Matt Baucum, PhD

matt.baucum@colostate.edu
817-994-8678
linkedin.com/in/mattbaucum/

EDUCATION

- **Ph.D. in Industrial Engineering**, 2021
  University of Tennessee, Knoxville, TN
  Dissertation: "Improving Reinforcement Learning Techniques for Medical Decision Making"
- Committee: Anahita Khojandi (chair), John Kobza, James Ostrowski, Rama Vasudevan
- **M.A. in Quantitative Psychology**, 2018
  University of Southern California, Los Angeles, CA
- **B.A. in Psychology** (Applied Mathematics Minor), 2016
  Pepperdine University, Malibu, CA

PROFESSIONAL EXPERIENCE

- **Assistant Professor**, Department of Computer Information Systems, Colorado State University, 2024 - Present
- **Assistant Professor**, Department of Business Analytics, Information Systems, and Supply Chain, Florida State University, 2022 - 2024
- **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 & PUBLICATIONS

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

Baucum, M., Harris, M., Kessler, L.M., and Lu, G. Reducing overdose deaths and mitigating county disparities with optimal allocation of substance use treatment centers. Major revision, *Manufacturing & Service Operations Management*.

Baucum, M. and Rabiee, M. Towards responsible AI through clustered interpretability: Developing metrics and a framework with social good implications. Under 2nd review, *INFORMS Journal on Computing* special issue on "Responsible AI and Data Science for Social Good".

Baucum, M., Rabiee, M., and Aslani, B. RGID (Rapid Global Interpretability Dashboard): Fast, comprehensive, and interactive pattern discovery for black-box predictive models. Under 2nd review, *INFORMS Journal on Computing*. Github repository at https://github.com/mbaucum1/RGID

Baucum, M., Khojandi, A., Ramdhani, R., and Vasudevan, R. (2023). Optimizing patient-specific medication regimen policies using wearable movement trackers in Parkinson's disease. *Management Science*, *69*(10):5964-5982. `https://doi.org/10.1287/mnsc.2023.4747`.

Baucum, M., Khojandi, A., Myers, C., and Kessler, L. Optimizing substance use treatment selection using reinforcement learning. (2023). *ACM Transactions on Management Information Systems*, *14*(2), 1-30. `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 (**inaugural issue**). `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. https://doi.org/10.1007/s10669-020-09789-6.

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.

WORKING PAPERS

Baucum, M. and Dreyfus, D. Optimizing service offerings in U.S. substance use treatment centers. Analysis phase. Target journal: *Journal of Operations Management.*

Baucum, M. and Chen, A. Estimating patient-specific effectiveness of telehealth adoption in substance use treatment. Conceptualization phase.

Sitzmann, T., Ahmad, B., Argys, L., Baroway, C., Bassani, G., Dincelli, E., Hoon, S., **Baucum, M.**, and Rabiee, M. Using interpretable machine learning to uncover predictors of student success and dropout. Study planning phase.

- Project received $100,000 internal grant at CU Denver.

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 PRESENTATIONS (* denotes presenting author)

Baucum, M.* and Rabiee, M. (2024). Clustered interpretability: Developing metrics and a framework for explainable machine learning in clustered datasets. TREO presentation at the 2024 Americas Conference on Information Systems (AMCIS), Salt Lake City, UT.

Baucum, M.*, Harris, M., Kessler, L.M., and Lu, G. (2024). Reducing overdose deaths and mitigating county disparities: Optimal allocation of substance use treatment centers. Invited presentation at the 2024 Cornell ITOM (Information Technology & Operations Management) Symposium, Ithaca, NY.

Baucum, M.*, Harris, M., Kessler, L.M., and Lu, G. (2023). An end-to-end machine learning approach for optimal allocation of substance use treatment centers. Paper presented at the 2023 Decision Sciences

Institute Annual Conference, Atlanta, GA.

Baucum, M.*, Harris, M., Kessler, L.M., and Lu, G. (2023). An end-to-end optimization approach for optimal allocation of substance use treatment centers. Paper presented at the 2023 INFORMS Annual Meeting, Phoenix, AZ.

Baucum, M.*, Rabiee, M., Aslani, B. (2023). A novel visualization framework for extracting insights from machine learning models. Paper presented at the Americas Conference on Information Systems (AMCIS) 2023, Panama City, Panama.

Baucum, M.*, Rabiee, M., Aslani, B. (2023). A novel visualization framework for explaining healthcare AI decisions. Paper presented at the 2023 Conference on Health IT and Analytics (CHITA), Washington, D.C.

Baucum, M.*. (2023). We can stop saying 'black box' now: Extracting clear, actionable insights from high-dimensional machine learning models. Paper 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.

CONFERENCE PROCEEDINGS (* denotes presenting author)

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, Cincinatti, 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).

TEACHING EXPERIENCE

CIS 355: Business database management, Colorado State University, Fall 2024

- Entity-relationship modeling, database normalization, and introductory SQL for undergraduate students. Taught in MySQL and Snowflake.

ISM 5935: Data Visualization, Florida State University, Spring 2023 & 2024

- Principles and practice of effective data visualization for Masters of Science in Business Analytics (MSBA) students. Taught in Tableau.
- Rating: 4.9 / 5.0 (Spring 2023, 92% resp. rate)
- Rating: 5.0 / 5.0 (Spring 2024, 100% resp. rate)

ISM 4212: Information for Operating Ctrl & Data Mgmt, Florida State University, Fall 2023

- Entity-relationship modeling, database normalization, and introductory SQL for undergraduate students. Taught in MySQL.
- Rating: 4.9 / 5.0 (73% resp. rate)

ISM 5560: Data Management in Business Analytics, Florida State University, Fall 2022 & 2023

- Entity-relationship modeling, database normalization, and advanced SQL for Masters of Science in Business Analytics (MSBA) students. Taught in MySQL.
- Rating: 5.0 / 5.0 (Fall 2023, 92% resp. rate)
- Rating: 4.9 / 5.0 (Fall 2022, 100% resp. rate)

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), 4.8 / 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

FUNDING & RESEARCH GRANTS

NSF 23-102: Catalyzing Human-Centered Solutions through Research and Innovation in Science, the Environment and Society (submission in-progress)
- Serving as an unfunded collaborator along with faculty at CU Denver Business School.
- Grant submission requests funds to develop a machine learning-driven framework for improving graduation rates for underrepresented student groups in the state of Colorado.

First-year Assitant Professor (FYAP) Summer Research Grant, 2023 (awarded)
- Internal university-level funding awarded to promising summer research proposals from first-year assistant professors.

Graduate Advancement & Training Education Scholarship, 2020 (awarded)
- One-year fellowship awarded to doctoral students for research collaboration with Oak Ridge National Laboratory.

AWARDS & RECOGNITIONS

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.

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: MIS Quarterly, INFORMS Journal on Computing (IJOC), Journal of Management Information Systems (JMIS), Journal of the Association for Information Systems (JAIS), International Conference on Information Systems (ICIS), Journal of Medical Internet Research, Risk Analysis

Session chair, AMCIS 2024

Mini-track Co-Chair, AMCIS 2024

Poster judge, 2023 INFORMS Annual Meeting

Professional Memberships
- Decision Sciences Institute
- Association of Information Systems
- INFORMS

Emerging Scholar Programs
- 2022 Decision Sciences Institute faculty development consortium
- 2022 POMS Emerging Scholar Program

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.