

# KEVIN ROSS

Assistant Professor  
Technology and Information Management (TIM)  
University of California, Santa Cruz  
kross@soe.ucsc.edu

## RESEARCH INTERESTS

Resource allocation in service networks, queueing theory, policy modeling, stochastic processes, dynamic scheduling, optimization, service enterprise management, call centers, workforce optimization, communication networks

## EDUCATION

- 2004 ***Ph.D. Management Science & Engineering, Stanford University, CA***  
Thesis: "Dynamic Scheduling in Queueing Systems with Applications to Communication Networks" (Advisor: Professor Nicholas Bambos)  
▪ Thesis earned an *honorable mention* in the INFORMS Telecommunications Society Dissertation Competition
- 2001 ***M.S. Engineering-Economic Systems & Operations Research, Stanford University, CA***  
Courses included optimization, stochastic processes, strategy, supply chains, investment science, technology in public policy and computer science algorithms
- 1998 ***B.Sc. Hons, 1st Class, Mathematics, University of Canterbury, New Zealand***  
Honors Thesis: "Multi-path Simulated Annealing Algorithms"

## PROFESSIONAL EXPERIENCE

- 2004 - present ***Assistant Professor, University of California, Santa Cruz CA***  
Technology and Information Management (TIM)  
(on partial leave fall 2007 – spring 2010)
- 2008-2010 ***Principal Consultant, PA Consulting Group, London, UK***  
*Customer service modeling expert for various clients, Decision Science Practice*
- Fall 2007 ***Visiting Assistant Professor, London Business School, London, UK***  
Department of Management Science and Operations
- 2004 – 2008 ***Research Contractor, NASA Ames Research Center, Mountain View CA***  
▪ Led two research projects (1) adaptive control in and (2) air traffic management – scheduling flights for uncertain weather conditions
- 1999 – 2004 ***Research and Teaching Assistant Stanford University, Stanford CA***  
Department of Management Science & Engineering  
Ph.D. research on scheduling for Information Technology
- Summer 2002 ***Research Scientist, Bell Laboratories, Lucent Technologies, Murray Hill NJ***  
Department of Mathematics of Networks and Systems  
▪ Research on optical network scheduling – developed algorithms for national telecommunication network management

- Summer 2000 **Decision Scientist, Eli Lilly and Company, Indianapolis IN**
- Analyzed labor patterns, developed a scheduling tool and made hiring recommendations for a pharmaceutical production plant

## HONORS, AWARDS, DISTINCTIONS

- 2011 Guest Editor, INFORMS Journal on Education
- 2010 Aeronautics Technical Excellence in Publications Award, NASA
- 2006 **Honorable Mention**, INFORMS Telecommunications Society Dissertation Competition
- 2006 Invited member of the **INFORMS Young Investigator Roundtable**
- One of 26 young researchers selected to engage in discussions on the future research and practice of operations research
- 2001 – 2004 **Harvey Fellow**, Stanford University (Mustard Seed Foundation)
- Awarded to future leaders in fields of strategic importance
- 1999 – 2001 **Gerhard Casper Fellow**, Stanford University (Stanford Graduate Fellowship)
- The highest honor awarded to an entering Ph.D. student in Management Science & Engineering at Stanford University
- 1997 **Brent Wilson Memorial Prize** for applied mathematics, University of Canterbury
- 1994 – 1995 **New Zealand International Mathematical Olympiad** team member
- One of six competitors last two years of high school

## Ph.D. Supervision

- 2010 J. Rios, **Acceleration of Aircraft-level Traffic Flow Management**
- 2009 G. Ryder, **Routing to Develop Expertise in Customer Contact Centers**

