Dr. Jimmy Risk

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WORKING EXPERIENCE

California State Polytechnic University, Pomona CA
Department of Mathematics & Statistics

- Associate Professor — Sept 2023–Current
- Department Chair (Temporary) — July 2022–August 2022
- Sabbatical Leave — Fall 2023
- Assistant Professor — Sept 2017–Sept 2023

University of California, Santa Barbara CA
Department of Statistics & Applied Probability

- Teaching Assistant — Sept 2013–June 2017
- Teaching Associate (Student Lecturer) — Summer 2015, 2016

Michigan State University
Department of Statistics & Probability

- Teaching Assistant — Jan 2012–June 2013
- Teaching Associate (Student Lecturer) — Summer 2012

EDUCATION

Doctor of Philosophy, Statistics & Applied Probability — September 2013–June 2017
Emphasis in Financial Mathematics and Statistics
University of California, Santa Barbara, CA
Dissertation Committee:

- Michael Ludkovski (Advisor)
- Jean-Pierre Fouque
- Tomoyuki Ichiba

Thesis Topic: Applications of Gaussian Processes to Actuarial Modeling and Pricing

Extended Adademic Visit — September 2015
ISFA: Institut de Science Financière et d'Assurances - Université Lyon 1
Topic: Stochastic Kriging in Longevity Risk Pricing
Invited by Stéphane Loisel

Master of Science, Statistics & Probability — January 2011–May 2013
Michigan State University, East Lansing, MI

Bachelor of Science, Mathematics (Actuarial Specialization) — January 2007–August 2010
Michigan State University, East Lansing, MI

RESEARCH

RESEARCH INTERESTS

- **Mathematical Finance and Blockchain Applications**
  - Quantitative risk management and valuation techniques
  - Level-set estimation methods in risk analysis
  - Nested Monte Carlo simulations for financial modeling
  - Modeling liquidity surfaces in decentralized finance platforms (blockchain applications)
- **Statistical Learning and Gaussian Processes**
  - Co-authored *Gaussian Process Models for Quantitative Finance* (Springer)
  - Gaussian Process regression in financial mathematics and actuarial science
  - Kernel methods and reproducing kernel Hilbert spaces
  - Connections between Gaussian Processes and machine learning algorithms
  - Gaussian Process super-resolution techniques in image processing

- **Mortality Modeling and Actuarial Science**
  - Advanced mortality modeling using Gaussian Processes
  - Bayesian model averaging for mortality models
  - Multi-population mortality modeling with multi-output Gaussian Processes
- **Sports Analytics Integrating Mathematical Finance**
  - Application of mathematical finance principles to sports economics (e.g., soccer player contracts)
  - Markov chains and network analysis in player performance evaluation
  - Space-time models for in-game data analysis

PUBLICATIONS

Cohen, Albert, and Risk, Jimmy. "European Football Player Valuation: Integrating Financial Models and Network Theory." *Journal of Quantitative Analysis in Sports.* (Accepted With Revision) (Preprint link)

Risk, Jimmy, and Ludkovski, Michael. "Expressive Mortality Models through Gaussian Process Kernels." *ASTIN Bulletin: The Journal of the IAA 54.2 (2024): 327-359.* (Preprint link)

Risk, Jimmy, Switkes, Jennifer, and Zhang, Ann. "N.C. Congressional Districting: A 'Rocks-Pebbles-Sand Approach'." *Discover Global Society 1.1 (2023): 18.* (Preprint Link)

Risk, Jimmy, Huynh, Nhan, and Ludkovski, Michael. "SOA 2021 ILEC mortality prediction contest." *Society of Actuaries* (2021). https://www.soa.org/globalassets/assets/files/resources/research-report/2021/mort-prediction-contest.pdf

Risk, Jimmy, and Ludkovski, Michael. "Sequential Design and Spatial Modeling for Portfolio Tail Risk Measurement." *SIAM Journal on Financial Mathematics 9.4* (2018) 1137-1174.

Ludkovski, Michael, Risk, Jimmy, and Zail, Howard. "Gaussian Process Models for Mortality Rates and Improvement Factors." *ASTIN Bulletin: The Journal of the IAA 48.3* (2018) 1307-1347.

Risk, Jimmy, and Ludkovski, Michael. "Statistical emulators for pricing and hedging longevity risk products." *Insurance: Mathematics and Economics* 68 (2016): 45-60.

