2009-2013	University of Kentucky Assistant professor, Department of Biostatistics	Lexington, KY
2009-2013	University of Kentucky Assistant professor, Department of Statistics	Lexington, KY
2005-2006	Center for Public Health Statistics, University of Iowa Research assistant	Iowa City, IA

Peer-Reviewed Publications

- Breheny, P. (To appear). Marginal false discovery rates for penalized regression models. *Biostatistics*.

- Zhang, X., Yoon, J.-Y., Morley, M., McLendon, J. M., Mapuskar, K. A., Gutmann, R., Mehdi, H., Bloom, H. L., Dudley, S. C., Ellinor, P. T., Shalaby, A. A., Weiss, R., Tang, W. W., Moravec, C. S., Singh, M., Taylor, A. L., Yancy, C. W., Feldman, A. M., McNamara, D. M., Irani, K., Spitz, D. R., Breheny, P., Margulies, K. B., London, B. and Boudreau, R. L. (2018). A common variant alters SCN5A–miR-24 interaction and associates with heart failure mortality. *The Journal of Clinical Investigation*, **128** 1154–1163.

- Keck, K. J., Breheny, P., Braun, T. A., Darbro, B., Li, G., Dillon, J. S., Bellizzi, A. M., O'Dorisio, T. M. and Howe, J. R. (2018). Changes in gene expression in small bowel neuroendocrine tumors associated with progression to metastases. *Surgery*, **163** 232 – 239.

- Breheny, P. and Burchett, W. (2017). Visualization of regression models using visreg. *The R Journal*, **9** 56–71.

- Chau, D., Reddy, A., Breheny, P., Young, A., Ashford, E., Song, M., Zhang, C., Taylor, T., Younes, A. and Vazifedan, T. (2017). Revisiting the applicability of adult early post-operative nausea and vomiting risk factors for the paediatric patient: A prospective study using cotinine levels in children undergoing adenotonsillectomies. *Indian Journal of Anaesthesia*, **61** 964–971.

- Graham, M. M., Gu, X., Ginader, T., Breheny, P. and Sunderland, J. J. (2017). 68Ga-DOTATOC imaging of neuroendocrine tumors: A systematic review and metaanalysis. *Journal of Nuclear Medicine*, **58** 1452–1458.

- Keck, K. J., Choi, A., Maxwell, J. E., Li, G., O'Dorisio, T. M., Breheny, P., Bellizzi, A. M. and Howe, J. R. (2017). Increased grade in neuroendocrine tumor metastases negatively impacts survival. *Annals of Surgical Oncology*, **24** 2206–2212.

- Spracklen, C. N., Smith, C. J., Saftlas, A. F., Triche, E. W., Bjonnes, A., Keating, B. J., Saxena, R., Breheny, P. J., Dewan, A. T., Robinson, J. G., Hoh, J. and Ryckman, K. K. (2017). Genetic predisposition to elevated levels of c-reactive protein is associated with a decreased risk for preeclampsia. *Hypertension in Pregnancy*, **36** 30–35. PMID: 27657194.

- Zeng, Y. and Breheny, P. (2016). Overlapping group logistic regression with applications to genetic pathway selection. *Cancer Informatics*, **15** 179–187.

- Pashkova, N., Peterson, T., Krishnamani, V., Breheny, P., Stamnes, M. and Piper, R. (2016). DEEPN as an approach for batch processing of yeast 2-hybrid interactions. *Cell Reports*, **17** 303–315.

- Hill-Burns, E. M., Ross, O. A., Wissemann, W. T., Soto-Ortolaza, A. I., Zareparsi, S., Siuda, J., Lynch, T., Wszolek, Z. K., Silburn, P. A., Mellick, G. D., Ritz, B., Scherzer, C. R., Zabetian, C. P., Factor, S. A., Breheny, P. J. and Payami, H. (2016). Identification of genetic modifiers of age-at-onset for familial parkinson's disease. *Human Molecular Genetics*, **25** 3849.