## SELECTED RECENT SEMINARS AND CONFERENCE PRESENTATIONS

- June 2010 Imperial College London
- Dec 2010 University of Auckland
- April 2010 University College London
- May 2009 London School of Economics
- Oct 2008 Imperial College London
- Nov 2007 London Business School
- Nov 2007 University of Southampton
- March 2007 University of Queensland
- July 2006 European Conference on Operations Research
- June 2006 POMS Service Operations Conference
- June 2006 Norwegian Technical University
- May 2006 Stanford University Netlab
- Apr 2006 Berkeley IOR Department Seminar
- Mar 2006 INFORMS Telecommunications Society Conference
- Dec 2005 University of Canterbury
- Nov 2005 Bell Laboratories, Lucent Technologies
- Oct 2005 New York University
- Oct 2005 IBM Watson Research Center
- Oct 2005 Nokia Research
- Oct 2005 NASA Ames Research Center
- Sep 2005 HP Labs
- Sep 2005 IBM Almaden Research Center
- July 2005 International Federation of Operational Research Societies Triennial Meeting
- June 2005 INFORMS Applied Probability Society Conference

## TEACHING

- 2007 **London Business School, London** (Instructor)  
P157 Stochastic Modeling
- 2004 - present **University of California, Santa Cruz** (Instructor)  
ISM 50 Business Information Systems  
ISM 206 Optimization Theory and Applications  
ISM 158 Business Information Strategy  
ISM 280A Graduate Research Seminar  
ISM 270 Service Engineering and Management  
Crown College Undergraduate Research Fellowship Advisor  
Ph.D. research advisor to G. Ryder, J. Rios
- 2002 – 2003 **Stanford University** (Teaching Assistant)  
MS&E 310: Linear Programming
- 1998 **University of Canterbury** (Teaching Assistant)  
MATH105: Mathematics 1C  
STAT 111: Statistics 1

## ACADEMIC SERVICE

- 2006 - present **Technical Program Committee** member for the *Workshop on Service-Oriented Engineering and Optimization 2007*, *IEEE International Conference on Computer Communications and Networks 2007*, *IEEE INFOCOM 2007*, *IEEE BROADNETS 2006*, *IEEE Web Information Systems Engineering 2009* conferences.  
▪ Led reviews of original research publications with top research scholars
- 2005 - 2007 **Director**, TIM Graduate Program
- 2004 – 2009 **Reviewer**, MSOM, IEEE ICC, IEEE Transactions on Communications, Management Science, IEEE Transactions on Networking, IEEE Transactions on Parallel and Distributed Systems, Cluster Computing Magazine, the Journal of Networks, Software Tools and Applications, Queueing Systems, Elsevier Computer Networks Journal, IEEE Transactions on Automatic Control
- 2004 – 2005 **Co-chair**, TIM Junior Faculty Search Committee
- 2004 – 2005 **Co-chair**, TIM Senior Faculty Search Committee

## PATENTS

K. Kumaran, K.Ross, I. Saniee, I. Wadjaja **Method Of Scheduling Bursts Of Data For Transmission In A Communication Network**, Serial No. 10/426389; Filed April 30, 2003.

## FUNDING

- 2011 Smarter Energy, IBM Innovation Awards, \$10,000 (pending)
- 2007 'Robust Scheduling for the National Airspace' (continued fund), UARC, \$27,000
- 2006 'Traffic Management Investigation', NASA, \$28,316
- 2006 'Robust Scheduling for the National Airspace', UARC, \$24,303
- 2006 'Resource Allocation and Pricing for Services', KISMT, \$5,000
- 2005 'Adaptive Control in Communication Systems', NASA University Aligned Research Program, \$31,958

## WORKING PAPERS AND RECENT SUBMISSIONS

K. Ross and K. Fridgeisdottir, **Cost-per-Impression and Cost-Per-Action Pricing in Display Advertising with Risk Preferences**, *Under review at the Journal of Manufacturing and Service Operations Management (MSOM)*.

