Careers
in the
MATHEMATICAL SCIENCES

siam | Society for Industrial and Applied Mathematics

Applied mathematics and computational and data science impact nearly every facet of our lives.

In this guide, you will find answers to questions about careers in applied mathematics and computational and data science, and profiles of professionals working in a variety of environments for which a strong background in mathematics is necessary for success.

Mathematical careers in business, industry, and government continue to evolve and diversify. As new application areas are discovered and established techniques are applied in new ways, a wide variety of career opportunities have become available to people with talent and training in the mathematical sciences.

These careers rarely carry the title of "mathematician" and are often coupled with a specialty or area of research interest.

WHERE CAN YOU MAKE AN IMPACT?

Mathematics plays a major role in the bottom line of industrial organizations and helps companies perform better in today's data-driven marketplace. Many different types of organizations hire mathematicians, computational scientists, and data scientists. To find out where you can make an impact, search the websites of organizations and corporations that interest you to learn more about their location(s), mission statement and objectives, history, and job postings. Gain experience through internships and work-study opportunities to help you determine your personal workplace preferences when it comes to things like non-profit or for-profit, large or small, working independently or on a team, and how much customer contact you prefer to have.

WHAT KINDS OF PROBLEMS MIGHT YOU WORK ON?

While careers in the mathematical sciences may differ widely by discipline and job title, one thing remains constant among them—problem solving. Below are some potential problems that someone with mathematical training might encounter. Which of them do you find most intriguing, and why?

- *How can airlines use smarter scheduling to increase profits and reduce the costs of engine maintenance?*
- *How can one design a detailed plan for a clinical trial?*
- *Is ethanol a viable solution for the world's dependence on fossil fuels? Can biofuel production be optimized to combat negative implications on the world's economy and environment?*
- *How can 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 can automotive 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 or activity to one they have discovered. What is the most efficient way to do so?*
- *How might disease spread in populated areas in the event of a bioterrorism incident, and how could it be contained?*
- *How do you design a robotic hand to grip a coin and drop it in a slot?*
- *How can mathematical models of opinion dynamics be used to figure out how a person's social network impacts who they will vote for in the next election?*
- *How can you mathematically model the spread of a forest fire depending on weather, ground cover, and type of trees?*
- *How can you allocate an investment among various financial instruments to meet a risk/reward trade-off?*
- *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 consumers' experience based on their past purchases, behavior, and interests?*

ARE YOU READY?

Part of the preparation for your future is obtaining a solid foundation in mathematical and computational knowledge in areas like differential equations, probability, combinatorics, and linear algebra, as well as the art of

WHAT'S OUT THERE FOR SOMEONE WITH YOUR TALENTS, INTERESTS, AND BACKGROUND?

Growing disciplines to consider and look into more closely:

- Climatology and Climate Change Impacts
- Computer Animation and Digital Imaging
- Data Mining and Differential Privacy
- Data Science
- Ecology/Epidemiology/ Environment
- Machine Learning and Artificial Intelligence
- Materials Science
- Personalized Medicine
- Quantum Information Science
- STEM Ethics
- Systems Biology

Other areas in which mathematicians work:

- Arts, Entertainment, and Recreation
- Clean Energy
- Climate Modeling
- Education
- Finance and Economics
- Government
- Health Care and Social Assistance
- Information Technology
- Insurance
- Legal Services
- Management of Companies and Enterprises
- Manufacturing
- Nonprofit
- Pharma
- Retail Trade
- Supply Chain
- Transportation and Warehousing
- Utilities

abstraction and advanced computing and programming skills. Preparation for a career in the mathematical sciences also involves being able to apply these skills to real-life problems and achieve practical results. Mathematical and computational skills are a huge career asset that can set you apart and open doors.

HOW DO YOU GET STARTED?

Choose a major in the mathematical sciences

Consider degree programs in the mathematical sciences and academic disciplines that require mathematical and computational skills, such as engineering, life science fields, public health sciences, computer and information sciences, statistical sciences, financial mathematics, earth sciences, and physical sciences. Pairing math with a minor in any of these degrees can be a powerful combination.

Use your university's resources

Many universities offer robust career centers. Services such as career assessments can help you narrow your search to suit your personality and interests. Other resources may include career coaches, résumé help, interview preparation, career development webinars, job boards, and career fairs.

Explore internships, summer jobs, industrial research opportunities, and work-study

What better way to determine the range of opportunities and explore possible areas of interest than to be in the workplace? Check with your university's career center and online job portals, as well as the career and job resources on the SIAM website at *www.siam.org/careers*. You may also be able to find programs where you can work with a faculty member and other students on a research problem that originates from a business in order to get experience and learn approaches needed to solve such problems.

The National Science Foundation and other agencies offer programs such as Research Experiences for Undergraduates (REUs), Non-Academic Research Internships for Graduate Students (INTERN), and Mathematical Sciences Graduate Internships (MSGI) that support active research participation by undergraduate and graduate students in many research areas.

This brochure is available for free download (PDF) or to purchase (print copies) at: ***go.siam.org/careersbrochure***.

Build a network of contacts

Join a professional organization like SIAM and get involved with student chapters, activity groups, and geographic sections. Attend conferences and events, and participate in webinars, discussion groups, and other programs and resources to connect with individuals in your field. Volunteer for committees or community service opportunities.

Practice communication

Learn to communicate ideas in a compelling, concise way to someone unfamiliar with the topic.

Be open to all sorts of jobs

Be open to job postings with titles that may not align specifically with your experience or career preparation. If you have training in the mathematical sciences and skills that apply, you can often learn the rest on the job. Do you need to have every skill listed on a job description? No, you should meet at least a few of the criteria well and have ways to demonstrate your depth of skill in those areas. Think of ways to use the skills you have to approach new problems.

Note: "career stage" in this publication is defined as:

- Early (1–10 years post bachelor's)
- Mid (11–25 years post bachelor's)
- Late (26+ years post bachelor's)

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

- Actuary
- Analyst
- Analytics Consultant
- Analytics Manager
- Applied Mathematics Researcher
- Biostatistician
- Business Intelligence Developer
- Business Analyst
- Cryptanalyst
- Cryptographer
- Data Analyst
- Data Engineer
- Data Operations Associate
- Data Processing Specialist
- Data Scientist
- 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
- Math Curriculum Coach/ Consultant/Director
- Modeling Engineer
- Operations Researcher
- Operations Support Specialist
- Pharmacokinetic/ Pharmacodynamic Modeler
- Principal Scientist
- Product Manager
- Program Manager
- Programmer
- Quality Systems and Compliance Manager
- Quantitative Analyst
- Quantitative Developer
- Quantitative Pharmacologist
- Quantitative Scientist
- Quantitative Software Engineer
- Research and Development Engineer
- Research Analyst
- Research Scientist
- Researcher
- Risk Analyst
- Risk Strategist
- Simulation Engineer
- Software Engineer
- Software Architect
- Statistician
- Strategist
- Supply Chain Analyst
- Systems Engineer
- Technical Staff

Sharon Arroyo

SENIOR TECHNICAL FELLOW

EMPLOYER
The Boeing Company

DEPARTMENT
Applied Mathematics, Boeing Research & Technology

LOCATION
Seattle, Washington, U.S.

EDUCATION
B.S. Mathematics, Stanford University
M.S. Operations Research, Cornell University
Ph.D. Operations Research, Cornell University

CAREER STAGE: Late

WHAT DO YOU DO?

I partner with Boeing engineers to develop mathematical algorithms and tools that are used across Boeing to reduce costs and improve product designs. I lead projects and collaborate with leadership to establish technical direction and strategy for applied mathematical research. I mentor and teach colleagues to expand the use and value of applied mathematics. I have collaborated with colleagues to drive impact in many application areas including supply chain, transportation systems, production systems, and communication networks. I enjoy solving technical challenges that improve business results and seeing my mentees achieve their goals.

What types of skills do you use?
I collaborate with leadership to establish technical strategy at Boeing based on my specialization in operations research and discrete optimization. I work in a dedicated organization that drives understanding and adoption of proven math solutions and tools. Our team collaborates with customers to understand their challenges and aligns the appropriate set of cross-discipline mathematical skills to address them.

How are applied mathematics and/or computational science important to what you do?
The vast size and advanced nature of the engineering work in industry means that difficult mathematics challenges naturally arise. Using expertise in mathematics allows for many of these problems to be tackled in stride.

What are the pros and/or cons of your profession/job?
Pro: Mathematics is inherently multidisciplinary and forms the technical basis for a large portion of many industrial challenges. One of the truly great things about being a mathematician in industry is having a front row seat to many of these exciting challenges.

Con: The time-bound nature of the work. Academia afforded me more time to explore mathematical options, while industry projects are guided by business-driven deadlines. I have come to appreciate the results-oriented nature of industry work.

Does your job offer flexibility?
Yes, I have had the opportunity to collaborate with different teams to develop solutions to interesting challenges across commercial, defense, and space.

CAREER PATH

What career path did you take to your current position?
I was an assistant professor at Iowa State University for three years. I had the opportunity to consult with industry and realized I enjoyed working with teams on multidisciplinary problems and seeing the real-world impact of math. Due to this experience, I joined the Boeing Math Group and have been a member for more than 25 years.

Was your career path well planned or a result of taking opportunities as they arose?
One must be open to exploring career opportunities as they arise. I consulted with industry while I was an assistant professor, and the nature of the work attracted me to move to industry.

ADVICE

What advice would you give to someone pursuing a similar degree or profession?
Try to get an industrial internship early in your program. Overall, be true to yourself when establishing your career goals. Be flexible in how you achieve them and engage in continuous learning along the way. Enjoy the journey!

> *“I am creative in every aspect of my job to design, develop, and deliver mathematical solutions that drive impact and support the largest number of applications. And, I am dedicated to mentoring and teaching a diverse and inclusive team.”*

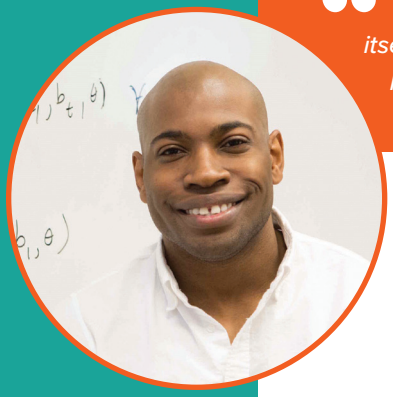
Raymond Perkins

PEOPLE ANALYTICS RESEARCHER

EMPLOYER
Meta

DEPARTMENT
Workforce Strategy and Analytics

LOCATION
New York, New York, U.S.



