

# Ishaan Goel

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## Summary

Mathematics researcher and AI developer with deep quantitative foundations. Seeking to apply expertise in generative AI and stochastic modeling to solve complex problems in Natural Language Processing and Quantitative Finance.

## Education

**Illinois Institute of Technology** (3.6/4.0)

Aug 2022 – Present

M.A.S. Artificial Intelligence

Dual B.S. Applied Mathematics and Data Science, Finance Minor

Specializations in Discrete Math, Stochastics, Mathematical Finance

*Heald and STEM+ Scholarships Recipient*

## Relevant Coursework

**Math:** Probability, Linear Optimization, Stochastic Processes, Graph Theory, Monte Carlo Methods in Finance, SPDEs, Real Analysis, Abstract Algebra, Combinatorics, Dynamical Systems, Functional Analysis (audit)

**AI/ML:** Machine Learning, Statistical Learning, Natural Language Processing, Artificial Intelligence, Data Mining, Deep Learning, Information Retrieval, Algorithms, Database Organization, Game Theory (audit)

**Finance:** Economics of Capital Investments, Principles of Economics

**Spring 2026:** Big Data Technologies, Advanced AI, Quantitative Risk Management, Financial Derivatives

**Other:** Language Theory in NLP, Deep Technology Commercialization

## Experience

**Illinois Institute of Technology, Department of Applied Mathematics**

Chicago, IL

*Research Assistant under Dr. Igor Cialenco, NSF-funded research*

Aug 2024 – Present

Applying concepts from RL, stochastic (optimal) control, and game theory to model groundwater rights distribution and assess policy impacts for water markets by integrating mathematical theory with hydrological and economic data.

*Research Assistant under Dr. Michael Pelsmayer*

May 2025 – Present

Making a Markov Chain sampler in Python to generate uniform random hypergraphs with the same  $k$ -core sequences.

**PeopleStrong Technologies Ltd.**

Gurugram, India

*Intern*

Jun 2025 – Jul 2025

Built a scalable RAG-based system for Automated Ticket Resolution, enabling document-grounded Q&A for 1,000+ employees and reducing index testing time by over 200x (weeks to hours). Gained hands-on experience in deploying production-ready agentic AI systems and accelerating iteration cycles through automation and containerization.

*Intern*

Jul 2024 – Jul 2024

Designed and deployed a scalable LLM-based chatbot with an agentic architecture integrating 5 RAG systems, validated via A/B testing and approved for company-wide rollout.

## Projects

**mathcode** | *PyPi, Python, NumPy, NetworkX*

Jun 2025 – Present

Actively developing a Python library implementing mathematical algorithms from coursework: graph algorithms, stochastic processes (Brownian motion, Markov chains, SDEs/SPDEs), optimization (gradient descent variants, simplex), abstract algebra, and reinforcement learning (value/policy iteration, Monte Carlo methods).

**Full-Stack Information Retrieval Engine** | *IR, scikit-learn, Flask, Scrapy, Python*

Oct 2025 – Dec 2025

Developing a full-stack information retrieval engine featuring a Scrapy crawler with configurable depth and AutoThrottle, a TF-IDF inverted index with cosine similarity and optional semantic  $k$ NN search (word2vec, FAISS), and a Flask-based query processor with Top-K ranking, NLTK spell correction, WordNet expansion, and CSV export.

**Distributed RL for Plastic Drift Simulation** | *RL, PyTorch, JAX, Python*

Aug 2025 – Nov 2025

Developed a distributed Monte Carlo RL framework that simulates ocean plastic drift and aggregates results from volunteer clients for large-scale model optimization, earning 3rd place in the Grainger Computing Innovation Prize.

## Skills

**Programming:** Python, R, Julia, C++, Java, L<sup>A</sup>T<sub>E</sub>X, HTML, CSS, SQL, Mathematica, MATLAB

**Python Stack:** PyTorch, scikit-learn, NumPy, pandas, matplotlib, NetworkX, PySpark

**R Stack:** tidyverse, data.table, glmnet, boot, gam, keras, caret, e1071, rpart, foreach, dbscan, pROC, Matrix, pls, class

**Spoken Languages:** English, Hindi, Urdu, Mandarin Chinese, Spanish, Punjabi, Modern Standard Arabic

**Others:** Generative AI, Mathematical Finance, Operations Research, Stochastic Modeling, Discrete Mathematics