Max Vargas

With experience in mathematical research and teaching, I constantly strive to solve complex problems from unique perspectives with an emphasis on communicating my results to people of a diverse mathematical background.

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Authorized to work in the US for any employer

Work Experience

Graduate Employee

University of Oregon - Eugene, OR
September 2018 to Present

Main instructor for eight courses, roughly 30 students each. Teaching assistant for three courses with over 400 students. Examples include Calculus, Statistics, College Algebra, and more. Graded the upper division graduate abstract algebra course, providing feedback on technical writing. Numerous research and expository talks at mathematical conferences and seminars.

In performing research, I study semi-infinite analogues of highest weight categories showing up in representation theory. This is related to the study of monoidal and tensor categories. In particular, I approach abstract problems by setting them up in concrete, explicit, and calculable terms.

Undergraduate Researcher

Massachusetts Institute of Technology - Cambridge, MA
June 2017 to September 2017

Participant in the Summer Program for Undergraduate Research (SPUR) in the MIT math department. Working with another student, I explored connections between restricted Boltzmann machines in machine learning and the renormalization group and the Ising model in statistical mechanics. I also employed probabilistic methods to characterize intrinsic statistical features on restricted Boltzmann machines in terms of random walks on the associated neural network.

Undergraduate Research Assistant

Dark Matter Time Projection Chamber - Cambridge, MA
2015 to 2016

Lab assistant for the Dark Matter Time Projection Chamber experiment. I designed and built a system to link several photomultiplier tubes to collect and analyze data allowing for the detection of single-photon levels of light. Attached this system to a larger particle detector as an auxiliary aid in a dark matter detection experiment.

Education

PhD in Mathematics
University of Oregon - Eugene, OR
September 2018 to Present

Bachelor of Science in Mathematics
Massachusetts Institute of Technology - Cambridge, MA
September 2014 to June 2018

Skills

- Research
- Laboratory experience
- Teaching
- Leadership
- Python
- TensorFlow
- Unity
- Linux
- C++
- SQL
- Communication skills
- Machine Learning
- Collaboration
- Autodesk Inventor
- Mathematics
- Linear Algebra
- Abstract Algebra
- Statistics
- Algorithm design
- Data structures
- LaTeX
- GIMP
- Technology
- SDKs
- GitHub

Languages

- Spanish - Fluent
- Japanese - Beginner

Links

https://github.com/MaxVargas

Awards

Promising Scholar Award

2018

Granted by the University of Oregon Graduate School. $6000 bonus stipend.

Groups

Undergraduate Liaison, American Mathematical Society, University of Oregon Student Chapter

June 2020 to Present

1. I am on the outreach committee for the UO AMS student chapter. We look for opportunities for graduate students to have an impact outside their immediate mathematical world.
2. Organized termly events to promote relations between undergraduate and graduate mathematics students. Examples include graduate student panels and presentations allowing undergraduates to learn about the mathematical world in ways they do not see in a traditional classroom environment.

Mentor for the University of Oregon Directed Reading Program

January 2020 to Present

Approximately 15 weeks each winter. Guided undergraduate mentees through a reading project in a mathematical field of interest. Provided weekly goals for each meeting, culminating in a presentation given by the mentee.

Erdös Institute

January 2022 to Present

Graduate level workshops in data science and machine learning aimed to produce portfolio worthy projects. Courses cover topics from data gathering and cleaning techniques, supervised and unsupervised learning, neural networks, forecasting for time series data, and more.