Gayla R. Olbricht
Curriculum Vitae

Department of Mathematics & Statistics
Missouri University of Science & Technology
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Education

2004–2010	Ph.D.	Statistics	Purdue University	West Lafayette, IN
2002–2004	M.S.	Applied Statistics	Purdue University	West Lafayette, IN
1997–2001	B.S.	Mathematics	Missouri State University	Springfield, MO

Ph.D. Dissertation

Incorporating Genome Annotation in the Statistical Analysis of Genomic & Epigenomic Tiling Array Data, *Advisors*: Dr. Rebecca W. Doerge, Dr. Bruce A. Craig

Professional Experience

08/2011–Present: Assistant Professor
Department of Mathematics & Statistics
Missouri University of Science & Technology, Rolla, MO

08/2010–05/2011: Visiting Assistant Professor
Department of Statistics
Purdue University, West Lafayette, IN

05/2008–08/2010: Research Assistant (*Advisor*: Dr. Rebecca W. Doerge)
Department of Statistics
Purdue University, West Lafayette, IN

05/2007–05/2008: National Science Foundation (NSF) GK-12 Fellow
NSF/Discovery Learning Center GK-12 Program
Purdue University, West Lafayette, IN
Role: Visiting scientist at Wea Ridge Middle School (6-8^{th} Math)

08/2003–08/2006: Teaching Assistant and Statistical Consultant
Department of Statistics
Purdue University, West Lafayette, IN

Research Interests

Statistical modeling of biological data. Application areas: genomics, epigenomics (DNA methylation), modeling sleep in *Drosophila* and heterogeneity in autism spectrum disorder. Statistical methods: Markov models, survival analysis, regression analysis, functional principal component analysis, multivariate methods

Inquiry-based math and science integration in K-12 education, undergraduate statistics research

*Indicates student supervised by GR Olbricht

Refereed Journal Publications

[J9] Amunugama K, Lihong J, **Olbricht GR**, Walker C, Huang Y-W, Nam PK, and Hou, C. (2016) "Cellular oxidative damage is more sensitive to variation in biosynthetic rate than in metabolic rate: A test of the theoretical model on hornworms (*Manduca sexta* larvae) ", *Experimental Gerontology* 82: 73-80.

[J8] Henslee AM, Murray SL, **Olbricht GR**, Ludlow DK, Hays ME, and Nelson HM. (2016) "Assessing freshman engineering students' understanding of ethical behavior", *Journal of Science & Engineering Ethics*. Published online 01/16/16, DOI: 10.1007/s11948-016-9749-2.

[J7] Sardesai N, Lee L-Y, Chen H, Yi H, **Olbricht GR**, Stirnberg A, Jeffries J, Xiong K, Doerge RW, and Gelvin SB. (2013) "Cytokinins secreted by agrobacterium promote transformation by repressing a plant Myb transcription factor", *Science Signaling* 6(302): ra100.

[J6] Østrup O, **Olbricht GR**, Østrup E, Hyttel P, Collas P, and Cabot R. (2013) "RNA profiles of porcine embryo during genome activation reveal complex metabolic switch sensitive to *in vitro* conditions", *PLoS ONE* 8(4): e61547.

[J5] Dhawan D, Ramos-Vara JA, Hahn NM, Waddell J, **Olbricht GR**, Zheng R, Stewart JC, and Knapp, DW. (2013) "DNMT1: An emerging target in the treatment of invasive urinary bladder cancer", *Urologic Oncology* 31(8): 1761-1769.

[J4] **Olbricht GR**, Craig BA, and Doerge RW. (2012) "Incorporating genomic annotation into a hidden Markov model for DNA methylation tiling array data", *Statistical Applications in Genetics and Molecular Biology* 11(5): Article 10.

[J3] Fleming-Waddell JN, **Olbricht GR**, Taxis TM, White JD, Vuocolo T, Craig BA, Tellam RL, Neary MK, Cockett NE, and Bidwell CA. (2009) "Effect of DLK1 and RTL1 but not MEG3 or MEG8 on muscle gene expression in callipyge lambs", *PLoS ONE* 4(10): e7399.

