A GUIDE FOR MATH MAJORS

Where can math take you?

Career pathways for math majors: industry, academia, national labs

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THE MAP

Four destinations, three degrees

PART 1

Industry

Which math fields lead to which jobs

PART 2

Academia

Research and teaching in every field

PART 3

National labs & government

Mission-driven science

PART 4

K-12 teaching

Middle and high school math

Part 5 · BS, MS, or PhD? What degrees you need for what kind of jobs

PART 1

Industry

Where math leads, with a BS or a PhD

PART 1 · INDUSTRY

From math fields to industry jobs

Pure math

Algebra · number theory · topology · combinatorics · logic

Applied math

Differential equations · numerical analysis · math biology · scientific computing · optimization

Statistics & data

Probability · statistics · data science

PART 1 · INDUSTRY · PURE MATH

Industry jobs for pure math

Cybersecurity

Cryptographer

Courses: number theory, abstract algebra

IBM Research
Research Scientist, Cryptography

Google
Cryptography Engineer

NICHE PATHS · NEED EXTRA CS OR PHYSICS TRAINING

Tech: quantum computing
Algebra, topology · IBM Quantum, Microsoft Quantum

Tech: AI for math
Logic, proof assistants (Lean) · Google DeepMind

⚠ **Few industry jobs use pure math directly.** Companies need computation and data more than new theorems, so these roles are rare and usually require a PhD.
Many pure-math graduates go into software, data, or finance instead.

PART 1 · INDUSTRY · APPLIED MATH

Industry jobs for applied math

Aerospace & energy

Simulation Engineer

Courses: differential equations, numerical analysis

Southwest Research Institute
Research Engineer

Boeing
CFD Engineer

Pharmaceuticals

PK/PD Modeler

Courses: differential equations, math biology

Merck
Pharmacometrics Scientist

Genentech
Pharmacometrician

Logistics

Operations Researcher

Courses: optimization, linear algebra, probability

American Airlines
Operations Research Analyst

H-E-B
Supply Chain Analyst

No clear line: applied math and data science overlap; in practice, many jobs use both.

PART 1 · INDUSTRY · STATISTICS & DATA

Industry jobs for statistics & data

Finance

Quantitative Researcher

Courses: probability, stochastic calculus

Wells Fargo, JPMorgan Chase
Quantitative Analyst

Jane Street, Citadel
Quantitative Researcher

Tech

Data Scientist

Courses: statistics, machine learning

USAA
Data Scientist

Google
Data Scientist

Healthcare & pharma

Biostatistician
Data Scientist

Courses: statistics, experimental design

Eli Lilly
Biostatistician

Pfizer
Statistician

Also · Insurance: Actuary · USAA, State Farm · **More job titles:** SIAM careers list

PART 2 · ACADEMIA

Every field of math has a home here

Research university

Research, teaching, grad students, grants.

Teaching load: ~2 courses/term

Teaching	**40%**
Research	**40%**
Service	**20%**

Teaching-focused college

Mostly teaching; research with undergrads.

Teaching load: 3–4 courses/term

Teaching	**70%**
Research	**15%**
Service	**15%**

Community college

First- and second-year math courses.

Teaching load: ~5 courses/term

Teaching	**85%**
Research	**~0%**
Service	**15%**

Typical split of a faculty member’s effort; varies by school.

PART 2 · ACADEMIA

The path to a faculty job



My path: BS 2011 → PhD 2016 → postdoc 2016–20 → asst. prof. 2020 → assoc. prof. 2026

What draws people

- Freedom to choose your research questions
- Teaching and mentoring students
- Tenure: very secure once earned

What to weigh

- Long training before a permanent job
- Competitive market; you move where the job is
- Lower starting pay than industry

PART 3 · NATIONAL LABS & GOVERNMENT

Math in service of a mission

Applied & computational	Pure math	Statistics & data
DOE national labs Los Alamos, Sandia, Oak Ridge, Livermore, Argonne, and more Simulation, supercomputing, energy, climate, epidemics	**National Security Agency** Often called the largest U.S. employer of mathematicians Cryptography and codebreaking; NSA Texas is in San Antonio	**Federal agencies** Census Bureau, Bureau of Labor Statistics, CDC, FDA, NIH Official statistics, public health, drug approval

PART 3 · NATIONAL LABS & GOVERNMENT

Getting in the door

AS AN UNDERGRAD

Paid summer internships: DOE SULI, lab student programs, NSA student programs

→

IN GRAD SCHOOL

Lab graduate internships; DOE Computational Science Graduate Fellowship

→

AFTER THE PHD

Lab postdoc, then staff scientist leading your own projects

⚠ **Check eligibility:** many programs require U.S. citizenship or permanent residency

