Esmaeil Keyvanshokooh

Email: keyvan@tamu.edu,
Phone: +1-734-730-3090,
Website: `https://mays.tamu.edu/directory/ekeyvanshokooh/`
Address: Mays Business School, Texas A&M University,
Department of Information & Operations Management, 4217 TAMU, College Station, TX, 77843.

EDUCATION

University of Michigan, Ann Arbor, Michigan *May 2021*
Ph.D. in Operations Research,
Department of Industrial and Operations Engineering (IOE).
Thesis: *Personalized Data-Driven Learning and Optimization: Theory & Applications to Healthcare.*

University of Michigan, Ann Arbor, Michigan *May 2018*
M.Sc. in Statistics, Department of Statistics.

Iowa State University, Ames, Iowa *August 2015*
M.Sc. in Industrial Engineering and Operations Research.
Thesis: *Hybrid Robust & Stochastic Optimization Approaches for Closed-loop Supply Chain Systems.*

K. N. Toosi University of Technology (KNTU), Tehran, Iran *May 2010*
B.Sc. in Industrial Engineering and Operations Research

ACADEMIC EMPLOYMENT & EXPERIENCE

Assistant Professor of Information & Operations Management *August 2021-Present*
Mays Business School, Texas A&M University, College Station, TX.
Department of Information & Operations Management.

Research Affiliate Faculty, Texas A&M Data Science Institute (TAMIDS) *Jan 2022-Present*
Texas A&M University, College Station, TX.

INDUSTRY EMPLOYMENT & EXPERIENCE

Machine Learning & Operation Research Engineer & Analyst *May 2015-September 2015*
Norfolk Southern Corporation, Atlanta, Georgia.

SUMMARY OF RESEARCH INTERESTS

My research aims to develop data-driven analytical decision-making methodologies through design and analysis of *online statistical learning* mechanisms and *data-driven dynamic optimization* algorithms with emphasis on deriving *theoretical performance guarantees*. My research problems are motivated by high-impact problems in healthcare analytics and operations, medical decision-making, and service operations management.

Methodology: Data-driven optimization, statistical machine learning, sequential decision making under uncertainty, statistical reinforcement learning and multi-armed bandit, distributionally robust and stochastic optimization.

Applications: Big data and business analytics, healthcare analytics and operations, medical decision making, and service operations management.

Google Scholar Profile: 1116 citations with h-index of 7 and i10-index of 7.
Check here for the latest update.

Under Revision Papers

[J1] Esmaeil Keyvanshokooh, Mohammad Zhalechian, Cong Shi, Mark Van Oyen, Pooyan Kazemian, Contextual Learning with Online Convex Optimization: Theory and Applications to Chronic Diseases, Major Revision, ***Management Science***, 2022.

- Finalist, INFORMS MSOM Society Best Student Paper, 2021.
- Finalist, INFORMS Health Application Society (HAS) Best Student Paper, 2021.
- Second-place, INFORMS Decision Analysis Society (DAS) Best Student Paper, 2020.
- Winner of Katta G. Murty Best Student Paper Award on Optimization, 2020.

[J2] Mohmmad Zhalechian, Esmaeil Keyvanshokooh, Cong Shi, Mark Van Oyen, Personalized Hospital Admission Control: A Contextual Learning Approach, Minor Revision, ***Operations Research***, 2022.

- Winner of Richard Wilson Best Student Paper on Service Systems (Mohammad Zhalechian), 2021.

Recent Accepted Papers

[J3] Esmaeil Keyvanshokooh, Cong Shi, Mark Van Oyen, Online Advance Scheduling with Overtime: a Primal-Dual Approach, ***Manufacturing & Service Operations Management***, Vol. 23(1), 246-266, 2021.

- Winner of Richard C. Wilson Best Student Paper Award on Service Systems, 2019.

[J4] Esmaeil Keyvanshokooh, Pooyan Kazemian, Mohammad Fattahi, Mark Van Oyen, Coordinated and Priority-based Surgical Care: An Integrated Distributionally Robust Stochastic Optimization Approach, ***Production & Operations Management***, to appear, 2022.

- Winner of IOE Bonder Fellowship Award in Applied Operations Research, 2017.

