Konstantin M. Zuev
California Institute of Technology
September, 2023

CONTACT INFORMATION

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1200 E. California Blvd
Pasadena, CA 91125, USA

CURRENT APPOINTMENTS

- **Teaching Professor of Computing and Mathematical Sciences** — June 2022 – present
  - o Teaching Assistant Professor of Computing and Mathematical Sciences — Feb. 2020 – June 2022
  - o Special Lecturer in Computing and Mathematical Sciences — Aug. 2015 – Feb. 2020

  Department of Computing and Mathematical Sciences
  California Institute of Technology

- **Scientific Advisory Board Member** — Sep. 2021 – present
  - o Data Science Consultant — Sep. 2018 – Aug. 2021

  Virtualitics, Inc

PREVIOUS APPOINTMENTS

- **Honorary Supervisor in Uncertainty and Risk in Complex Systems and Networks** — Aug. 2015 – Aug. 2018
- **Assistant Professor in Uncertainty and Risk in Complex Systems and Networks** — Sep. 2013 – Aug. 2015
  Institute for Risk and Uncertainty
  University of Liverpool (on sabbatical at *Northeastern University*, Mar. 2014 – Aug. 2015)

- **Assistant Professor of Mathematics (NTT)** — Aug. 2011 – July 2013
  Department of Mathematics
  University of Southern California

- **Visiting Research Associate** — Nov. 2011 – July 2013
  Department of Computing and Mathematical Sciences
- **Postdoctoral Scholar** — Mar. 2010 – Aug. 2011
  Department of Mechanical and Civil Engineering
  California Institute of Technology

- **Postdoctoral Fellow** — Feb. 2009 – Feb. 2010
  Department of Civil and Environmental Engineering
  The Hong Kong University of Technology and Technology

EDUCATION

- **Ph.D.** in **Mathematics** — Dec. 26, 2008
  Department of Mechanics and Mathematics
  Lomonosov Moscow State University

- **Ph.D.** in **Civil Engineering** — Jan. 6, 2009
  Department of Civil and Environmental Engineering
  The Hong Kong University of Science and Technology

- **M.S.** in **Mathematics** with distinction and gold medal (GPA 4.9 out of 5) — June 25, 2003
  Department of Mechanics and Mathematics
  Lomonosov Moscow State University

HONORS AND AWARDS

- Associated Students of the California Institute of Technology (ASCIT) Teaching Award, 2023.
- Graduate Student Council (GSC) Teaching Award, 2023.
- Research Grant from the Carver Mead New Adventure Fund, 2023.
- Invited Faculty Speaker, Senior Graduation Banquet at Caltech, 2022.
- Humboldt Research Fellowship for Experienced Researchers, 2021.
- Northrop Grumman Prize for Excellence in Teaching, 2019.
- Associated Students of the California Institute of Technology (ASCIT) Teaching Award, 2018.
- Invited Speaker, Symposium "Making Rational Decisions under Uncertainty and Model Complexity," 2017. A Celebration in Honor of Professor James L. Beck's Career and Tenure at Caltech.
- Keynote Speaker, ASCE-IRD-RRMC Workshop "Resiliency of Urban Tunnels and Pipelines," 2016.
- Paper [13] (see Publication List) is selected by the Institute of Physics (IOP) for a collection of the highest quality work for its "*novelty, significance and potential impact on future research*", 2015.
- Honorary Supervisor, Institute for Risk and Uncertainty, University of Liverpool, 2015-2018.
- Elected Chairman, Committee on Probability and Statistics in the Physical Sciences of the Bernoulli Society for Mathematical Statistics and Probability, 2015 – 2018.
- Invited Member, ASCE Infrastructure Resilience Division, Risk and Resilience Measurements Committee, Risk, Uncertainty and Resilience Quantification Subcommittee, since 2015.
- Invited Participant, NIST-ASCE Workshop on Economics of Community Disaster Resilience, 2015.
- Invited Author, Springer Handbook on Uncertainty Quantification, 2014.
- Institute for Mathematics and its Applications Travel Award, 2014.
- Invited Author, Springer Encyclopedia of Earthquake Engineering, 2013.
- Invited Speaker, Southern California Probability Symposium, 2011.
- American Institute of Mathematics Travel Award, 2011.
- Caltech Postdoctoral Scholarship, 03/2010-08/2011.
- Fields Institute Travel Award, 2009.

RESEARCH INTERESTS

My current main research interest is **network science**. In particular, I am interested in network data analysis, network models, network dynamics, percolation and network resilience, and dynamical processes on complex networks. As a special type of complex networks, I am particularly interested in course-prerequisite networks. To learn more about my research interests, past and present research, please see: Research Interests.

PUBLICATIONS

All publications are available at my Publications Page.
For citation analysis, please see my Google Scholar Profile.

JOURNAL PAPERS

[28] A. Garbuno-Iñigo, F.A. DiazDelaO, and K.M. Zuev, "History Matching with Probabilistic Emulators and Active Learning," https://arxiv.org/abs/2004.07878, submitted.

[27] G. Budel, M. Kitsak, R.Aldecoa, K.M. Zuev, and D. Krioukov "Random Hyperbolic Graphs in d+1 Dimensions," https://arxiv.org/abs/2010.12303, submitted.

[26] C.J. Kinslow, Y. Liu, K.M. Zuev, K.R. Chaudhary, T.J.C. Wang, C.M. Donalek, M. Amori, S. Cheng, and Y. Wang, "Influenza Activity and Regional Mortality for Non-Small Cell Lung Cancer," https://doi.org/10.21203/rs.3.rs-3264032/v1, submitted.

[25] P. Stavrinides and K.M. Zuev (2023), "Course-Prerequisite Networks for Analyzing and Understanding Academic Curricula," *Applied Network Science,* vol. 8, 19.

[24] V.E. Kontosakos, K. Mendonca, A.A. Pantelous, and K.M. Zuev (2021), "Pricing Discretely-Monitored Double Barrier Options with Small Probabilities of Execution," *European Journal of Operational Research*, vol. 290, no. 1, pp. 313-330.