- Huang, J., Breheny, P., Lee, S., Ma, S. and Zhang, C.-H. (2016). The Mnet method for variable selection. *Statistica Sinica*, **26** 903–923.

- Singleton, M. D. and Breheny, P. J. (2016). Nonlinear hierarchical modeling of experimental infection data. *Preventive Veterinary Medicine*, **130** 129 – 136.

- Smith, C. J., Saftlas, A. F., Spracklen, C. N., Triche, E. W., Bjonnes, A., Keating, B., Saxena, R., Breheny, P. J., Dewan, A. T., Robinson, J. G., Hoh, J. and Ryckman, K. K. (2016). Genetic risk score for essential hypertension and risk of preeclampsia. *American Journal of Hypertension*, **29** 17–24.

- Breheny, P. (2015). The group exponential lasso for bi-level variable selection. *Biometrics*, **71** 731–740.

- Breheny, P. and Huang, J. (2015). Group descent algorithms for nonconvex penalized linear and logistic regression models with grouped predictors. *Statistics and Computing*, **25** 173–187.

- Lee, S. and Breheny, P. (2015). Strong rules for nonconvex penalties and their implications for efficient algorithms in high-dimensional regression. *Journal of Computational and Graphical Statistics*, **24** 1074–1091.

- Yi, H., Breheny, P., Imam, N., Liu, Y. and Hoeschele, I. (2015). Penalized multimarker vs. single-marker regression methods for genome-wide association studies of quantitative traits. *Genetics*, **199** 205–222.

- Miller, M., Ma, D., Schappet, J., Breheny, P., Mott, S., Bannick, N., Askeland, E., Brown, J. and Henry, M. (2015). Downregulation of dystroglycan glycosyltransferases LARGE2 and ISPD associate with increased mortality in clear cell renal cell carcinoma. *Molecular Cancer*, **14** 141.

- Spracklen, C. N., Saftlas, A. F., Triche, E. W., Bjonnes, A., Keating, B., Saxena, R., Breheny, P. J., Dewan, A. T., Robinson, J. G., Hoh, J. and Ryckman, K. K. (2015). Genetic predisposition to dyslipidemia and risk of preeclampsia. *American Journal of Hypertension*, **28** 915–923.

- Vanderpool, R. C., Breheny, P. J., Tiller, P. A., Huckelby, C. A., Edwards, A. D., Upchurch, K. D., Phillips, C. A. and Weyman, C. F. (2015). Implementation and evaluation of a school-based human papillomavirus vaccination program in rural kentucky. *American Journal of Preventive Medicine*, **49** 317 – 323.

- Hovey, A. M., Devor, E. J., Breheny, P. J., Mott, S. L., Dai, D., Thiel, K. W. and Leslie, K. K. (2015). mir-888: A novel cancer-testis antigen that targets the progesterone receptor in endometrial cancer. *Translational Oncology*, **8** 85 – 96.

- Bada, H., Sithisarn, T., Gibson, J., Garlitz, K., Caldwell, R., Capilouto, G., Li, Y., Leggas, M. and Breheny, P. (2015). Morphine versus clonidine for neonatal abstinence syndrome. *Pediatrics*, **135** e383–e391.

- Laham, J. L., Breheny, P. J. and Rush, A. (2015). Do clinical parameters predict first planned extubation outcome in the pediatric intensive care unit? *Journal of Intensive Care Medicine*, **30** 89–96.

- McClintock, T. S., Adipietro, K., Titlow, W. B., Breheny, P., Walz, A., Mombaerts, P. and Matsunami, H. (2014). *In Vivo* identification of eugenol-responsive and muscone-responsive mouse odorant receptors. *The Journal of Neuroscience*, **34** 15669–15678.

- Campos, J. R., Breheny, P., Araujo, R. R., Troedsson, M. H., Squires, E. L., Timoney, P. J. and Balasuriya, U. B. (2014). Semen quality of stallions challenged with the Kentucky 84 strain of equine arteritis virus. *Theriogenology*, **82** 1068 – 1079.