[J5] Mohmmad Zhalechian, Esmaeil Keyvanshokooh, Cong Shi, Mark Van Oyen, Online Resource Allocation with Personalized Learning, ***Operations Research***, to appear, 2022.

Working Papers

[W1] Esmaeil Keyvanshokooh, Mohammad Fattahi, Pooyan Kazemian, Maryam Zokaeei, and Kenneth Freedberg, Mitigating the COVID-19 Pandemic through Data-Driven Resource Sharing, 2022.

Published Papers

[J6] Sobhan Mostafayi Darmian, Mohammad Fattahi, Esmaeil Keyvanshokooh, An Optimization-based Approach for the Healthcare Districting under Uncertainty, ***Computers and Operations Research***, Vol 135, (2021).

[J7] Mohammad Fattahi, Kannan Govindan, Esmaeil Keyvanshokooh, A Multi-stage Stochastic Program for Supply Chain Network Re-design Problem with Uncertain Price-dependent Demands, ***Computers and Operations Research***, Vol 100, 314-332, (2018).

[J8] Kannan Govindan, Mohammad Fattahi, Esmaeil Keyvanshokooh,
Supply Chain Network Design under Uncertainty: a Comprehensive Review & Future Research,
European Journal of Operational Research, Vol 263(1), 108-141, (2017).

[J9] Mohammad Fattahi, Kannan Govindan, Esmaeil Keyvanshokooh,
Responsive and Resilient Supply Chain Design under Operational and Disruption Risks with Delivery Lead-time Sensitive Customers,
Transportation Research Part E: Logistics & Transportation Review, Vol 101, 176-200, (2017).

[J10] Esmaeil Keyvanshokooh, Sarah Ryan, Elnaz Kabir,
Hybrid Robust and Stochastic Optimization Approach for Closed-loop Supply Chain Design Network using an Accelerated Benders Decomposition,
European Journal of Operational Research, Vol 249(1), 76-92, (2016).

[J11] Mohammad Fattahi,, M. Mahootchi, Esmaeil Keyvanshokooh, Farid Alborzi,
Investigating Replenishment Policies for the Centralized and Decentralized Supply Chains using Stochastic Programming approach,
International Journal of Production Research, 53(1), 41-69, (2015).

[J12] Esmaeil Keyvanshokooh, Mohammad Fattahi, Mohammad Hosseini, Reza Tavakkoli-Moghaddam,
A Dynamic Pricing Approach for Returned Products in Integrated Forward and Reverse Logistics Network Design,
Applied Mathematical Modeling, Vol 37(24), 10182-10202, (2013).

HONORS AND AWARDS

Finalist, INFORMS MSOM Society Best Student Paper *2021*
One of the four finalists, Awarded for the paper *"Contextual Learning with Online Convex Optimization: Theory and Applications to Chronic Diseases"*.

Finalist, INFORMS Healthcare Application Society (HAS) Best Student Paper *2021*
One of the four finalists, Awarded for the paper *"Contextual Learning with Online Convex Optimization: Theory and Applications to Chronic Diseases"*.

Second-place, INFORMS Decision Analysis Society (DAS) Best Student Paper *2020*
Awarded for the paper *"Contextual Learning with Online Convex Optimization: Theory and Applications to Chronic Diseases"*.

Winner of Katta G. Murty Best Student Paper Award *2020*
IOE Department, University of Michigan, Ann Arbor, MI
Awarded for the best student paper dealing with a theoretical research paper on an optimization problem or an applied optimization paper carried out.

Rackham Pre-doctoral Fellowship Award *2019*
Rackham Graduate School, University of Michigan, Ann Arbor, MI
Awarded annually to outstanding doctoral students in the University of Michigan who have achieved candidacy and are actively working on their research that is unusually creative, ambitious and impactful.

Winner of Richard C. Wilson Best Student Paper Award *2019*
IOE Department, University of Michigan, Ann Arbor, MI
Awarded for the best student paper dealing with any application of industrial and operations engineering, including, but not limited to, operations, quality control, finance, logistics, healthcare, etc.