[23] S.K. Stavroglou, A.A Pantelous, H.E. Stanley, and K.M. Zuev (2020), "Unveiling Causal Interactions in Complex Systems," *Proceedings of the National Academy of Sciences,* vol. 117, no. 14, pp. 7599-7605.

[22] S.K. Stavroglou, A.A. Pantelous, H.E. Stanley, and K.M. Zuev (2019), "Hidden Interactions in Financial Markets," *Proceedings of the National Academy of Sciences,* vol. 116, no. 22, pp. 10646-10651.

[21] C.J. Kinslow, Y. Wang, Y. Liu, K.M. Zuev, T.J.C. Wang, C.M. Donalek, M. Amori, and S. Cheng (2019), "Influenza and Mortality for Non-Small Cell Lung Cancer," *Journal of Clinical Oncology*, vol. 37, e13114.

[20] M.D. Vamvakaris, A.A. Pantelous, and K.M. Zuev (2018), "Time Series Analysis of S&P 500 Index: A Horizontal Visibility Graph Approach," *Physica A,* vol. 497, pp. 41-51.

[19] Y. Chen, R.N. Mantegna, A.A. Pantelous, and K.M. Zuev (2018), "A Dynamic Analysis of S&P 500, FTSE 100 and EURO STOXX 50 Indices under Different Exchange Rates," *PLOS ONE,* vol. 13, no. 3, article e0194067.

[18] W. Cunningham, K.M. Zuev, and D. Krioukov (2017), "Navigability of Random Geometric Graphs in the Universe and Other Spacetimes," *Nature Scientific Reports,* vol. 7, article 8699.

[17] S. Stavroglou, A.A. Pantelous, K. Soramaki, and K.M. Zuev (2017), "Causality Networks of Financial Assets," *Journal of Network Theory in Finance,* vol 3, no. 2, pp. 17-67.

[16] A. Garbuno-Iñigo, F.A. DiazDelaO, and K.M. Zuev (2016), "Transitional Annealed Adaptive Slice Sampling for Gaussian Process Hyper-Parameter Estimation," *International Journal for Uncertainty Quantification,* vol. 6, no. 4, pp. 341-359.

[15] A. Garbuno-Iñigo, F.A. DiazDelaO, and K.M. Zuev (2016), "Gaussian Process Hyper-Parameter Estimation using Parallel Asymptotically Independent Markov Sampling," *Computational Statistics & Data Analysis*, vol. 103, pp. 367–383.

[14] K.M. Zuev, F Papadopoulos, D. Krioukov (2016), "Hamiltonian Dynamics of Preferential Attachment," J*ournal of Physics A: Mathematical and Theoretical,* vol. 49, article 105001.

[13] K.M. Zuev, O. Eisenberg, and D. Krioukov (2015), "Exponential Random Simplicial Complexes," *Journal of Physics A: Mathematical and Theoretical*, vol. 48, article 465002.

[12] K.M. Zuev, D. Krioukov, M. Boguña, and G. Bianconi (2015), "Emergence of Soft Communities from Geometric Preferential Attachment," *Nature Scientific Reports*, vol. 5, article 9421.

[11] K.M. Zuev, S. Wu, and J.L. Beck (2015), "General Network Reliability Problem and its Efficient Solution by Subset Simulation," *Probabilistic Engineering Mechanics,* vol. 40, pp. 25-35.

[10] J. Birch, A.A. Pantelous, and K.M. Zuev (2015), "The Maximum Number of 3- and 4-Cliques within a Planar Maximally Filtered Graph," *Physica A,* vol. 417, pp 221-229.

[9] K.M. Zuev and J.L. Beck (2013), "Global Optimization using the Asymptotically Independent Markov Sampling Method," *Computers & Structures*, vol. 126, pp. 107-119.

[8] J.L. Beck and K.M. Zuev (2013), "Asymptotically Independent Markov Sampling: A New MCMC Scheme for Bayesian Inference," *International Journal for Uncertainty Quantification*, vol. 3, no. 2, pp. 445-474.

[7] K.M. Zuev, J.L. Beck, S.K. Au, and L.S. Katafygiotis (2012), "Bayesian Post-Processor and Other Enhancements of Subset Simulation for Estimating Failure Probabilities in High Dimensions," *Computers & Structures,* vol.92-93, pp. 283-296.

[6] K.M. Zuev and L.S. Katafygiotis (2011), "Modified Metropolis-Hastings Algorithm with Delayed Rejection," *Probabilistic Engineering Mechanics*, vol. 26, no. 3, pp. 405-412.

[5] K.M. Zuev and L.S. Katafygiotis (2011), "The Horseracing Simulation Algorithm for Evaluation of Small Failure Probabilities," *Probabilistic Engineering Mechanics*, vol. 26, no. 2, pp. 157-164.

[4] A.V. Bolsinov and K.M. Zuev (2009), "A Formal Frobenius Theorem and Argument Shift," *Mathematical Notes,* vol. 86, no. 1, pp. 10-18. Original Russian paper is published in *Matematicheskie Zametki,* vol. 86, no. 1, pp. 3-13.

[3] L.S. Katafygiotis and <u>K.M. Zuev</u> (2008), "Geometric Insight into the Challenges of Solving High-Dimensional Reliability Problems," *Probabilistic Engineering Mechanics,* vol. 23, no. 2-3, pp. 208-218.

[2] <u>K.M. Zuev</u> (2006), "Spectrum of the Laplace-Beltrami Operator on Suspensions of Toric Automorphisms," *Sbornik: Mathematics*, vol. 197, no. 9, pp. 1297-1308. Original Russian paper is published in *Matematicheskii Sbornik*, vol. 197, no. 9, pp. 43-54.

[1] <u>K.M. Zuev</u> (2006), "On the Case of Integrability of a Geodesic Flow on a Homogeneous Manifold," *Bulletin of the Lomonosov Moscow State University,* Ser. 1 (Mathematics, mechanics), no. 2, pp. 13-16.

