Career Paths in Applied Mathematics and Statistics

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What is Applied Mathematics?

- **Applied mathematics** is the application of mathematical methods by different fields such as physics, engineering, medicine, biology, finance, business, computer science, social sciences, government, and industry.

  → Applied mathematics is a combination of mathematical science and specialized knowledge (application).

- Use theories and techniques, such as **mathematical modeling** and **computational methods**, to formulate and **solve problems** in these different fields.

Sources:
https://www.sjsu.edu/math/student-resources/advising/mathematical-careers.php
https://en.wikipedia.org/wiki/Applied_mathematics

What is Statistics and Data Science?

- **Modern statistics:** the science of collecting and analyzing data, making inferences from data.

  → The fundamentals of statistics are rooted in the **probability theory**.

- **Data science**: developed with the need to analyze big data sets.
- Interdisciplinary field that uses scientific methods, algorithms and systems to extract knowledge and insights from noisy, structured and unstructured data, and apply knowledge/insights from data across a broad range of application.
- A "concept to unify statistics, data analysis, informatics, and their related methods" in order to "understand and analyze actual phenomena" with data.

Sources:
https://www.sjsu.edu/math/student-resources/advising/mathematical-careers.php
https://en.wikipedia.org/wiki/Statistics and https://en.wikipedia.org/wiki/Data_science
Slides from Dr. Kozubowski ☺

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A **data scientist** is a professional who creates programming code and combines it with statistical knowledge to create insights from data.

What can I do with a degree in math or statistics?

- Mathematics, statistics, and computational science are utilized in almost every discipline of science, engineering, industry, and technology.

- What kinds of problems might you work on?
- While careers in math / stats may differ widely by discipline and job title, one thing remains constant among them — **problem solving**.

Sources:
https://www.siam.org/students-education/programs-initiatives/thinking-of-a-career-in-applied-mathematics
https://www.sjsu.edu/math/student-resources/advising/mathematical-careers.php

HERE ARE SOME EXAMPLES OF ORGANIZATIONS THAT HIRE MATHEMATICIANS AND COMPUTATIONAL SCIENTISTS:

- ACADEMIC INSTITUTIONS AND RESEARCH INSTITUTES
- AEROSPACE AND TRANSPORTATION EQUIPMENT MANUFACTURERS OR SERVICE PROVIDERS
- ANALYTICS AND FORECASTING ORGANIZATIONS
- CHEMICAL OR PHARMACEUTICAL MANUFACTURERS
- COMMUNICATIONS SERVICES PROVIDERS
- COMPUTER INFORMATION AND SOFTWARE FIRMS; ESTABLISHED OR START-UPS
- CONSUMER PRODUCTS COMPANIES
- ENERGY SYSTEMS FIRMS
- ELECTRONICS AND COMPUTER MANUFACTURERS
- ENGINEERING RESEARCH ORGANIZATIONS
- FINANCIAL SERVICE AND INVESTMENT MANAGEMENT FIRMS
- GOVERNMENT LABS, RESEARCH OFFICES AND AGENCIES
- INSURANCE COMPANIES
- MEDICAL DEVICE COMPANIES
- PRODUCERS OF PETROLEUM AND PETROLEUM PRODUCTS

POSSIBLE JOB TITLES FOR PEOPLE WITH APPLIED MATH & COMPUTATIONAL SCIENCE BACKGROUNDS AND EDUCATION:

- Actuary
- Analyst
- Analytics Consultant
- Analytics Manager
- Applied Mathematics Researcher
- Associate Editor
- Biostatistician
- Business Analyst
- Business Intelligence Developer
- Claims Specialist
- Consultant
- Cryptanalyst
- Cryptographer
- Data Analyst
- Data Engineer
- Data Operations Associate
- Data Processing Specialist
- Data Scientist
- Director of Math Tutorial Curriculum
- Engineer
- Forecast Analyst
- Functional Analyst
- Game designer/slot game designer/game mathematician
- Geolocation Engineer
- Global Pricing Analyst
- Guidance and Navigation Engineer
- Informatics Scientist
- Information Analyst
- Investment Analytics Quant
- Manager
- Math Curriculum Coach
- Math Curriculum Consultant
- Mathematician
- Modeler
- Modeling Engineer
- Operations Researcher
- Operations Support Specialist
- Pharmacokineticist
- PK/PD Modeler
- Planner
- Principal Scientist
- Product Manager
- Program Manager
- Programmer
- Project Manager
- Quality Systems and Compliance Manager
- Quantitative Analyst
- Quantitative Developer
- Quantitative Pharmacologist
- Quantitative Researcher
- Quantitative Scientist
- Quantitative Software Engineer
- Reporting Engineer
- Research and Development Engineer
- Research Analyst
- Researcher
- Research Scientist
- Risk Analyst
- Risk Strategist
- Scientist
- Simulation Engineer
- Software Engineer
- Staff Scientist
- Statistician
- Strategist
- Supply Chain Analyst
- Systems Engineer
- Technical Staff
- Tutor

Credit: https://bigmathnetwork.wordpress.com/2017/03/03/big-math-job-titles-hint-usually-not-mathematical-scientist/

Some applications to work on…

- How can **airlines** use smarter scheduling to reduce costs of engine maintenance? Or smarter pricing to maximize profit?
- How can **automotive and aircraft companies** test performance, safety, and ergonomics, while at the same time lowering the cost of construction and testing prototypes?
- A **pharmaceutical company** wants to search a very large database of proteins to find one that is similar in shape / activity to one they have discovered. What's the most efficient way to do so?
- How do we use major advances in computing power to incorporate knowledge about interactions between the **oceans, the atmosphere and living ecosystems** into models used to predict long-term change?
- How might **disease spread** in populated areas in the event of a bioterrorism event? How would it be contained?
- How does a person's **social network** impact who they will vote for in the next election?
- How can you allocate an **investment** among various financial instruments to meet a risk/reward trade-off?