[J2] Fleming-Waddell JN, Wilson LM, **Olbricht GR**, Vuocolo T, Byrne K, Craig BA, Tellam RL,Cockett NE, and Bidwell CA. (2007) "Analysis of gene expression during the onset of muscle hypertrophy in callipyge lambs", *Animal Genetics* 38(1): 28-36.

[J1] Reed DH and **Hobbs GR**. (2004) "The relationship between population size and temporal variability in population size", *Animal Conservation* 7(1): 1-8.

Refereed Conference Publications

[C5] Al-jabery K, Obafemi-Ajayi T, **Olbricht GR**, Takahashi TN, Kanne S, and Wunsch D. (2016) "Ensemble statistical and subspace clustering model for analysis of autism spectrum disorder phenotypes", *38th Annual International Conference of the IEEE Engineering in Medicine and Biological Society*. (accepted)

[C4] Baumann D, Su Y*, Mendis I*, and **Olbricht GR**. (2015) "Differential methylation methods in multi-context organisms", *Proceedings of the Kansas State University Conference on Applied Statistics in Agriculture.* (accepted with revisions)

[C3] **Olbricht GR**, Samaranayake VA, Injamuri S, Wang L*, Fiebelman C, and Thimgan MS. (2014) "Modeling sleep and wake bouts in *Drosophila melanogaster* ", *Proceedings of the Kansas State University Conference on Applied Statistics in Agriculture.*

[C2] **Olbricht GR**, Craig BA, and Doerge RW. (2010) "Modeling DNA methylation tiling array data", *Proceedings of the Kansas State University Conference on Applied Statistics in Agriculture.*

[C1] **Olbricht GR**, Sardesai N, Gelvin SB, Craig BA, and Doerge RW. (2009) "Statistical methods for Affymetrix tiling array data", *Proceedings of the Kansas State University Conference on Applied Statistics in Agriculture.*

Refereed Education & Outreach Publications

[E3] Riskowski JL and **Olbricht GR**. (2010) "Student views of diversity through a multicultural mathematics activity: Viewing transformation during the middle school years", *Multicultural Education* 17(2): 2-12.

[E2] Riskowski JL, **Olbricht GR**, and Wilson J. (2010) "100 students", *Mathematics Teaching in the Middle School* 15(6): 320-327.

[E1] Gunaratna NS, **Olbricht GR**, Lipka AE, Watkins AE, and Yoshida PY. (2006) "Serving the community through discipline-specific consulting", *Journal of Higher Education Outreach & Engagement* 11(4): 99-108.

Manuscripts Submitted or In Preparation

Submitted

[S2] Fan R, **Olbricht GR**, Baker X, and Hou C. "Birth mass is the key to understanding the negative correlation between lifespan and body size in dogs", submitted to *Aging*, 06/2016.

[S1] Paul RH, Phillips S, Hoare J, Laidlaw DH, Cabeen R, **Olbricht GR**, Su Y*, Stein DJ, Engelbrecht S, Seedat S, Salminen LE, Baker LM, Heaps J, and Joska J. "Neuroimaging abnormalities in clade C HIV are independent of Tat genetic diversity", submitted to *AIDS*, 04/2016.

In Preparation

[P5] **Olbricht GR**, Fiebelman C, Barton D, Wang L*, Ercal N, Samaranayake VA, and Thimgan MS. "Individual differences in sleep architecture predict biological aging in *Drosophila*", in preparation.

[P4] **Olbricht GR**, Injamuri S, Fiebelman C, Wang L*, Samaranayake VA, and Thimgan MS. "Modeling of sleep duration properties reveal differences between *Drosophila* with and without circadian rhythms", in preparation.

[P3] Adekpedjou A, **Olbricht GR**, and Zamba KD. "Confidence bands for quantiles as a function of the covariates in recurrent event models", in preparation.

[P2] Milad M* and **Olbricht GR**. "Region-level differential methylation testing with smoothed functional principal component analysis", in preparation.