> *"Don't pigeonhole yourself too early in your career. You don't have to take every opportunity that presents itself, but at least expose yourself to opportunities and learn about as many of them as possible."*

EDUCATION
B.A. Mathematics and Economics, Morehouse College
M.A. Operations Research and Financial Engineering, Princeton University
Ph.D. Operations Research and Financial Engineering, Princeton University

CAREER STAGE: Early

WHAT DO YOU DO?

As a people analytics researcher, I develop quantitative models and data-driven strategies for managing and expanding Meta's workforce. I am a member of the Model Optimization and Strategy team where I spend my time discussing strategy with cross function partners, developing mathematical models, and performing statistical analysis. The nature of my work is constantly evolving and changing as the company identifies new opportunities and faces new challenges such as changing global markets, new government regulations, or changes to competitors' corporate strategies. Depending on the circumstances, my work may focus on location and facility placement strategy, headcount planning and development, and talent market analysis and selection.

What types of skills do you use?
A people analytics researcher should develop strong business context, quantitative modeling, and communication skills. The job requires one to identify and understand impactful business problems, develop defensible and actionable solutions, effectively communicate insights, and successfully influence decision makers. Many of the types of problems analysts or researchers face use common methodology from operations research such as optimization, statistical modeling, and predictive analytics. Though having a strong technical background is important for the role, strong communications skills are equally as important.

How are applied mathematics and/or computational science important to what you do?
Applied mathematics is critical for the role. You're literally applying mathematics to solve real-world problems and obtain applicable solutions.

What are the pros and/or cons of your profession/job?
The biggest benefit of the job is the amount of exposure to a diverse set of problems. Since most large companies have sizable workforces and constantly face changing market conditions, the skillset is easily transferable across many industries.

CAREER PATH

What career path did you take to your current position?
I never planned or even considered a career in people analytics. I studied mathematics and economics in college, where I was introduced to mathematical research. It was through a summer research experience for undergrads (REU) that I developed an interest in quantitative finance. I originally went to graduate school with the intention of going into finance; my graduate program focused on both operations research and financial engineering. After graduate school I worked as a quantitative investment analyst for an asset management firm and focused on portfolio optimization. When a recruiter contacted me about people analytics, I was skeptical, especially since I knew very little about the field. But through discussion and research I realized the work was very similar to what I was doing. The main difference was, instead of modeling and managing financial assets, my work would focus on a different type of asset—people.

Was your career path well planned or a result of taking opportunities as they arose?
I'm a strong believer in playing to your strengths and leveraging opportunities as they present themselves. There was nothing planned about my current role—it was a tactical decision based on an exciting opportunity.

ADVICE

What advice would you give to someone pursuing a similar degree or profession?
I was told early to speak to every recruiter that contacts me, even if I am not in the market or interested. It is a great way to discover new interests, develop useful relationships, and identify career opportunities. With a strong background in mathematics and programming, there are a tremendous number of opportunities available to you; to grasp them you need to make sure you are aware of them.

SALARY

Many of the large tech firms with huge workforces are pouring meaningful investment into people analytics since talent is a driving force behind their success. As someone with a Ph.D. and a quantitative background, starting total compensation is $200K+.

Jesse Berwald

PRINCIPAL SOFTWARE ARCHITECT

EMPLOYER
Quantum Computing, Inc.

DEPARTMENT
Engineering

LOCATION
Remote (I currently reside in Minneapolis, Minnesota, U.S.)

> *Something to be aware of is that you will use your mathematics skills in a general sense solving very interesting problems, but it's unlikely that you will directly leverage your specialty.*

EDUCATION
B.S. Honors Mathematics, University of Michigan
Ph.D. Mathematics, Montana State University

CAREER STAGE: Mid

WHAT DO YOU DO?

As a software architect I interact closely with many levels of the organization. I ensure that hardware engineering projects align with requirements from sales and marketing. It is essential that the senior leadership understands the scope of a product and how to prioritize where we can take it. One example of a recent interesting project was we released a software interface to a new hardware device, which allows customers to solve integer optimization problems on a quantum computing device.

What types of skills do you use?
My foundational skills as a mathematician have allowed me to learn new skills such as quantum computing with minimal pain and suffering. Mathematicians are keen generalizers, which is an important crossover skill in many jobs, including software engineering. Project planning and management is foundational: decompose a six-month block of work into smaller milestones and deliverables. Nevertheless, most days require a much larger dose of interpersonal skill than any other skill.

How are applied mathematics and/or computational science important to what you do?
Applied mathematics and computer science are foundational to my work. Quantum computing leverages a wide range of tools, from machine learning to quantum physics. Staying abreast of new research means that I set aside time to read relevant research papers, too. Currently, architecting software for quantum computing involves a larger-than-average portion of the stack: at one end, an understanding of the underlying physics is often required; at the other end, one is tasked with implementing these ideas as machine learning algorithms in the cloud.

What are the pros and/or cons of your profession/job?
Pro: In my current role at a start-up, we are all focused on essentially a single product, which really helps to guide one's work.

Con: Start-ups can travel a nonlinear path at times, which might involve a sudden change in the company's direction, which can lead to feelings of instability.

Does your job offer flexibility?
My job is very flexible in terms of working hours and location.

CAREER PATH

What career path did you take to your current position?
My career path has been very nonlinear. I dropped out of high school to pursue bike racing and ended up finishing my last two years of undergrad at University of Michigan. The next five years included graduate school in Connecticut, a software position at IBM in Massachusetts, serving coffee, framing houses in Montana, and lots of rock and ice climbing. I reentered graduate school in Bozeman, Montana and graduated with a Ph.D. in mathematics.

After my Ph.D. I spent two years as a postdoc at William & Mary, then a year at the Institute for Mathematics and its Applications at University of Minnesota. Both of these postdocs focused on dynamical systems and topological data analysis. In 2014, I left academia for a data science position at Target, and after three years I transitioned to a sales engineer role at D-Wave, a quantum computing company in Vancouver, which ended up having many interesting collaborations with industrial partners. Now I work for a small start-up in the quantum computing realm, but have transitioned in this job from a quantum algorithm engineer to a software architect.

ADVICE

What advice would you give to someone pursuing a similar degree or profession?
Reach out to people you know in industry, pursue summer internships at national labs or companies, and learn to code in a modern language such as Python. The need for mathematical reasoning shows up in many unexpected areas.

Was there anything that surprised you when you started out in your career?
The number of people and technologies I regularly work with always impresses me. Developing a new product often involves much more work than a large journal paper.

SALARY

$150K–$300K + bonus and stock options

Emily Kubicek

DATA STRATEGY MANAGER

EMPLOYER
The Walt Disney Company

DEPARTMENT
Audience Modeling and Data Science

LOCATION
Los Angeles, California, U.S.

EDUCATION
B.A. Communication Sciences, San José State University
Ph.D. Cognitive Neuroscience, Gallaudet University

CAREER STAGE: Early

WHAT DO YOU DO?

As a data strategy manager, I would categorize my job as 50% technical and 50% business. However, it's important to note that the technical and business aspects are not mutually exclusive; much of my job involves mixing the two and deciding on the best decisions with both business and technical objectives in mind. Having been a data scientist on this same team prior to my current position, I leverage my technical understanding in ensuring external and internal clients work seamlessly with our data offerings.

What types of skills do you use?
Coding (SQL, bash, Python), data engineering, knowledge of various cloud services.

How are applied mathematics and/or computational science important to what you do?
The development of many of our data offerings is rooted in machine learning and other data-related concepts such as graph theory. Without a strong foundation in these areas, we would not be able to productize the insights and tools we have created using these advanced methods.

What are the pros and/or cons of your profession/job?
Pros: Work/life balance, liking the company I work for, and constant change.

Cons: I can easily see how working in tech can take over your life. It's important to remember, even if you thoroughly enjoy your work, you should have a life outside of it.

Does your job offer flexibility?
Yes, I currently work both from home and in an office.

CAREER PATH

What career path did you take to your current position?
Ph.D. in Cognitive Neuroscience → Data Science Professional Intern → Data Scientist → Data Strategy Manager

Was your career path well planned or a result of taking opportunities as they arose?
I knew I wanted to go into data science after graduate school. The biggest catalyst for my current career was the internships I did prior to a full-time salaried offer. While my background wasn't traditionally tech, being able to showcase my hard and soft skills to potential employers opened many doors for me.

ADVICE

What advice would you give to someone pursuing a similar degree or profession?
Internships. Internships. Internships. In looking for internships be sure to cast a wide net—if in tech, look for a variety of roles, not just the one you think you want to end up with. A diversified toolset is always something hiring managers look for.

Was there anything that surprised you when you started out in your career?
You can still be technical and not model all day. I code, develop, and do amazing things with cloud services all day. All these things are as much a part of and needed in data science as modeling is.

SALARY

My job would be categorized under the larger umbrella of technical product manager. Technical product managers handle small scale, large scale, one product, multiple products, etc., which makes the salary dependent on the responsibilities of that particular role. Scope of role is something I would keep in mind not only when researching jobs but also when negotiating salaries.

"If you want to be in a technical role working with data, I cannot emphasize the importance of cloud infrastructure enough. If you know little to nothing about cloud, I recommend going for your AWS Cloud Practitioner Certification. Many of the cloud companies have their versions; it really doesn't matter which one you choose, as the services are largely similar. However, AWS is the most widely used. You can use affordable classes on Udemy to get prepared for the test (which you can take remotely). This skillset is useful if you want to be on the research, data, and even business side of tech."

> *Learn to have a growth mindset and do not be afraid of failure and setbacks.*

Jieqiu Chen

PRINCIPAL DATA AND APPLIED SCIENTIST

EMPLOYER
Microsoft

DEPARTMENT
Experiences and Devices

LOCATION
Seattle, Washington, U.S.

