# Mike Ion

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## ▬▬▬ Education

**2017–2022**
**(In progress)**
**Ph.D.**, *Mathematics Education*, University of Michigan.
Advisor: Pat Herbst; Dissertation Title: *Exploring the Dimensionality of Mathematics Teacher Knowledge: A Natural Language Processing Approach.*

**2013-2015**
**M.S.**, *Mathematics*, Cal Poly.
Advisor: Ben Richert

**2009-2013**
**B.S.**, *Mathematics*, Cal Poly.

## ▬▬▬ Research Interests

I am interested in understanding mathematics teachers' knowledge through their use of language as they reason through various decision points within instructional situations. Methodologically, this involves using machine learning/natural language processing to train models to analyze their responses. I aspire to specialize as a methodologist working on interdisciplinary projects.

## ▬▬▬ Research Experience

**Sept. 2017 -**
**Present**
**Graduate Student Research Associate - Geometry, Reasoning, and Instructional Practices (GRIP) Lab**, University of Michigan, Supervisor: Pat Herbst.
I primarily serve as a research assistant working on an NSF Grant studying the undergraduate geometry course (NSF Award Number: 1725837). Some responsibilities include:
- Conducting item-response theory (IRT) analysis of results from mathematical knowledge for teaching (MKT) assessments, and distribute reports to instructors.
- Coding qualitative data (e.g., interview data, survey responses) manually and with machine learning models)
- Organizing working groups for an online professional development network of university geometry instructors.
- Writing conference papers and presenting research at national conferences.

**May 2019 -**
**Dec. 2019**
**Graduate Student Research Apprentice - Wolverine Pathways Curriculum Development Project**, University of Michigan, Supervisor: Maisie Gholson.
Responsibilities included:
- Working on a team to develop social-justice oriented curriculum materials for summer mathematics program.
- Facilitating a professional development workshop for Wolverine Pathways teachers.
- Advising team members on survey methodologies.

## ▬▬▬ Invited Talks and Conference Papers

**Jan. 2019**
**State of Undergraduate Geometry Courses for Secondary Teachers: Curriculum, Instructional Practices, and Student Achievement**, Joint Mathematics Meeting. Denver, CO.
Herbst, P., Stevens, I., Milewski, A., **Ion, M.**, Ko, I.

| Nov. 2019 | **What Do We Mean by Equity: A Topic Modeling Approach**, Education in Mathematics, Science, and Technology Research Interdisciplinary Workshop. Ann Arbor, MI.<br>**Ion, M.**, Robinson, D. |
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| Nov. 2019 | **Developing Practical Measures To Support the Improvement of Geometry for Teachers Courses**, Psychology of Mathematics Education, North America Annual Conference. St. Louis, MO.<br>**Ion, M.**, Herbst, P., Margolis, C., Milewski, A., Ko, I. |
| Apr. 2019 | **Tensions in Teaching Mathematics to Future Teachers: Understanding the Practice of Undergraduate Mathematics Instructors**, American Education Research Association Conference. Toronto, Canada.<br>Milewski, A., **Ion, M.**, Herbst, P., Shultz, M., Ko, I., Bleecker, H. |
| Mar. 2019 | **Sources of Justification for College Geometry Instructional Actions**, Graduate Student Community Organization Graduate Student Conference. Ann Arbor, MI.<br>**Ion, M.**, Margolis, C. |
| Feb. 2019 | **Preparing Teachers for Secondary Geometry: Understanding the Tensions in Teaching Undergraduate Mathematics Courses for Future Teachers**, Association of Mathematics Teacher Educators Annual Conference. Orlando, FL.<br>Milewski, A., Herbst, P., **Ion, M.**, Bleecker, H. |
| Oct. 2018 | **Learning About the Norms of Teaching Practice: How Can Machine Learning Help Analyze Teachers' Reactions to Scenarios?**, Michigan Institute for Data Science Annual Symposium. Ann Arbor, MI.<br>**Ion, M.**, Bardelli, E., Herbst, P.<br>Awarded 'Most Likely Scientific Impact' |
| Oct. 2018 | **What Influences Do Instructors of the Geometry for Teachers Course Need to Contend With?**, Psychology of Mathematics Education, North America. Greenville, SC.<br>Herbst, P., Milewski, A., **Ion, M.**, Bleecker, H. |
| Mar. 2018 | **Characterizing University Geometry Courses: An Interview-Based Approach**, Graduate Student Community Organization Graduate Student Conference Ann Arbor, MI.<br>**Ion, M.** |