- Stokes, S., Breheny, P., Radulescu, A. and Radulescu, V. C. (2014). Impact of obesity on the risk of venous thromboembolism in an inpatient pediatric population. *Pediatric Hematology-Oncology*, **31** 475–480.

- Laham, J. L., Breheny, P. J., Gardner, B. M. and Bada, H. (2014). Procalcitonin to predict bacterial coinfection in infants with acute bronchiolitis: A preliminary analysis. *Pediatric Emergency Care*, **30** 11–15.

- Crawford, T. N., Sanderson, W. T., Breheny, P., Fleming, S. T. and Thornton, A. (2014). Impact of non-HIV related comorbidities on retention in HIV medical care: Does retention improve over time? *AIDS and Behavior*, **18** 617–624.

- Li, Y. and Breheny, P. (2013). Kernel-based aggregation of marker-level genetic association tests involving copy-number variation. *Microarrays*, **2** 265–283.

- Sanz, M., Loynachan, A., Sun, L., Oliveira, A., Breheny, P. and Horohov, D. (2013). The effect of bacterial dose and foal age at challenge on rhodococcus equi infection. *Veterinary Microbiology*, **167** 623–631.

- Heron, P., Stromberg, A., Breheny, P. and McClintock, T. (2013). Molecular events in the cell types of the olfactory epithelium during adult neurogenesis. *Molecular Brain*, **6** 49.

- Owen, C., Breheny, P., Ingram, R., Pfeifle, W., Cain, J. and Ryan, M. (2013). Factors associated with pharmacy student interest in international study. *American Journal of Pharmaceutical Education*, **77** 54.

- Breheny, P., Chalise, P., Batzler, A., Wang, L. and Fridley, B. L. (2012). Genetic association studies of copy-number variation: Should assignment of copy number states precede testing? *PLoS ONE*, **7** e34262.

- Breheny, P., Li, Y. and Charnigo, R. (2012). Statistical challenges and opportunities in copy number variant association studies. *Journal of Biometrics & Biostatistics*, **3** e118.

- Huang, J., Breheny, P. and Ma, S. (2012). A selective review of group selection in high-dimensional models. *Statistical Science*, **27** 481–499.

- Smith, K. L., Li, Y., Breheny, P., Cook, R. F., Henney, P. J., Sells, S., Pronost, S., Lu, Z., Crossley, B. M., Timoney, P. J. and Balasuriya, U. B. R. (2012). New real-time PCR assay using allelic discrimination for detection and differentiation of equine herpesvirus-1 strains with A_{2254} and G_{2254} polymorphisms. *Journal of Clinical Microbiology*, **50** 1981–1988.

- Nickell, M. D., Breheny, P., Stromberg, A. J. and McClintock, T. S. (2012). Genomics of mature and immature olfactory sensory neurons. *Journal of Comparative Neurology*, **520** 2608–2629.

- Podzielinski, I., Randall, M. E., Breheny, P. J., Escobar, P. F., Cohn, D. E., Quick, A. M., Chino, J. P., Lopez-Acevedo, M., Seitz, J. L., Zook, J. E. and Seamon, L. G. (2012). Primary radiation therapy for medically inoperable patients with clinical stage I and II endometrial carcinoma. *Gynecologic Oncology*, **124** 36–41.

- Scott, S. L., McSpirit, S., Breheny, P. and Howell, B. M. (2012). The long-term effects of a coal waste disaster on social trust in Appalachian Kentucky. *Organization & Environment*, **25** 402–418.

- Srinivasan, J. and Breheny, P. J. (2012). Meditation for quality improvement of medical encounters: Single-intervention, vedanta-based meditation effects on vital signs and mood indices. *Journal of Evidence-Based Complementary & Alternative Medicine*, **17** 96–103.

- Fardo, D., Druen, A., Liu, J., Mirea, L., Infante-Rivard, C. and Breheny, P. (2011). Exploration and comparison of methods for combining population- and family-based genetic association using the genetic analysis workshop 17 mini-exome. *BMC Proceedings*, **5** S28.