Winner of Bonder Fellowship Award in Applied Operations Research *2017*
IOE Department, University of Michigan, Ann Arbor, MI
Awarded annually to one graduate student deemed to have the potential for making a significant contribution to the field of applied operations research.

INFORMS Doctoral Student Colloquium (Phoenix, Arizona) *2017*

Rackham Graduate School Merit Fellowship Award *2015*
Rackham Graduate School, University of Michigan, Ann Arbor, MI
Awarded selectively to incoming Ph.D. students in their first year of study on the basis of academic merit and potential for research.

TEACHING EXPERIENCE

Sole Instructor, Mays Business School, Texas A&M University *Spring 2022*
Class: *Operations Management* (SCMT 364)
Enrollment: 36 undergraduate students (2 sections).
Outline: This is a *core* undergraduate class, which includes concepts, issues and techniques used to plan, analyze, and control systems of production; operational problems in producing goods and services.
Instructor Evaluation: **TBD**.

Sole Instructor, University of Michigan, Ann Arbor, MI *Fall 2018*
Class: *Operations Analysis and Management* (IOE 440)
Enrollment: 69 undergraduate and master students.
Outline: This is a graduate-undergraduate class, which includes data analytics, capacity management, inventory control, supply chain management systems, queueing models and systems, and the mathematics and physics of service enterprises.
Instructor Evaluation: **4.6 out of 5** (The UMICH College-wide Median is 4.48 out of 5).

Teaching Assistant, University of Michigan, Ann Arbor, MI *Fall 2020*
Class: *Stochastic Processes* (IOE 515)
Enrollment: 51 Ph.D. and master students.
Outline: This is a core Ph.D. class, which includes probability theory, Poisson processes, renewal processes, martingales, and discrete and continuous time Markov chains.

Teaching Assistant, Iowa State University, Ames, IA *Fall 2013-Winter 2015*
I have been a teaching assistant for the following courses:

- *Probability Theory & Statistics.*
- *Inventory Control & Production Planning.*
- *Linear Programming & Optimization.*
- *Data Analytics.*

ACADEMIC SERVICE

Referee for Journals: I have been a referee for the following journals since 2015:

- Management Science (MS) (2 papers).
- Operations Research (OR) (1 paper).
- Manufacturing & Service Operations Management (M&SOM) (1 paper).
- Production and Operations Management (POM) (6 papers).
- Journal of Operations Management (JOM) (1 paper).
- Naval Research Logistics (2 papers).
- IISE Transactions (2 papers).
- Healthcare Management Science (1 paper).
- Optimization Letters (1 paper).
- European Journal of Operational Research (EJOR) (12 papers).
- International Journal of Management Science (Omega) (3 papers).
- International Journal of Production Research (3 papers).
- Computers and Operations Research (2 papers).

Judge for Competitions and Awards:

- MSOM Service Operations SIG Conference, 2021 and 2022.
- MSOM Healthcare Operations SIG Conference, 2022.

Academic Panelist for Societies:

- POMS Ph.D. Job Search Workshop Series, POMS Society, 2021.
- Academic Job Search Workshop, Minority Issues Forum, INFORMS 2021.

Session Organizer & Chair for INFORMS & POMS Annual Meetings:

- INFORMS 2019: Predictive Analytics & Decision-Making in Healthcare
  (Invited Speakers: Rakesh Nagi, Anil Aswani, Timothy Chan).
- INFORMS Healthcare 2019: Multi-armed Bandit & Online Learning in Healthcare
  (Invited Speakers: Yonatan Mintz, Mike Mingcheng Wei).
- POMS 2019: Personalized Treatment & Care Delivery
  (Invited Speakers: Rachna Shah, Cong Shi).
- INFORMS 2018: New Advances in Appointment Scheduling & Online Resource Allocation
  (Invited Speakers: Turgay Ayer, Nan Liu).

IOE INFORMS Student Chapter:

- I have been served as the *Professional Development Chair* for 2018-19 and 2019-20.
- Received INFORMS Student Chapter Award at Summa Cum Laude level (2019-2020).

ACADEMIC ADVISING

Ph.D. Research Advisses:

- Mohammad Zhalechian at Uni of Michigan (2017-current): Co-authored job market papers.

