



Panel: Teaching the Mathematics of Data Science

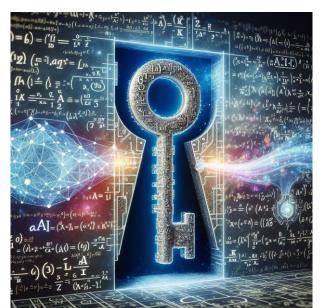
Tammy Kolda May 6, 2025

2/28/2025

Math = Key to Al









Director, Data Science & **Analysis**

Bachelor's or Master's degree in Statistics, Economics, Mathematics, Computer Science, or related discipline

Data Scientist, Product Analytics (PhD)

Currently has or in the process of obtaining Ph.D. in Mathematics, Statistics, a relevant technical field, physics, mathematics, or another or equivalent practical experience. Degree must be completed prior to joining Meta.



NVIDIA

10,001+ employees

Artificial Intelligence Algorithms Engineer – New College Grad 2024

PhD or Master's Degree in Computer Science, AI, Applied Math, or related field Strong Mathematical fundamentals and AI/DL algorithms skills or experience

OpenAl

Research Engineer/Scientist, **Long Context (Foundations)**

You have a background in statistical machine learning, theoretically and empirically rigorous field.

Product Manager, ChatGPT Growth

Obtained a bachelor's degree in Computer Science, Engineering, Information Systems, Analytics, Mathematics, Physics, Applied Sciences, or a related field. Google Careers



Data Scientist - New Grad (2025 Start)

You will have graduated in December 2024 or Spring 2025 with a Master's or PhD degree in a quantitative field (e.g., Statistics, Math, Computer Science, Physics, Economics, Operational Research or **Engineering**)



Senior Data Scientist Degree in a quantitative field (e.g. Statistics, Mathematics, Physics)

Data Scientist III, Research

Master's degree in Statistics, Data Science, Mathematics, Physics, Economics, Operations Research, Engineering, or a related quantitative field.

What's Missing in Math Requirements



What's Typically Required

- Calculus (x2)
- Linear Algebra
- Differential Equations
- Discrete Mathematics
- Real Analysis
- Complex Analysis
- Abstract Algebra

What Should Be Required

- Probability
- Programming
- Inference (Optimization or Statistical)
- Modeling (Statistical or Computational)

OPTIONS

Data Science

Computational Sci & Eng

Software Eng.

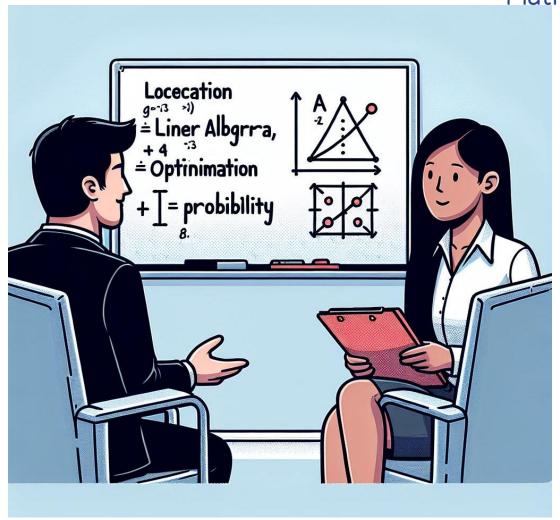
Financial Mathematics

Mathematical Biology

Key Math Skills for Data Scientists



- Numerical Linear Algebra
 - Rank
 - Soliving Linear Systems, Least Squares
 - Eigen- and Singular Value Decompositions
 - Computational Complexity
- Numerical Optimization
 - Gradients and related concepts
 - Chain rule!
 - Basic definitions critical point, minimizer, global versus local, etc.
 - Methodology methods, line searchers, etc.
- Probability
 - Rules of Probability, e.g., Bayes Theorem
 - Bias and Variance
 - Standard Distributions
 - Principal Component Analysis



2/28/2025