BOOKS

[1] <u>K.M. Zuev</u>, *Fundamentals of Statistical Inference: Why Data Science Works.* In preparation. Accepted for publication by Springer. The zero draft is available online at http://arxiv.org/abs/1603.04929.

BOOK CHAPTERS

[4] <u>K.M. Zuev</u> and M. Beer (2018), "Reliability of Critical Infrastructure Networks: Challenges," In: B.M. Ayyub et al. (Eds.), *Resilience Engineering for Urban Tunnels*, Chapter 6.

[3] J.L. Beck and <u>K.M. Zuev</u> (2017), "Rare Event Simulation," In: R. Ghanem et al. (Eds.), *Handbook on Uncertainty Quantification*, Springer International Publishing, Chapter 30, pp 1075-1100.

[2] M.D. Vamvakaris, A.A. Pantelous, and <u>K.M Zuev</u> (2017), "Investors' Behavior on S&P 500 Index during Periods of Market Crashes: A Visibility Graph Approach," In: F. Economou et al. (Eds.), *Handbook of Investors' Behavior during Financial Crises*, Academic Press, Chapter 22, pp 401-417.

[1] <u>K.M. Zuev</u> (2015), "Subset Simulation Method for Rare Event Estimation: An Introduction," In: M. Beer et al (Eds.), *Encyclopedia of Earthquake Engineering*, Springer Berlin Heidelberg, pp. 3671-3691.

EDITORIALS

[1] <u>K.M. Zuev</u> and M. Beer (Guest Editors) (2017), "Special Issue on Complex Engineered Networks: Reliability, Risk, and Uncertainty," *ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part B: Mechanical Engineering*, vol. 3, no. 2.

CONFERENCE PAPERS

[13] I. Zaliapin, K. Henricksen, and <u>K.M. Zuev</u>, "Hyperbolic Geometry of Earthquake Networks," *EGU General Assembly, 2020.*

[12] <u>K.M. Zuev</u> and J.L. Beck, "Asymptotically Independent Markov Sampling: A New MCMC Scheme for Bayesian Inference," *2nd International Conference on Vulnerability and Risk Analysis and Management & 6th International Symposium on Uncertainty Modelling and Analysis ASCE-ICVRAM-ISUMA-2014.*

[11] <u>K.M. Zuev</u>, J.L. Beck, and *S. Wu*, "Rare Events in Complex Networks and their Efficient Estimation," *SIAM Workshop on Network Science NS14, 2014*.

[10] <u>K.M. Zuev</u>, *S. Wu*, and J.L. Beck, "Efficient Estimation of Complex Network Reliability," *MIPT 56th Annual Scientific Conference, 2013*.

[9] <u>K.M. Zuev</u>, *S. Wu*, and J.L. Beck, "Network Reliability Problem and its Efficient Solution by Subset Simulation," *11th International Conference on Structural Safety and Reliability ICOSSAR-2013.*

[8] <u>K.M. Zuev</u> and J.L. Beck, "Global Optimization for Performance-Based Design using the Asymptotically Independent Markov Sampling Method," *11th International Conference on Structural Safety and Reliability ICOSSAR-2013.*

[7] <u>K.M. Zuev</u> and L.J. Beck, "Bayesian Post-Processing for Subset Simulation for Decision Making under Risk," *Asian-Pacific Symposium on Structural Reliability and its Applications APSSRA-2012*.

[6] <u>K.M. Zuev</u>, L.J. Beck, and L.S. Katafygiotis, "On the Optimal Scaling of the Modified Metropolis-Hastings Algorithm," *11th International Conference on Applications of Statistics and Probability in Civil Engineering ICASP-2011.*

[5] <u>K.M. Zuev</u> and L.S. Katafygiotis, "Modified Metropolis-Hastings Algorithm with Delayed Rejection for High-Dimensional Reliability Analysis," *Computational Methods in Structural Dynamics and Earthquake Engineering COMPDYN-2009*.

[4] L.S. Katafygiotis and <u>K.M. Zuev</u>, "Horseracing Simulation Algorithm for Evaluation of Small Failure Probabilities," *Computational Methods in Structural Dynamics and Earthquake Engineering COMPDYN-2009*.

[3] <u>K.M. Zuev</u> and L.S. Katafygiotis, "Modified Metropolis-Hastings Algorithm with Delayed Rejection," *Asian-Pacific Symposium on Structural Reliability and its Applications APSSRA-2008.*

[2] L.S. Katafygiotis and <u>K.M. Zuev</u>, "Estimation of Small Failure Probabilities in High Dimensions by Adaptive Linked Importance Sampling," *Computational Methods in Structural Dynamics and Earthquake Engineering COMPDYN-2007.*

[1] L.S. Katafygiotis and <u>K.M. Zuev</u>, "Geometric Insight into the Challenges of Solving High-Dimensional Reliability Problems," *5th International Conference on Computational Stochastic Mechanics CMS-5,* 2006.

MISCELLANEOUS

[1] S.K. Au, J.L. Beck, <u>K.M. Zuev</u>, and L.S. Katafygiotis, Discussion of paper by F. Miao and M. Ghosn "Modified Subset Simulation Method for Reliability Analysis of Structural Systems," *Structural Safety*, 2011, vol. 33, pp. 251-260. Published in *Structural Safety*, 2011, vol. 34, pp. 379-380.

SELECTED PRESENTATIONS

Asterisk * and hash # indicate invited and keynote talks respectively.

* 04/2021, *"New Approaches to Complex Reliability Problems,"* TU Dortmund, Germany, Online Seminar.

* 01/2018, *"Solving Complex Reliability Problems at Local and Global Scale,"* University of Central Florida, Florida, USA.

* 05/2017, *"Hyperbolic Geometry of Complex Network Data,"* CMX (Computational Mathematics + X) Seminar, California Institute of Technology, Pasadena, California, USA.

* 02/2017, *"Subset Simulation and Reliability of Critical Infrastructure Networks: Recent Progress, New Applications, and Challenges,"* Symposium on Making Rational Decisions under Uncertainty and Model Complexity, Pasadena, California, USA.

* 10/2016, *"Reliability of Critical Infrastructure Networks at Local and Global Scale,"* Clemson University Center of Excellence, Clemson, South Carolina, USA.

