JAMES D. WILSON

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Assistant Professor of Statistics and Data Science ◇ Director of Data Science
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EDUCATION

University of North Carolina at Chapel Hill 2015
Ph.D. Statistics and Operations Research
Dissertation: *Statistical Analysis of Relational Data: Mining and Modeling Complex Networks*
Advisors: Andrew B. Nobel, Shankar Bhamidi

Clemson University 2010
M.S. Mathematical Sciences
Thesis: *Modeling of Disease Outbreak Using a Hidden Markov Binary Field*
Advisor: Francisco X. Vera

Campbell University 2008
B.S. Mathematics, Chemistry

ACADEMIC APPOINTMENTS

Assistant Professor University of San Francisco August, 2015 - Present

- Department of Mathematics and Statistics

- Master of Analytics Program

Director of Data Science University of San Francisco August, 2017 - Present

TEACHING EXPERIENCE

I have taught the following with full responsibilities. * I developed this course.

University of San Francisco

Graduate Courses

- **Introduction to Machine Learning**. MSAN 620 - Fall '15
- **Computational Statistics***. MSAN 629 - Spring '17
- **Multivariate Statistical Analysis**. MSAN 623 - Spring '16
- **Regression Analysis**. MSAN 601 - Fall '17

Undergraduate Courses

- **Introduction to Statistical Learning***. MATH 373 - Spring '18
- **Introduction to Data Science with R***. BSDS 100 - Spring '17, Fall '17
- **Probability and Applications**. MATH 370 - Fall '15
- **Business Statistics**. MATH 106 - Spring '16

Clemson University

– **Mathematical Analysis**. MTHSC 102 - Fall '09

University of North Carolina, Chapel Hill

– **Introduction to Statistics**. STOR 155 - Fall '12, Fall '13

ICPSR Summer Program, University of Michigan

– **Network Analysis I**. Summer '17 (Graduate course)

SUMMER COURSES, WORKSHOPS AND TUTORIALS

- **Network Analysis I**. Four week summer course given at the *ICPSR Summer Program in Quantitative Methods of Social Research*, Inter-university Consortium for Political and Social Research. University of Michigan, Ann Arbor, MI. <`http://www.icpsr.umich.edu/icpsrweb/sumprog/courses/0131`> July, 2017
- **Generalized Exponential Random Graph Models: Inference for Weighted Networks.** Political Networks Conference 2017. The Ohio State University, Columbus, OH. <`http://conference.polinetworks.org/2017/workshops`> June, 2017
- **Machine Learning Short Course on Classification.** The San Francisco 49'ers. Santa Clara, CA. September, 2016
- **Generalized Exponential Random Graph Models: Inference for Weighted Networks.** Invited Lecture at the *ICPSR Summer Program in Quantitative Methods of Social Research*, Inter-university Consortium for Political and Social Research. University of California at Berkeley, Berkeley, CA. July, 2016
- **Introduction to Statistical Computing in R.** College of Arts and Sciences, University of San Francisco. San Francisco, CA. October, 2015
- **Generalized Exponential Random Graph Models: Inference for Weighted Networks.** Political Networks Conference 2015. Reed College, Portland. <`http://conference.polinetworks.org/2015/workshops`> June, 2015

PUBLICATIONS

Published

9. Wilson, J.D., Palowitch, J., Bhamidi, S., and Nobel, A.B. (2018) **Community extraction in multilayer networks with heterogeneous community structure.** Accepted, *Journal of Machine Learning Research.*
8. Jeske, D., Stevens, N.T., Wilson, J.D., and Tartakovsky, A. (2018) **Statistical network surveillance.** Accepted, *Wiley StatsRef-Statistics Reference Online.*
7. Stillman, P.E., Wilson, J.D., Denny, M.J., Desmarais, B., Bhamidi, S., Cranmer, S., and Lu, Z-L. (2017) **Statistical modeling of the default mode brain network reveals a segregated highway structure.** *Scientific Reports* 7(1), 11694.
6. Wilson, J.D., Desmarais, B., Cranmer, S., Denny, M. and Bhamidi, S. (2017) **Stochastic weighted graphs: flexible model specification and simulation.** *Social Networks* 49, 37 - 47.
5. Woodall, W.H., Zhao, M., Paynabar, K., Sparks, R., and Wilson, J.D. (2017) **An overview and perspective on social network monitoring.** *IISE Transactions* 49:3, 354 - 365.

4. Szekely, E., Pappa, I., Wilson, J.D., Bhamidi, S., Jaddoe, V., Verhulst, H.T., and Shaw, P. (2016) **Childhood peer network characteristics: genetic influences and links with early mental health trajectories.** *Journal of Child Psychology and Psychiatry* 57(6), 687 - 694.

