

Matt Baucum, PhD

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EDUCATION

Ph.D. in Industrial Engineering, 2021

University of Tennessee, Knoxville, TN

Dissertation: "Improving Reinforcement Learning Techniques for Medical Decision Making"

M.A. in Psychology, 2018

University of Southern California, Los Angeles, CA

B.A. in Psychology (Applied Mathematics Minor), 2016

Pepperdine University, Malibu, CA

RESEARCH & PUBLICATIONS

Healthcare analytics (doctoral & early-career research, 2019-present)

Baucum, M., Rabiee, M., and Aslani, B. A visualization framework for interpretable machine learning. Working paper.

Baucum, M., Harris, M., Kessler, L.M., and Lu, G. Reducing overdose deaths and mitigating county disparities: Optimal allocation of substance use treatment centers. Under review, *Management Science*.

Baucum, M., Khojandi, A., Ramdhani, R., and Vasudevan, R. (2023). Optimizing patient-specific medication regimen policies using wearable movement trackers in Parkinson's disease. Forthcoming, *Management Science*.

Baucum, M., Khojandi, A., Myers, C., and Kessler, L. (Forthcoming). Optimizing substance use treatment selection using reinforcement learning. *ACM Transactions on Management Information Systems*. <https://doi.org/10.1145/3563778>.

Baucum, M., Khojandi, A., Vasudevan, R., and Davis, R. Adapting reinforcement learning-based treatments with limited data to personalize critical care. (2022). *INFORMS Journal on Data Science*, 1(1), 27-49. <https://doi.org/10.1287/ijds.2022.0015>.

Baucum, M., Khojandi, A., and Vasudevan, R. Improving deep reinforcement learning with transitional variational autoencoders: A healthcare application. (2020). *Journal of Biomedical & Health Informatics*, 25(6), 2273-2280. <https://doi.org/10.1109/JBHI.2020.3027443>.

Behavioral decision making (Masters degree research, 2016-2018)

Baucum, M., and John, R.S. (2020). The psychophysics of terror attack casualty counts. *Risk Analysis*, 40(2), 399-407. <https://doi.org/10.1111/risa.13396>.

Baucum, M., Cui, J., and John, R. S. (2020). Temporal and geospatial gradients of fear and anger in social media responses to terrorism. *ACM Transactions on Social Computing*, 2(4), 1-16. <https://doi.org/10.1145/3363565>.

Baucum, M., John, R.S., Burns, W., Portney, K., and Mumpower, J. (2020). Modeling affective and cognitive responses to soft-target terrorism over time. *Environment Systems and Decisions*, 41(2), 227-235.

Baucum, M., and John, R.S. (2018). Causal evidence in risk and policy perceptions: Applying the covariation/mechanism framework. *Acta Psychologica*, 186, 90-103. <https://doi.org/10.1016/j.actpsy.2018.03.003>.

Baucum, M., Rosoff, H., John, R.S., Burns, W., and Slovic, P. (2018). Modeling public responses to soft-target transportation terror. *Environment Systems and Decisions*, 38(2), 239-249.

<https://doi.org/10.1007/s10669-018-9676-7>.

Baucum, M., Scurich, N., and John, R. S. (2018). Lay judgements of the probable cause standard. *Law, Probability and Risk*, 17(3), 225-242. <https://doi.org/10.1093/lpr/mgy010>.

EDITED BOOK CHAPTERS

Baucum, M., and Khojandi, A. Markov decision processes: Application to treatment planning. (2024, anticipated). In P.M. Pardalos and O. Prokopyev (Eds.), *Encyclopedia of Optimization, 3rd edition*, Springer Nature. Forthcoming.

CONFERENCE PROCEEDINGS

Baucum, M.*, Khojandi, A., and Papamarkou, T. Hidden Markov Models as recurrent neural networks: An application to Alzheimer's disease. Paper presented at the 2021 IEEE International Conference on Bioinformatics and Bioengineering (October 2021).