* 08/2016, *"Hyperbolic Geometry of Complex Network Data,"* Probability and Statistics Seminar, University of Southern California, Los Angeles, California, USA.

08/2016, *"Reliability of Critical Infrastructure Networks: Challenges,"* the ASCE Workshop on Resiliency of Urban Tunnels and Pipelines, ASCE Headquarters, Reston, Virginia, USA.

* 02/2016, *"Hyperbolic Geometry of Complex Network Data,"* Mathematics & Statistics Colloquium, University of Nevada, Reno, USA.

* 07/2014, *"Asymptotically Independent Markov Sampling: A New MCMC Scheme for Bayesian Inference,"* 2nd International Conference on Vulnerability and Risk Analysis and Management & 6th International Symposium on Uncertainty Modelling and Analysis, Liverpool, UK.

11/2013, *"Complex Systems, Complex Networks, and their Reliability,"* Risk Institute Seminar, University of Liverpool, UK.

11/2013, *"Risk Estimation and Uncertainty Quantification by Markov Chain Monte Carlo Methods,"* Workshop on Risk and Uncertainty, University of Liverpool, UK.

* 03/2013, *"Efficient Markov Chain Monte Carlo Methods for Reliability Estimation and Uncertainty Quantification in Complex Systems and Networks,"* Risk Institute Seminar, University of Liverpool, UK.

05/2012, *"Bayesian Post-Processing for Subset Simulation for Decision Making under Risk,"* Asian-Pacific Symposium on Structural Reliability and its Applications, Singapore.

04/2012, *"Bayesian Subset Simulation,"* SIAM Conference on Uncertainty Quantification, Raleigh, North Carolina, USA.

* 12/2011, *"Markov Chain Monte Carlo Revolution in Reliability Engineering,"* Southern California Probability Symposium, University of Southern California, Los Angeles, California, USA.

05/2011, *"Markov Chain Monte Carlo and its Application to Some Engineering Problems,"* Mechanical and Civil Engineering Seminar, California Institute of Technology, Pasadena, California, USA.

02/2011, *"Asymptotically Independent Markov Sampling: A New MCMC Scheme for Bayesian Inference,"* Probability and Statistics Seminar, University of Southern California, Los Angeles, California, USA.

08/2010, *"Bayesian Subset Simulation for Failure Probability Estimation,"* Engineering Mechanics Institute 2010, University of Southern California, Los Angeles, California, USA.

03/2010, *"A Tutorial on MCMC Algorithms,"* Research Group Seminar, California Institute of Technology, Pasadena, California, USA.

* 02/2010, *"Random Walks in High Dimensions: Metropolis Algorithm and its Modifications,"* Department of Civil Engineering, Centre for Hazards Research, National University of Singapore, Singapore.

06/2009, *"Horseracing Simulation Algorithm for Evaluation of Small Failure Probabilities,"* Computational Methods in Structural Dynamics and Earthquake Engineering, Rhodos, Greece.

06/2009, *"Modified Metropolis-Hastings Algorithm with Delayed Rejection for High-Dimensional Reliability Analysis,"* Computational Methods in Structural Dynamics and Earthquake Engineering, Rhodos, Greece.

09/2008, *"Geometry of Integrable Geodesic Flows," Seminar "Lie Algebras and Integrable Systems,"* Moscow State University, Moscow, Russia.

09/2008, *"Formal Argument Shift Method,"* Seminar "Modern Geometric Methods," Moscow State University, Moscow, Russia.

06/2008, *"Modified Metropolis-Hastings Algorithm with Delayed Rejection,"* Asian-Pacific Symposium on Structural Reliability and its Applications, Hong Kong, China.

06/2007, *"Estimation of Small Failure Probabilities in High Dimensions by Adaptive Linked Importance Sampling,"* Computational Methods in Structural Dynamics and Earthquake Engineering, Rethymno, Crete, Greece.

07/2006, *"On the Spectrum of the Laplace-Beltrami Operator on the Suspensions of Toric Automorphisms,"* International Conference on Differential Equations and Dynamical Systems, Suzdal, Russia.

06/2006, *"Geometric Insight into the Challenges of Solving High-Dimensional Reliability Problems,"* 5th International Conference on Computational Stochastic Mechanics, Rhodos, Greece.

TEACHING EXPERIENCE

To learn about my teaching philosophy, please see: [Teaching Philosophy](#)
A sample of student comments on my teaching: [Student Comments](#)
Courses taught online due to *COVID-19* are shown in *italic*.

Course Instructor

- **ACM 95a/100a: Introductory Methods of Applied Mathematics for the Physical Sciences,** Caltech

Teaching Quality Evaluation	Course Rating	Instructor Rating
Winter 2022-23 (ACM95a: 147 students)	4.42 out of 5 (Caltech 4.28)	4.68 out of 5 (Caltech 4.25)
Winter 2022-23 (ACM100a: 28 students)	4.69 out of 5 (Caltech 4.28)	4.77 out of 5 (Caltech 4.25)
Winter 2021-22 (ACM95a: 143 students)	*4.68 out of 5 (Caltech 4.26)*	*4.84 out of 5 (Caltech 4.22)*
Winter 2021-22 (ACM100a: 29 students)	*4.42 out of 5 (Caltech 4.26)*	*4.75 out of 5 (Caltech 4.22)*

Winter 2020-21 (ACM95a: 155 students)	*4.90 out of 5 (Caltech 4.36)*	*4.98 out of 5 (Caltech 4.36)*
Winter 2020-21 (ACM100a: 38 students)	*4.89 out of 5 (Caltech 4.36)*	*4.93 out of 5 (Caltech 4.36)*
Winter 2018-19 (ACM95a: 137 students)	4.74 out of 5 (Caltech 4.24)	4.81 out of 5 (Caltech 4.15)
Winter 2018-19 (ACM100a: 33 students)	4.86 out of 5 (Caltech 4.24)	4.86 out of 5 (Caltech 4.25)
Winter 2017-18 (ACM95a: 127 students)	4.58 out of 5 (Caltech 4.21)	4.85 out of 5 (Caltech 4.17)
Winter 2017-18 (ACM100a: 57 students)	4.62 out of 5 (Caltech 4.21)	4.75 out of 5 (Caltech 4.17)