- Breheny, P. and Huang, J. (2011). Coordinate descent algorithms for nonconvex penalized regression, with applications to biological feature selection. *Annals of Applied Statistics*, **5** 232–253.

- Gode-Potratz, C., Kustusch, R., Breheny, P., Weiss, D. and McCarter, L. (2011). Surface sensing in vibrio parahaemolyticus triggers a programme of gene expression that promotes colonization and virulence. *Molecular Microbiology*, **79** 240–263.

- Breheny, P. and Huang, J. (2009). Penalized methods for bi-level variable selection. *Statistics and Its Interface*, **2** 369–380.

- Oleson, J., Breheny, P., Pendergast, J., Ryan, S. and Litchfield, R. (2008). Impact of travel distance on wisewoman intervention attendance for a rural population. *Preventive Medicine*, **47** 565–569.

- Gfeller, K., Oleson, J., Knutson, J., Breheny, P., Driscoll, V. and Olszewski, C. (2008). Multivariate predictors of music perception and appraisal by adult cochlear implant users. *Journal of the American Academy of Audiology*, **19** 120.

- Breheny, P., Laederach, A., Fulton, D. and Andreotti, A. (2003). Ligand specificity modulated by prolyl imide bond cis/trans isomerization in the Itk SH2 domain: a quantitative NMR study. *Journal of the American Chemical Society*, **125** 15706–15707.

Manuscripts in submission

- Zeng, Y. and Breheny, P. (In submission). The biglasso package: A memory- and computation-efficient solver for lasso model fitting with big data in R.

- Zeng, Y., Breheny, P. and Yang, T. (In submission). Efficient feature screening for lasso-type problems via hybrid safe-strong rules.
- Miller, R. and Breheny, P. (In submission). Marginal false discovery rate control for likelihood-based penalized regression models.

Ph.D. Dissertation

- Breheny, P. "Regularized methods for high-dimensional and bi-level variable selection". Dissertation advisor: Professor Jian Huang. Defended May 2009.

Other Publications

- Breheny, P. (2014). Review of *Genomic Clinical Trials and Predictive Medicine*, by Richard Simon. *Journal of the American Statistical Association*, **109** 868–869.
- Schofield, M. and Breheny, P. (2014). Review of *The BUGS Book: A Practical Introduction to Bayesian Analysis*, by David Lunn, et al. *The American Statistician*, 68: 63.
- Breheny, P. (2011). Review of *Intuitive Biostatistics: A Nonmathematical Guide to Statistical Thinking*, by H. Motulsky. *The American Statistician*, 65: 67-68.
- *2005 Iowa Health Fact Book*, University of Iowa College of Public Health and the Iowa Department of Public Health.

Software

Primary author and maintainer:

- grpreg, an R package for computing regularized paths for regression models with grouped covariates.
- ncvreg, an R package for fitting MCP- and SCAD-penalized regression models.
- visreg, an R package for visualizing regression models.

Contributor:

- grpregOverlap, extends the grpreg package to the case of overlapping groups.
- biglasso, an R package for fitting lasso- and elastic-net-penalized regression models for big data (too large to fit into RAM).

Selected Presentations

- Marginal False Discovery Rates for Penalized Regression Models. Invited. Joint Statistical Meetings. Baltimore, MD. August 2017.
- Medicine, likelihood, and the mathematics of learning from experience. Keynote lecture. Mathematics Undergraduate Math Symposium, Simpson College. Indianola, IA. April 2016.