## Teaching Experience

| Sept. 2018 - Present | **Graduate Student Instructor**.<br>University of Michigan. Ann Arbor, MI.<br>I serve as a teaching assistant for the graduate-level Introduction to Quantitative Methods course (EDUC 793) provided in the School of Education. Responsibilities include:<br>○ Delivering weekly lab instruction to 20 students on supplementing their statistics learning through the use of Stata software.<br>○ Attending lecture and providing instructional support to students.<br>○ Grading homework, exams, and final papers. |
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| Jul. 2019 & Jul. 2018 | **Instructor for John Hopkins University CTY Summer Program**.<br>Hong Kong University. Hong Kong, S.A.R. & Seattle University. Seattle, WA.<br>Primary instructor for course titled *Paradoxes and Infinities* during the summers of 2018 and 2019. These courses had around 20 students from around the world. Responsibilities included:<br>○ Developing curriculum for 100+ contact hours in the classroom.<br>○ Writing written evaluations for all students<br>○ Supervising the work of a teaching assistant. |

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| Jan. 2017 - Jul. 2017 | **Lecturer - Mathematics Department**.<br>Cal Poly. San Luis Obispo, CA.<br>Served as instructor of record for the following courses:<br>○ Precalculus (Math 118)<br>○ Trigonometry (Math 119)<br>○ Calculus for Business and Economics (Math 221)<br>○ Calculus for the Life Sciences (Math 161) |
| Sept. 2013 - Jun. 2015 | **Graduate Teaching Associate (Instructor of Record)**.<br>Cal Poly. San Luis Obispo, CA.<br>Served as instructor of record for the following courses:<br>○ Precalculus (Math 116, Math 118)<br>○ Calculus for Business and Economics (Math 221) |
| Sept. 2011 - Jun. 2013 | **Calculus Workshop Facilitator**.<br>Cal Poly. San Luis Obispo, CA.<br>Workshop coordinator for Calculus I, II, and III courses. Responsiblities included:<br>○ Attending the content course<br>○ Preparing worksheets, mock quizzes and exams, and games<br>○ One-on-one meetings with students<br>○ Meeting weekly with course instructor and Math Program Staff<br>○ Running a workshop with 10-25 students, assisting and guiding them through the content. |
| Jun. 2011 - Aug. 2012 | **Residential Counselor/Teaching Assistant for EPGY Summer Institutes**.<br>Stanford University. Palo Alto, CA.<br>A full-time residential position during the summers of 2011 and 2012. I provided educational support for mathematics courses for gifted middle school students. |

## Awards

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| Sept. 2017- Present | **School of Education Scholar Award**.<br>University of Michigan |
| April 2019 | **Educational Studies Summer Grant**.<br>University of Michigan |
| October 2018 | **Most Likely Scientific Impact**.<br>University of Michigan Data Science Symposium |
| June 2015 | **Outstanding Teaching Associate Award**.<br>Cal Poly |

## Professional Development

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| Nov. 2019 | **Deep Learning Workshop**, *led by Google*. |
| Jun. 2018 | **Introduction to Deep Neural Networks with Keras/Tensorflow Workshop**, *led by Greg Teichert*. |
| May. 2018 | **Big Data Camp**, *led by Interdisciplinary Committee on Organizational Studies at University of Michigan*.<br>Worked with a team of grad students on a big data project looking at success rates of NSF grants based on language use. Code can be found at: https://github.com/mikeion/NSF-Awards-Project |
| Mar. 2018 | **An Introduction to Machine Learning for Social Scientists Workshop**, *led by Jake Hofman from Microsoft Research*. |

## Skills

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| Computing | Python (advanced), Stata (intermediate), M-Plus (intermediate), Git (intermediate), R (beginner) |
| Human Languages | English, Spanish (intermediate), Farsi (beginner), Setswana (beginner) |
| Specialties | Natural Language Processing, Statistics, Psychometrics, Structural Equation Modeling |

## (Recent) Statistics and Programming Coursework

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| University of Michigan | Natural Language Processing: Algorithms and People (SI 630); Introduction to Quantitative Methods (EDUC 793); Quantitative Methods for Non-Experimental Research (EDUC 795); Psychometrics (EDUC 707); Structural Equation Modeling (EDUC 803) |
| Datacamp.com | Introduction to Python; Intermediate Python; Python Data Science Toolbox (Part 1 and Part 2); Supervised Learning with Sklearn; Introduction to Importing Data with Python; Intermediate Importing Data with Python; Introduction to Natural Language Processing in Python |

## Service

**Jun. 2015 - May 2016**   **Peace Corps Volunteer**, *Botswana*.
- Served as a mentor for an HIV-awareness youth group and a chess club.
- Acted as a health promoter while training young people to serve as peer educators, enabling them to provide HIV/AIDS education and awareness to other youth and adults in their communities.
- Inside and outside the classroom work developing a math curriculum at a low-income junior secondary school.
- Advanced-Mid proficiency on the Language Proficiency Interview in the local language (Setswana)

**Dec. 2014**   **Alternatives to Violence Project**, *California Men's Colony*.
- Served as a volunteer for a two-day workshop aimed at providing inmates advice on understanding why conflict happens and strategies for communicating in difficult situations.