# Nitesh Mathur


**Contact Information**

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## SUMMARY


PhD candidate in applied mathematics with strong background in machine learning (ML), artificial intelligence (AI), and deep learning (DL). Two publications in partial differential equations (PDEs), three data-related internships, proficient in Python, R, SQL, Tensorflow, Keras, scikit-learn. Programming for 7+ years and seeking an opportunity in ML, AI, or quantum computing research.


## EDUCATION

- **Ph.D. Mathematics** — Aug 2019-May 2023
  *University of Iowa, Iowa City, IA*
  Advisor: Dr. Tong Li
  Thesis: Study on Systems of Nonlinear Conservation Laws Arising in Chemotaxis and Traffic Flow, GPA: 3.88
- **M.S. Mathematics** — May 2018-May 2019
  *The University of Tulsa, Tulsa, OK*
  Advisor: Dr. Kevin O'Neil
  Master's Report: An Algorithm to Reverse The Generalized Factorials Process, GPA: 4.00
- **B.S. Mathematics**, *Magna Cum Laude* — Aug 2015-May 2018
  *The University of Tulsa, Tulsa, OK*
  Minors: Computer Science, Music
  Presidential Scholar, Honors Scholar, TURC Research Scholar, GPA: 3.967

## CERTIFICATES

- **Graduate Certificate in College Teaching** — Jan 2022-May 2023
  *University of Iowa, Iowa City, IA*
- **Deep Learning Specialization** — June 2021-Dec 2021
  *Andrew Ng, Coursera*
  - Convolution Neural Networks Certificate
  - Neural Networks and Deep Learning Certificate
  - Sequence Models Certificate
  - Structuring Machine Learning Projects Certificate
  - Hyperparameter Tuning and Regularization Certificate
- Developing Serverless Solutions on AWS — June 2022
  *AWS Training and Certifications*
- **DevOps Foundation** — May 2022
  *LinkedIn Learning*

## PUBLICATIONS

1. Tong Li and Nitesh Mathur, Global well-posedness and asymptotic behavior of $BV$ solutions to a system of balance laws arising in traffic flow. Networks and Heterogeneous Media. 18 (2) (2023), 581-600.
2. Tong Li and Nitesh Mathur, Riemann Problem For a Non-Strictly Hyperbolic System in Chemotaxis, Discrete and Continuous Dynamical Systems Series B, 27 (2022), 2173-2187.

## WORK EXPERIENCE

- **Principal Financial Group**, Des Moines, IA May-July 2022
  ***Data Engineering Intern***
  - Extracted data via Github and Azure APIs and implemented data pipeline to calculate DORA (DevOps Research and Assessment)
  - Produced dashboard in AWS QuickSight and implemented project in AWS CDK with Python
  - Built website using React and Node.js for Personalized Onboarding in IT Code Jam hackathon
- **Bank of Oklahoma Financial (BOKF)**, Tulsa, OK May 2018-May 2019
  ***IT Intern, Service Management and Automation Team***
  *Accelerated Career Track (ACT)*
  - Assisted in developing and deploying a company-wide release of ServiceNow
  - Implemented recommendation dashboard by using R and SQL to streamline bank's prospecting
- **Bank of Oklahoma Financial (BOKF)**, Tulsa, OK May-Aug 2017
  ***IT Intern, Bank Data Warehouse and Salesforce Team***
  *Accelerated Career Track (ACT)*
  - Eliminated technical debt by improving regression testing from 72% to 95%
  - Wrote a 30-page white paper and presented to bank executives for 'Battle of the Interns'

## SKILLS

- Proficient in Python, R, Java, SQL
- **Machine Learning Frameworks and NLP**
  - Tensorflow, Transformers, Keras, scikit-learn, NumPy, Pandas, Jupyter Notebook
- **Data Visualization**
  - PowerBI, Tableau, D3, Visualization Toolkit (VTK)
- **Web Development**
  - HTML, CSS, React, Node.js
- **IT DevOps**
  - ServiceNow, Apex/Salesforce, SCRUM/Agile
- **Version Control**
  - Github, GitKraken, CI/CD (Azure Pipelines)
- **AWS Services**
  - Lambda, StepFunctions, S3, Glue, DynamoDB, QuickSight, Amplify, API Gateway
- **Math Programming**
  - LaTex, Mathematica, Matlab, XPP

## RELEVANT GRADUATE COURSES

Mathematics for Quantum Computing, Statistical Learning, Probability, Numerical Optimization, Numerical Analysis, Stochastic Modeling, Bioinformatics, Dynamical Systems, Functional Analysis, Partial Differential Equations (PDEs)