- Estimating false inclusion rates in penalized regression models. Invited. ENAR Spring Meeting. Austin, TX. March 2016
- Penalized regression approaches for genomics and genetic association studies. Iowa Institute of Human Genetics Bioinformatics Short Course 2014. Iowa City, IA. July 2014.
- Estimating false inclusion rates in penalized regression models. Invited. International Society for Nonparametric Statistics (ISNPS II). Cádiz, Spain. June 2014.
- Kernel-based aggregation of marker-level genetic association tests involving copy-number variation. Invited. Joint Statistical Meetings. Montreal, Canada. August 2013.
- Visualizing Regression Models using `visreg`. Joint Statistical Meetings. Montreal, Canada. August 2013.
- Group descent algorithms for nonconvex penalized linear and logistic regression models with grouped predictors. Joint Statistical Meetings. San Diego, CA. July 2012.
- Visualizing Regression Models using `visreg`. International `R` Users Meeting (useR). Nashville, TN. June 2012.
- Group exponential penalties for bi-level variable selection. Joint Statistical Meetings. Miami, FL. July 2011.
- Genetic association studies of copy-number variation: should assignment of copy number states precede testing? International Genetic Epidemiology Society Meetings. Boston, MA. October 2010.
- The MNet estimator. Joint Statistical Meetings. Vancouver, British Columbia. August 2010.
- Coordinate descent algorithms for nonconvex optimization. ENAR Spring Meeting. New Orleans, LA. March 2010.
- Coordinate descent algorithms for nonconvex penalized regression methods. Joint Statistical Meetings. Washington, D.C. August 2009.
- Statistical graphics and visualization using `R` and `GGobi`. Biostatistics Student Organization Seminar. Iowa City, IA. March 2009.
- A short guide to SAS macros. Iowa SAS Users Group. Iowa City, IA. February 2009.
- Bilevel feature selection with applications to genetic association studies. Invited. Fall Conference on Statistics in Biology. Ames, IA. October 2008.
- A general framework for bi-level variable selection. Joint Statistical Meetings. Denver, CO. August 2008.
- Impact of travel distance on WISEWOMAN intervention attendance. University of Iowa Research Week. Iowa City, IA. April 2008.
- Extending regression models using penalized approaches. Biostatistics Student Organization Seminar. Iowa City, IA. November 2007.

Teaching

Instructor, University of Iowa

- BIOS 4120: Introduction to Biostatistics (S18, S17, S15, S14, Su09)
- BIOS 7210: Survival Data Analysis (F17, F15)
- BIOS 5710: Biostatistical Methods I (F16, F14)
- BIOS 7600: High-Dimensional Data Analysis (S16)

Guest lecturer, University of Iowa

- EPID 6250: Genetics and Epidemiology (F17)
- EPID 5560: Molecular Epidemiology (S16, S15)
- BIOS 4110: General Biostatistics (Su16, Su15, Su14)
- BIOS 5510: Biostatistical Computing (F08, F07)
- BIOS 7120: Theory of Biostatistics II (S09)
- BIOS 5720: Biostatistical Methods II (S08)

Instructor, University of Kentucky

- STA 580: Biostatistics I (S12, F10, S10, F09)
- BST 760: Advanced Regression (S13, S11)
- STA 621: Nonparametric Statistics (F12, F10)
- BST 701: Bayesian Modeling in Biostatistics (S13)
- BST 764: Applied Statistical Modeling for Medicine and Public Health (F11)
- STA 715: Readings in Statistics: Penalized Regression (F11)
- STA 715: Readings in Statistics: Analysis of Copy-Number Variation (S12)

Guest lecturer, University of Kentucky

- BST 675: Biometrics I (F12)
- CPH 701: Current topics in Public Health (F11)
- CPH 786: Doctoral Seminar (F10)

Teaching assistant, University of Iowa

- BIOS 5110: Introduction to Biostatistics (S05, F04)

Teaching assistant, Iowa State University

- BBMB 301: Survey of Biochemistry (S04)

Supplemental instructor, Iowa State University

- Math 166: Calculus II (S01, F00)