J. Rios and K. Ross, **Converging upon Basic Feasible Solutions through Dantzig-Wolfe Decomposition**, *Under review at Optimization Letters*

K. Ross, N. Bambos and G. Michailidis, **Cone Schedules for Processing Systems in Fluctuating Environments**, *Under review at Queueing Systems*

K. Ross, **The impact of Finite Internal Buffers on Network Stability**, *Under review at Operations Research Letters*

## BOOK CHAPTERS

K. Ross and N. Bambos. **Geometry of Packet Switching: Maximal Throughput Cone Scheduling Algorithms**. In *Springer-Verlag: High-Performance Packet Switch Architectures* pages 81 - 98. Editors Itamar Elhanany and Mounir Hamdi. Invited chapter, 2006.

K. Ross and N. Bambos. **Adaptive Batch Scheduling for Packet Switching with Delays**. In *Springer-Verlag: High-Performance Packet Switch Architectures*, pages 65 - 78. Editors Itamar Elhanany and Mounir Hamdi. Invited chapter, 2006.

## ARCHIVAL JOURNAL AND FULLY REVIEWED CONFERENCE PAPERS

V. Mehrotra, K. Ross, G. Ryder and Y. Zhou, **Routing to Manage Resolution and Waiting Time in Call Centers with Heterogeneous Servers**, *To appear in the Journal of Manufacturing and Service Operations Management (MSOM) (2011)*

J. Rios and K. Ross, **Massively parallel Dantzig-Wolfe decomposition applied to traffic flow scheduling**, *Journal of Aerospace Computing, Information, and Communication*, Vol. 7 No. 1, pages 32-45 (2010)

K. Ross and N. Bambos, **Projective Cone Scheduling (PCS) Algorithms for Packet Switches of Maximal Throughput**, *IEEE/ACM Transactions on Networking*. Volume: 17 Issue: 3, pp. 976-989 (2009)

G. Ryder, K. Ross and J. Musacchio, **Optimal Service Policies Under Learning Effects**, *International Journal of Services and Operations Management*. Vol 4. No. 6, pp. 631-51 (2008)

J. Rios and K. Ross, **Massively parallel Dantzig-Wolfe decomposition applied to traffic flow scheduling**, *Proceedings of the AIAA Guidance, Navigation, and Control Conference* (2009)

J. Rios and K. Ross, **Solving high-fidelity, large-scale traffic flow management problems in reduced time**, *Proceedings of The 8th AIAA Aviation Technology, Integration, and Operations (ATIO) Conference*, (2008)

J. Rios and K. Ross, **Parallelization of the traffic flow management problem**, *Proceedings of the AIAA Guidance, Navigation, and Control Conference*, (2008)

C. Heitz, G. Ryder and K. Ross, **Knowledge Management in Call Centers: How routing rules influence expertise and service quality**, *Manufacturing and Service Operations Management (MSOM) conference*, (2008)

G. Ryder and K. Ross, **Optimal Service Rules in the Presence of Learning and Forgetting**, *Proceedings, Frontiers of Services Conference*, (2007)

J. Rios and K. Ross, **Delay Optimization for Airspace Capacity Management with Runtime and Equity Considerations**, *Proceedings, AIAA Guidance, Navigation, and Control Conference and Exhibit (GNC)* (2007)

K. Ross and N. Bambos, **Job Scheduling for Maximal Throughput in Autonomic Computing Systems**, *International Workshop on Self-Organizing Systems* pages 105-119, (2006)

K. Ross and N. Bambos, **Capacity Maximizing Packet Scheduling Algorithms for Interconnection Networks with Finite Buffers**, *IEEE GLOBECOM* (2006)

G. Ryder and K. Ross, **A Probability Collectives Approach to Weighted Clustering Algorithms for Ad Hoc Networks**, *IASTED Conference on Communication and Computer Networks*, pp. 94-99, (2005)

K. Ross and N. Bambos, **Dynamic Quality of Service Control in Packet Switch Scheduling**, *IEEE International Conference on Communications*, Vol. 1, pp.396-401, (2005)