Risk, Jimmy. "Correlations between Google search data and Mortality Rates." arXiv preprint arXiv:1209.2433 (2012). https://arxiv.org/abs/1209.2433

BOOKS AND BOOK CHAPTERS

Book: Risk, Jimmy and Ludkovski, Michael. "Gaussian Process Models in Quantitative Finance". *SpringerBriefs in Quantitative Finance Series. Springer.* (In Press)

Book Chapter: Risk, Jimmy and Ludkovski, Michael. "Gaussian Processes for Statistical Learning in Actuarial Science." Chapter in *Foundations for Undergraduate Research in Mathematics. Springer.* (In Press)

WORKING PAPERS *(Available on request)*

Risk, Jimmy, Tung, Shen-Ning, and Wang, Tai-Ho. "Analysis and Forecasting of Liquidity Surfaces in Uniswap v3"

Cohen, Albert, Risk, Jimmy, and Wang, Tai-Ho. "Stochastic Control Approaches to Dynamic Pythagorean Exponent Modelling in Sports Finance"

Cohen, Albert, Risk, Jimmy, and Wang, Tai-Ho. "Dynamic Pythagorean Exponent Models and Option Pricing with Applications to Baseball"

Risk, Jimmy, Amelin, Charles, and Frank, Hakeem. "Interpretable Kernels for Gaussian Process Super-Resolution."

GRANT FUNDING

Development of Educational Pathways for Data Science

- Principal Investigator for Cal Poly Pomona's subaward from the California Education Learning Lab's grant to UCSB.
- Total funding for CPP: $131,284.
- Aims to develop educational pathways from Community Colleges to Cal State and University of California systems resulting in degrees in data science.
- Part of a consortium led by Professor Mike Ludkovski (UCSB).
- Builds on collaborations such as the Central Coast Data Science Partnership and PALiISaDS, focusing on curriculum alignment, intersegmental outreach, and inclusive pedagogy in Data Science education across Southern California.

Provost's Teacher-Scholar Support Program

- Awarded 2 units of assigned time for the academic year 2022-23 to facilitate growth as a teacher-scholar at Cal Poly Pomona.
- Supports the engagement with research, scholarly, and creative activities that enrich teaching and the student academic experience, fostering a collaborative and inclusive polytechnic education.

PROGRAMMING RELATED CONTRIBUTIONS

EasyGPR (Python Package)

- https://github.com/jimmyrisk/EasyGPR
- Creator and maintainer
- Python package providing a user-friendly interface for Gaussian Process Regression, designed to simplify the process for users transitioning from R.

GPmortalityNotebook (R Notebook)

- https://github.com/jimmyrisk/GPmortalityNotebook
- Creator and maintainer
- `R` Notebook to accompany "*Gaussian Process Models for Mortality Rates and Improvement Factors*,"
- Facilitates the replication of results and further exploration of the study.

HONORS & AWARDS

Winner of SOA Mortality Prediction Contest — Fall 2021

- Open entry (internationally)
- The Society of Actuaries (SOA) is global professional organization for actuaries; one of the two largest in the United States
- See publications section for winning submission

Recipient of SOA Hickman Scholarship — Spring 2015–Spring 2017

- Worldwide scholarship for PhD students pursuing academia & actuarial credentials
- Only five new scholars awarded annually

ACTUARIAL

Passed exams P, FM, MLC, C, MFE; All VEE credits completed

TEACHING EXPERIENCE

Assistant Professor

Department of Mathematics & Statistics, California State Polytechnic University, Pomona

- STA 4430 (Mathematical Statistics II) (Sp24)
- STA 4990 (Introduction to Statistical Learning) (Sp22, Sp23, Sp24)
- STA 5900 (Statistical Consulting) (Sp21, Sp22, Sp23)
- STA 1200 & 1200H (Statistics with Applications) (S18, Su18, F18, Su23)
- STA 4320 (Applied Regression Analysis) (F18, Su20, F22)
- STA 5650 (Graduate Level Multivariate Analysis) (F20, F22)
- STA 4990 (Introduction to Data Science) (Su22)

- STA 4990 (Introduction to Actuarial Science) (Su21, Su22)
- STA 4250 (Survival Analysis) (Sp18, Sp20, Sp22)
- STA 5250 (Graduate Level Time Series Analysis) (F17, F19, F21)
- STA 3100 (Sampling Methods and Applications) (F21)
- MAT 4190 (Advanced Linear Algebra) (Su21)
- STA 2100 (Introduction to Statistics) (F18, F20)
- MAT 3140 (Introduction to Real Analysis) (Su20)
- MAT 2250 (Linear Algebra and Differential Equations) (Su19, F19)
- STA 5320 (Graduate Level Linear Statistical Models) (Sp19)
- MAT 5990 (Graduate Level Introduction to Measure Theory) (Su19)