Advising

- Advisor for three completed Ph.D. dissertations:
  - "Scalable sparse machine learning methods for big data," Yaohui Zeng, Department of Biostatistics, University of Iowa, November 2017.
  - "Nonlinear hierarchical models for longitudinal experimental infection studies," Michael Singleton, Department of Biostatistics, University of Kentucky, March 2015.
  - "Genetic association testing of copy number variation," Yinglei Li, Department of Statistics, University of Kentucky, October 2014.
- Currently serving as doctoral dissertation advisor for:
  - Ryan Miller (Ph.D. in Biostatistics, University of Iowa)
  - Biyue Dai (Ph.D. in Biostatistics, University of Iowa)
- Advisor for six completed preceptorship projects:
  - "Using CADD Scores to Inform Bayesian Analysis of Genetic Variants Implicated in Preterm Birth", Michael Brumm, Department of Biostatistics, University of Iowa, May 2018.
  - "Understanding the Sense of Smell through Identification of Olfactory Receptors Activated by Various Scents", Ziqian Chen, Department of Biostatistics, University of Iowa, May 2017.
  - "Empirical Bayes Analysis of Overdispersed High-Dimensional Protein Interaction Data", Anna Reisetter, Department of Biostatistics, University of Iowa, May 2017.
  - "Comparing Cross-Validation Methods in Penalized Cox Regression," Biyue Dai, Department of Biostatistics, University of Iowa, November 2016.
  - "Rare Variant Analysis of Paired, Case-Only, Whole-Exome Sequencing Data from a Study of Preterm Birth," Anthony Rhoads, University of Iowa, December 2015.
  - "Improving the Accuracy of Gene Expression Classifiers by Incorporating Pathway Information: A Latent Group Selection Approach," Yaohui Zeng, Department of Biostatistics, University of Iowa, December 2014.
- Advisor for one completed M.P.H. capstone:
  - "Statistical analysis of metabolite concentrations in heart tissue from four groups of mouse models in response to Adriamycin treatment," Zhenyu Huang, College of Public Health, University of Kentucky, November 2011.
- Currently serving on six doctoral committees
- Committee member for three completed M.P.H. capstones
- Committee member for thirteen completed Ph.D. dissertations
- Committee member for one completed Dr.P.H. capstone

Funding (active)

- Small Business Innovation Research grant G968100-CG, "Improved Detection of Bladder Cancer Recurrence using a Biophysical Marker". PI: Dr. Michael O'Donnell. 9/2017-9-2018. Role: Co-investigator (0.6 calendar).
- National Institutes of Health grant 1-R01-DK110023, "C3 Glomerulopathy – A Collaborative Study". Contact PI: Dr. Richard Smith. 4/2017-3/2021. Role: Co-PI (1.2 calendar).
- National Institute on Deafness and Other Communication Disorders grant 1- R01-DC014468, "In vivo patterns of receptor activation by odorants". PI: Dr. Timothy McClintock. 12/2015-11/2020. Role: Co-investigator (1 calendar).
- National Cancer Institute grant 5-P30-CA086862, "Cancer Center Support Grant". PI: Dr. George Weiner. 10/2013-3/2021. Role: Co-investigator (1.68 calendar).
- National Institutes of Health grant 1-R25-HL131467, "Iowa Summer Institute for Research Education in Biostatistics". PI: Dr. Gideon Zamba. 2/2016-1/2019. Role: Co-Investigator (.48 calendar).
- National Institutes of Health grant 1-P50-CA174521, "Neuroendocrine Tumor Specialized Programs of Research Excellence (SPORE) in Human Cancer". PI: Dr. Sue O'Dorisio. 9/1/15-8/31/20. Role: Co-investigator (0.6 calendar).

Funding (completed)