EDUCATION
B.S. Applied Mathematics, Renmin University of China
Ph.D. Management Sciences/Operations Research, The University of Iowa

CAREER STAGE: Mid

WHAT DO YOU DO?

My responsibilities include developing new data science capabilities, establishing cross-team collaboration to bring the latest technology to our product, sharing best practices, and hiring and coaching junior scientists. Two days in a typical week are fully packed with meetings, and 2–3 days are dedicated to design review, building models, and coding. A few weeks are reserved for learning, attending conferences, and planning. One of my favorite projects was leading a team of project managers, engineers, and scientists from Microsoft's AI Development Acceleration Program to develop a state-of-the-art system for cross learning on large-scale time series data. I also built a machine learning system to predict the number of users of Microsoft Teams, which has been used to do capacity planning for Teams since April 2020. This ensures we provision enough resources for running Teams meetings to support students, small businesses, and enterprises. What I find most rewarding is that my work contributes to the success of my company and benefits its many users.

What types of skills do you use?
Soft skills: collaboration, communication, writing, influencing. Technical skills: machine learning, optimization, coding (R, Python, SQL).

How are applied mathematics and/or computational science important to what you do?
Applied mathematics is fundamental to my ability to think critically and enables me to abstract a business problem into a mathematical one.

What are the pros and/or cons of your profession/job?
Pro: I find my job fulfilling because my work benefits many people and the decisions made from data analysis could have a multi-million dollar impact on the business. In addition, there are plenty of challenging projects that I can work on by collaborating with scientists, engineers, product managers, and researchers.

Does your job offer flexibility?
We can work fully remotely or go to the office a couple days a week. Ultimately, we are measured not by when we do our work, but by the impact we bring to the table.

CAREER PATH

What career path did you take to your current position?
After my Ph.D. I thought I wanted to go into academia, but there were few openings in universities in 2010 after the Great Recession and I was not able to get a faculty job. However, I was fortunate to be offered a postdoc fellowship at Argonne National Laboratory. After completing my postdoc, I realized that doing research was not my passion; instead, I was more interested in solving practical problems. So I went to industry and started out as an operations research scientist at the Dow Chemical Company. While there, I attended a conference where I learned about interesting work being done by "data scientists" (a relatively new job family at that time). I decided that I wanted to become a data scientist, as I found the idea of using big data and mathematical modeling to solve business problems fascinating. I took a few online machine learning courses and started to apply those methods in my daily work. About a year later, I landed a data scientist job at Microsoft and have been working here since then.

ADVICE

Was there anything that surprised you when you started out in your career?
Ph.D. training made me think that solving harder problems leads to more rewards than solving easier ones (rewards = papers accepted to journals, more citations, etc.). In industry, the difficulty of the problem does not necessarily positively correlate with rewards (in the sense of business impact and career growth).

SALARY

This is highly dependent on the industry, company, and location of the job. For the tech industry, a good reference is *levels.fyi*, where it shows the median total compensation for a data scientist is $175K.

Dan Eckhardt

LEAD, ELECTRIC PROPULSION

EMPLOYER
Air Force Research Laboratory, United States Space Force

DEPARTMENT
In-Space Propulsion Branch

EDUCATION
B.S. Applied Mathematics and B.S Electrical Engineering, Illinois Institute of Technology
Ph.D. Mathematics, Rensselaer Polytechnic Institute

CAREER STAGE: Mid

WHAT DO YOU DO?

I lead a team of scientists and engineers in the research and development and sustainment of spacecraft electric propulsion technologies for the United States Space Force (USSF) and Department of Defense (DoD) customers, as well as other government agencies, industry, and various academic institutions. I'm also principal investigator (PI) on developing Verification & Validation (V&V) and optimization techniques used in various rocket technologies. On any given day I might be in the lab running experiments, in meetings with stakeholders, or collaborating with professors and their students on research topics. I find the breadth of the work I do very rewarding. Being at the bleeding edge of technology, there is always a new challenge to tackle, and that keeps me motivated.

What types of skills do you use?
The ability to write and speak concisely so I can pass on critical information to higher-ups is very important. Teamwork and time management are also essential, especially since we typically work on large projects where various specialists are contributing.

How are applied mathematics and/or computational science important to what you do?
I use applied mathematics and computational science in every aspect of my work. For example, as PI, I'm working with a team to develop computational techniques that leverage advances in data-driven work in order to better incorporate experimental campaigns with high fidelity physics models.

What are the pros and/or cons of your profession/job?
Pro: The continuous opportunity to learn. There is a lot of amazing work being done and having to keep up forces me to go outside my traditional field and learn different ways of approaching problems. Writing proposals for grants to pursue some of my ideas that may not necessarily align with what my job entails allows me to keep actively publishing and collaborating with academia.

Con: The bureaucracy of working for the government can be challenging, but there is concerted effort to reduce a lot of the unnecessary bureaucracy that stifles innovation.

Does your job offer flexibility?
My job offers growth and career broadening opportunities to explore and gain experience in other fields for months at a time, which allows one to grow and get a better perspective of different aspects of working for the DoD.

CAREER PATH

What career path did you take to your current position?
I began working for Air Force Research Laboratory (AFRL) through the National Research Council Postdoctoral Fellowship. I was interested in exploring plasma-related research outside of academia to gain a broader outlook on the topic. I ended up loving working for AFRL and I've stayed here since.

Was your career path well planned or a result of taking opportunities as they arose?
Definitely not well thought out; I intended to stay in academia, but I ended up in government in a field that's only tangentially related to what I studied. I took (and continue to take) advantage of opportunities as they arose.

ADVICE

What advice would you give to someone pursuing a similar degree or profession?
My advice is to be open to jobs that might not obviously relate to your field of study. Networking is very important – go to conferences if you can and talk to people in careers you may not be interested in. You may be surprised how much you like what you hear. And as always, be open to experiences and learning new things.

Has SIAM played a role in helping you build your career?
We had SIAM Student Chapters at both Illinois Institute of Technology and Rensselaer Polytechnic Institute and participating in those activities allowed me to network—gaining both collaborators and mentors, present my research, and learn about new opportunities. SIAM has contributed to shaping both my academic and professional life.

SALARY

Typical government salaries are available at *opm.gov*.

> *"The most important skills I use are the ability to learn on the fly and the willingness to continue learning. These are critical since I am not an expert in everything, and yet I'm supposed to be."*

“Leadership requires courage.”

Jeff (Jeffrey R.) Sachs
DISTINGUISHED SCIENTIST

EMPLOYER
Merck & Co., Inc.

DEPARTMENT
Quantitative Pharmacology and Pharmacometrics, a.k.a. “QP2”

LOCATION
Rahway, New Jersey, U.S. (hybrid/remote)

EDUCATION
B.S. Applied Mathematics, Brown University
M.S. Applied Mathematics, Brown University
Ph.D. Mathematics, MIT
American Course on Drug Development and Regulatory Sciences (ACDRS) Certification, University of California, San Francisco

CAREER STAGE: Mid

WHAT DO YOU DO?

I am responsible for modeling and simulation for discovery and development of vaccines. We have a team of project leads who are also modelers from a variety of backgrounds including econometrics, chemical engineering, pharmacometrics, statistics, and math.

We collaborate with scientists across basic (discovery or “in vivo”) and clinical (human) biology, infectious disease, virology, and immunology; with statisticians, epidemiologists, toxicologists; and with experts on clinical operations, regulations, and manufacturing. Our work involves designing experiments (test-tube, animal, and clinical trials), analyzing the data, helping interpret the results, and supporting resulting decisions on dose, regimen, and whether or not to move a program forward to the next phase. We all need to know enough of the biology, clinical science and strategy, and regulatory requirements to allow fluid, two-way communication—devoid of math-speak or equations—with all our colleagues and with senior leadership in the organization.

What types of skills do you use?
We need communication, computational, mathematical, statistical, and scientific skills to do our jobs! We do a lot of modeling with differential equations coupled to stochastic modeling, comparing simulated experiment designs, and collaborative interpretation of results.

What are the pros and/or cons of your profession/job?
Pros: For many of us, the most rewarding thing is having a substantial impact on human health. Our simulations have helped decisions to go forward with programs that are protecting people’s health; made prophylaxis (prevention of an infectious disease) even easier and more widely available; enabled clinical trials that advanced science toward protecting against other diseases; and driven “no-go” decisions that have saved the company over $1 billion, enabling those resources to be routed to other projects.

I also find it very rewarding to publish, as this helps understand what is high quality/novel and provides other valuable feedback. It also helps get our results and methods into the hands of others who can build on them to improve the lives of people and animals.

It is also a great and pleasurable privilege to mentor. It gives me such a great feeling to help someone succeed by supporting their decisions on what to prioritize and which skills to develop.

CAREER PATH

What career path did you take to your current position?
My childhood love of math, science, and biology has, through great luck, made me employable doing something fulfilling and useful. My career path was planned with certainty from college (or before), but then changed, without plan or anticipation: academic → government → technical consulting → pharmaceutical IT research → pharmacometrician in infectious diseases, oncology, and then vaccines.

ADVICE

What advice would you give to someone pursuing a similar degree or profession?
Study everything that interests you (and some pragmatic things that don’t). Demonstrate that you are really interested in these things through your actions (courses taken, publications, certificates, knowledge displayed). Examples of “pragmatic things” include data visualization principles, how to give a presentation valuable to technical and non-technical audiences, basics of at least one interpreted procedural language and at least one object-oriented language, at least basic probability and stats, and at least one application domain: engineering, biology, materials, animation, computer science, economics/finance, AI, natural language processing, etc.

Was there anything that surprised you when you started out in your career?
Intellect, for example quantitative or other technical skills, is only table stakes. True success requires deep human interaction, empathy to understand what people/teams really need, and a sincere caring about people. Quality and speed of results come only after that.

Has SIAM played a role in helping you build your career?
I have gotten at least two of my jobs (including my current one) through SIAM conferences.

SALARY

Starting positions for individuals with a Ph.D. can have compensation above $100K.

Rachel Crowell

FREELANCE MATH AND SCIENCE JOURNALIST/WRITER

EDUCATION
B.S. Mathematics and Statistics,
University of Missouri–Kansas City

CAREER STAGE: Early

WHAT DO YOU DO?