## TEACHING & TUTORING SUMMARY

■ **University of Iowa**, Iowa City, IA — Aug 2019-May 2023

*Teaching Assistant (TA)*

- Courses Taught: Calculus II (Standalone), PDEs (Graduate Level), Mathematics for Biological Sciences, Engineering Mathematics I & II
- Programming Languages Taught: Mathematica
- Responsibilities included teaching, making quizzes and exams in LaTex, grading, holding office hours, and tutoring in the Math Lab

■ **The University of Tulsa**, Tulsa, OK

*Teaching Assistant (TA)* — Aug 2017-May 2019

- Courses Taught: Calculus I, Calculus II

*Math Lab Tutor* — Sep 2016-May 2017

- Courses Tutored: Calculus I-III, Differential Equations

*Center for Student Academic Support (CSAS)* — Jan 2016-May 2017

- Courses Tutored: Pre-Calculus, Linear Algebra

## TEACHING

*University of Iowa, 2019-2023*

- MATH 1860: Calculus II — Spring 2023
  *Standalone Instructor*
- MATH 5700: Introduction to Partial Differential Equations — Spring 2022
  *Graduate Level*
- MATH 1560: Engineering Math II - Multivariable Calculus — Fall 2021
- Preparation for Calculus — Summer 2021
- MATH 1860: Calculus II — Spring 2021
- MATH 1550: Engineering Math I Single Variable Calculus — Fall 2020
- MATH 1860: Calculus II — Spring 2020
- MATH 1440: Mathematics for the Biological Sciences — Fall 2019

*University of Tulsa, 2018-2019*

- MATH 2010: Calculus I — Spring 2019
- MATH 2020: Calculus II — Fall 2018
- MATH 2020: Calculus II — Spring 2018
- MATH 2010: Calculus I — Fall 2017

## TALKS

■ University of Iowa

1. Global *BV* Solutions to a System of Balance Laws Arising in Traffic Flow. PDE Seminar, 8 March 2023.
2. Riemann Problem for a Non-Strictly Hyperbolic System in Chemotaxis. Modeling, Analysis and Simulation in PDEs Seminar, University of California, Berkeley, 27 January 2023.
3. Global BV solution to a system of balance laws from traffic flow. XVIII International Conference on Hyperbolic Problems: Theory, Numerics, Applications (HYP2022), University of Malaga, Malaga, Spain. 10 June, 2022.
4. Humor in the classroom. Nitesh Mathur & Zach Bryhtan, MATH 6217 Seminar in College Teaching, Dr. Kelly Mitchell, 21 April 2022.

5. Global BV solution to a system of of balance laws from traffic flow. PDE Seminar, 10 November 2021.
6. An Introduction to the Generalized Factorials: Based on the Paper of Manjul Bhargava.
7. Heartland Talk, University of Wisconsin-Platteville, 5 October 2021.
8. Navier Stokes and the Millenium Problem: Based on the paper of Charles L. Fefferman. MATH 6710 Partial Differential Equations II, Dr. Lihe Wang, 10 May 2021.
9. Navier Stokes: Nonuniqueness of Weak Solutions to the Navier-Stokes Equation. Semester Project, MATH 6710 Partial Differential Equations II, Dr. Lihe Wang, 30 April 2021.
10. Applications of Algebraic Geometry: With a Hint of Robotics. MATH 6010 Intro to Algebra II, Dr. Ryan Kinser, 20 April 2021.
11. Minimal Polyomials and Gröbner Basis. MATH 6010 Intro to Algebra II, Dr. Ryan Kinser, 19 March 2021.
12. Riemann Problem For A Non-Strictly Hyperbolic System in Chemotaxis. Partial Differential Equations (PDE) Seminar, 24 February 2021.
13. A Survey of Algorithms: Alternatives to Buchberger's Algorithm. MATH 6010 Intro to Algebra II, Dr. Ryan Kinser, 12 February 2021.
14. An Introduction to the Generalized Factorials. Graduate and Undergraduate Student Seminar(GAUSS) Seminar. 11 February 2021.
15. Lax Oleinik Formula: Integral Solution, Entropy Condition, and Uniqueness. MATH 6710 Partial Differential Equations I, Dr. Xiaoyi Zhang. 4 December 2020.
16. Applications of Analysis in PDE: An Overview and Applications. MATH 6200 Analysis I, Dr. Palle Jorgensen, 2 December 2020
17. The Riemann Problem: System of Conservation Laws. Partial Differential Equations (PDE) Seminar, 23 November 2019.

