

# AMANDA BOWER

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## EDUCATION

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**University of Michigan-Ann Arbor (UM-AA)**

*September 2014 - November 2020*

Applied and Interdisciplinary Mathematics PhD

NSF Graduate Fellow

Thesis Advisors: Laura Balzano and Martin Strauss

**University of Michigan-Dearborn (UM-D)**

*September 2009 - April 2013*

Bachelor of Science, Mathematics Major

Minors: Applied Statistics and Computer and Information Science

## RESEARCH INTERESTS

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My research is broadly in machine learning. I enjoy problems that are theoretically sound yet practically motivated. I especially like working on problems that can have a positive societal impact. My recent research interests include

- algorithmic fairness and bias,
- rankings and preference learning, and
- algorithmic fairness and bias specifically in the ranking setting.

## SELECTED PUBLICATIONS AND PREPRINTS

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1. A. Bower, H. Eftekhari, M. Yurochkin, and Y. Sun, “**Individually Fair Rankings.**” In submission.
2. A. Bower and L. Balzano, “**Preference Modeling with Context-Dependent Salient Features.**” ICML 2020.
3. M. Yurochkin\*, A. Bower\*, and Y. Sun, “**Training individually fair ML models with sensitive subspace robustness.**” ICLR 2020. Selected for a Spotlight talk (15%).
4. A. Bower\*, L. Niss\*, Y. Sun\*, and A. Vargo\*, “**Debiasing Representations by Removing Unwanted Variation Due to Protected Attributes.**” FAT-ML workshop at ICML 2018.
5. A. Bower, L. Jain, L. Balzano, “**The Landscape of Nonconvex Quadratic Feasibility.**” ICASSP 2018. Selected for oral presentation (14%).
6. A. Bower\*, S. Kitchen\*, L. Niss\*, M. Strauss\*, A. Vargo\*, and S. Venkatasubramanian\*. “**Fair Pipelines.**” FAT-ML workshop at KDD 2017.

\* = Equal Contribution

## WORK AND TEACHING EXPERIENCE

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**University of Michigan SPADA Lab**

May - August 2020

*Research Mentor*

*Ann Arbor, MI*

- I co-mentored three undergraduates and a masters student on two algorithmic fairness projects as part of a summer research program that L. Balzano ran in the SPADA lab. One project studied the long term dynamics of fair ranking systems, and the other explored bias in judge sentencing decisions on the state level and risk assessment tools.

**Netflix***Machine Learning Researcher, Intern*

May - August 2019

*Los Angeles, CA*

- I audited algorithms for bias with the Content Demand Modeling team. My responsibilities included giving presentations on my work and writing an internal memo for how to think about algorithmic bias at Netflix.

**University of Michigan***Graduate Student Instructor for graduate level machine learning*

September - December 2018

*Ann Arbor, MI*

- For a graduate level machine learning course taught by C. Scott and S. Sekeh, I held office hours, organized and taught a python tutorial, graded exams, and answered questions on an online forum.

**University of Michigan Math and Science Scholars***Course Assistant*

July - August 2017, 2018

*Ann Arbor, MI*

- I was a course assistant and mentor to talented high school students for a math and art course taught by Martin Strauss.

**UCLA/IPAM Research in Industrial Projects for Students***Undergraduate Researcher*

June - August 2013

*Los Angeles, CA*

- I was a project manager of a research project whose goal was to improve the search algorithm used by the USC Shoah Foundation for indexed video testimonies of survivors of the Holocaust and other genocides. My advisor was Zicong Zhou.

**Williams College SMALL Research Experience for Undergraduates***Undergraduate Researcher*

June - August 2012

*Williamstown, MA*

- I did research in number theory and probability. My advisor was Steven J. Miller.

**University of Michigan-Dearborn***Mentor and grader*

September 2011 - April 2012

*Dearborn, MI*

- I mentored for advanced calculus I and graded for number theory.

**TALKS AND POSTERS**

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- **Preference Modeling with Context-Dependent Salient Features**

1. Talk at ICML 2020.
2. Poster and lightening talk at Heidelberg Laureate Forum, 2020.
3. Poster at Women in Machine Learning workshop at NeurIPS, 2019.

- **Training individually fair ML models with sensitive subspace robustness**

1. Spotlight talk (15% of accepted papers) at ICLR 2020.
2. Talk at the Institute for Advanced Study domain adaptation reading group, 2020.

- **Debiasing Representations By Removing Unwanted Variation Due To Protected Attributes**

1. Poster (presented by L. Niss) at FAT-ML workshop at ICML in Stockholm, Sweden, 2018.
2. Poster at the University of Michigan MIDAS Annual Data for Public Good Symposium, 2019.
3. Poster at the University of Michigan Women in Big Data at Michigan Symposium, 2018.