Some applications to work on…

- Can mathematical models be coupled with efficient computational implementations to obtain practical, low-cost simulations to guide **computer chip design and manufacture**?
- How can genome sequencing analysis help in making clinical decisions based on a **personalized medicine** approach?
- How can mathematics improve rating prediction performance of **e-commerce systems** and help enhance the consumer experience based on their past purchases, behavior and interests?
- Can we provide insight to **coastal communities** about future sea level rise and the risk and likelihood of effects of climate related events on their communities?
- How can you mathematically model the **spread of a forest fire** depending on weather, ground cover and type of trees?
- How do you design a **robotic hand** to grip a coin and drop it in a slot?

Former students & colleagues with applied math / statistics degrees have jobs at:

- Academic institutions
- K-12 math teacher
- Google; Apple; Yahoo; Amazon

Government Jobs:

- NSA (National Security Agency)
- FDA (US Food and Drug Administration)
- USDA (US Dept of Agriculture)
- US Dept of Labor
- Las Alamos National Lab

- Pharmaceutical companies: Pfizer; Norvartis; Eli Lily
- 3M
- Boeing
- Volvo IT
- NV Energy
- HBO Max
- Stitch Fix
- LinkedIn
- Wall street jobs
- Freelance math/science journalist

Former students & colleagues with applied math / statistics degrees have jobs at:

- Gaming industry: IGT, Peppermill, Light and Wonder
- Banks – data analytics
  e.g. Credit One Bank, Las Vegas
- Investment banking – data analysis, strategy
- Insurance companies – actuarial work, health insurance
- Jobs in Data Science; Machine Learning, AI
- Climate modeling
- Consulting
- Lawyer
- Disney; Seamstress; Costume designer

Public health / Health care:

- Renown – health data analytics
- NV Dept of Health and Human Services
- Nevada Central Cancer Registry (NCCR)
- Medical Information Bureau, NYC
- Personalized medicine

Why Study Statistics?

Change the World: From protecting endangered species and managing the impacts of climate change to making medicines more effective and reducing hunger and disease.

Have Fun: Careers in statistics are fun! You could be a "Moneyball"-style statistician or a member of the data science team of a U.S. presidential campaign.

Satisfy curiosity: Statistics is a science. If you are curious about how things work, statistics is a career that will keep your curiosity piqued and your brain engaged.

Make money: Demand for statisticians and data scientists is growing, and so are their salaries. The median salary for statisticians is $104,350 according to 2025 Bureau of Labor Statistics data.

Adapted from the American Statistical Association web page

Slide courtesy of Dr. Kozubowski

Job Opportunities in Statistics / Data Science

One of the most in-demand career paths in technology

- **Explosive Market Demand:** Employment for math/statistics and data occupations is projected by the U.S. Bureau of Labor Statistics to grow much faster than the national average.
- **Data Science Growth:** Roles for data scientists are booming with a projected **34% growth rate** through 2034, adding roughly 23,400 openings each year.
- **Premium Entry Points:** Companies are paying a steep premium for individuals who can combine mathematical rigor with statistical processing.
- Best Jobs of 2026 (US News & World Report)
  - **Data Scientist: #8 overall**
  - **Actuary: #11 overall**

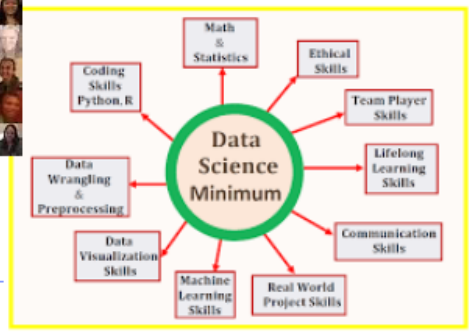
https://www.bls.gov/ooh/math/

Salary Comparison

- **Data Scientist:** Brings in a **median annual salary of $112,590**, with top tech-hub or senior roles exceeding $173,000 to $194,000.
- **Actuary:** Brings in a **median annual salary of $125,770**, where statistical models are applied to manage risk and economic uncertainty.
- **Mathematician & Statistician:** Brings in a **median annual salary of $104,350**, proving that corporate and scientific research labs intensely value advanced data analysis.

https://www.bls.gov/ooh/math/

Recommended skills

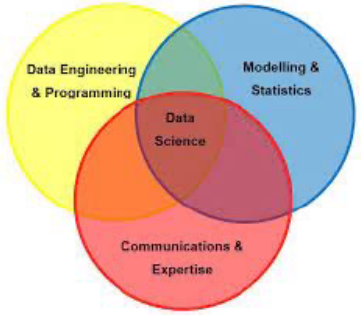


Technical skills

- Statistics
- Multivariable calculus
- Linear algebra
- Machine learning techniques
- Programming/computing
- Data base management

Human skills

- Communication skills
- Critical thinking and logic
- Problem solving
- Team work
- Adaptability and flexibility



Common educational background

A bachelor's degree in data science/statistics or a related field, such as mathematics or computer science.
Best jobs may require a more advanced degree: over 90% of the professionals working in the field have either MS or PhD degree.

Slide courtesy of Dr. Kozubowski