- National Institute of Child Health and Human Development grant 1-R21-HD087864, "Newborn Metabolic Screening for Prediction of Childhood Respiratory Phenotypes". PI: Dr. Kelli Ryckman. 4/2016-3/2018. Role: Co-investigator (1.2 calendar).
- National Institute of Biomedical Imaging and Bioengineering grant 1-R21-EB021870, "DEEPN strategy for large-scale differential protein interaction studies". PI: Dr. Robert Piper. 12/2015-11/2017. Role: Co-investigator (1.2 calendar).
- Small Business Technology Transfer grant G797300-CG, "Improved Preparation of Cell Suspensions for Single Cell Genomics". PI: Dr. Michael Henry. 7/2017-12/2017. Role: Co-investigator (0.6 calendar).
- National Institutes of Health grant 2-T15-HL07622, "Iowa Summer Institute in Biostatistics (ISIB)". PI: Dr. Kathryn Chaloner. 3/2013-2/2016. Role: Co-investigator (0.48 calendar).
- Bill & Melinda Gates Foundation grant OPP52256, "The Role of Cholesterol in Preterm Birth". PI: Dr. Kelli Ryckman. 1/1/10-12/31/14. Role: Biostatistician (1.2 calendar).
- Kentucky Biomedical Research Infrastructure Network grant, "KY IDeA Networks of Biomedical Research Excellence." Principal investigator: Dr. Arnold Stromberg. 08/2012-07/2012. Role: Co-investigator (0.45 Academic, 08/2012-07/2013).
- National Institute on Aging grant 1-R21-AG040542-01A1, "Muscle, fat and NK lymphocytes in aging." Principal investigator: Dr. Charles Lutz. 08/2012-07/2014. Role: Co-investigator (0.45 Academic, 08/2012-07/2013).

- Merck IISP ID 40305, "A study to compare the impact of a school based HPV program on vaccination uptake and completion rates." Principal investigator: Dr. Christine Weyman. 08/2012-08/2013. Role: Consultant (0.25 Summer, 08/2012-07/2013).
- National Center for Research Resources grant 2-P20-RR020145-07, "Center for the Biologic Basis of Oral/Systemic Diseases". Principal investigator: Dr. Jeffrey Ebersole. 9/2004-7/2014. Role: Co-investigator (0.9 Academic, 10/2010-07/2013).
- Dan and Virginia Martin Pediatric Research Fund, in association with the University of Kentucky Department of Pediatrics (internal funding). Role: Statistical support (0.9 Academic, 12/2010-07/2013).
- Altarum Institute grant SC-10-013, "Models of SNAP Nutrition education and Evaluation, Wave 2". Principal investigator: Laura Stephenson. Role: Co-investigator (0.9 Summer, 05/2013-07/2013).
- National Institute of Child Health and Human Development grant 1-R21-HD059058-01-A2, "Farm to School: A Community-Based Program to Combat Childhood Obesity". Principal investigator: Dr. Mark Swanson. 9/2010-8/2011. Rol: Co-investigator (0.45 Summer, 9/2010-8/2012).
- University of Kentucky Summer Research Fellowship, "Visualization of regression functions". Role: Principal investigator (5/2011-8/2011, funds used to support a graduate research assistant over the summer).
- National Institute of General Medical Sciences grant 5-T32-GM077973, "Statistics in microbiology, infectious diseases, and bioinformatics". Principal investigator: Dr. Kathryn Chaloner. Role: Fellow (8/2006-7/2009).

Professional Service

- Associate Editor, Reviews Section, *Journal of the American Statistical Association* and *The American Statistician*, *2013-*
- Awards Officer, Section on Statistical Computing and Section on Statistical Graphics, American Statistical Association, *2015-2017*
- Review Editor, *Frontiers in Bioinformatics and Computational Biology*, 2011-2015
- Reviewer for grant proposal submitted to the National Security Agency (3)
- Refereed articles for the following journals:
  - *The Journal of the American Statistical Association* (7)
  - *Genetic Epidemiology* (4)
  - *Annals of the Institute of Statistical Mathematics* (3)
  - *Journal of Computational and Graphical Statistics* (2)
  - *The American Statistician* (2)
  - *Statistics and Computing* (2)
  - *Biometrics* (2)
  - *Communications in Statistics: Theory and Methods* (2)
  - *PLoS ONE* (2)