As a self-employed professional, I manage all activities of my business, such as cultivating and maintaining relationships with clients, developing and pitching new story ideas to publications (or deciding whether to accept new assignments they bring to me), interviewing sources, and writing articles. I then respond to editors/clients' requests for revisions, participate in the fact-checking process, and invoice for payment. I also maintain my professional social media presence.

I find it most rewarding when I talk with mathematicians and other researchers who are enthusiastic about their research and excited to discuss it with others. It's also satisfying when my articles are published and ready to be enjoyed by others.

What types of skills do you use?
To succeed as a science writer, you must learn how to read and analyze research papers. Interpersonal communication skills are also critical, as you'll need to be able to talk with mathematicians and scientists and work with editors/clients. This process needs to culminate in a finished product that's understandable to your audience (which often includes lay readers). Time management skills and attention to detail are also helpful.

How are applied mathematics and/or computational science important to what you do?
Having a degree in math and statistics helps me market myself and my business. It also gives me confidence to tackle writing about these subjects and find exciting research developments to cover.

Does your job offer flexibility?
Yes, being self-employed offers flexibility, with some caveats. With this income structure, you don't have paid vacation or sick leave in the same way that employees do. Also, self-employment taxes tend to be higher.

CAREER PATH

What career path did you take to your current position?
I earned my bachelor's degree in mathematics and statistics. I then completed an American Association for the Advancement of Science (AAAS) Mass Media Science and Engineering Fellowship sponsored by the American Mathematical Society. My fellowship site was the Oregonian, a newspaper in Portland, Oregon. I also recently participated in a mid-career mentorship program for science writers through the National Association for Science Writers that served as an additional professional development opportunity for me.

Was your career path well planned or a result of taking opportunities as they arose?
It was the result of taking opportunities as they arose. I had considered many career paths and just before I graduated, a math professor in my department shared an announcement about the AAAS Mass Media Fellowship. As soon as I started my fellowship, I knew I wanted to have a career in science writing.

ADVICE

What advice would you give to someone pursuing a similar degree or profession?
Join the National Association of Science Writers to connect with learning and networking opportunities. (Student and affiliate memberships are available.) Apply for science writing internships and fellowships (such as the AAAS Mass Media Fellowship) if you're eligible. Ask about opportunities to write for publications on your university campus, and submit articles to *SIAM News*.

SALARY

Salaries vary widely based on the types of clients you serve, how many projects you accept and the scope of the projects you tackle. There are also many different payment structures (such as getting paid a rate per word, per hour, or per project) used in the industry.

"There is a high demand for science writers/journalists who can write about mathematics and computer science. You must be able to put yourself in other peoples' shoes and to translate complex scientific concepts into articles that are understandable and interesting to a wide range of people."

Alyssa Cuyjet

TECHNICAL PROGRAM MANAGER

EMPLOYER
Google

DEPARTMENT
Cloud

LOCATION
New York, New York, U.S.

"Always ask questions. It's one of the best ways to learn about different analytical techniques and your company."

EDUCATION
B.A. Mathematics, Trinity College
M.S. Statistics, American University

CAREER STAGE: Early

WHAT DO YOU DO?

My main responsibilities deal with supply and delivery analytics for data centers globally, ensuring that there is enough capacity to meet demand at data centers. As a technical program manager (TPM), this may include more technical work such as writing/reviewing code, running models, and visualizing/analyzing project results, as well as gathering business requirements, defining major steps of a project, and ensuring that work is progressing as expected.

What types of skills do you use?
This job requires a combination of hard and soft skills. Knowledge of optimization, probability distributions, and statistics are needed in addition to coding in languages such as SQL, R, and Python, which are integral to running analytical models and analyzing the results. On top of tech skills, communication with stakeholders is incredibly important to making sure that projects align with their vision, and learning the business helps to see how all the pieces fit together, ensuring that projects will have a meaningful impact.

What are the pros and/or cons of your profession/job?
Pro: Constantly being able to learn. You learn so much by being surrounded by people from different industries and different jobs, which helps when it comes to problem solving.

Does your job offer flexibility?
So far, I've been able to keep a good work/life balance. I try to avoid checking emails/messages after logging off for the day and I don't feel pressure from management to do so.

"Technical skill is absolutely important for the job, but it will only take you so far if you don't understand how the business works, how the analytics will be applied, and any constraints that need to be accounted for in the analyses."

CAREER PATH

What career path did you take to your current position?
After completing two summer undergraduate research programs, one theoretical and one applied, I knew I wanted to pursue a career in analytics. Upon completing my grad program, I started as a modeling analyst within the auto insurance industry. I built upon the skills that I developed in school while developing soft skills and learning about business, which is important to ensure that analyses are useful. After that, I moved into a data scientist role at an education technology startup. There, I applied my prior work experience in regression/machine learning while also learning more about data engineering and business intelligence. My current position sparked my interest because it combined my desire to continue working in data analytics and to strengthen my business and management skills.

Was your career path well planned or a result of taking opportunities as they arose?
My career path was a combination of planning and opportunity. While in my first job, I knew I wanted to relocate to New York City, continue doing similar work, and take on a new challenge. When an opportunity presented itself, I took my current job.

ADVICE

What advice would you give to someone pursuing a similar degree or profession?
The data world is vast, so I would recommend trying to find positions that allow you to get experience (or visibility) in different areas: data engineering, business intelligence, analytics, data science/machine learning. This can help you get a better idea of what you want to pursue long term.

Was there anything that surprised you when you started out in your career?
The importance of grasping the business side of things was a surprise. It helps you to understand how your model/results are working, whether results are expected, or if there is an issue.

SALARY

Typical salary for TPMs can range from $80K–$200K+ depending on experience and location.

Dirk Hartmann
SIEMENS TECHNICAL FELLOW

EMPLOYER
Siemens Digital Industries Software

DEPARTMENT
Simulation and Test Solutions, Strategy and Innovation

LOCATION
Munich, Germany

"Grasp opportunities even if they seem too large; you will grow while doing them."

EDUCATION
Master of Advanced Study, Applied Mathematics, and Theoretical Physics, University of Cambridge
Physics Diploma, Mathematics Diploma, and Mathematics Doctor of Natural Sciences, University of Heidelberg

CAREER STAGE: Mid

WHAT DO YOU DO?

As a Siemens Technical Fellow for one of the biggest simulation companies, my main responsibility is to scout novel technologies and to feed them into our innovation funnel. The latter includes the realization of proof of concepts as well as demonstrators, thus rapid prototyping is part of the job. Furthermore, to identify high value opportunities for novel products and solutions, networking with the whole Siemens organization, our customers, as well as academic partners is part of my daily activity.

What types of skills do you use?
Beyond a broad mathematical skillset and a good portion of curiosity, networking is key to identifying the right opportunities. The segment at Siemens I am part of develops simulation and test solutions. The heart of these is advanced mathematical algorithms. Therefore, applied mathematics and computational science are at the core of every product and every project with which I am involved. They are the fuel for our innovation pipeline.

What are the pros and/or cons of your profession/job?
Pro: The job is really about what I love to do: exploring novel algorithms, networking with people, and at the same time creating value for our customers and society. Sometimes it is hard to distinguish whether this is a job or a hobby.

Con: There are no big cons, but as in all big organizations, sometimes there are administrative overheads, some not-too-productive meetings, and times when the organization is not moving as fast as I would love it to move.

Does your job offer flexibility?
My job offers great flexibility; Siemens is a great role model here. For example, my direct colleagues and I are distributed all over Europe and even Canada, but we still have strong roots in the local offices. For me, it is a great mix of working from home, working in the office, and traveling.

"Beyond a broad mathematical skillset and a good portion of curiosity, networking is key to identifying the right opportunities. Only when the right technology matches with a great value proposition do innovations emerge."

CAREER PATH

What career path did you take to your current position?
I started my studies with degrees in physics and slowly moved to applied mathematics, driven by my passion for numerical methods. Having a strong desire to create impact, I focused early on applying mathematics and numerical methods to real-world problems. In my Ph.D. and as a postdoc, I focused on mechano-biology before I was offered an opportunity at Siemens Technology. At Siemens I took several roles, from individual contributor to consultant and project/program manager as well as the lead researcher for the technology field Simulation and Digital Twin. Driven by my ambition to create even more impact on Siemens offerings, I moved to the Siemens Business Unit Digital Industry Software, where I am currently a Siemens Technical Fellow.

Was your career path well planned or a result of taking opportunities as they arose?
While the career path might look straightforward, it was really a result of taking on opportunities and challenges whenever I spotted them.

ADVICE

What advice would you give to someone pursuing a similar degree or profession?
Focus on what you love to do and what you are good at. In addition, try to network as much as possible and do a couple of internships to learn where you would like to work and to identify future job opportunities – this is something I have not done personally but would do differently.

Was there anything that surprised you when you started out in your career?
At the start of my career, I was very surprised by the conservatism of engineering, which I now appreciate for the robustness and stability of the software tools and ultimately the resulting products. This sometimes makes innovation more challenging.

SALARY

Salaries depend strongly on experience and location. Search terms: (Senior) Director, Technical Fellow.

William Pack

SENIOR PRINCIPAL SYSTEMS ENGINEER

EMPLOYER
Raytheon Intelligence and Space

DEPARTMENT
Intelligence, Surveillance, and Reconnaissance –Tactical EO/IR Systems

LOCATION
McKinney, Texas, U.S.

"Grad students—find opportunities to incorporate as much scientific computing into your degree as possible. Handwritten proofs are not as important as working code in industry."

EDUCATION
B.S. Mathematics, University of New Orleans
M.S. Applied Mathematics, University of New Orleans

CAREER STAGE: Mid

WHAT DO YOU DO?

I am the Sensor Characterization Lead for Raytheon Technologies' F-35 Electro-Optical Distributed Aperture System (EO DAS) program. This role includes modeling the performance of the wide field-of-view MidWave InfraRed (MWIR) sensors and validating the models through data collection and analysis; developing a suite of data reduction/analysis tools (MATLAB) for ingesting, conditioning, analyzing, and interpreting sensor test data for sell-off of sensor requirements; developing error budgets to inform various levels of sensor and special test equipment design; and writing documentation for all models, test analysis tools, and error budgets.