Primary Supervisor of Undergraduate Research:

- Chun Hu (2017-2018): Machine Learning Approaches for Classifying Patients in Chronic Disease.
- Xiaofeng Zou (2018-2019): Contextual Learning of Personalized Patient Progression in Glaucoma.

PROPOSAL WRITING EXPERIENCE

I have gained experience in developing and writing the following grant proposals for different funding agencies. My contribution included (i) developing the new ideas, (ii) writing the initial draft of these proposals, and (iii) preparing preliminary results.

Michigan Institute for Data Science (MIDAS), Data Science Proposal for COVID-19:
Data-Driven Epidemic Prediction and Key Resource Optimization to Combat COVID-19, Fall 2020.

National Science Foundation, Operations Engineering (OE) Program:
Uncertainty-Sensitive Real-Time Appointment Scheduling for Healthcare Services Delivery, Winter 2018.

Glaucoma Research Foundation, Proposal for Shaffer Grant:
Using Machine Learning Methods to Forecast Glaucoma Development, Fall 2017.

MEMBERSHIPS

- Institute for the Operations Research and the Management Sciences (INFORMS)
  - Manufacturing and Service Operations Management (MSOM)
  - Health Applications Society (HAS)
  - Applied Probability Society (APS)
  - Public Sector Operations Research (PSOR)
  - Decision Analysis Society (DAS)
  - Optimization Society
- Production and Operation Management Society (POMS)

INVITED TALKS AT PEER INSTITUTIONS

[T1] Personalized Predictive and Prescriptive Analytics: Theory & Applications to Healthcare", Kenan-Flagler Business School, University of North Carolina at Chapel Hill, 2021.

[T2] 'Personalized Predictive and Prescriptive Analytics: Theory & Applications to Healthcare", Department of Information Systems and Operations Management, Warrington College of Business, University of Florida, 2021.

[T3]"Personalized Predictive and Prescriptive Analytics: Theory & Applications to Healthcare", Information and Operations Management, Mays Business School, Texas A&M University, 2021.

[T4]"Personalized Predictive and Prescriptive Analytics: Theory & Applications to Healthcare", Analytics & Operations Department, Imperial College Business School, 2021.

[T5]"Personalized Predictive and Prescriptive Analytics: Theory & Applications to Healthcare", Operations & Supply Chain Department, Haskayne School of Business, University of Calgary, 2021.

[T6] "Personalized Data-Driven Learning and Optimization: Theory & Applications to Healthcare", Supply Chain Management Department, Eli Broad College of Business, Michigan State University, 2020.

[T7] "Personalized Predictive and Prescriptive Analytics: Theory & Applications to Healthcare", Wisconsin School of Business, University of Wisconsin-Madison, 2020.

[T8] "Personalized Data-Driven Learning and Optimization: Theory & Applications to Healthcare", Department of Industrial & Systems Engineering, University of Minnesota, 2020.

[T9] "Personalized Online Learning and Optimization: Theory and Practice in Healthcare", Industrial & Operations Engineering Department, University of Michigan, Lunch & Learn Seminar, 2020.

[T10] "Contextual Learning with Online Convex Optimization: Applications to Chronic Diseases", Industrial & Operations Engineering Department, University of Michigan, Lunch & Learn Seminar, 2019.

INVITED CONFERENCE PRESENTATIONS

[P1] E. Keyvanshokooh, M. Zhalechian, C. Shi, and MP. Van Oyen, Contextual Learning with Online Convex Optimization: Theory with Applications to Chronic Diseases, INFORMS 2020.

[P2] E. Keyvanshokooh, M. Zhalechian, C. Shi, and MP. Van Oyen, Online Advance Scheduling with Personalized Learning: A Primal-Dual Approach, INFORMS 2020.

[P3] E. Keyvanshokooh, C. Shi, MP. Van Oyen, Advance Online Scheduling with Overtime: a Primal-Dual Approach, presented at INFORMS 2018 (Phoenix, AZ), MSOM 2018 (Dallas, TX), POMS 2019 (Washington DC), INFORMS Healthcare 2019 (Cambridge, MA), and INFORMS 2019 (Seattle, WA).