■ University of Tulsa

1. A Combinatorial Perspective to Vortex Dynamic Problems. Spring Colloquium 2018, University of Tulsa, March 2018.
2. The Factorial Function and Generalization: Based on the Paper of Manjul Bhargava. Graduate Journal Club, University of Tulsa, March 2018.
3. Introduction and Applications of Game Theory. Nitesh Mathur & Xian Wang, Writings for Professionals, April 2018.
4. Binomial Theorem Generalizations and Patterns in Square Numbers. TRD2017: 5th Tulsa Research Partners Citywide Research Day, University of Oklahoma: Schusterman Center, November 2018.
5. Exploring Square Number Patterns and Binomial Theorem Generalizations. Oklahoma-Arkansas MAA Section Meeting, University of Oklahoma, April 2017.
6. The Special Cases of the Binomial Theorem and Square Number Patterns. Spring Colloquium 2017, University of Tulsa, March 2017.
7. The Beauty of Mathematics: Exploring Square Number Patterns. Union High School (guest speaker), Tulsa, OK. November 2016.
8. Square Number Research and Patterns. Mathematical Association of America (MAA), University of Tulsa, September 2016.

**CONFERENCES ATTENDED**

- XVIII International Conference on Hyperbolic Problems: Theory, Numerics, Applications (HYP2022) June 2022
  *University of Malaga, Malaga, Spain*
- Iowa PDE Seminar October 2022
  *University of Iowa, Iowa City, Iowa*
- Midwest PDE Seminar October 2022
  *University of Missouri, Columbia, Missouri*
- Iowa PDE Seminar October 2021
  *Iowa State University, Ames, Iowa*
- Oklahoma-Arkansas MAA Conference Apr 2018
  *Arkansas Tech University, Russelville, Arkansas*
- Oklahoma-Arkansas MAA Conference Apr 2017
  *University of Oklahoma, Norman, Oklahoma*
- ACTC (Association fo Core Texts and Courses) Conference Feb 2017
  *Concordia University, Irvine, California*
- Oklahoma-Arkansas MAA Conference Apr 2016
  *University of Central Arkansas, Conway, Arkansas*

**HONORS & AWARDS**

- Graduate College Post-Comprehensive Research Fellowship, Fall 2022
  *University of Iowa*
- Kleinfeld Award for Student Research Publications Feb 2023, Apr 2021
  *(For Acceptance) University of Iowa*
- Kleinfeld Award for Student Research Publications Dec 2022, Feb 2021
  *(For Submission) University of Iowa*
- Ralph W. Veatch Award in Mathematics May 2018
  *University of Tulsa*
- Tulsa Undergraduate Research Challenge (TURC) Scholar Summer 2016, 2017
  *University of Tulsa*
- Honors Scholar 2015-2019
  *University of Tulsa*
- Presidential Scholar 2015-2019
  *University of Tulsa*
- Valedictorian, Student of the Year, National Merit Scholar 2014- 2015
  *Union High School*

## OUTREACH & VOLUNTEER

- Webmaster — Jan-Dec 2022
  *Math Graduate Board (MGB), University of Iowa*
- Co-Organizer — Jan-Dec 2021
  *Graduate and Undergraduate Student Seminar (GAUSS), University of Iowa*
- Vice President, — Aug 2016-May 2019
  *Mathematical Association of America (MAA) Chapter, University of Tulsa*
  - Launched a regional high school math competition, *Hurricane Mathfest*
  - Established monthly High School Math Circle
  - Administered Integration Bee and Pi Day Celebration
  - Engaged in outreach to local high schools in multiple visits
  - Invited monthly keynote speakers at Tech Food Friday
- Co-Founder & President, — Aug 2015-May 2017
  *Circle K International, University of Tulsa,*
  - Chartered the student organization
  - Served with Kiwanis Club of Tulsa, community food banks, Safari Sanctuary, Iron Gate of Tulsa, Special Olympics qualifications, and Asbury Church
- Summer Policy Institute — Jul-Aug 2016
  *Oklahoma Policy Institute, Tulsa, OK*

## PROFESSIONAL AFFILIATIONS AND MEMBERSHIPS

- Society of Industrial and Applied Mathematics (SIAM) — 2022-present
- Phi Kappa Phi — 2018-2020
- Kiwanis Club of Tulsa — 2014-2019

## ORCHESTRA

- Concertmaster, — March 2023
  *Iowa City Repertory Ensemble String Orchestra*
- Campus Symphony Orchestra (CSO) — Jan 2022-present
  *University of Iowa*
- University Symphony Orchestra — Aug 2019-May 2023
  *University of Tulsa*
- Tulsa Youth Symphony Orchestra (TYSO), Union High School Orchestra, Asbury Church Orchestra, All-District — 2008-2015
- Violinist — 2008-present
- Performances in Oklahoma City, St. Louis, Frisco, Chicago, Chattanooga, and Washington D.C.

## REFERENCES

- Dr. Tong Li, tong-li@uiowa.edu
- Dr. Ryan Kinser, ryan-kinser@uiowa.edu

## LINKS

- Website
- LinkedIn
- Github