3. Parker, K.S., Wilson, J.D., Marschall, J., Mucha, P.J., and Henderson, J.P. (2015) **Network analysis reveals sex and antibiotic resistance associated antivirulence targets in clinical uropathogens.** *American Chemical Society: Infectious Diseases* 1(11), 523 - 532.

2. Wilson, J.D., Wang, S., Mucha, P.J., Bhamidi, S., and Nobel, A.B. (2014) **A testing based extraction algorithm for identifying significant communities in networks**. *Annals of Applied Statistics* 8(3), 1853 - 1891.

1. Wilson, J.D., Bhamidi, S., and Nobel, A.B. (2013) **Measuring the statistical significance of local connections in directed networks.** *Neural Information Processing Systems Workshop on Frontiers of Network Analysis: Methods, Models and Applications.*

Under Review

7. Cranmer, S., Kent, D., and Wilson, J.D. **A Simple Monitoring System for Judging the Dynamicism of Effects over Time.** (Submitted.)

6. Jeske, D., Stevens, N.T., Wilson, J.D., and Tartakovsky, A. **Statistical Methods for Network Surveillance.** (Submitted.)

5. Wilson, J.D., Baybay, M., Sankar, R., and Stillman, P. **Multi-node2vec: fast feature engineering for multilayer networks.** (Submitted.)

4. Lee, J., Li, G., and Wilson J.D. **Varying-coefficient models for dynamic networks.** (Submitted. Preprint: `https://arxiv.org/abs/1702.03632`)

3. Mackay, J., and Wilson, J.D. **A Free Market or a Fixed Market? Network Approaches to Detecting Collusion within Regional Labor Markets.** (Submitted.)

2. Sparks, R., and Wilson, J.D. **Monitoring communication outbreaks among an unknown team of actors in dynamic networks.** (Submitted. Preprint: `http://arxiv.org/abs/1606.09308`)

1. Wilson, J.D., Stevens, N.T., and Woodall, W.H. **Modeling and estimating change in temporal networks via a dynamic degree corrected stochastic block model.** (Submitted. Preprint: `http://arxiv.org/abs/1605.04049`)

Technical Reports

1. MacMillan, K. and Wilson, J.D. **Topic supervised non-negative matrix factorization.** (Preprint: `https://arxiv.org/abs/1706.05084`)

SOFTWARE DEVELOPED

ESSC: Extraction of statistically significant communities in undirected networks. R package available at <`https://github.com/jdwilson4/ESSC`>.

Gergm: Generalized exponential random graph models for weighted graphs. R package available at <`https://github.com/matthewjdenny/GERGM`> and also as CRAN package *gergm*. (Maintained by Matthew J. Denny)

NetSurv: Network surveillance via the degree corrected stochastic block model for dynamic weighted graphs. R package available at <`https://github.com/jdwilson4/NetSurv`>.

MultilayerExtraction: Extraction of densely connected vertex-layer communities in multilayer networks. R package available at <https://github.com/jdwilson4/MultilayerExtraction>.

Vcergm: Varying-Coefficient random graph models for dynamic networks. R package available at <https://github.com/jihuilee/VCERGM> (Maintained by Jihui Lee)

DATA SCIENCE MENTOR

Nine month advising of students and data scientists in statistical, machine learning, and computational problems. Company projects include

- AT&T Big Data ('15-'16)
- Airbnb Data Science ('15-'16)
- San Francisco 49ers ('16-'17)
- Houston Astros ('16-'17 and '17-'18)
- Eventbrite ('16-'17)
- Silicon Valley Bank ('17)
- Shippo ('17)
- Zipcar ('17-'18)
- Xoom ('17-'18)
- Bracket Voodoo ('17-'18)

PROFESSIONAL SERVICE

- **Conference organizer** - the 1st annual Data Institute Conference at the University of San Francisco downtown campus <http://www.sfdatainstitute.org>.
- **Journal Reviewer**:
  - Annals of Statistics
  - IEEE Transactions on Information Theory
  - Scientific Reports
  - Journal of Statistical Software
  - Physica A: Statistical Mechanics and its Applications
  - Journal of Computational and Graphical Statistics
  - Social Network Analysis and Mining
  - Statistical Analysis and Data Mining
  - Stochastic Processes and Applications
  - Journal of Statistical Physics
- Faculty Mentor for Undergraduate Data Science Group at the University of San Francisco
- **Conference Session Chair**:
  - Joint Statistical Meetings (JSM), 2016
  - International Symposium on Business and Industrial Statistics (ISBIS), 2018
- **Search Committees (at USF)**:
  - MS Data Science Faculty, 2018
  - Data Institute Postdoctoral Fellow (x2), 2018
  - Director of Engineering, 2018