K. Ross and N. Bambos, **Packet Scheduling Across Networks of Switches**, *International Conference on Networking*, pp.849-856, (2005)

K. Ross and N. Bambos, **Local Search Scheduling Algorithms for Maximal Throughput in Packet Switches**, *Twenty-third Annual Joint Conference of the IEEE Computer and Communications Societies (INFOCOM)*, pp. 1158-1169, (2005)

K. Ross and N. Bambos, **Optimizing Quality of Service in Prioritized Packet Switch Scheduling**, *IEEE International Conference on Communications*, Vol. 4, pp. 1986-1990, (2004)

K. Ross, N. Bambos, K. Kumaran, I. Saniee and I. Wadjaja, **Scheduling Bursts in Time-Domain Wavelength Interleaved Networks**, *IEEE Journal on Selected Areas in Communications*. Vol. 21, No. 9, pp.1441-1451 (2003)

K. Ross, N. Bambos, K. Kumaran, I. Saniee, and I. Wadjaja, **Dynamic Scheduling of Optical Data Bursts in Time-Domain Wavelength Interleaved Networks**, *11th Symposium on High Performance Interconnects*, pp. 108-113, (2003)

K. Ross and N. Bambos, **Projective Cone Schedules in Queueing Structures; Geometry of Packet Scheduling in Communication Network Switches**, *Allerton Conference on Communication, Control, and Computing*, pp. 626-635, (2002)

## **SAMPLE CONSULTING EXPERIENCES**

**Thomson Reuters** – Kevin developed a customer intelligence strategy for Thomson Reuters, to support their Treasury business growth plan. This included assessing data on customer profiles, sales and transaction history, identifying opportunities to grow and defend their business valued at over \$1b per year. As part of the assessment, he developed data visualisation tools, completed statistical analyses and identified priority areas for development.

**Commonwealth Edison (ComEd) and PECO** – Kevin designed an optimization model to manage credit and collections at ComEd, the electricity utility in Chicago. He oversaw data mining of 2 years of customer account history before designing and implementing the collections decision tool. This analysis covered 83 million payment records, 14 million accounts and 87 different types of collection action, and was used as the basis for modelling and optimising customer response. The tool quantified customer responses to collection activities, produced daily summaries and forecasts of activity and risk and prioritized collection activities. The tool identified over \$20m worth of debt that could be removed from ComEd's accounts, and was later adopted by ComEd's sister company PECO.

**London Councils** - Kevin developed a best-practice target operating model for customer services at London local authorities. He engaged with senior stakeholders from several local authorities and public service providers to capture a joined-up vision of customer service experience.

**Government Car Despatch Agency (GCDA)** – Kevin worked with the GCDA to bring the schedules of UK government ministers' personal drivers from 69% to 100% compliance with the working time directive. This involved analysing ministerial needs, optimising schedules, modifying contract terms, and communicating the recommended changes with senior staff at the Department for Transport.

**Bromley Primary Care Trust** – Kevin developed the financial business case to form a new community interest company delivering healthcare services within Bromley. He worked with a team of executives and clinicians to plan for successful transformation and sustainable growth, and demonstrated how the new organisation could transform from a non-profit organisation to a profitable entity, recovering start-up costs within three years of launch. The new organisation achieved the government goal of separating commissioning from delivery of healthcare without risking quality.

**London Local Authorities** – Kevin developed a model to evaluate future customer access options for the London Borough of Newham, driving a major strategic programme at the council. This work analysed all customer interactions through web, phone and walk-in centres, and showed how the council could save approximately £16m per year by eliminating unnecessary contacts and redeploying customer service specialists.

**A global leader in the fitness industry** - Kevin performed a statistical customer behaviour analysis for global health and wellness company. He used advanced modelling techniques to identify customers at risk of cancelling their membership, as part of a wider project to reduce churn in membership by providing the right tools and incentives to customers and staff. He demonstrated how the company could be ten times more accurate in predicting customer defection.