Soni, A.*, Armhein, B., **Baucum, M.**, Paek, E.J., and Khojandi, A. Using verbal fluency, natural language processing, and machine learning to detect Alzheimer's disease. Paper presented at the 2021 IEEE Engineering in Medicine and Biology Conference (October 2021).

Day, M.*, Dey, R.K., **Baucum, M.**, Paek, E.J., Park, H., and Khojandi, A. Predicting severity in people with aphasia: A natural language processing and machine learning approach. Paper presented at the 2021 IEEE Engineering in Medicine and Biology Conference (October 2021).

Titu, N.*, **Baucum, M.**, No, T., Trotsky, M., Karandikar, J., Schmitz, T., and Khojandi, A. Estimating Johnson-Cook material parameters using neural networks. Paper presented at the 49th North American Manufacturing Research Conference, Cincinnati, OH (June 2021).

Baucum, M.*, John, R.S., Mayorga, M., Slovic, P., Burns, W., Portney, K., and Mumpower, J. The dynamics of risk perception for soft-target terrorism. Paper presented at the 14th Probabilistic Safety and Management Conference, Los Angeles, CA (September 2018). Retrieved from http://www.iapsam.org/psam14/proceedings/paper/paper_63_1.pdf.

**Presenting author*

CONFERENCE PRESENTATIONS

Baucum, M.*. (2023). We can stop saying 'black box' now: Extracting clear, actionable insights from high-dimensional machine learning models. Paper to be presented at the 2023 INFORMS Business Analytics Conference, Aurora, CO.

Baucum, M.*, Kessler, L.M., Harris, M., and Lu, G. (2022). Optimal substance use treatment center placement strategies for maximizing public health impact. Paper presented at the 2022 Decision Sciences Institute Annual Conference, Houston, TX.

Baucum, M.*, Khojandi, A., Myers, C., and Kessler, L.M. (2022). Optimizing substance use treatment selection with reinforcement learning. Paper presented at the 2022 Production and Operations Management Society (POMS) Virtual Conference.

Baucum, M.*, Khojandi, A., Vasudevan, R., Ramdhani, R. (2021). Optimizing patient-specific medication regimen policies using wearable sensors in Parkinson's disease. Paper presented at the 2021 INFORMS Virtual Annual Meeting.

Baucum, M.*, Khojandi, A., and Vasudevan, R. (2020). Adapting reinforcement learning policies with limited data to personalize treatment planning. Paper presented at the 2020 INFORMS Virtual Annual Meeting.

Baucum, M.* (2020). Introduction to Markov decision processes for decision analysts: A public health application. Paper presented at the 2020 INFORMS Virtual Annual Meeting.

Baucum, M.*, Khojandi, A., and Fernandez, R. (2020). Generating realistic patient trajectories with transitional variational autoencoders. Paper presented at the 42nd Society for Medical Decision Making Virtual Annual Meeting.

Baucum, M.*, Khojandi, A., and Fernandez, R. (2019). Improving chronic disease forecasting with synthetically augmented datasets. Paper presented at the 2019 INFORMS Annual Meeting, Seattle, WA.

Khojandi, A.* and **Baucum, M.** Forecasting of disease progression: Hidden Markov models versus recurrent neural networks. (2019). Poster presented at the 2019 41st Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), Berlin, Germany.

Baucum, M.*, Rosoff, H., and John, R.S. (2018). Psychophysics of terror attack consequences. Paper presented at the 2018 INFORMS Annual Meeting, Phoenix, AZ.

Nguyen, K.*, and **Baucum, M.** (2017). Quantifying the accuracy of subjective probability estimates: A meta-analysis. Paper presented at the 2017 Society for Risk Analysis Annual Meeting, Arlington, VA.