[P1] Obafemi-Ajayi T, **Olbricht GR**, Germeroth C, Settles L*, Takahashi TN, Miles JH, Wunsch D. "Genetic variant analysis of facially delineated clusters of boys with Autism Spectrum Disorders (ASD) using family based association testing", in preparation.

Funded Grants

External Grants (Amounts are Direct Costs)

- **Olbricht GR (PI)**, "An undergraduate research program in applied statistics", funded by the Center for Undergraduate Research in Mathematics at Brigham Young University via NSF, 05/01/2016-05/31/2017, $4098. Awarded.

- Samaranayake VA (PI), Neiss JL (co-PI), **Olbricht GR (co-PI)**, Pringle OA (co-PI), and Westenberg DJ (co-PI), "Science Education and Quantitative Literacy: An Inquiry-based Approach: Cycle 14", funded by the Missouri Dept. of Higher Education, 04/01/2016-06/30/2017, $174,779.10. Awarded.

- Samaranayake VA (PI), Neiss JL (co-PI), **Olbricht GR (co-PI)**, Pringle OA (co-PI), and Westenberg DJ (co-PI), "Science Education and Quantitative Literacy: An Inquiry-based Approach: Cycle 13", funded by the Missouri Dept. of Higher Education, 04/01/2015-06/30/2016, $252,452.51. Awarded.

- Samaranayake VA (PI), Neiss JL (co-PI), **Olbricht GR (co-PI)**, Pringle OA (co-PI), and Westenberg DJ (co-PI), "Science Education and Quantitative Literacy: An Inquiry-based Approach: Cycle 12", funded by the Missouri Dept. of Higher Education, 04/01/2014-06/30/2015, $229,957. Awarded.

Internal Grants

- Thimgan MS (PI) and **Olbricht GR (co-PI)**, "Identifying indicators of sleepiness by mathematical modeling of sleep and wake transitions", funded by the Missouri S & T Center for Statistical and Computational Modeling of Biological Complexity, 07/01/2015-06/30/2016, $1000 ($500/per lab). Awarded.

- Zolman BK (PI), **Olbricht GR (co-PI)**, and Kim C-S (co-PI), "Using new technologies to dissect root initiation pathways", funded by the Interdisciplinary Intercampus Research Program, University of Missouri, 05/01/2013-08/31/2014, $22,000. Awarded.

- **Olbricht GR (PI)**, "A hidden Markov model for Next-Generation Sequencing (NGS) methylation data", funded by the University of Missouri Research Board, 06/01/2013-06/01/2014, $10,000. Awarded.

Grant Applications - Pending

- Anand R (PI), **Olbricht GR (co-PI)**, *et al.*, "Environmental Influences on Child Health Outcomes (ECHO)"', submitted to NIH, 04/2016. Pending.
- Obafemi-Ajayi T (co-PI), **Olbricht GR (co-PI)**, Wunsch DC (co-PI), *et al.*, "Genomic analysis of facially delineated clusters of ASD", submitted to NIH, 02/2016. Pending.
- Paul RH (PI), Hoare J (co-PI), **Olbricht GR (co-PI)**, Ndhlovu L (co-PI), "Impact of slow progressive HIV on pediatric brain integrity", submitted to NIH, 12/2015. Pending.
- Thimgan MS (co-PI), **Olbricht GR (co-PI)**, and Samaranayake VA (co-PI),"Mathematically modeling sleep in a model system", submitted to NIH, 10/2015. Pending.