MEMBERSHIPS

American Statistical Association, Institute of Mathematical Statistics, American Association for the Advancement of Science, Society of Industrial and Applied Mathematics, Association for Computing Machinery

PRESENTATIONS

Invited

- **Community Extraction in Multilayer Networks with Heterogeneous Community Structure.** Joint Statistical Meetings, Vancouver, Canada. August, 2018
- **Network Surveillance using Random Graph Theory and Statistical Process Monitoring.** International Symposium on Business and Industrial Statistics, University of Piraeus, Greece. July, 2018
- **Community Extraction in Multilayer Networks with Heterogeneous Community Structure.** Network Institute and Department of Political Science, Northeastern University. February, 2018
- **Community Extraction in Multilayer Networks with Heterogeneous Community Structure.** Lawrence Livermore National Labs. November, 2017
- **A/B Testing under Interference.** 1st Annual Data Institute Conference, San Francisco, CA. October, 2017
- **Generalized Exponential Random Graph Models.** Department of Statistics, Virginia Tech. October, 2017
- **Using Dynamic Networks to Analyze the Silicon Valley Wage Cartel**. Statistical Society of Canada, University of Manitoba, Winnepeg Canada. June, 2017
- **Community Extraction in Multilayer Networks with Heterogeneous Community Structure.** Department of Statistics, Colorado State University. October, 2016
- **A Significance based Community Extraction Method for Multilayer Networks.** Statistical Learning and Data Science Conference, University of North Carolina at Chapel Hill. June, 2016
- **A Significance based Community Extraction Method for Multilayer Networks.** Census Bureau, Suitland, MD. June, 2016
- **Network Analytics: Contemporary Methods and Applications.** Data Science Meetup, University of San Francisco. February, 2016
- **Modern Statistical Techniques for Analyzing Complex Networks.** AT&T Big Data and Center of Excellence, Palo Alto. October, 2015
- **Extraction of Statistically Significant Communities in Networks.** Department of Mathematical Sciences, Georgia Southern University. April, 2015
- **Significance based Extraction Techniques for Community Detection in Large and Multilayer Networks.** Department of Statistics, University of Virginia. February, 2015
- **Significance based Extraction Techniques for Community Detection in Large and Multilayer Networks.** Department of Statistics and the Computational Modeling and Data Analytics Program, Virginia Tech. February, 2015
- **Significance based Extraction Techniques for Community Detection in Large and Multilayer Networks.** Department of Mathematics and Statistics, California State University at Monterey Bay. January, 2015
- **Significance based Extraction Techniques for Community Detection in Large and Multilayer Networks.** Department of Statistics, University of Illinois, Urbana Champaign. January, 2015

- **Significance based Extraction Techniques for Community Detection in Large and Multilayer Networks.** Department of Mathematics, University of San Francisco. January, 2015

Contributed

- **Network Surveillance using Random Graph Theory and Statistical Process Monitoring.** Joint Statistical Meetings; Baltimore, MD. August, 2017
- **Generalized Exponential Random Graph Models: Statistical Inference for Weighted Graphs.** Joint Statistical Meetings; Chicago, IL. August, 2016
- **Generalized Exponential Random Graph Models: Statistical Inference for Weighted Graphs.** Political Networks Conference 2016. Washington University, St. Louis, MO. June, 2016
- **Extraction of Statistically Significant Communities in Multilayer Networks.** INFORMS 2014 Annual Meeting; San Francisco, CA. November, 2014
- **A Testing based Community Extraction Method for Identifying Significant communities in Social Networks.** Duke Network Analysis Center; Durham, NC. September, 2014
- **Community Extraction in Multilayer Networks.** International Chinese Statistical Association Applied Statistics Symposium; Portland, OR. June, 2014
- **Networks and Community Detection.** Statistics and Operations Research Student Colloquium, University of North Carolina; Chapel Hill, NC. March, 2014
- **Measuring the Statistical Significance of Local Connections in Directed Networks.** (Poster Presentation) Neural and Information Processing Systems; Reno, NV. December, 2013
- **The Statistical Significance of Local Structures in Undirected and Directed Networks.** (Poster Presentation) Statistics and Applied Mathematics Institute Social Network Data Workshop; Durham, NC. October, 2013
- **Extraction of Statistically Significant Communities in Undirected Networks.** Joint Statistical Meetings; Montreal, Canada. August, 2013
- **Graphs and Transductive Learning.** (Poster Presentation) Duke University; Durham, NC. December, 2011
- **Modeling of Disease Outbreak Using a Hidden Markov Binary Field.** (Poster Presentation) National Science Foundation and Defense Threat Reduction Agency Conference; Chapel Hill, NC. July, 2010