**Presenting author*

PROFESSIONAL EXPERIENCE

Assistant Professor, Department of Business Analytics, Information Systems, and Supply Chain, Florida State University, 2022 - Present

Adjunct Instructor, Department of Business Analytics, University of Tennessee, 2021-2022

Visiting Instructor, Department of Decision Sciences & Management, Tennessee Tech University, 2021-2022

Market Research Analyst, Honda Research & Development, 2019-2020

User Experience Researcher, AT&T, 2018-2019

Research Assistant, USC Center for Risk & Economic Analysis of Terrorist Events, 2016-2018

National Security Intern, Pacific Northwest National Laboratory, 2014-2015

TEACHING EXPERIENCE

Served or serving as primary instructor unless otherwise noted.

ISM 5935: Data Visualization, Florida State University, Spring 2023 (upcoming)

- Principles and practice of effective data visualization for Masters of Science in Business Analytics (MSBA) students. Taught in Tableau.

ISM 5560: Data Management in Business Analytics, Florida State University, Fall 2022

- Entity-relationship modeling, database normalization, and SQL for Masters of Science in Business Analytics (MSBA) students. Taught in MySQL.
- Rating: 4.9 / 5.0

BZAN 548: Time Series Analysis, University of Tennessee, Spring 2022

- Overview of univariate and multivariate methods for time series analysis and forecasting for M.S. in Business Analytics students. Taught in R.

- Rating 4.8 / 5.0

DS 3620: Business Analytics, Tennessee Tech University, Fall 2021 - Spring 2022

- Survey of statistical, data visualization, and optimization methods for business and finance majors.
- Rating 4.7 / 5.0 (Fall), 4.9 / 5.0 (Spring)
- Fall 2021 evaluation scores were highest in department

DS 2810: Computer Applications in Business, Tennessee Tech University, Fall 2021

- Introduction to database and spreadsheet applications in business.
- Rating 4.9 / 5.0 (Fall), 4.7 / 5.0 (Spring)
- Fall 2021 evaluation scores were highest in department

BAS 471: Statistical Methods, University of Tennessee, Fall 2021

- Probability and statistics course for Business Analytics majors. Taught in R.
- Rating 4.6 / 5.0

IE 565: Applied Data Science (Guest Instructor), University of Tennessee, Spring 2021

- Taught a multi-section module on theory and applications of generative neural networks.

AWARDS & FUNDING

Outstanding Industrial & Systems Engineering Student, 2021

- Selected as department's Outstanding Student for 2020-2021 academic year.

2nd Place, University of Tennessee Three-Minute Thesis Competition, 2021

- Summarized dissertation research into three-minute presentation for non-technical audience.

Graduate Advancement & Training Education Scholarship, 2020

- One-year fellowship awarded to doctoral students for research collaboration with Oak Ridge National Laboratory.

Provost Fellowship, 2016

- Merit-based fellowship for select University of Southern California graduate students.

SERVICE & PROFESSIONAL INVOLVEMENT

Editorial Review Board: Journal of Operations Management

Ad hoc reviewer: Risk Analysis, Health Care Management Science

Member, Decision Sciences Institute, 2022–Present

Participant, 2022 Decision Sciences Institute faculty development consortium

Participant, 2022 POMS Emerging Scholar Program

Session Chair, Institute for Operations Research and Management Science (INFORMS) Virtual Annual Meeting, 2020

- Session title: “Machine learning techniques for chronic disease treatment”

Member, Institute for Operations Research and Management Science (INFORMS)

Member, INFORMS Health Analytics Society

Member, Association of Information Systems

COMMUNITY ENGAGEMENT & ADVOCACY

Program Coordinator, Court-Appointed Special Advocates, 2020–2021

- Managed Court-Appointed Special Advocates (CASA) program in Scott County, TN.
- Trained volunteers to advocate in dependency court for foster children’s medical, mental health, and educational needs.
- Managed and analyze data for all referred dependency cases.

Volunteer Advocate, Court-Appointed Special Advocates, 2018–2020

- Served as volunteer advocate for foster care case.
- Assessed and reported on child’s medical, mental health, and educational needs.