- **The Landscape of Non-Convex Quadratic Feasibility**

1. Talk (oral acceptance rate 14%) at IEEE ICASSP in Calgary, Alberta, Canada, 2018.
2. Talk at the University of Michigan Applied and Interdisciplinary Math Student Seminar, 2018.
3. Poster at the University of Michigan Student Symposium for Interdisciplinary Statistical Sciences, 2018.
4. Poster at University of Michigan MCubed Symposium, 2018.

- **Fair Pipelines**

1. Poster at the FAT-ML workshop at KDD in Halifax, Nova Scotia, Canada, 2017.

## HONORS AND AWARDS

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- **National Science Foundation Graduate Research Fellowship**, 2015-2020. Fellowship awarded by the National Science Foundation that financially covers 3 years of graduate school. Approximately \$130,000.
- **Rackham Merit Fellowship**, 2014-2019. Fellowship awarded by UM-AA to first year graduate students to financially cover 4 semesters and a summer throughout the first five years of graduate school. Approximately \$45,000.
- **Kimball Midwest Scholarship**, 2017 and 2018. \$1,000.
- **Carroll V. Newsom Scholarship**, 2014. Given by the Department of Mathematics at UM-AA. Approximately \$6,000.
- **Chancellor's Medallion**, 2013. Given by UM-D to nine graduating students selected by faculty based on academic record, quality of character, vitality, intellect, and integrity.
- **Chancellor's Scholarship**, 2009-2013. Full tuition given by UM-D. Approximately \$45,000.
- **Undergraduate Honors Scholar Award for Outstanding Achievement in Mathematics**, 2013, Given by the Department of Mathematics and Statistics at UM-D.
- **Henry Ford Health System Scholarship**, 2009 and 2012.
- **Susan Nokes Alumni Scholarship**, 2009. Given by Melvindale High School.
- **Linda Bunte Memorial Scholarship**, 2009. Given by Melvindale High School.

## PROFESSIONAL SERVICE

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**Association for Women in Math Task Force** 2020  
*Panel Co-organizer*

- I co-organized a panel on ethics in math and algorithmic fairness for the 2021 Joint Math Meetings.

**NeurIPS Reviewer** 2019, 2020 (top 10% reviewer award)

**Women in Machine Learning Reviewer** 2019

**Midwest Machine Learning Symposium** June 2017  
*Poster Contest Organizer* Chicago, IL

- I co-designed, administered, and implemented code for a graduate student poster contest using rank aggregation algorithms with L. Jain and L. Balzano.

## WORKSHOPS, PROGRAMS, AND SUMMER SCHOOLS

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**Institute for Advanced Study**  
*Visiting PhD Student*

February - March 2020  
*Princeton, NJ*

- Visited my advisor L. Balzano who was participating in the special year on optimization, statistics, and theoretical machine learning at the Institute for Advanced Study during her sabbatical.

**Heidelberg Laureate Forum**  
*Participant*

September 2019  
*Heidelberg, Germany*

- Met “the recipients of the most prestigious awards in mathematics and computer science, the Abel Prize, ACM A.M. Turing Award, ACM Prize in Computing, Fields Medal and Nevanlinna Prize” as one of “200 selected young researchers from all over the world.”

**Fundamentals of Data Analysis**  
*Participant*

July 2018  
*Madison, WI*

- Summer school on randomized linear algebra; high-dimensional statistics; interactive machine learning; probability on graphs; continuous optimization; deep learning.

**Summer School High Dimensional Representations**  
*Participant*

July 2018  
*Berkely, CA*

- Mathematical Sciences Research Institute summer school on compressed sensing and other fundamental machine learning topics

**Workshop on Fair Interactive Learning and Fair Representations**  
*Participant*

March 2018  
*Philadelphia, PA*

- Computing Community Consortium workshop about algorithmic fairness in the context of interactive algorithms

**Workshop on Trustworthy Algorithmic Decision-Making**  
*Participant*

December 2017  
*Arlington, VA*

- The goal of the workshop was “to develop ideas . . . to make progress toward understanding, developing, and evaluating trustworthy algorithmic decision-making”

**Princeton Research Training Group Summer School in Financial Math**  
*Participant*

June 2013  
*Princeton, NJ*

- Summer school on modern and developing topics in financial math such as systemic risk and high-frequency trading.

**Women and Mathematics: 21st Century Geometry**  
*Participant*

May 2012  
*Princeton, NJ*

- Lecture series on 21st century geometry and mentoring program at the Institute for Advanced Study and Princeton University.

## TECHNICAL SKILLS

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- Python
- L<sup>A</sup>T<sub>E</sub>X
- Tensorflow