- **IDS/ACM/CS 157: Statistical Inference,** California Institute of Technology

Teaching Quality Evaluation	Course Rating	Instructor Rating
Spring 2022-23 (108 students)	4.68 out of 5 (Caltech 4.33)	4.82 out of 5 (Caltech 4.35)
Spring 2021-22 (107 students)	4.81 out of 5 (Caltech 4.31)	4.97 out of 5 (Caltech 4.29)
Spring 2020-21 (106 students)	*4.76 out of 5 (Caltech 4.39)*	*4.94 out of 5 (Caltech 4.38)*
Winter 2019-20 (71 student)	4.75 out of 5 (Caltech 4.27)	4.93 out of 5 (Caltech 4.23)
Spring 2018-19 (97 students)	4.71 out of 5 (Caltech 4.19)	4.92 out of 5 (Caltech 4.19)
Spring 2017-18 (42 students)	4.82 out of 5 (Caltech 4.15)	4.91 out of 5 (Caltech 4.18)
Winter 2016-17 (57 students)	4.74 out of 5 (Caltech 4.22)	4.84 out of 5 (Caltech 4.18)
Winter 2015-16 (9 students)	4.75 out of 5 (Caltech 4.16)	5.00 out of 5 (Caltech 4.11)

- **IDS/ACM/CS 158: Fundamentals of Statistical Learning,** California Institute of Technology

Teaching Quality Evaluation	Course Rating	Instructor Rating
Spring 2019-20 (49 students)	*4.94 out of 5 (Caltech 4.28)*	*5.00 out of 5 (Caltech 4.27)*

- **ACM/IDS 104: Applied Linear Algebra,** California Institute of Technology

Teaching Quality Evaluation	Course Rating	Instructor Rating
Fall 2022-23 (177 students)	4.69 out of 5 (Caltech 4.24)	4.78 out of 5 (Caltech 4.21)
Fall 2021-22 (146 students)	*4.71 out of 5 (Caltech 4.21)*	*4.80 out of 5 (Caltech 4.16)*
Fall 2020-21 (158 students)	*4.78 out of 5 (Caltech 4.37)*	*4.91 out of 5 (Caltech 4.36)*
Fall 2019-20 (180 students)	4.71 out of 5 (Caltech 4.27)	4.74 out of 5 (Caltech 4.26)
Fall 2018-19 (128 students)	4.65 out of 5 (Caltech 4.24)	4.72 out of 5 (Caltech 4.21)
Fall 2017-18 (90 students)	4.61 out of 5 (Caltech 4.19)	4.67 out of 5 (Caltech 4.13)
Fall 2016-17 (85 students)	4.49 out of 5 (Caltech 4.18)	4.62 out of 5 (Caltech 4.13)
Spring 2015-16 (14 students)	4.71 out of 5 (Caltech 4.13)	4.86 out of 5 (Caltech 4.14)

- **ACM/EE/IDS 116: Introduction to Probability Models,** California Institute of Technology

Teaching Quality Evaluation	Course Rating	Instructor Rating
Fall 2022-23 (172 student)	4.66 out of 5 (Caltech 4.24)	4.84 out of 5 (Caltech 4.21)
Fall 2021-22 (158 students)	*4.74 out of 5 (Caltech 4.21)*	*4.87 out of 5 (Caltech 4.16)*
Fall 2020-21 (136 students)	*4.84 out of 5 (Caltech 4.37)*	*4.93 out of 5 (Caltech 4.36)*
Fall 2019-20 (181 student)	4.58 out of 5 (Caltech 4.27)	4.74 out of 5 (Caltech 4.26)
Fall 2018-19 (108 students)	4.71 out of 5 (Caltech 4.24)	4.79 out of 5 (Caltech 4.21)
Fall 2017-18 (88 students)	4.60 out of 5 (Caltech 4.19)	4.73 out of 5 (Caltech 4.13)
Fall 2016-17 (83 students)	4.33 out of 5 (Caltech 4.18)	4.49 out of 5 (Caltech 4.13)

- **Introduction to MATLAB and Mathematica,** California Institute of Technology

Teaching Quality Evaluation	Course Rating	Instructor Rating
Spring 2016-17 (60 students)	4.40 out of 5 (Caltech 4.21)	4.56 out of 5 (Caltech 4.22)
Spring 2015-16 (48 students)	3.50 out of 5 (Caltech 4.13)	3.36 out of 5 (Caltech 4.14)

- **Uncertainty, Reliability and Risk,** University of Liverpool*, Winter 2013.
- **Mathematical Statistics**, University of Southern California, Spring 2012, Spring 2013.
- **Mathematics of Physics and Engineering**, University of Southern California, Spring 2012.
- **Fundamental Principles of Calculus**, University of Southern California, Fall 2011, Fall 2012.

Exam Committees

- **Aerospace Engineering Qualifying Exam,** California Institute of Technology, Falls 2017 – present.
- **Applied and Computational Mathematics Prelim Exam**, California Institute of Technology, 2022.
- **Mechanical and Civil Engineering Qualifying Exam,** California Institute of Technology, Falls 2016 – 19.

- **Graduate Exam on Statistics,** University of Southern California, 2012, 2013.

<u>Teaching Assistant</u>

- **Mechanics of Materials**, Hong Kong University of Science and Technology, Spring 2007, Spring 2008.
- **Statics and Dynamics,** Hong Kong University of Science and Technology, Fall 2006, Fall 2007.
- **Classical Differential Geometry,** Lomonosov Moscow State University, Spring 2005.

<u>Teacher of Mathematics</u>

- **Introduction to Topology,** Summer School of Moscow Center for Continuous Mathematical Education, Summer 2002.
- **Ruler-and-Compass Constructions**, Summer School of Moscow Center for Continuous Mathematical Education, Summer 2000.

