Rachel Bennett

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School of Industrial and Systems Engineering
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Education

Ph.D., Industrial Engineering, University of Oklahoma, Expected Graduation: May 2025.
Dissertation Title: *"Imbalance, Scalability, and Fairness for Neural Networks: Precision Medicine Applications."*
Advisor: Dr. Talayeh Razzaghi

M.S., Data Science and Analytics, University of Oklahoma, August 2021.
Thesis Title: *"Designing Reliable Machine Learning Algorithms for Early Predition of Preeclampisa."*
Advisor: Dr. Talayeh Razzaghi

B.S., Mathematics and Physics, University of Science and Arts of Oklahoma, United States, December 2015.

B.A., History, University of Science and Arts of Oklahoma, United States, December 2015.

Research Interests

Machine learning, big data analytics, predictive modeling, healthcare and bioinformatics, high performance computing, interpretable machine learning

Publications

Accepted Refereed Journal Articles

- **Bennett, R.**, Razzaghi, T., Mulla, Z. (2022). "Early Prediction of Preeclampsia Using Machine Learning Methods". Plos one, 17(4), e0266042.
- **Bennett, R.**, Pierce S., Razzaghi T., (2025). "Interpretable Machine Learning Models for Predicting Cesarean Delivery in Class III Obese Cohorts." IEEE Access, 13, 41230-41247.

Book Chapters

- **Bennett, R.**, Hemmati, M., Ramesh, R., Razzaghi, T., (2024). "A Gentle Survey of Artificial Intelligence/Machine Learning in Precision Health." Dynamics of Disasters: From Natural Phenomena to Human Activity, 15-53.

Conference Papers

- Razzaghi, T., **Bennett, R.**, Polk, J., Derakhshi, M., Le, H., Wickham, S. (2024, May). "Optimizing Protein Titer Production using Animal Cells: Predictive Modeling and Recommendations for Enhanced Yield." In 2024 IISE Annual Conference and Expo. IISE.

Working papers/Submitted

- **Bennett, R.**, Janitz A., Noyd D., Razzaghi T., "Predicting Follow up visits and Suboptimal care among Childhood Cancer Survivors." *Working paper.*
- **Bennett, R.**,Razzaghi T.,"A Scalable Multilevel Deep Neural Network." *Under preparation to be submitted to INFORMS Journal on Data Science.*

Professional Experience

Graduate Research Assistant; School of Industrial and Systems Engineering; University of Oklahoma; Norman, OK, (May 2020 – present)

Graduate Teaching Assistant; Department of Industrial Engineering; University of Oklahoma; Norman, OK, (January 2021 – May 2023)

Messenger; Oklahoma Senate; Oklahoma City, OK, (February 2019 – May 2019)

Digital Archivist; American Indian Culturual Center Foundation; Oklahoma City, OK, (January 2019 – September 2019)

Math and Science Tutor; Tutoring Center; University of Science and Arts of Oklahoma; Chickasha, OK, (August 2013 – May 2017)

Writing Tutor; Tutoring Center; University of Science and Arts of Oklahoma; Chickasha, OK, (August 2014 – May 2015)

Geophysics Intern; Association of Central Oklahoma Governments; Oklahoma City, OK, (September 2015 – October 2015)

Presentations

Invited Talks

- "An Introduction to using High Performance Computing for Research" University of Oklahoma *Tutorial: INFORMS student organization; November 2024; Norman, OK.*
- "Scalable and Trustworthy Deep Neural Networks for Imbalanced Data"; *2024 INFORMS Annual Conference; Seattle, WA.*
- "Multilevel Neural Networks for Robust Learning"; *2024 IISE Annual Conference; Montréal, Canada.*
- "An Adaptive Multilevel Neural Network for Early Detection of Preeclampsia"; *2023 INFORMS Annual Conference; Phoenix, AZ.*
- "Machine Learning: A Brief Demo of Supervised Learning" University of Oklahoma *Tutorial: INFORMS student organization; April 2023; Norman, OK.*
- "Early Detection of Preeclampsia using a Scalable Deep Neural Network Algorithm"; *2022 INFORMS Annual Conference; Indianapolis, IN.*
- "Machine Learning Methods and Applications in Materials"; *2022 ASME Central Oklahoma Section Lightning Talks; Norman, OK.*
- "An Imbalance Aware Deep Neural Network for Early Detection of Preeclampsia"; *2021 INFORMS Annual Conference; Anaheim, CA.*
- "A Cost-sensitive Deep Neural Network Model for Preeclampsia Prediction"; *2021 IISE Annual, Virtual Conference.*
- "Predicting the Development of Preeclampsia using Cost- Sensitive Deep Neural Networks"; *2021 ASME Central Oklahoma Section Lightning Talks; Norman, OK.*

Poster Presentations

- "Identifying Patterns of Suboptimal Follow-Up Care Among Childhood Cancer Survivors Using Survival Analysis Models"; *Innovating for Impact: DISC Inaugural Data Science Symposium, 2025; Norman, OK.*
- "Fair Multilevel Neural Networks"; *INFORMS: Minority Issues Forum, 2024 INFORMS Annual Conference; Seattle, WA.*
- "Fast Multilevel Neural Networks to Overcome Bias in Healthcare Applications"; *INFORMS: Minority Issues Forum, 2023 INFORMS Annual Conference; Phoenix, AZ.*