Teaching Associate (Student Lecturer)

Department of Statistics & Applied Probability, University of California, Santa Barbara

- PSTAT 109 (Statistics for Economics) (Summer 2015, 2016)

Department of Statistics & Probability, Michigan State University

- STT 200 (Introduction to Probability & Statistics) (Summer 2012)

Teaching Assistant

Department of Statistics & Applied Probability, University of California Santa Barbara

- PSTAT 501 (TA Training Course) (F16 W16)
- PSTAT 213ABC (PhD Level Probability Theory) (F15 F16 W16 W17 S16 S17)
- PSTAT 160A (Introduction to Stochastic Processes) (F15)
- PSTAT 171 (Mathematics of Interest) (F13 F14)
- PSTAT 172AB (Actuarial Statistics) (W14 W15 W16 S14 S15 S16)
- Lecturer for PSTAT 182T (Tutorial for Exam P & FM) (W14 S14)

Department of Statistics & Probability, Michigan State University

- STT 315 (Introduction to Probability & Statistics for Business) (S12, F12, S13)
- STT 455/456 (Actuarial Models) (F12, S13)

TEACHING CERTIFICATION

Equitable & Engaging Mathematics Teaching Practices (Summer 2024)

- Workshop to help attendees identify where equity gaps manifest in mathematics education.
- Emphasis on mathematical "microaggressions" which are subtle statements (often invisible to the speaker) that hinder confidence and growth.

Applying the Quality Matters Rubric (Summer 2021)

- Intensive workshop to certify ability to apply the rubric from the global organization *Quality Matters* (QM).
- QM Provides a scalable quality assurance system for online and blended learning used within and across organizations.
- QM professional development is designed to help educators deliver the promise of quality online learning opportunities to every level of learner.

HyFlex Training (Summer 2021)

- Training to teach HyFlex course option *(simultaneous in-person and online teaching)*

Cal Poly Pomona Safe Zone Ally Training (Fall 19)

- Organized training to learn more about individuals that may identify as Gay, Lesbian, Bisexual, Transgender, Queer/Questioning or may be unsure of their sexual orientation or gender identity.

INVITED LECTURES

- AMS Fall Western Sectional Meeting; Special Session on Calculating Probabilities using Matrix Methods with Applications to Markovian, Gaussian or Queueing Models October 2024
  Topic: *European Football Player Valuation: Integrating Financial Models and Network Theory*

- RCLR Modelling and Societal Impact of Longevity and Ageing in Amsterdam May 2023
  Topic: *Genetic Algorithm Applications of Gaussian Process Kernels toward Mortality Surface Inference*
- Science on Tap *(Cal Poly Pomona College of Science)* October 2021
  Topic: *How Random Was That? (An Introduction to Statistical Modelling)*
- UC Riverside Applied Statistics Colloquium March 2021
  Topic: *The Role of a Kernel in Statistical Learning*
- AMS Sectional Meeting; Special Session on Markov Processes, Gaussian Processes and Applications in San Francisco, CA October 2018
- Fourteenth International Longevity Risk and Capital Markets Solutions Conference in Amsterdam September 2018
  Topic: *An Interactive R Markdown Approach to Mortality Rate and Improvement Modeling using Gaussian Process Models*
- Twelfth International Longevity Risk and Capital Markets Solutions Conference in Chicago September 2016
  Topic: *Gaussian Process Models for Mortality Rates and Improvement Factors*
- 50th Actuarial Research Conference (ARC), University of Toronto August 2015
  Topic: *Statistical Emulators & Longevity Risk*
- Eleventh International Longevity Risk and Capital Markets Solutions Conference at Université Lyon 1, Lyon, France September 2015
  Topic: *Statistical Emulators & Longevity Risk*

SEMINAR TALKS

- CPP Mathematics and Statistics Colloquium November 2017 Topic: *Stochastic Kriging in Quantile Estimation with Applications to VaR Calculations*
- CPP Mathematics and Statistics Colloquium March 2017 Topic: *Gaussian Processes for Machine Learning*
- UCSB Statistics Department Gaussian Process Research Group November 2016
  Newly established quarterly seminar for faculty and PhD students to discuss topics and their current research in Gaussian Processes
  Topic: *Stochastic Kriging in Quantile Estimation with Applications to VaR Calculations*
- UCSB Statistics Department Colloquium Talk May 2016
  Topic: *Statistical Emulators & Gaussian Processes*
- UCSB Mathematics Department May 2015
  Topic: *Proving the Central Limit Theorem in the strong operator topology*