STUDENTS

<u>Undergraduate Research Students</u>

- Pavlos Stavrinides (Caltech, June 2022 – present)
  Project: "Course-Prerequisite Networks for Analyzing and Understanding Academic Curricula"
  Sponsor: Carver Mead New Adventure Fund. Budget: $20,000. Period: Jan. 2023 – Jan. 2025.
  Outcome: A journal paper [25] is published in *Applied Network Science* and presented at the
    o *CMS + IST Meeting of the Minds* 2023, Pasadena, USA.
    o *International School and Conference on Network Science NetSci-2023* in Vienna, Austria.
- Keegan Mendonca (Caltech, Apr. 2016 – Dec. 2016)
  Project: "Efficient Pricing of Barrier Options with Small Survival Probabilities using Subset Simulation"
  Outcome: A journal paper [24] is published in *European Journal of Operational Research*.

<u>Summer Undergraduate Research Fellows (SURFs):</u>

- Max Popken (Caltech, Jun. 2021 – Aug. 2021)
  Project: "Estimating Small Failure Probabilities"
  Sponsor: Caltech anonymous donor. Budget: $6,620. Period: Jun. 2021 – Aug. 2021.
- Anastasia Popova (Caltech, Jun. 2021 – Aug. 2021)
  Project: "Entropy of Motif Distribution and Robustness of Complex Networks"
  Sponsor: Caltech SURF program. Budget: $6,620. Period: Jun. 2021 – Aug. 2021.
- Leyu Yao (Caltech, Jun. 2018 – Aug. 2018)
  Project: "Reducing Damage caused by Cascading Failures in Power Grids"
  Sponsor: Caltech donor Øistein and Rita A. Skjellum. Budget: $6,000. Period: Jun. 2018 – Aug. 2018.
- Ashwin Hari (Caltech, Mar. 2017 – Aug. 2017)
  Project: "Reliability of Power Grids under Cascading Failures"
  Sponsor: Caltech donor Robert I. and Winifred E. Gardner. Budget: $6,000. Period: Jun. 2017 – Aug. 2017.
- Zhi Ren (Caltech, Jun. 2017 – Aug. 2017)
  Project: "Efficient Estimation of Delta-Hyperbolicity of Complex Networks"
  Sponsor: Caltech SURF program. Budget: $6,000. Period: Jun. 2017 – Aug. 2017.

<u>General Academic Adviser for Undergraduate Students</u>

- Caltech: J. Wu, A. Sun, M. Sultan, J. Siri, L. Pryor, E. Pan, A. Maheshwar, H. Zhang, A. Wang, C. Shepard, J. Kwak, R. Jiang, D. Ing, M. Gessesse, J. Corrales de Oliveira, J. Bowden, W. Chang, S. Soedarmadji, A. Huang, J. Koval, M. Tiffany, E. Zhang, E. Zheng, D. Zhou, T. Barrett, A. Huang, M. Nuzen, N. Poole, K. Rodriguez, C. Sun, L. Hu, Q. Wang, R. Mercado, A. Chelikani, E. Diaz, E. Pinkus, K. Yu, W. Bloomquist, E. Borba, A. Espino, J. Pak, A. Resnick, A. Xiong, N. Krishnan, N. Cho, J. Co-Reyes, C. Crowley.
- Northeastern University: O. Eisenberg.
- University of Liverpool: M. Holden, N. Tziolis, Y. Wong, Q. Zhu.

<u>Co-Supervised Graduate Students</u>

- Stavros Stavroglou (University of Liverpool, PhD in Applied Mathematics 2019)
- Yanhua Chen (University of Liverpool, PhD in Engineering 2018)
- Alfredo Garbuno-Iñigo (University of Liverpool, PhD in Engineering 2018)

- Will Cunningham (Northeastern University, PhD in Physics 2018)
- Jenna Birch (University of Liverpool, PhD in Mathematics 2015)

OUTREACH AND ENGAGEMENT ACTIVITIES

For more details, please see my Outreach & Popularization Page

- Team Leader of the Caltech Chess Club   Jul. 2020 – present
  This club is created for the entire Caltech community to enjoy friendly chess games
- Created Gems of Elementary Mathematics   Mar. 2020 – present
  for both outreach and popularization of school mathematics
- Co-taught the "Breaking Numbers into Parts" bridge class   Oct. 2019 – Mar. 2020
  for 1st and 2nd grade students at the Los Angeles Math Circle (LAMC)
- Presented a hands-on collaborative project "Mathematical Night Sky"   Oct. 2018
  for K-5 students and their parents at the STEAM Night at Sierra Madre Elementary School
  together with Caltech students Megan Durney (undergrad) and Natalie Bernat (grad).
- Taught two courses "Introduction to Topology" and "Ruler-and-Compass Constructions"   Aug. 2002
  for high school students at the Summer School of Moscow Center for Continuous
  Mathematical Education

RESEARCH VISITS

- Participant of the International School and Conference on Network Science NetSci-2023,   Jul. 2023
  University of Vienna, Austria
- Humboldt Research Fellow, Leibniz University Hannover, Germany (via Zoom)   June-Aug. 2022, 2023
- Invited Speaker, RISES Cluster, University of Central Florida, Florida, USA   Jan. 2018
- Invited Speaker, Clemson University Center of Excellence, South Carolina, USA   Oct. 2016
- Keynote Speaker, ASCE-IRD-RRMC Workshop on Resiliency of Urban Tunnels and Pipelines,   Aug. 2016
  ASCE Headquarters, Reston, Virginia, USA
- Invited Participant of the NIST-ASCE Workshop on Economics of Community Disaster Resilience, Apr. 2015
  ASCE Headquarters, Reston, Virginia, USA
- Participant of the International School and Conference on Network Science NetSci-2014,   Jun. 2014
  Berkeley, USA
- Participant of the workshop "Topology and Geometry of Networks and Discrete Metric Spaces," Apr. 2014
  Institute for Mathematics and its Applications, University of Minnesota, USA
- Participant of the workshop on Risk and Uncertainty, University of Liverpool, UK   Nov. 2013
- Participant of the workshop "Geometry of Large Networks,"   Nov. 2011
  American Institute of Mathematics, Palo Alto, USA
- Invited Speaker, Department of Civil Engineering,   Feb. 2010
  Centre for Hazards Research, National University of Singapore
- Scientific Researcher, Fields Institute, Toronto, Canada   Nov. 2009
- Guest Scientist, Department of Mathematics, Technische Universität Berlin, Germany   Jun. 2009
- Visiting Student, Department of Civil Engineering, HKUST, Hong Kong   Aug. – Nov. 2005
- Participant of Summer School and Conference on Poisson Geometry,   Jul. 2005
  The Abdus Salam International Center for Theoretical Physics, Trieste, Italy
- Leonhard Euler Student, Department of Mathematics,   Jul. 2003
  Ruhr University in Bochum, Bochum, Germany.