  - *Journal of Machine Learning Research* (2)
  - *Computational Statistics*
  - *Journal of Statistical Computing and Simulation*
  - *Statistical Applications in Genetics and Molecular Biology*
  - *Statistical Modelling*
  - *Psychological Methods*
  - *Frontiers in Plant Science*
  - *Communications in Statistics: Simulation and Computation*
  - *Current Eye Research*
  - *Statistics in Medicine*
  - *Technometrics*
  - *Annals of Applied Statistics*
  - *Journal of Biometrics and Biostatistics*
  - *American Journal of Epidemiology*
  - *Frontiers in Genetics*
  - *Journal of Multivariate Analysis*
  - *Journal of Translational Medicine*
  - *Annals of Statistics*
  - *Statistical Papers*
  - *Cancer Epidemiology, Biomarkers & Prevention*
  - *OMICS: A Journal of Integrative Biology*
  - *Statistical Science*
  - *IEEE Transactions on Parallel and Distributed Systems*
  - *The Journal of Bayesian Analysis*

- Session chair, Joint Statistical Meetings, *2009-2012, 2014-2018*
- Session chair, ENAR Spring Meeting, *2010*
- Member, American Statistical Association, *2006-*
- Member, Institute of Mathematical Statistics, *2005-*

Departmental Service

- Curriculum review committee, Department of Biostatistics, University of Iowa, *2017-*
- PhD Exam Steering Committee, Department of Biostatistics, University of Iowa, *2014-2018*
- MS Exam Committee, Department of Biostatistics, University of Iowa, *2014-2015, 2018*
- Computing Committee, Department of Biostatistics, University of Iowa, *2013-present*
- Co-chair, Faculty Search Committee, Department of Biostatistics, University of Iowa, *2016-2017*
- Exploratory Committee for developing an Advanced Statistical Computing course, Department of Biostatistics, University of Iowa, *2015-2016*
- Faculty Search Committee, Department of Biostatistics, University of Iowa, *2013-2014*, *2014-2015*
- Ph.D. qualifying exam committee, Department of Biostatistics, University of Kentucky, *2010-2012*

- M.S. comprehensive exam committee, Department of Statistics, University of Kentucky, *2012-2013*
- Degree program committee, Ph.D. in Epidemiology and Biostatistics, University of Kentucky, *2010-2012*
- Ph.D. qualifying exam committee, Department of Statistics, University of Kentucky, *2011*
- Picnic committee, Department of Statistics, University of Kentucky, *2009-2010*
- Minutes committee, Department of Statistics, University of Kentucky *2009-2010*
- President, Biostatistics Student Organization, University of Iowa, *2006-2007*

University Service

- Chair, research council, College of Public Health, University of Iowa, *2017-2018*
- Research council, College of Public Health, University of Iowa, *2015-2017*
- Computation and Informatics Committee, College of Public Health, University of Iowa, *2014-present*
- Faculty judge, Research Week Poster Competition, College of Public Health, University of Iowa, *2016-2017*
- Internal review committee to evaluate the Department of Community and Behavioral Health, College of Public Health, University of Iowa, *2015-2016*
- Search Committee, Tenure-track position in Department of Biomedical Engineering, University of Iowa, *2014-2015*
- Comprehensive exam committee for Interdisciplinary Ph.D. Program in Genetics, *2014, 2017*
- Academic Affairs Committee, College of Public Health, University of Kentucky, *2011-2013*
- Research, Evaluation, and Scholarship Committee, Center for Interprofessional Healthcare Education, Research, and Practice, University of Kentucky, *2012-2013*
- Discussion moderator, University of Kentucky Health Care Common Reading Experience, *2011-2012*
- Practice and Service Committee, University of Kentucky College of Public Health, *2009-2011*
- Ph.D. qualifying exam committee, Center for Biomedical Engineering, University of Kentucky, *2010*
- Faculty judge, Graduate Student Interdisciplinary Conference, University of Kentucky, *April 2010*

Honors and Awards

- Faculty Research Award, University of Iowa College of Public Health, *2018*
- College of Public Health Faculty Teaching Award, University of Iowa, *2015*
- Milford E. Barnes Award (for outstanding graduate student in Biostatistics), University of Iowa, *2009*.
- Elected to Delta Omega (Public Health Honorary Society), *2009*.
- Graduate teaching award, Iowa State University, *2003*.
- National Merit Scholar, *1998-2002*.

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