[P4] E. Keyvanshokooh, M. Zhalechian, C. Shi, and MP. Van Oyen, Online Personalized Care Framework to Reduce Readmission Risk, presented at POMS 2019 (Washington DC) and INFORMS Healthcare 2019 (Cambridge, MA).

[P5] E. Keyvanshokooh, P. Kazemian, M. Fattahi, and MP. Van Oyen, Managing Coordinated and Priority-based Care in Clinical and Surgical Suites under Integrated Uncertainty, presented at INFORMS 2018 (Phoenix, AZ), POMS 2019 (Washington DC), and INFORMS Healthcare 2019 (Cambridge, MA).

[P6] E. Keyvanshokooh, C. Shi, and MP. Van Oyen, Online Appointment Scheduling with a Rolling Horizon Approach: Primal-Dual Competitive Analysis, presented at INFORMS 2017 (Houston, TX).

[P7] E. Keyvanshokooh, P. Kazemian, M. Fattahi, and MP. Van Oyen, Coordinated Clinic Surgery Appointment Scheduling: A Multi-stage Stochastic and Distributionally Robust Approach, presented at INFORMS 2016 (Nashville, TN), and POMS 2017 (Seattle, WA).

[P8] E. Keyvanshokooh, MP. Van Oyen, MS. Lavieri, C. Andrews, and J. Stein, Dynamic Learning of Personalized Patient Progression in Chronic Diseases, presented at INFORMS Healthcare 2019 (Cambridge, MA) and INFORMS 2019 (Seattle, WA).

[P9] E. Keyvanshokooh, MP. Van Oyen, MS. Lavieri, C. Andrews, and J. Stein, Dynamic Online Learning of Personalized Patient Progression in Chronic Diseases: Application to Glaucoma, presented at INFORMS 2018 (Phoenix, AZ) and POMS 2019 (Washington DC).

[P10] E. Keyvanshokooh, MP. Van Oyen, MS. Lavieri, C. Andrews, and J. Stein, Dynamic Classification Approach for Classifying Patients in Chronic Disease: Application to Glaucoma, presented at INFORMS 2017 (Houston, TX).

[P11] MP. Van Oyen, E. Keyvanshokooh, B. Denton, and P. Kazemian, Improving Access Delays from Request to Surgery with Multiple Patient Types, INFORMS Healthcare 2017 (Rotterdam, Netherlands).

[P12] J. Stein, P. Kazemian, E. Keyvanshokooh, MS. Lavieri, and MP. Van Oyen, Using Kalman Filtering to Personalize Prediction of Open-angle Glaucoma Progression under Different Target IOP Levels, American Glaucoma Society Annual Meeting 2017 (Coronado, CA).

TECHNICAL SKILLS

Programming Languages & Software: Python, R, Julia, SQL, Apache Hadoop, Gurobi, and CPLEX.

SOCIETAL IMPACT STATEMENT

My research and teaching have a critically crucial impact on society in the areas of healthcare, medical decision-making, and service operations.

The massive advances in artificial intelligence (AI), machine learning (ML), and optimization over the recent decade has increased the opportunity to automate operational decisions for a wide range of real-world problems. However, such advances still do not permeate to most operations management problems due to their challenging and limiting structures, such as being restricted to *limited resources, the need for accounting for multiple sources of uncertainty, the need for personalization, and the need for making mutli-dimensional nested decisions.*

This results in several challenges and opportunities that have been the primary motivation for my research contributions in both practical and theoretical aspects. Generally speaking, my research thus far has focused on (i) identifying *practical and societal problems* arising in the area of operations management, (ii) prescribing *easy to implement, efficient and effective methodologies and algorithms* with provable theoretical performance guarantees, and (iii) deriving *managerial insights* for dealing with these practical problems.

My teaching impacts how the next generation of business leaders understand and manage the operations, planning, control, and supply chains of different organizations and companies. I engage my students to learn operations management concepts through exploiting real-world cases, experiments, and simulation activities. I also share *my academic research and industry experiences in business analytic, operations research and machine learning* with my students, to show them how operations management can have a profound impact in addressing societal challenges in healthcare and operations management cases.