PROFESSIONAL SERVICE

ADMINISTRATIVE DUTIES AND SERVICES

California Institute of Technology
- Team Liaison for the Caltech Women's Volleyball Team   Summer 2023 – present
- Interviewed candidates for the position of Director of EAS Programs for Student Success   Summer 2023

• Member of the AI Bootcamp Director Search Committee	Fall 2022 – Summer 2023
• Member of the CTLO Director Search Committee	Winter 2023 – Spring 2023
• Option Representative for the Graduate Minor in Information and Data Sciences	Sep. 2021 – present
• Helped to create a new Graduate Minor in Information and Data Sciences	Spring 2021
• Option Representative for the Information and Data Sciences Option	Sep. 2020 – present
• Member of the von Karman Postdoctoral Search Committee	Nov. 2020 – present
• Helped to prepare classroom ANB 105 for Virtual/Hybrid Teaching	Summer 2020
• Member of the Athletics & Physical Education Committee	Jul. 2020 – present
• Faculty Advisor, Caltech Chess Club	Aug. 2020 – present
• Faculty Advisor, Caltech Karate Club	Oct. 2018 – present
• Member of the GALCIT Qualifying Exam Committee	Sep. 2017 – present
• Member of the Mechanical and Civil Engineering Qualifying Exam Committee	Sep. 2016 – Sep. 2019

Other Administrative Duties and Services

• Member of the Editorial Board for the ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems: Part A: Civil Engineering, Part B: Mechanical Engineering	Apr. 2022 – present
• Member of the Editorial Advisory Board of Resilience Findings	Dec. 2021 – present
• Chairman of the Committee on Probability and Statistics in the Physical Sciences, Bernoulli Society for Mathematical Statistics and Probability	Sep. 2015 – Sep. 2018
• Deputy Admissions Tutor, School of Engineering, University of Liverpool	Sep. 2013 – Mar. 2014
• Member of the Board of Studies, School of Engineering, University of Liverpool	Sep. 2013 – Mar. 2014

MEETINGS ORGANIZED

- Mini-Symposium "Reliability and Resilience of Critical Infrastructure Systems and Networks," the *8th International Symposium on Reliability Engineering and Risk Management ISRERM-2022*, Hannover, Germany, September 4-7, 2022 (together with M. Beer, E. Patelli, M. Broggi, F. Coolen)
- Mini-Symposium "Reliability and Resilience of Critical Infrastructure Systems and Networks," the *13th International Conference on Structural Safety and Reliability ICOSSAR-2021,* Tongji University, Shanghai, China, June 21-25, 2021 (together with M. Beer, E. Patelli, M. Broggi, C. Wang, X. Qu)
- Mini-Symposium "Reliability and Resilience of Critical Infrastructure Systems and Networks," the *7th Asian-Pacific Symposium on Structural Reliability and Its Applications APSSRA-2020,* The University of Tokyo, Japan, October 4-7, 2020 (together with M. Beer, E. Patelli, M. Broggi, F. Coolen)
- Mini-Symposium "Statistical Methods for Engineering Analyses," the *7th Asian-Pacific Symposium on Structural Reliability and Its Applications APSSRA-2020,* The University of Tokyo, Japan, October 4-7, 2020 (together with M. Beer, B. Park, K.K. Phoon, M. Faes)
- Mini-Symposium "Reliability and Resilience of Critical Infrastructure Systems and Networks," the *13th International Conference on Applications of Statistics and Probability in Civil Engineering ICASP13,* Seoul National University, Seoul, Korea, May 26-30, 2019 (together with M. Beer, E. Patelli, M. Broggi, F. Coolen)
- Special Session "Reliability and Resilience of Critical Infrastructure Systems and Networks," the *6th International Symposium on Reliability Engineering and Risk Management ISRERM-2018,* Singapore, May 31 – June 1, 2018 (together with E. Patelli, M. Beer, M. Broggi, F. Coolen)
- Special Session "Complex Engineered Networks and Infrastructure Systems," the *3rd International Conference on Vulnerability and Risk Analysis and Management & 7th International Symposium on Uncertainty Modelling and Analysis & 7th International Symposium on Uncertainty Quantification and Stochastic Modeling ICVRAM-ISUMA-UNCERTAINTIES-2018,* Florianópolis, Brazil, April 8-11, 2018 (together with E. Patelli, M. Beer, M. Broggi, F. Coolen)
- Mini-Symposium "Advanced Simulation Methods for Probabilistic Analysis," the *7th European Congress on Computational Methods in Applied Sciences and Engineering ECCOMAS-2016*, Crete Island, Greece, June 5-10, 2016 (together with E. Patelli, S.K. Au, and E. Zio)
- Session "Risk Assessment of Complex Infrastructure Networks," the *6th Asian-Pacific Symposium on Structural Reliability and its Applications APSSRA-2016*, Shanghai, China, May 28-30, 2016 (together with J.L. Beck, E. Zio, and A.A. Pantelous)