What types of skills do you use?
Logic, data analysis, inference (statistics), coding.

How are applied mathematics and/or computational science important to what you do?
They form the cornerstone of my job. I consistently develop mathematical models of the systems my company develops and coding the math is key.

What are the pros and/or cons of your profession/job?
Pros: There are a plethora of interesting/difficult problems to solve (many engineering problems have not been rigorously mathematically formulated so when things go wrong, they often bring in a mathematician), stable work environment, job security, flexible work schedules, and the opportunity to work on cutting-edge military and space technology.

Cons: Bureaucracy and a decidedly un-academic environment. Also, the aerospace/defense industry is struggling to fit the new salary demands into their business models.

"Overall, my training in applied mathematics has served me well throughout my 20-year career in industry. Systems engineering, as a discipline within the aerospace/defense industry, has many areas where mathematicians can contribute. Modeling, simulation, and analysis (MS&A); optimization; system performance analysis; and sensitivity and reliability analysis are just a few of the subdisciplines that benefit from rigorous application of mathematics and statistics."

CAREER PATH

What career path did you take to your current position?
I spent the first 10 years of my career solely on the technical path, consistently seeking and solving problems of increasing technical difficulty. Around that time, I did a foray into management and program leadership. During my time as a section manager and chief engineer, I developed a strong sense of how the business operated and what things were important to the business. For the past four years or so, I have been strictly technical again.

ADVICE

What advice would you give to someone pursuing a similar degree or profession?
If you have a degree (or degrees) in one of the mathematical sciences and are interested in career opportunities in the aerospace/defense industry, my advice would be to couple your mathematical training with computation. A minor in computer science is a great complement to a math/stats degree.

Was there anything that surprised you when you started out in your career?
I honestly thought there would be greater mathematical proficiency among the working population than there is.

Has SIAM played a role in helping you build your career?
I joined SIAM as a student in the late 90s, as a professional 10 years into my career, and have been a participating member ever since. It is through my networking within SIAM that led to my appointments on the External Advisory Council for the Department of Mathematics at the University of Texas at Dallas and the SIAM Membership Committee.

SALARY

According to *salary.com*, the median salary for a systems engineer I (entry level) in the Dallas-Fort Worth area (where I live) is $72K. This starting salary assumes a bachelor's degree with 0 years of experience. Those with advanced degrees and/or industry experience can expect higher starting salaries. Salaries also vary by location.

Christine Harvey

PRINCIPAL HPC AND ANALYTIC COMPUTING ARCHITECT

EMPLOYER
The MITRE Corporation

DEPARTMENT
Enterprise Technical Computing

LOCATION
Teleworker in Nebraska, U.S.

EDUCATION
B.S. Computational Science, Stockton University
M.S. Computational Science, Stockton University
Ph.D. Computational Science and Informatics, George Mason University

CAREER STAGE: Mid

WHAT DO YOU DO?

As the Service Manager for High Performance Computing (HPC) at MITRE, a collection of Federally Funded Research and Development Centers, there is no such thing as a typical day! I have a lot of meetings that range from project management of our HPC systems, to supporting our interns, to troubleshooting complex parallel codes.

What types of skills do you use?
At this point in my career, I don't use quite as many technical skills, but I still do quite a bit of data analysis, processing, and creating visualizations. I also provide troubleshooting and debugging support to many of our more advanced and technical HPC users. When troubleshooting, I leverage my background in advanced computing and computational science, but there is also a considerable amount of general problem solving involved. As for non-technical skills, I spend a lot of time organizing content, communicating critical information, and figuring out ways to best educate our users and staff.

How are applied mathematics and/or computational science important to what you do?
All the math and computational science I learned in school is the foundation of how I spend my days. Math and computational science got me into modeling and simulation, which is how I learned more about parallel computing and eventually got into systems management. I use computational science skills especially when I'm troubleshooting complex problems and working with users to understand some of the hundreds of applications that run on our systems.

What are the pros and/or cons of your profession/job?
Every day is different, and I get to spend a lot of time with incredibly intelligent people solving some of the world's toughest problems! That's really exciting, and I like being able to jump in on projects when a team is having trouble and keep them on track or help them optimize their code to get more results faster. The major cons would be that there are just too many interesting things, and I have trouble saying no to tasks, which leads to a lot of work.

Does your job offer flexibility?
MITRE, and my job in particular, is very flexible. We generally keep flexible work hours and I have a lot of control over which tasks I take on and how I work.

CAREER PATH

What career path did you take to your current position?
I started out in modeling and simulation at MITRE and found that I spent most of my time as the team member running other people's code on the supercomputer. When a job opened in the division running the computer, I applied and got the role! I've been in this position for the past six years and I love the access I now have to all sorts of research.

Was your career path well planned or a result of taking opportunities as they arose?
Taking opportunities as they arose.

ADVICE

What advice would you give to someone pursuing a similar degree or profession?
Seek opportunities and promote yourself. Apply for jobs, internships, scholarships, conference travel grants —everything! And put time into your applications. Well written applications can speak louder than your grades or your background.

Was there anything that surprised you when you started out in your career?
Much of a professional career involves working on projects with groups of people that have different skills, schedules, and even levels of dedication and urgency.

Has SIAM played a role in helping you build your career?
Reading SIAM books, attending SIAM Conferences, and even the SIAM Job Board has helped me in my career—the exposure and awareness to the types of jobs and research opportunities has been very valuable!

SALARY

Depending on the size of HPC service you run, type of organization, and the number of people you support, the salary can have a wide range. I would say anywhere from $120K –$400K at a larger center.

> *"Learning how to work well with people and communicate what you need is a powerful tool."*

> *Love not only algorithms and data science, but people; seek value in what you do.*

Justina Ivanauskaite

ASSOCIATE DIRECTOR – DATA SCIENCE LEAD

EMPLOYER
MSD

DEPARTMENT
IT Hub

LOCATION
Prague, Czech Republic

EDUCATION
B.S. Econometrics, Vilnius University
M.S. Econometrics, University of Amsterdam
Exchange Student, University of Copenhagen

CAREER STAGE: Mid

WHAT DO YOU DO?

I lead a central IT team of 15 data scientists supporting a $5.6 billion USD (2021) in sales animal health division. Machine learning, optimization, simulation, and statistics are used to solve challenges in manufacturing, supply chain, and research and development in the commercial and animal monitoring space by providing data science services or building products where appropriate. I define team vision and strategy and communicate with partner teams and diverse stakeholders across multiple geographies. I evaluate feasibility and potential of new projects. I facilitate technical sharing among data scientists and run a company-wide initiative that helps data scientists get access to technical mentorship. I have designed and delivered data science evangelization sessions demystifying the topic to non-technical audiences.

What types of skills do you use?
I use mathematics, statistics, machine learning algorithms, and coding to provide data science services or build data science tools. Good programming skills and knowing how to use collaboration tools like Git when working on the same code with many people are very useful. These technical skills are not enough to make data science useful. It is crucial to be open, curious, and communicative to be able to understand the problem that is being solved, and how the solution will be used to provide relevant and useful use of algorithms. Here is an example of a project I lead: I use machine learning methodology to improve farm effectiveness proven on two large swine producers in Europe and currently being productionized and industrialized to become a global tool to be sold.

How are applied mathematics and/or computational science important to what you do?
Without knowing math and algorithms I would not be able to do my work.

What are the pros and/or cons of your profession/job?
Working with smart people, solving new challenges. I love feeling that we are in the process of building and creating.

Does your job offer flexibility?
Yes. COVID-19 brought a lot of flexibility for working from home, but I love coming to the office anyway and spending most of my work time with the team.

CAREER PATH

What career path did you take to your current position?
I got to my current company by being interviewed by someone really smart; the person asking the interview questions was so good that I knew I wanted to work there. Later, multiple opportunities (leading a project, leading a team) came my way and I took them even though I was not always sure I would make it, but it always turned out well.

Was your career path well planned or a result of taking opportunities as they arose?
I take opportunities as they come my way.

ADVICE

What advice would you give to someone pursuing a similar degree or profession?
Try to learn a few different programming languages from the beginning—later on it will be easy to switch to any new technology. Learn how to present your work well. Start building a network of people who have the same passion as you do.

Was there anything that surprised you when you started out in your career?
Not only math, but psychology and communication are crucial. Many students studying mathematics or other technical fields sometimes look down on soft subjects like psychology—I was guilty of this back then too. Luckily, my job experience and need to constantly collaborate to create and build together quickly brought to my attention the importance of soft skills.

Eric Eager

VICE PRESIDENT OF RESEARCH AND DEVELOPMENT

EMPLOYER
SumerSports

LOCATION
Palm Springs, Florida, U.S.

> *SIAM has a fantastic set of resources for an applied mathematician, from journals to conferences and more.*

EDUCATION
B.A. Mathematics, Minnesota State University-Moorhead
Ph.D. Applied Mathematics, University of Nebraska-Lincoln

CAREER STAGE: Mid

WHAT DO YOU DO?

Trained as an applied mathematician, I now run a team that uses data and information to make stakeholders better decision makers in sports. I also co-host the SumerSports Show podcast where we talk about how to solve problems with traditional and analytical approaches to football.

What types of skills do you use?
Mathematics, statistics, computer programming, communication, and management.

How are applied mathematics and/or computational science important to what you do?
Having a mathematical habit of mind is essential for "jumping the line" in an established profession like sports. The ability to look at problems differently than the consensus and having the tools to produce solutions quickly are essential in a fast-paced and ever-moving environment.

What are the pros and/or cons of your profession/job?
Relative to academia, where I spent my first six years, private industry is a lot more messy—for example, in academia everyone more-or-less has the same academic background as you do, but this is not the case in industry. The rewards (better pay, access to talent) are very good.

Does your job offer flexibility?
Yes, I work completely remotely at the moment.

> *Be willing to put your work out there and be open to feedback. The process of peer review outside of academia is more messy, but often more rewarding. People matter. Your network matters.*

CAREER PATH

What career path did you take to your current position?
I studied applied mathematics and mathematical biology and wrote my Ph.D. thesis on how stochasticity and nonlinear processes affect population dynamics. I spent my first six years as a professor at the University of Wisconsin-La Crosse, before transitioning to a career in football analytics. Having flexibility as a professor allowed me to do consulting on the side and find a passion in this area. I still dabble in teaching as an instructor for Wharton and DataCamp and I maintain a strong interest in mentorship.