IN PERSON CONFERENCE ATTENDANCE

- 8th Asian Quantitative Finance Conference August 2024
  National Taipei University of Technology, Taipei Taiwan
- 8th Western Conference in Mathematical Finance March 2017
  University of Washington
- Society of Actuaries Annual Meeting & Exhibit October 2015
  Austin, TX
- Second NUS-UParis Diderot Workshop on Quantitative Finance September 2015
  University of Paris Diderot
- Conference on Stochastic Asymptotics & Applications September 2014
  Joint with Sixth Western Conference on Mathematical Finance
  University of California Santa Barbara
- 49th Actuarial Research Conference (ARC) July 2014
  University of California Santa Barbara

ADVISED MASTERS THESES

- Monica Amezquita *A Temporal Approach to Pedestrian Classification* Summer 2023
- Daniel Silva *Gaussian Processes for Time Series Regression Forecasting Significant Ocean Wave Heights* Summer 2023
- Ricardo Aguila *Applications of PCA to Reinforcement Learning of Gridworld Type Problems* Summer 2023

- Maya Kasfy *History, Overview, and Connections Between Real Analysis and Probability Theory* Summer 2023
- Ronald Lencevicius *Connections between Neural Tangent and Laplace Kernels* Summer 2022
- Chris Muzquiz *Multi-output Gaussian Process Kernels for Natural Language Processing* Summer 2022
- Charles Amelin *Gaussian Process Super-Resolution* Summer 2021
- Kaitlyn McGloin *Methodology and Analysis of Collaborative Filtering Recommender Systems* Spring 2021
- Esteban Escobar *An Introduction to Practical Topological Data Analysis* Spring 2021
- Hakeem Frank *Gaussian Process Models for Computer Vision* Spring 2020
- Yuying (Bella) Guan *Introduction to Gaussian Processes For Regression* Spring 2020
- Kevin Bailey *Statistical Learning for Esports Match Prediction* Spring 2020
- Greg Nelson *Red and White Wine Data Analysis* Spring 2020

PROGRAMMING SKILLS

Languages and Frameworks

- **Python** - Fluent in base `python`, `pytorch`, `gpytorch`, and `scikit-learn`.
- **R** - Fluent in base `R`, `tidyverse`, `ggplot`, and integration with `Python` and `Julia` in `RStudio`.
- **Julia** - Proficient in high-performance computing and data analysis.
- **Version Control** - Experienced with `GitHub` for collaborative development and project management.

Documentation and Typesetting

- LaTeX, Markdown

LEADERSHIP EXPERIENCE

CPP STA 1200 (Statistics with Applications) Coordinator F20–S24

- STA 1200 is one of CPP's highest enrolled courses
- First appointed coordinator; created a plan for coordination
- Meet biweekly with all STA 1200 instructors to discuss teaching duties
- Revise curriculum and teaching methods to better assist students and lecturers
- Develop assessment tools (common final exam item) for course assessment
- Develop resources to assist students and lecturers (Canvas course shell, list of recommended applets, videos, etc.)

PROFESSIONAL SERVICE

Journal Reviewer

- Guest reviewer for *AMS Contemporary Mathematics Series* S24
- Book chapter review for *Foundations for Undergraduate Research in Mathematics by Springer* with special edition on Actuarial Science and Sports Analytics F23
- Peer reviewer for *Variance - The Journal of the Casualty Actuarial Society* since Fall 2022, contributing to the evaluation process of submissions in casualty actuarial science. F22–Current

Cal Poly Pomona Mathematics and Statistics Committee Experience

- TA and Lecturer Hiring Committee F18–S22
- Faculty Search Committee F21–S23
- Scholarship Committee F21–S24
  - Chair (F22–Current)
- Assessment Committee F18–S24
  - Develop and utilize tools for department wide course assessment

- Graduate Committee F17–S18
- Statistics Committee F17–Current
  - Chair (F22–S24)
- Colloquium Committee F17–S18
- Advising Committee (Chair) F18–S19

EXTRA-CURRICULAR ACTIVITIES

- Faculty advisor for Cal Poly Pomona Association of Applied Statistics F20–S23
- Led student research group studying Continuous Martingales and Brownian Motion by Revuz & Yor F15–S16
- Member of SOA Education & Research Section Su16–Current
- Member of SIAM S12–Current