- Mini-Symposium "Reliability of Large Systems and Structures," the *6th Asian-Pacific Symposium on Structural Reliability and its Applications APSSRA-2016*, Shanghai, China, May 28-30, 2016 (together with M. Beer, A.A. Pantelous, and M. Broggi)
- Session "Financial Networks: Statistical Inference and Probabilistic Modeling," the *2015 ISI World Statistics Congress*, Rio de Janeiro, Brazil, July 27-31, 2015 (together with A.A. Pantelous and K. Soramäki)
- Mini-Symposium "Advanced Simulation Methods for Probabilistic Analysis of Complex Engineering Problems," the *12th International Conference on Applications of Statistics and Probability in Civil Engineering ICASP-12,* Vancouver, Canada, July 12-15, 2015 (together with E. Patelli, S.K. Au, and E. Zio)
- Workshop *"Random graphs, simplicial complexes, and their applications,"* Northeastern University, Boston, USA, May 18-22, 2015 (together with D. Krioukov, C. King, A. Suciu, and G. Lippner)
- Mini-Symposium "Efficient Methods for Uncertainty Quantification," the *5th International Conference on Computational Methods ICCM-2014*, Cambridge, UK, July 28-30, 2014 (together with A. DiazDelaO, M. Beer, I. Kougioumtzoglou, E. Patelli, and S.K. Au)
- Mini-Symposium "Critical Infrastructures and Network Systems: Statistical Properties and Modelling for Reliability, Risk, Vulnerability and Resilience Analyses," the *2nd International Conference on Vulnerability and Risk Analysis and Management & 6th International Symposium on Uncertainty Modelling and Analysis ASCE-ICVRAM-ISUMA-2014*, Liverpool, UK, July 13-16, 2014 (together with J.L. Beck and E. Zio)
- Mini-Symposium "Bayesian Updating, Filtering and Inversion for Dynamic Systems," the *9th International Conference on Structural Dynamics EURODYN-2014*, Porto, Portugal, June 30-July 2, 2014 (together with J.L. Beck and A.A. Taflanidis)
- Session "Reliability of Complex Systems and Networks," the *11th International Conference on Structural Safety & Reliability ICOSSAR-2013*, New York, USA, June 16-20, 2013 (together with J.L. Beck and S.K. Au)

SCIENTIFIC AND TECHNICAL COMMITTEES

- Scientific Committee of the *14thInternational Conference on Applications of Statistics and Probability in Civil Engineering, ICASP13,* 2023
- Co-Chair, International Technical Committee of the *8th International Symposium on Reliability Engineering and Risk Management (ISRERM), 2022*
- International Technical Committee of the *8th International Symposium on Reliability Engineering and Risk Management, ISRERM 2022*
- Program Committee of the *IEEE Symposium on Computational Intelligence for Engineering Solutions, IEEE CIES 2021*
- Technical Committee of the *29th European Safety and Reliability Conference*, *ESREL 2019*
- Scientific Committee of the *13th International Conference on Applications of Statistics and Probability in Civil Engineering, ICASP13,* 2019
- Program Committee of the Satellite Meeting ``*Geotoponets2016: Network Geometry and Topology*,'' at the *International School and Conference on Network Science, NetSci 2016*
- Scientific Committee of the *12th International Conference on Applications of Statistics and Probability in Civil Engineering, ICASP12,* 2015
- Scientific Committee of the *2nd International Conference on Vulnerability and Risk Analysis and Management & 6th International Symposium on Uncertainty Modelling and Analysis, ASCE-ICVRAM-ISUMA-2014*

ORGANIZING COMMITTEES

- Management Chair Committee of the *1st Symposium on Quantitative Finance and Risk Analysis, QFRA 2015*
- Local Organizing Committee of the *2nd International Conference on Vulnerability and Risk Analysis and Management & 6th International Symposium on Uncertainty Modelling and Analysis, ASCE-ICVRAM-ISUMA-2014*

JOURNAL EDITOR

- Guest Editor, ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part B: Mechanical Eng. Special Issue: Complex Engineered Networks: Reliability, Risk, and Uncertainty, vol. 3, no. 2, June 2017

JOURNAL REVIEWER

- Nature Communications
- Nature Scientific Reports
- PLOS ONE
- Computers & Structures
- Structural Safety
- International Journal of Reliability and Safety
- Journal of Engineering Mechanics
- Journal of Integrated Computer-Aided Engineering
- Journal of Risk and Reliability
- Physica A
- Physics Letters A
- Physical Reviews E
- Probabilistic Engineering Mechanics
- Random Structures and Algorithms
- Journal of Mechanical Engineering Science
- Mechanical Systems and Signal Processing
- Inverse Problems in Science and Engineering
- SIAM/ASA Journal on Uncertainty Quantification
- ASME ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems Part B: Mechanical Engineering

REVIEWER FOR THE FOLLOWING CONFERENCES

- 2022, IEEE Symposium Series On Computational Intelligence (IEEE SSCI 2022)
- 2022, 8th International Symposium on Reliability Engineering and Risk Management (ISRERM 2022)
- 2019, 29th European Safety and Reliability Conference (ESREL 2019)
- 2019, 13th International Conference on Application of Statistics and Probability (ICASP-2019)
- 2018, 6th International Symposium on Reliability Engineering and Risk Management (ISRERM-2018)
- 2015, 12th International Conference on Application of Statistics and Probability (ICASP-2015)
- 2014, 5th International Conference on Computational Methods (ICCM-2014)
- 2014, 6th International Symposium on Uncertainty Modelling and Analysis (ISUMA-2014)
- 2014, 2nd International Conference on Vulnerability and Risk Analysis and Management (ICVRAM-2014)
- 2014, 9th International Conference on Structural Dynamics (EURODYN-2014)
- 2013, 11th International Conference on Structural Safety & Reliability (ICOSSAR-2013)
- 2011, 11th International Conference on Applications of Statistics and Probability (ICASP-2011)

PROFESSIONAL SOCIETIES

- ASCE Infrastructure Resilience Division (IRD) and IRD Risk and Resilience Measurements Committee, Risk, Uncertainty and Resilience Quantification Subcommittee, (Invited Member since 2015)
- Committee on Probability and Statistics in the Physical Sciences C(PS)2 under the auspices of the Bernoulli Society for Mathematical Statistics and Probability, (Invited Member 2013-2015, Chairman 2015 – 2018, Invited Member 2018-2020)