Prior to joining Sumer, I held similar positions at Pro Football Focus (PFF), where I used my training as an applied mathematician to produce solutions to quantitative problems for National Football League and NCAA Football clients and numerous media clients and contacts. I also co-hosted the PFF Forecast Podcast, which was the most popular football analytics podcast in the world.

Was your career path well planned or a result of taking opportunities as they arose?
My transition to private industry was very much a chance occurrence. Folks who want to work in sports now have a somewhat more direct path (thanks to the hard work of a lot of people)—including degrees in things like data science, sports analytics, and related fields popping up.

ADVICE

What advice would you give to someone pursuing a similar degree or profession?
Be ready to work in an industry that isn't even defined, yet. (American) football analytics was barely a field when I started my degree. When I got my Ph.D. in math in 2012, no NFL teams had a full-time data scientist on staff, and neither did the company I ended up working for first (PFF)—I was their first data scientist.

Was there anything that surprised you when you started out in your career?
Academia allowed for a lot of flexibility, so if you are transitioning out of it, be sure you're willing to work completely on someone else's time, until things change.

SALARY

Management/partner roles in data science range from $150K–$500K in sports and can often be higher for non-sports jobs.

> *This is a very exciting time to consider becoming a researcher in applied mathematics.*

Juan M. Restrepo

HEAD AND DISTINGUISHED MEMBER OF THE R&D STAFF

EMPLOYER
Oak Ridge National Laboratory

DEPARTMENT
Mathematics in Computation Section

LOCATION
Oak Ridge, Tennessee, U.S.

EDUCATION
B.S. Music (major) and Philosophy (minor), New York University
M.S. Engineering, Penn State University
Ph.D. Physics, Penn State University

CAREER STAGE: Late

WHAT DO YOU DO?

As section head, I am responsible for the science management for the mathematics in computation section (about 25% of my time); this includes the management and development of mathematics capabilities that support the laboratory and DOE science research mission; the other 75% of time is spent leading research in statistical physics related to non-equilibrium dynamics with applications in climate and systems biology, data science, probabilistic high-performance computing, and machine learning applications to data and dynamics.

What types of skills do you use?
I leverage my creativity to propose scientific research questions and research directions. I use my ability to collaborate with others who have skills I am less familiar with to tackle big problems; my experience in teaching to mentor and communicate; my computing skills to push through when theoretical means hit a challenge for progress; and my theoretical skills when my computing skills hit a challenge for progress.

How are applied mathematics and/or computational science important to what you do?
Central: my goal is to develop new mathematics and algorithms that can lead to significant progress in the sciences.

What are the pros and/or cons of your profession/job?
Pro: I spent 30 years in academia and loved every minute of it, working on whatever I found interesting. I am now working in big science and large collaborations and love the challenges of mission-oriented research.

Does your job offer flexibility?
My current job offers far less flexibility than my job as a faculty member — this is big, collaborative, research. However, I am afforded greater flexibility regarding pursuing various science domains.

CAREER PATH

What career path did you take to your current position?
I was very deliberate in my shift from academic to government laboratory work.

Was your career path well planned or a result of taking opportunities as they arose?
There was little by way of deliberate planning. I have an irrepressible penchant for adventure and taking chances.

ADVICE

What advice would you give to someone pursuing a similar degree or profession?
Focus first on developing expertise (help yourself before helping others). Find mentors who can give good and sincere advice.

Was there anything that surprised you when you started out in your career?
I had no expectations to turn to science, never mind succeeding in it. Hard work, humility, determination, and passion paid off. Along the way, there were many people who were generous with their time and whose impact on my career has been dramatic and hard to underestimate.

Has SIAM played a role in helping you build your career?
From the time I was a student to the present, SIAM has been a continual guide and supporter in my career. I have found mentors, collaborators, friends, and plenty of sage advice within the SIAM community. SIAM has been a publisher of many affordable and great texts, *SIAM Review* offers great material for teaching, and book reviews have been very useful. SIAM has an affordable first-rate journal publication model.

SALARY

The Department of Energy offers very good life/work balance, good salaries, and good career progression opportunities for applied mathematicians and data scientists, starting with very generous postdoc salaries and benefits.

> *Science needs people of all types, of all points of view, of all research strengths. Find your strengths and weaknesses and use these to map yourself optimally into research and/or communicating/teaching of science.*

> *Students—learn to be proactive, strategic, and ask for what you need.*

Vrushali A. Bokil

PROFESSOR OF MATHEMATICS AND INTERIM DEAN, COLLEGE OF SCIENCE

EMPLOYER
Oregon State University

DEPARTMENT
Mathematics and Dean's Office, College of Science

LOCATION
Corvallis, Oregon, U.S.

EDUCATION
B.S. Mathematics, University of Poona, India
M.S. Mathematics, New Mexico State University
M.S. Applied Mathematics, Indian Institute of Technology
Ph.D. Mathematics, University of Houston

CAREER STAGE: Late

WHAT DO YOU DO?

In my professor role, I teach undergraduate and graduate courses in mathematics, mentor undergraduate and graduate students in research, and perform service to my profession and organization. I conduct research in computational and applied mathematics, with emphasis on computational electromagnetics and mathematical epidemiology. As Interim Dean of Science, I provide leadership and oversight of academic and administrative programs including development and implementation of strategic plans, allocation of resources, operational success, stewardship, and the evaluation of results that support Oregon State University's goals and mission. As an administrator, I leverage strategic/systems thinking to solve complex problems involving personnel issues, funding issues, and competing objectives to support people and move the organization forward towards successful execution of our mission.

What types of skills do you use?
Strategic/systems thinking, proposal writing, managing employees, negotiating, networking, collaboration, and leadership skills to direct groups.

How are applied mathematics and/or computational science important to what you do?
My area of expertise is numerical analysis of differential equation based models. I also develop mathematical models for physical/biological systems and conduct analysis (both theoretical and computational) of these systems.

Does your job offer flexibility?
Yes. As a professor, I can choose (within reason) to work on different areas of research, teach the courses that I want to teach, and choose the areas in which to focus my service contributions.

> *SIAM has provided opportunities for visibility (presenting at conferences, organizing minisymposia), for networking (SIAM events), for travel (travel grants), for learning (books), for publishing research (journals), and for professional service (committees).*

CAREER PATH

What career path did you take to your current position?
I did a postdoc for three years and then secured a tenure-track position as an assistant professor of mathematics. I was promoted to associate professor with tenure in six years (normal length of time) and to full professor of mathematics in another six years. I served as associate head of the mathematics department for two years, associate dean for about two years, and am now Interim Dean.

Was your career path well planned or a result of taking opportunities as they arose?
My career path to full professor of mathematics was well thought out. I have had the ambition of being a professor since I was 15 years old! Positions in administration have been opportunistic.

ADVICE

What advice would you give to someone pursuing a similar degree or profession?
Professional development, networking, and seeking mentorship are key to success. Continuously develop yourself professionally and be strategic in accepting opportunities that arise. Have a strategic plan for your career that you continuously update with the help of a mentor.

Was there anything that surprised you when you started out in your career?
It was extremely difficult to work with people whose competitiveness was at odds with the success of others and of the entire organization. I found strong mentors and supporters in unexpected places. I have learned that interpersonal relationships are complex, interacting with systemic issues and systemic oppression in ways that are hard to understand and predict. I have learned to check my own biases constantly and to pay close attention to and be empathetic about the experiences and worldview of people that I interact with and especially those that I lead.

SALARY

Professor of Mathematics at an R1 institution: $90K–$200K
Interim Dean at an R1 institution: $200K–$500K

Joerg Gablonsky

TECHNICAL FELLOW

EMPLOYER
The Boeing Company

DEPARTMENT
Applied Math Group, Boeing Research and Technology (BR&T)

LOCATION
Seattle, Washington, U.S.

> *"Practice communicating your research to both experts in your field and people that have no knowledge of your field."*

EDUCATION
Master's degree Math and Business, University of Trier, Germany
Ph.D. Applied Mathematics, North Carolina State University

CAREER STAGE: Mid

WHAT DO YOU DO?

I am lead for a group of mathematicians developing and supporting simulation-based optimization methods, and chair of the Boeing Enterprise High-Performance Computing (HPC) Council (EHPCC).

As a mathematician I develop new algorithms, implement them in Python, and write tests. As lead I provide guidance to the team, develop our roadmaps, and decide with the team what ideas to pursue. I also meet with our internal users to provide training and assistance and use that to guide our roadmaps to provide unique capabilities that solve aviation optimization challenges. As chair of the EHPCC I coordinate Boeing's HPC activities. This involves working with engineering groups across Boeing to understand their needs and building the business case for continued funding. Boeing is transitioning some of its HPC usage to cloud, and I work with IT on all aspects of this.

What types of skills do you use?
The mathematical skills I developed in school and expanded while working are at the core of what I do. Communicating with engineers is a key skill, as is communicating with non-technical people and other people outside the field. Condensing information to what is critical for the audience is also important, as is empathy for the people you are working with. Some of my work involves big changes, which can be challenging; listening to stakeholders and addressing concerns directly is key to success.

How are applied mathematics and/or computational science important to what you do?
Since applied mathematics is part of my job every day, it is critical.

What are the pros and/or cons of your profession/job?
Pro: I love the flexibility of my job and the ability to solve interesting challenges. I get to create positive change for the large engineering community I support. Sometimes I get to directly interact with our products.

Con: Sometimes you must deal with bureaucracy slowing things down.

Does your job offer flexibility?
Yes, I changed roles multiple times during my career, and can work virtually a large percentage of the time.

CAREER PATH

What career path did you take to your current position?
I started as an applied mathematician in the math group, working on design space exploration methods and their applications. I became lead of research projects in HPC which led to transitioning to Boeing Information Technology (IT) to help stand up the Enterprise HPC Service. This involved consolidating HPC systems from across the enterprise into a single service. I traveled across the United States to understand requirements from all stakeholders that were being asked to transition to the centralized service, which led to a successful consolidation.