- "Early Detection of Preeclampsia using a Scalable Deep Neural Network Algorithm"; *2023 Oklahoma Conference for Statistics, Biostatistics, and Data Science; Oklahoma City, OK.*
- "An Imbalance-Aware Deep Neural Network for Early Prediction of Preeclampsia"; *2023 INFORMS Business Analytics San Antonio, TX.*
- "Predicting Preeclampsia Using Cost-Sensitive Deep Neural Networks"; *2020 Graduate College of Engineering Grad Student Poster Fair; Norman, OK.*
- "Determining the Volume of a Surface Defined by Tomographic Scattering Points"; *2015 Mathematical Association of America MathFest, Washington, D.C.*

Student Mentoring

M.S. Thesis (Served as Research Mentor)

- Leama Tah, Spring 2025, Topic: "Prediction of length of Stay Among Preeclamptic Patients Using Supervised Learning Methods."
- Abrar Mohamed, Spring 2025, Topic: "Interpretable Machine Learning Models for Early Detection of Preeclampsia."
- Caxton Muchono, Spring 2024, Topic: "Cardiovascular Risk Stratification for Childhood Cancer Survivors Using Interpretable Machine Learning Models."
- Mel Benito, Spring 2024, Topic: "Predicting Prolonged Length of Stay in Pre-Eclamptic Patients."
- Mahita Mallapu, Spring 2024, Topic: "Prediction of Preeclampsia using 2022 Natality Data."

Undergraduate Research Experience (Served as Research Mentor)

- Deaveyan Beltran-Hodge, Fall 2023, Topic: "Identifying Factors for Prolonged Length of Stay in Pre-Eclamptic Patients."

Honors/Awards

- 3 Minute Thesis Finalist (2024)
  University of Oklahoma.
- Graduate Student Senate Travel Grant (2023)
  Awarded by University of Oklahoma Graduate Student Senate.
- Finalist of Student Poster Competition - Minority Issues Forum (2023)
  INFORMS Annual Conference
- Winner of Student Poster Competition (2022)
  First Annual Oklahoma Conference for Statistical Innovation and Application in the Era of Data Science
- Dave Bert Scholarship Recipient (2021)
  Awarded by the Gallogly College of Engineering, University of Oklahoma.
- 3 Minute Thesis Finalist (2021)
  University of Oklahoma.
- Machine Learning and AI Symposium predict-a-thon Winner (2019)
  Awarded by the University of Oklahoma Machine Learning and AI Symposium.
- USAO Distinguished Graduate (2015)
  Top ranked graduate in graduating class of Fall 2015 of University of Science and Arts of Oklahoma.
- Outstanding Division Graduate in Math (2015)
  Outstanding Graduate in Mathematics in graduating class of Fall 2015 of University of Science and Arts of Oklahoma.
- Outstanding Division Graduate in Physics (2015)
  Outstanding Graduate in Physics in graduating class of Fall 2015 of University of Science and Arts of Oklahoma.

- Hypatia Honor Society (2013)
  Invited member of Hypatia Honor Society.
- Alpha Lambda Delta Freshman Honor Society (2011)
  Member of National Freshman Honor Society for maintaining above a 3.5 GPA during first year of higher education.

Extracurricular Organizations and Outreach

- INFORMS Student Chapter, OU
  - *Vice-President* (2023-2024)
  - *Secretary* (2024-present)
  - *Treasurer* (2022)
- Graduate Student Senate
  - External Affairs Committee, *Member* (2023-2024)
  - Human Diversity Committee, *Chair* (2020-2021)
- Graduate Student Community at Gallogly College of Engineering
  - *Co-Chair* (2021–present)
  - *Promotional Team Member* (2021–2022)
- Human Factors Undergraduate Poster Competition, *Judge* (May 1, 2024)
- Graduate College of Engineering Diversity, Equity, and Inclusion Council of Excellence, OU, *Member* (2020–2021)
- Data Science and Analytics Club, OU, *Member* (2019)
- Inter-Tribal Heritage Club, USAO, *President* (2015)
- Math, Technology, and Science Club, USAO, *Member* (2013–2015)
- Women in Science Club, USAO, *Member* (2013–201)
- Literary Club, USAO, *Member* (2015)

Professional Affiliations

- American Statistical Association (ASA) (2024–present)
- Society of Industrial and Applied Mathematics (SIAM) (2020–present)
- Institute for Operations Research and the Management Sciences (INFORMS) (2020–present)
  - Minority Issues Forum (2023–present)
  - Women in OR/MS (2023–present)
- The Institute of Industrial and Systems Engineers (IISE) (2020-present)
  - Society for Health Systems (2020–present)
  - Data Analytics and Information Systems Division (2020–present)
  - Modeling and Simulation Division (2020–present)
  - Artificial Intelligence Division (2020–present)

Other Qualifications

- Data and AI Intensive Research with Rigor and Reproducibility (DAIR3) workshop, June 17-22, 2024
  University of Michigan