Presentations

Invited and Contributed Talks

- "Statistical modeling of sleep in *Drosophila melanogaster*", part of mini-symposium on Modeling and Computations for General and Chaotic Biological Systems, 2^{nd} Annual Meeting of SIAM Central States Section. Little Rock, AR, 09/2016 (to be presented).
- "Statistical analysis and software tools for biomedical data analysis", part of a tutorial on Computational Learning Approaches to Data Analytics in Biomedical Applications, 38^{th} International Conference of the IEEE Engineering in Medicine and Biology Society. Orlando, FL, 08/2016 (to be presented).
- "Statistical analysis of DNA methylation in plants", Mathematics Department Colloquium, Missouri State University. Springfield, MO, 11/2015.
- "Differential DNA methylation detection in plants: The importance of sequence context", Bioinformatics Seminar, Purdue University. West Lafayette, IN, 10/2015.
- "Investigating differences in sleep properties between Alzheimer's and normal fruit flies", Annual meeting of NCCC170: Research Advances in Agricultural Statistics. Mayaguez, Puerto Rico, 06/2015.
- "Analyzing DNA methylation data in plants: The importance of sequence context" Mathematics and Statistics Department Graduate Seminar, University of Missouri - Kansas City. Kansas City, MO, 04/2015.
- "Exploratory analysis of sleep and wake bouts in *Drosophila melanogaster*", Annual meeting of NCCC170: Research Advances in Agricultural Statistics. Lincoln, NE, 07/2014.

- "Statistical challenges in genomics and epigenomics", Division of Mathematics and Computer Science Colloquium, Truman State University. Kirksville, MO, 04/2013.
- "Statistical issues in the analysis of DNA methylation data", Department of Epidemiology and Biostatistics Seminar Series, Drexel University. Philadelphia, PA, 04/2013.
- "Statistical challenges for DNA methylation profiling", Biology Department Seminar, Missouri University of Science & Technology. Rolla, MO, 02/2012.
- "Statistical challenges for DNA methylation profiling with Next-Generation Sequencing (NGS) technology", Missouri Institute for Computational and Applied Mathematical Sciences Seminar, Missouri University of Science & Technology. Rolla, MO, 02/2012.
- "Incorporating genomic annotation in the statistical analysis of DNA methylation tiling array data", Applied and Computational Mathematics and Statistics Seminar, University of Notre Dame. Notre Dame, IN, 10/2010.
- "A hidden Markov model with genomic annotation for identifying DNA methylation with tiling arrays", Bioinformatics Seminar, Department of Statistics, Purdue University. West Lafayette, IN, 04/2010.
- "The power of student leadership in statistics", Invited Panel on "To the Nth power: Younger statisticians taking the lead", Joint Statistical Meetings. Denver, CO, 08/2008.
- "A role for students in pro bono statistics", Invited Session on "The future of pro bono statistics", Joint Statistical Meetings. Salt Lake City, UT, 07/2007.

Posters

- Wang L*, Fiebelman C, Craft R, Samaranayake VA, **Olbricht GR**, and Thimgan MS. "Applying Functional Principal Component Analysis (FPCA) to improve life span prediction from sleep properties in the fly", Joint Statistical Meetings. Chicago, IL, 08/2016 (to be presented).
- **Olbricht GR**, Injamuri S, Fiebelman C, Wang L*, McNeil S*, Samaranayake VA, and Thimgan MS. "Statistical modeling of sleep properties in *Drosophila melanogaster*", Joint Statistical Meetings. Seattle, WA, 08/2015.
- Turpin SF* and **Olbricht GR**. "Statistical methods for detection of differential methylation in human disease studies", Undergraduate Research Day at the Capitol. Jefferson City, MO, 03/2014.
- **Olbricht GR**. "Statistical methods for Next-Generation Sequencing (NGS) DNA methylation data", Joint Statistical Meetings. San Diego, CA, 07/2012.
- **Olbricht GR** and Doerge RW. "The technical and statistical challenges of whole-genome DNA methylation sequencing", Kansas State University Conference on Applied Statistics in Agriculture. Manhattan, KS, 04/2011.