I helped stand up Boeing's Digital Transformation Environment (DTE), transforming the way Boeing develops and delivers software. This included development of the business case and being part of the leadership team. After a short time in Boeing IT Enterprise Architecture organization, I returned to the Applied Math group for my current role. In 2019 I was recognized as a Boeing Technical Fellow.

Was your career path well planned or a result of taking opportunities as they arose?
It was very much driven by taking on opportunities.

ADVICE

What advice would you give to someone pursuing a similar degree or profession?
Learn to program in both interpretive and compiled programming languages (Python, C, C++, or Fortran), and use a version control system like Git. Take classes outside your domain, maybe even business classes.

Has SIAM played a role in helping you build your career?
I became a SIAM member in grad school, which allowed me to build a network. I have attended many SIAM conferences, and I am involved with committees.

SALARY

$150K–$250K

Ariel Leslie

METRICS AND DATA SENIOR ANALYST

EMPLOYER
Lockheed Martin Missile and Fire Control

DEPARTMENT
Engineering and Technology

LOCATION
Grand Prairie, Texas, U.S.

EDUCATION
B.S. Mathematics with Minor in Health Studies, Texas Southern University
Ph.D. Mathematics, focus on Applied Mathematics, University of Texas Arlington

CAREER STAGE: Early

WHAT DO YOU DO?

I lead a metrics analysis team which requires constant communication with stakeholders, company executives (VPs and directors), chief engineers, and members within my team and partnering teams regarding metrics collection and data submission. My responsibilities include:

- Creating data science topic seminar presentations for and with our college iinterns
- Collaborating with other business areas on metrics collection
- Analyzing data (projects regarding metrics surveillance and process improvement) and making presentations for business executives
- Leading monthly meetings with stakeholders, chief engineers, and directors
- Collecting data across various databases, data wrangling within various databases
- Learning new techniques of how to analyze data

What types of skills do you use?
Problem solving, critical thinking, analysis, programming (R, Python, and MATLAB), data query/cleaning, data wrangling from various databases, written and verbal communication of data analysis results, teamwork.

How are applied mathematics and/or computational science important to what you do?
Computational science techniques, such as statistical modeling and machine learning, are based in a good understanding of advanced linear algebra, which is a very large part of my team's data analysis, The use of critical thinking is a larger portion of my job because business questions arise every week.

What are the pros and/or cons of your profession/job?
Pros: Corporate partnerships including special discounts on sports tickets and travel opportunities; discounts for everyday use from rental car and cell phone companies; social networks within the company; remote work; private movie screenings; ease of finding other job opportunities within the company; pay and benefits; every Friday off.

Cons: Very siloed environment; few holidays.

Does your job offer flexibility?
Yes, I am remote and can work a flexible schedule as needed. It is not uncommon for Lockheed employees to also be professors at local colleges.

CAREER PATH

What career path did you take to your current position?
This is my first position after obtaining my Ph.D. I participated in the Institute for Mathematics and its Applications (IMA) Math-to-Industry Boot Camp, which gave me the opportunity to learn more about programming languages and statistical modeling.

Was your career path well planned or a result of taking opportunities as they arose?
I definitely took opportunities as they arose. The defense industry was not on my radar but because Lockheed is located in the Dallas-Fort Worth area, I applied. I applied for 40+ roles but it was a colleague that alerted me to my current position.

ADVICE

What advice would you give to someone pursuing a similar degree or profession?
Pay attention in linear algebra. Take that programming course! Take a statistical modeling course! Practice coding as much as you can. Never ever give up!

Was there anything that surprised you when you started out in your career?
The friendliness of business executives. I was very much accustomed to the STEM culture where people are very smart but may not be able to hold a conversation, but that changed quickly once I onboarded at Lockheed Martin.

SALARY

Depending on location and level of education, $72K–$140K

"Learning to communicate effectively with people who have various backgrounds is a skill that will pay for itself."

Nele Mueller-Plock

DIRECTOR OF PHARMACOMETRICS

EMPLOYER
Certara

DEPARTMENT
Integrated Drug Development

LOCATION
Princeton, New Jersey, U.S.

EDUCATION
Pharmacist degree (state examination), University of Muenster
Ph.D. Clinical Pharmacy, Martin Luther University Halle-Wittenberg

CAREER STAGE: Mid

WHAT DO YOU DO?

In clinical research, a large amount of data is generated to better understand the pharmacokinetics (what the body does to the drug) and the pharmacodynamics (what the drug does to the body) of a development compound. I develop dynamic models that describe the time course of underlying physiological processes to help identify optimal doses or dosing regimens, predict outcomes in special populations like pediatrics, and to ultimately guide development decisions. I work both as a hands-on modeler, writing code, and as a consultant in teams, giving strategic input for model and overall drug development. I am also a communicator of modeling results, translating mathematical details into key outcomes helpful for clinicians.

What types of skills do you use?
Pharmacometrics requires interdisciplinary skills, bringing together expertise in mathematics and programming, physiology, and pharmaceutical sciences. The key to success is working in a team with experts of multiple backgrounds who have all acquired knowledge outside of their original area of training. Working as a consultant, you must be well organized and efficient, and be a good communicator.

What are the pros and/or cons of your profession/job?
I feel very lucky working in one of the biggest pharmacometrics consultancy companies worldwide. We have the opportunity to be exposed to many different disease areas and modeling approaches. I love interacting with my clients and helping them to make informed decisions. I am faced with many scientific challenges but feel nothing is more rewarding than seeing a drug being approved and being made available to potentially save lives, knowing I have contributed to this success in some way.

Does your job offer flexibility?
I work from home as a part-time employee and am very flexible when it comes to working hours. I often spend my lunch break doing sports and can build my working schedule around my kids' activities. What counts is the high-quality work that needs to be delivered and being available for clients when I am needed.

CAREER PATH

What career path did you take to your current position?
I always had a strong interest in mathematics but went to study pharmaceutical sciences as I had no knowledge about how to apply 'pure' mathematics after graduation. During my studies, I was exposed to the concept of measuring drug concentrations in the body and developing nonlinear mixed-effects models to make predictions and dose recommendations. I could see a direct benefit for patients and decided to apply for a Ph.D. in pharmacometrics. I worked for multiple smaller and bigger pharmaceutical companies in positions with increasing responsibility. Joining a consultancy company was a great step that made me grow even further. I wouldn't say this career path was completely planned. At some point during my studies, however, I realized how I could combine my interests in physiology and mathematics, and then it was all clear.

ADVICE

What advice would you give to someone pursuing a similar degree or profession?
Be curious and get experience across many disciplines. Do not fall in love with your equations, or the elegance of your modeling approach. Instead, learn to break it down to simple messages (visualize!) that will help clinicians in making the right decision.

SALARY

Salary varies between companies and locations and is a combination of base/bonus/long-term incentives (LTI).
Entry Level: $120K–$135K + 20% bonus/LTI
Associate Director: $170K–$210K + 40% bonus/LTI
Director: $210K–$250K + 60% bonus/LTI

> *"The pharmacometrics discipline is increasingly applying systems biology and machine learning approaches. Experience in these areas may be a plus when applying for a job in this field."*

> *Learn to code—you will almost certainly need to.*

Matthew Wiener
EXECUTIVE DIRECTOR

EMPLOYER
CSL Behring

DEPARTMENT
R&D Information and Technology

LOCATION
Bern, Switzerland

EDUCATION
B.S. Mathematics, MIT
B.S. Humanities (Russian), MIT
Ph.D. Mathematics, University of Chicago

CAREER STAGE: Late

WHAT DO YOU DO?

I lead a team that investigates and models data, writing (and testing and documenting!) software to perform analyses and simulations. I spend a lot of time discussing results and asking questions to make sure we all understand what's been done and what it means. I also discuss with colleagues in research and development (R&D) what kinds of problems they are facing with organizing or using data, and what kinds of models could be useful to them. Most rewarding is when something I've worked on affects human health; one of the things I'm most proud of is when an analysis I did as part of a team helped clarify some issues encountered while making a particular vaccine and made it available earlier than otherwise would have been the case. Least rewarding, but necessary, is budgeting.

What types of skills do you use?
Most important is the inclination to build simplified representations that capture important aspects of the problem at hand, not any particular method (which you can always learn). It's also very important to understand the right level of detail when communicating with different audiences. Sometimes a very technical audience will want to hear all about the details, but more often, people want to see some evidence that your approach is reasonable (for example, can reproduce known results), what you recommend be done next, and why.

How are applied mathematics and/or computational science important to what you do?
Models analyzed mathematically and computationally are used to speed every part of drug development, from deciding which biological targets to pursue, to choosing molecules, to designing clinical trials.

What are the pros and/or cons of your profession/job?
Pro: My work is aimed at curing or preventing disease, which is both inherently worthwhile and interesting.

Con: Occasionally, changes in company priorities require that you stop working on something you're interested in (but academics can also lose grants).

Does your job offer flexibility?
I've worked mostly in large companies, which offer a lot of flexibility in various ways. Most notably, I've had the freedom to investigate and work in many different areas related to developing vaccines and medicines.

CAREER PATH

What career path did you take to your current position?
I worked briefly in consulting after getting my Ph.D. That was a bad fit for me, and I was lucky enough to find a post doc in computational neuroscience at the National Institutes of Health (NIH). While there, I saw an ad on the R mailing list looking for people working with large biological data sets and wound up at Merck Research Laboratories in the Applied Mathematics and Computer Science Department. I've worked in the pharmaceutical industry ever since. Later Merck decided to open an IT center in Prague, and I was asked to hire the Mathematical Modeling and Analytics group there. After building up that group, I took a job in Switzerland, still working on the border between IT and research.

Was your career path well planned or a result of taking opportunities as they arose?
My path was almost entirely unplanned. Even changes from one topic to another inside a company have often arisen from conversations leading to a collaboration—that's how I got involved in vaccine manufacturing. And I wasn't planning on moving to Prague or Switzerland (and my wife certainly wasn't), but we both ended up loving it.

ADVICE

What advice would you give to someone pursuing a similar degree or profession?
Take some classes in application areas you're interested in: biology, epidemiology, finance, whatever. Having a bit of background in the substantive field you would like to apply mathematics in is a big advantage, although you can also pick things up as you go along.

