Justin Sirignano

Website: https://jasirign.github.io
Email: jasirign@illinois.edu
Phone: 949-370-5510

Appointments

Assistant Professor, University of Illinois at Urbana-Champaign — Aug. 2016-
Department of Industrial and Enterprise Systems Engineering

Chapman Fellow, Imperial College London — 2015-2016
Department of Mathematics

Education

Stanford University — 2010-2015
PhD in Management Science and Engineering
GPA: 4.0/4.0

Princeton University, B.S.E. — 2006-2010
Major: Operations Research and Financial Engineering
Certificate: Applied and Computational Mathematics
GPA: 3.9/4.0 and graduated *summa cum laude*
Elected to Phi Beta Kappa, Tau Beta Pi, and Sigma Xi

Research Interests

Machine learning, optimization, applied probability, stochastic modeling, financial engineering applications.

Research Publications

1. "Stochastic Gradient Descent in Continuous Time" (with K. Spiliopoulos).
   SIAM Journal on Financial Mathematics, forthcoming 2017.

2. "Risk Analysis for Large Pools of Loans" (with K. Giesecke). **Winner of the inaugural SIAM Financial Mathematics & Engineering Conference Paper Prize.**
   Management Science, forthcoming 2017.

3. "Large-scale Loan Portfolio Selection" (with K. Giesecke and G. Tsoukalas).
   Operations Research, 64(6), 1239-1255, 2016.

4. "Large Portfolio Asymptotics for Loss from Default" (with K. Giesecke, K. Spiliopoulos, and R. Sowers).
   Mathematical Finance, 25(1), 77-114, 2015.

5. "Fluctuation Analysis for the Loss from Default" (with K. Giesecke and K. Spiliopoulos).
   Stochastic Processes and their Applications, 124(7), 2322-2362, 2014.

Other Publications

1. "Deep Learning Models in Finance."
   SIAM News, June 2017.

2. Book review of "Deep Learning" by Goodfellow, Bengio, and Courville.
   SIAM Review, forthcoming 2017.

3. "Optimization of Secondary-Air Addition in a Continuous One-Dimensional Spray Combustor" (with L. Rodriquez, A. Siders, and W. Sirignano).
Journal of Propulsion and Power, 26(2), 288-294, 2010.

4. "A Forward-Backward Algorithm for Stochastic Control Problems" (with S. Ludwig, R. Huang, and G. Papanicolaou).
Proceedings of the First International Conference on Operations Research and Enterprise Systems, February 2012.

Preprints

1. "Stochastic Gradient Descent in Continuous Time: A Central Limit Theorem" (with K. Spiliopoulos).
Submitted to *Mathematics of Operations Research*. arXiv:1710.04273

2. "Deep Learning for Mortgage Risk" (with K. Giesecke and A. Sadhwani).
Submitted to *Journal of Finance*. arXiv:1607.02470

3. "Inference for Large Financial Systems" (with G. Schwenkler and K. Giesecke).
Submitted to *Mathematical Finance*. SSRN: 3012751

4. "Deep Learning for Limit Order Books."
Submitted to *Quantitative Finance*. arXiv:1601.01987

5. "DGM: A Deep Learning Algorithm for solving Partial Differential Equations" (with K. Spiliopoulos).
To be submitted in 2017 to *SIAM Journal on Scientific Computing*. arXiv:1708.07469

6. "A Deep Learning Model of Universal Price Formation in Financial Markets" (with Rama Cont).
Forthcoming, 2017.

Awards and Honors

1. Chapman Fellowship at Imperial College London

2. Winner of the inaugural SIAM Financial Mathematics & Engineering Conference Paper Prize.

3. Rose Hills Foundation Engineering Fellowship at Stanford University.

4. Lore von Jaskowsky Memorial Prize, School of Engineering and Applied Sciences at Princeton University, for senior thesis research.

Patents

1. US Patent Application 15/331,825
Title: Apparatus for Analyzing the Risk of a Large Loan Pool and Method of Using
Inventors: K. Giesecke and J. Sirignano

2. US Patent Application 15/613,256
Title: Apparatus for Optimizing a Loan Pool and Method of Using
Inventors: K. Giesecke and J. Sirignano

Teaching

1. "Deep Learning" (Fall 2016, Fall 2017). Graduate course.

2. "Deep Learning II" (Spring 2018). Graduate course.

3. "Machine Learning" (Spring 2016). Graduate course.

4. "Analysis of Data" (Spring 2017, Spring 2018). Undergraduate course.

Professional Activities

1. Organized Minisymposiums and Sessions
   (i) *Machine learning in finance* session at INFORMS Annual Meeting, Houston, October 2017.
   (ii) *Financial engineering* session at INFORMS Applied Probability Meeting, Northwestern University, July 2017.
   (iii) *Machine learning for finance* minisymposium at SIAM Financial Mathematics Conference, Austin, November 2016.
   (iv) *Machine learning for finance* session at INFORMS Annual Meeting, Nashville, November 2016.
   (v) *Large-scale portfolio risk* session at INFORMS Annual Meeting, Philadelphia, November 2015.
2. Referee for *Operations Research*, *Management Science*, *SIAM Journal on Financial Mathematics*, and other journals.
3. Co-organizer of "Machine Learning" seminar series at University of Illinois at Urbana-Champaign.
4. Member of committee for the Masters of Financial Engineering program.

Selected Presentations

1. Seminar at Princeton University, 2017.
2. INFORMS Applied Probability Society Conference, Northwestern University, July 2017. Invited.
3. Seminar at Northwestern University, April 2017.
4. J.P. Morgan, New York City, August 2017. Invited seminar.
5. SIAM Financial Mathematics Conference, Austin, Texas, November 2016. Co-organized minisymposium on machine learning in finance.
6. Bank of England, London, May 2016. Invited seminar.
7. INFORMS Annual Meeting, Nashville, November 2016. Invited.
8. Seminar at London Business School, London, June 2016.
9. Seminar at Oxford University, May 2016.
10. London-Paris Bachelier Workshop on Mathematical Finance, London, September 2015. Invited.
11. Lending Club, San Francisco, June 2015.
12. IPAM Workshop on Systemic Risk and Financial Networks, Los Angeles, 2015. Invited.
13. SIAM Financial Mathematics and Engineering Meeting, Chicago, 2014. Invited.
14. INFORMS Annual Meeting, San Francisco, 2014. Invited.
15. Joint Mathematics Meeting, Baltimore, 2014. Invited.
16. INFORMS Annual Meeting, Phoenix, October, 2012. Invited.
17. SIAM Financial Mathematics and Engineering Meeting, Minneapolis, 2012. Chair of the *Credit Risk* session.
18. Annual Meeting of the Canadian Applied and Industrial Mathematics Society, Toronto, 2012. Invited.
19. 5th Financial Risks International Forum, Paris, France, 2012.

Students

2 PhD students, 1 masters thesis student, and 1 undergraduate senior thesis student.

Other work experience

British Petroleum, Natural Gas and Power (NAGP), Summer 2013. Machine learning model for electric power market.

Citizenship

United States of America