Awards

- Outstanding Teaching Award
  Missouri University of Science and Technology, 11/2015
- StatCom Community Service Award
  Department of Statistics, Purdue University, 05/2007

Teaching Experience

Course Title	Institution	Level*	Terms Instructed
Statistical Methods for Bioinformatics**	Missouri S & T	G	1
Mathematical Statistics	Missouri S & T	U/G	1
Probability and Statistics⋆	Missouri S & T	U/G	2
Nonparametric Statistical Methods	Missouri S & T	G	2
Regression Analysis⋆	Missouri S & T	U/G	1
Introduction to Biostatistics	Missouri S & T	U/G	4
Engineering Statistics	Missouri S & T	U	6†
Applied Regression Analysis	Purdue University	G	1
Elementary Statistical Methods	Purdue University	U	1
Statistics and Society	Purdue University	U	3
Fundamental Concepts of Statistics	Cold Spring Harbor Lab‡	G	2
Intermediate Algebra I	Missouri State University	U	2

* G = Graduate Course, U=Undergraduate Course
** Developed Course (first time offered at Missouri S & T)
⋆ Course included a distance education component
† Coordinator for 5 semesters
‡ Teaching Assistant, Watson School of Biological Sciences,"Topics in Biology" course series

Student Direction

- Graduate Advising
  - Yuqing Su, Ph.D., Title: "TBD", expected completion May 2020.
  - Luyang Wang, Ph.D., Title: "Novel statistical modeling of sleep patterns in *Drosophila melanogaster*", expected completion December 2017.
  - M. Milad, Ph.D., Title: "Region level differential methylation testing with smoothed Functional Principal Component Analysis (FPCA)", expected completion May 2017. (Passed Ph.D Comprehensive Exam 05/2016).
  - Arnold Harder, M.S., expected completion December 2017.
  - Luke Settles, M.S. (thesis), Title: "Family-based association testing in facially delineated clusters of autistic boys", expected completion May 2017.

- Luyang Wang, M.S. (thesis), Title: "Statistical analysis of sleep patterns in *Drosophila melanogaster*"', graduated December 2014.
- Stephanie Berhorst, M.S. (thesis), Title: "Statistical analysis of microarray data in a sleep deprivation study", graduated December 2013.

- Graduate Committees
  - Member of Ph.D. committee for 11 students (6 graduated, 5 current).
  - Member of M.S. committee for 12 students (11 graduated, 1 current).

- Undergraduate Advising
  - Academic Advisor of B.S. in Applied Mathematics with Statistics Emphasis for 2 students (both graduated)
  - Elizabeth Cundiff, Steven Giangreco, Allie Plunk, Jason Viehman, Center for Undergraduate Research in Mathematics (CURM), participants for 2016-2017 academic year.
  - Yik Fai Siu, Opportunities Undergraduate Research Experience (OURE), Title: "Statistical analysis of soccer matches", expected completion May 2017.
  - Arielle Bodine, OURE, Title: "Comparing statistical methods for analyzing DNA methylation data", completed May 2016.
  - Daniel Kristapovich, OURE, Title: "Statistical analysis of sleep patterns in *Drosophila melanogaster*", completed May 2016.
  - Shelby McNeil, OURE, Title: "Sleep response to starvation and sleep deprivation in *Drosophila melanogaster*", completed Spring 2015.
  - Samuel Turpin, OURE, Title: "Statistical methods for detection of differential methylation in human disease studies ", completed Spring 2014.

Professional Service

- Refereed journal articles for:
  - Epigenomics (2015-2016)
  - South African Statistical Journal (2014-2015)
  - G3: Genes, Genomes, Genetics (2013-2014)
  - Epigenetics (2013)
  - Abstract and Applied Analysis (2012)
  - Statistical Applications in Genetics and Molecular Biology (2010)
- Member, NCCC-170: Research Advances in Agricultural Statistics, starting 10/01/2016
- Secretary, Mid-Missouri Chapter of the American Statistical Association, 12/2015 – Present
- Other Chapter Officer (Vice President), Mid-Missouri Chapter of the American Statistical Association, 05/2014– 12/2015

- Session Chair, Section on Statistical Education - Contributed Papers
  JSM, Chicago, IL, 08/2016 (to be completed)
- Session Chair, Missouri MAA Spring Meeting, Rolla, MO, 03/2015
- Session Chair, Section on Statistics and Marketing - Contributed Papers
  JSM, San Diego, CA, 07/2012