> *Always test your model or software in some cases where you know the answer, to build confidence that you have put them together right. Don't confuse the models you build with the systems you are modeling. Models are a way of quantitatively working out the consequences of some assumptions, but your assumptions may be wrong or incomplete. Rely on experts in the phenomenon you are modeling to help you understand the range of the models' applicability.*

Skyler Sinclair

SOFTWARE ENGINEER

EMPLOYER
Self employed as a contractor in the nonprofit space

EDUCATION
B.S. Mathematics, Harvey Mudd College

CAREER STAGE: Early

WHAT DO YOU DO?

As a consultant, I work on a wide variety of impactful projects. Currently, I alternate between helping a food waste policy organization model where and how food gets wasted across the U.S. food supply chain and working with a global nonprofit to improve COVID-19 vaccination outreach and messaging. Day to day, this involves designing and writing systems that take in data, process it, and report it to stakeholders. It involves talking to other engineers, data scientists, folks who create datasets, and folks who need data. As a contractor at nonprofits, I often work with much smaller teams than one would find in industry, and I am often the first engineer hired at nonprofits that want to become more technically proficient.

What types of skills do you use?
Communication is paramount as a contractor on teams with few technical folks. To help an organization accomplish more with data and models, I need to know what questions to ask to understand a team's needs and how to get them on board with possible solutions.

How are applied mathematics and/or computational science important to what you do?
I use math and computer science every day in my job! I use computer science to write data pipelines that are dependable, scalable, and easy to test. I use mathematics in running models, generating predictions, checking data for outliers, and making visualizations that clearly communicate model results.

What are the pros and/or cons of your profession/job?
Pro: How much of a positive impact engineering and math can have in the nonprofit space. There are so many key issues out there that need data work and getting the chance to work on those projects is amazing. Teams also tend to be more diverse and issue-driven than your average team in industry.

Con: Sometimes it can be hard to separate emotionally from work when you're working on issues that feel so important!

Does your job offer flexibility?
Yes! This is something especially important to me because I need more flexibility than most due to chronic health issues. Being a consultant, I choose how many hours I work each week, and which days I am working.

CAREER PATH

What career path did you take to your current position?
I originally started off in big tech at Google, which was a great place to learn how to be a software engineer. I then went to a food waste reduction startup and then to the nonprofit space, first full-time at a voting rights organization and then at a variety of contracting gigs.

Was your career path well planned or a result of taking opportunities as they arose?
A bit of both. I started off as a math major in college always wanting things to be a "bit more applied" and was always looking for ways to maximize my impact while doing the data work I loved. However, I didn't know about the rich data opportunities in the nonprofit space until many years out of college, so it took a lot of tries (fellowships, big companies, little companies) until I found the niche I am happy in!

ADVICE

What advice would you give to someone pursuing a similar degree or profession?
Talk to people who have the jobs you are interested in! Every career has so many cultural norms and nuances, and it's incredibly hard to learn them without asking for help.

Was there anything that surprised you when you started out in your career?
I was surprised by the nonprofit data space! I didn't know how desperately the space needed engineers, that contracting is often the norm in nonprofits, and that I could control my hours and earn a very reasonable salary.

SALARY

The range is wide depending on the funding an organization has available, but a full-time engineer in a U.S. nonprofit should be making a baseline of $100K.

> *"Often, working alongside academics and data scientists, I rely on my math knowledge to translate academic models to scalable code."*

Brett Musco

PRODUCT MANAGER

EMPLOYER
Motive

DEPARTMENT
Tracking and Telematics

LOCATION
San Francisco, California, U.S. (remote)

EDUCATION
B.E. Civil Engineering (Minors Environmental Engineering and Engineering Management), Cornell University
M.S. Transportation Systems Engineering, Cornell University

CAREER STAGE: Early

WHAT DO YOU DO?

I work on developing strategic technology to reduce cost, increase efficiency, and improve safety of trucking and vehicle fleets across industries. My day to day is split between strategic and tactical work. On the tactical side, as a product manager for the tracking and telematics teams, I oversee the execution of prioritizing projects and new development and coordinating between our frontend engineering, backend engineering, design, and sales teams. Our goal is to ensure we are meeting our customers' technical requirements and providing a quality user interface. Strategically, I am always looking to determine how to best improve and advance our systems, aiming to deliver a product our customers love. As part of this, I analyze customer usage, trends, and qualitative feedback from our fleets to discern current state inefficiencies and areas of opportunity.

What types of skills do you use?
My work requires me to leverage large scale data analysis, critical and analytical thinking, and a range of communication skills to bridge the gap between technical capabilities and real-life customer needs.

How are applied mathematics and/or computational science important to what you do?
Having a strong foundation in mathematics and engineering has helped me develop the necessary skills to be an effective product manager through testing out hypotheses and proof of concepts and teaching me how to think critically.

What are the pros and/or cons of your profession/job?
I am able to constantly work on challenging problems in a new and innovative space, which keeps the day to day interesting and mentally stimulating. However, with this, there is always a need to make hard tradeoffs between ideas based on cost, time, and resources.

Does your job offer flexibility?
Currently my job provides me a lot of flexibility to fit in my personal schedule and career aspirations. I work in a remote environment with teams across the world which allows me to balance my hobbies (including being an Ironman distance triathlete), family time, and other commitments. With respect to my career, any new ideas and paths are encouraged and supported within Motive's fast-paced and innovative environment.

CAREER PATH

What career path did you take to your current position?
After receiving my master's degree in transportation systems, I worked for a small consulting firm in the field that was particularly technology focused. This experience led me to be interested in understanding how we can leverage technology and data to drive efficiency in supply chains. Since then, I have pursued this interest through my work as a product manager within Wayfair's supply chain organization and now on the tracking and telematics teams at Motive. My career path has been about learning where my passions are and pursuing opportunities that let me follow those passions.

ADVICE

What advice would you give to someone pursuing a similar degree or profession?
Keep an open mind—what you learn in school can always be applied to many professions and roles. Don't necessarily let your degree limit the career you pursue. Rather, look for opportunities that intellectually stimulate you and keep you driven and motivated.

Was there anything that surprised you when you started out in your career?
It often takes more intentional thought than expected to apply textbook learnings, technical information, and analyses to real-world problem spaces.

SALARY

Salary can vary based on industry, company maturity, and equity options. Do a quick search and comparison of companies' compensation packages when applying. Entry level for a product associate starts around $70K base. Senior product manager roles offer around $140K base.

"Finding balance in a remote environment can be challenging. Often it takes a bit of trial and error to determine what schedule, tools, and work structures work best for you and your team."

Vishnu Thaver

DIRECTOR, CORPORATE DEVELOPMENT

EMPLOYER
Tradeweb Markets

DEPARTMENT
Corporate Development

LOCATION
New York, New York, U.S.

EDUCATION
B.B.A. Finance, University of Notre Dame
M.S. Applied Computational Mathematics and Statistics, University of Notre Dame

CAREER STAGE: Early

WHAT DO YOU DO?

My main responsibilities are to identify/evaluate partnership and acquisition opportunities for Tradeweb, with the goal of growing the company. Most of my projects incorporate financial modeling, valuation, risk assessment, and competitive analysis. A successful project involves identifying and evaluating, but also presenting to key stakeholders, executing, and integrating. It is all very rewarding, but most of all is the ability to have a diverse set of challenges to attack each day.

What types of skills do you use?
I use math, accounting, presentation skills, Excel, and networking.

How are applied mathematics and/or computational science important to what you do?
In many circumstances I develop forecasts for various model inputs. I often use statistical and mathematical methodologies for these forecasts.

What are the pros and/or cons of your profession/job?
Pro: Learning new things each day, solving problems, making an impact.

Con: Long hours sometimes.

Does your job offer flexibility?
Yes, I can work from home or the office.

CAREER PATH

What career path did you take to your current position?
School → Risk analytics consulting → Current job

Was your career path well planned or a result of taking opportunities as they arose?
I took opportunities as they arose.

ADVICE

What advice would you give to someone pursuing a similar degree or profession?
Get as much internship experience as possible. Take all the opportunities to develop your own projects and share them on GitHub. Get multi-disciplinary: science, finance, etc.

Was there anything that surprised you when you started out in your career?
I was surprised at how much my social skills would come in handy.

SALARY

$200K-$300K

“Get as much internship experience as possible. Take all the opportunities to develop your own projects and share them on GitHub.”

About SIAM

Society for Industrial and Applied Mathematics (SIAM), headquartered in Philadelphia, Pennsylvania, is an international community of more than 14,000 individual, academic, and corporate members from around the world. SIAM fosters the development of applied mathematical and computational methodologies needed in various application areas. Through publications, research, conferences, and communities like student chapters, geographic sections, and activity groups, SIAM helps build cooperation between mathematics and the worlds of science and technology to solve real-world problems. SIAM was incorporated in 1952 as a non-profit organization.

SIAM's goals are to:

- Advance the application of mathematics and computational science to engineering, industry, science, and society;
- Promote research that will lead to effective new mathematical and computational methods and techniques for science, engineering, industry, and society;
- Provide media for the exchange of information and ideas among mathematicians, engineers, and scientists.

SIAM News

This information hub is the go-to resource for breaking news in applied mathematics and computational and data science. Content includes:

- Technical, research-based articles by experts in the field
- Online-exclusive blog posts about cutting-edge research and programs
- Announcements pertaining to relevant events, science policy updates, and funding opportunities
- Career and fellowship resources for students and early-career professionals
- Recaps of SIAM conferences, programs, and publications
- Updates about innovative mathematical software
- Commentary on ethics-based issues in the field
- Reviews of broad-interest mathematics books

Visit us at *sinews.siam.org*.

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For more information on salaries:

Glassdoor and *Salary.com* provide comprehensive salary information for a wide range of professions. Many governments offer data on their employees' salaries and there are many societies and agencies that do compensation studies in their fields and make the information accessible.

This brochure was produced using information provided by the individuals profiled and it has been edited for space and other considerations. Profiled individuals were asked to respond to prompts and were not required to submit responses to every question.

For more information on careers, jobs, internships, and more: *www.siam.org/careers.*

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Society for Industrial and Applied Mathematics
3600 Market Street, 6th Floor
Philadelphia, PA 19104-2688 U.S.

www.siam.org / siam@siam.org