Department and University Service

- Missouri S & T
  - Faculty Advisor, Kappa Mu Epsilon, 05/2016 – Present
  - Member, Integrative Biosciences Ph.D. Committee, 01/2016 – Present
  - Member, Governing Board, Missouri S & T Center for Statistical and Computational Modeling of Biological Complexity (CSCMBC), 07/2014 – Present
  - Member, Department Policy Committee, 08/2014–Present
  - Member, Department Undergraduate Curriculum Committee, 08/2011–Present
  - Reviewer, University of Missouri Research Board Proposals, 05/2016
  - Member, Department Chair Search Committee, 11/2012-05/2013
  - Judge, Missouri S & T Undergraduate Research Conference, 04/2013, 04/2014, & 04/2015
- Purdue University
  - Assistant Director, Statistical Consulting Service, 08/2010-12/2010

Outreach Activities

- Co-PI, Science Education and Quantitative Literacy (SEQL), Cycles 12-14
  Missouri Department of Higher Education Grant (MDHE), 04/01/2014-06/30/2017
  Responsibilities: Presenting mathematics and statistics activities to 3^{rd}-5^{th} grade teachers, conducting classroom observational visits, and assisting with program assessment activities.
- Presenter, Missouri S & T Undergraduate Student Organizations
  Responsibilities: Presented informative talks about research and careers in biostatistics and statistical genomics. Presented to the local Mathematics Association of America Chapter (04/2012), Actuarial Science Club (02/2015), Introduction to Mathematics (Math 1101) Freshman Class (10/2015), and Kappa Mu Epsilon Chapter (11/2015).
- Advisor, 100 People Project
  Gowen Achievement Program, Rancho Viejo Elementary School, Yuma, AZ, Spring 2012
  Responsibilities: Providing feedback about statistical methods for elementary school students conducting a survey for students at their school.

- Consultant and Leader, Statistics in the Community(StatCom)*
  Department of Statistics, Purdue University, 06/2003–08/2010
  Responsibilities: Advisor, Director, Associate Director, Team Member (Consultant)
  *StatCom is a graduate student volunteer organization that provides pro bono statistical consulting services to nonprofit and governmental groups. Services include survey design and data analysis reports.

- Founder, StatCom P-12 Outreach
  Department of Statistics, Purdue University, 08/2004-08/2010
  Responsibilities: Presenting age-appropriate interactive statistics activities at public and classroom events.

- Intern for Statistics in the Community (StatCom)
  Member Initiatives Grant, American Statistical Association (ASA), 05/2006-05/2007
  Responsibilities: Promoting the development of StatCom programs at other institutions. Presentations given at 6 universities and 2 American Statistical Association (ASA) chapters to introduce StatCom and encourage the foundation of new StatCom programs.

- Co-author for *Amstat News* articles about StatCom
  - Ochsenfeld CA and **Olbricht GR**. (2009) "Statistical community service: What role can students play?", *Amstat News*, December 2009, Issue 390: 11-12.
  - **Olbricht GR**, Gunaratna NS, and Ochsenfeld CA. (2007) "StatCom plays role in community, JSM", *Amstat News*, June 2007, Issue 360: 11-12.
  - Gunaratna NS, Lipka AE, **Olbricht GR**, and Yoshida PY. (2006) "Service-oriented statistics: What can students do?", *Amstat News*, June 2006, Issue 348: 7-8.

Professional Development

- Missouri Section Project NExT Fellow
  Mathematical Association of America (MAA), 04/2012–Present

- Statistical Methods for Genome Wide Regional Analysis with Next Generation Sequencing Data Short Course, ENAR Spring Meeting, Baltimore, MD, 03/2014

- Successful Data Mining in Practice Short Course, Columbia, MO, 10/2013

- University of Missouri Faculty Scholars Program, Fall 2012-Spring 2013

- Junior Researcher Workshop, ENAR Spring Meeting, Washington DC, 03/2012.

Professional Society Memberships

- American Statistical Association (ASA), Institute of Mathematical Statistics (IMS), and East North American Region (ENAR) of the International Biometric Society