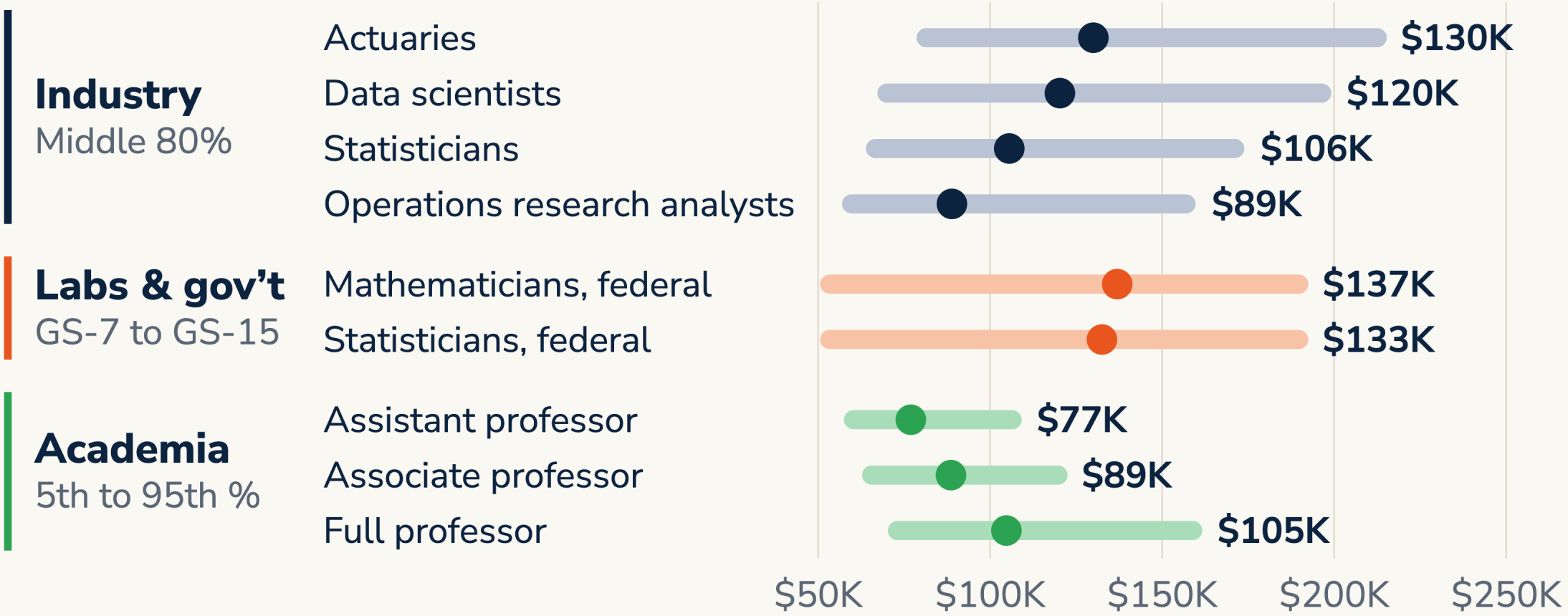
COMPARE

Three pathways side by side

Pay, job security, flexibility

COMPARE AND CONTRAST · PAY

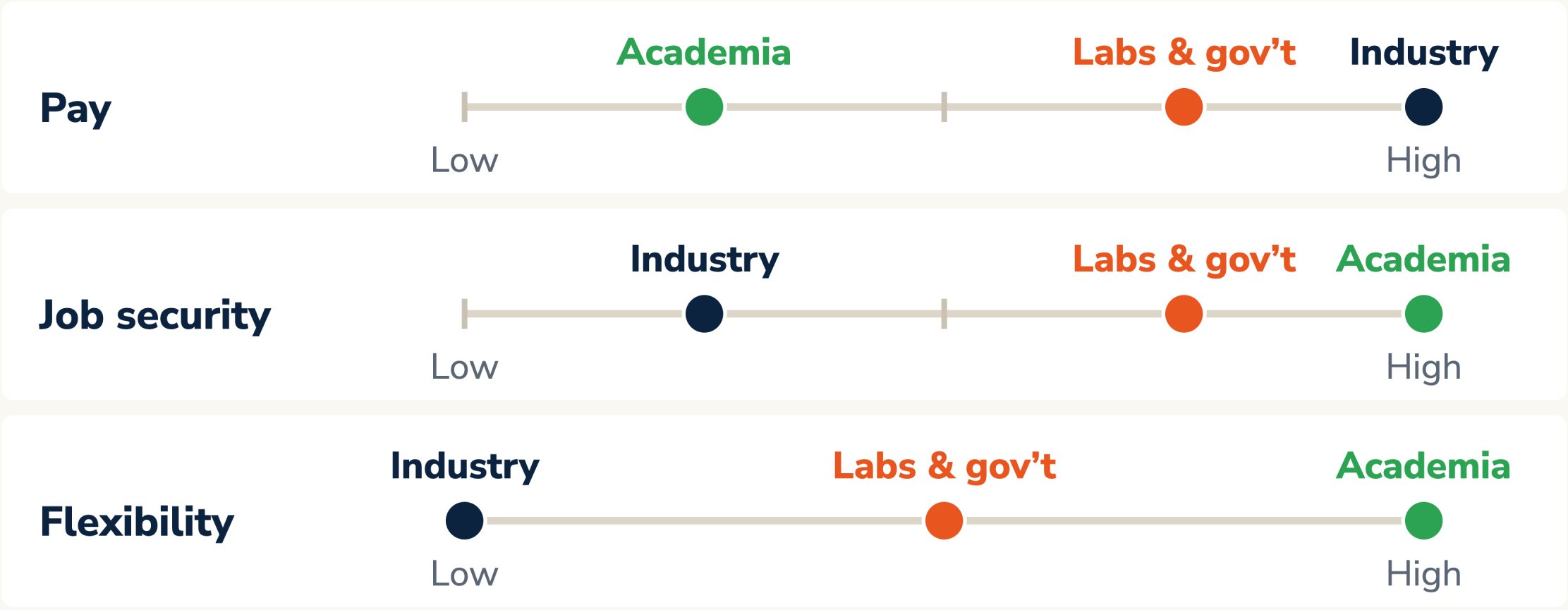
Pay by pathway: medians and spread



Dot: median. Bar: typical range. BLS 2025; OPM 2026; CUPA-HR 2024–25 (9-month).

COMPARE AND CONTRAST

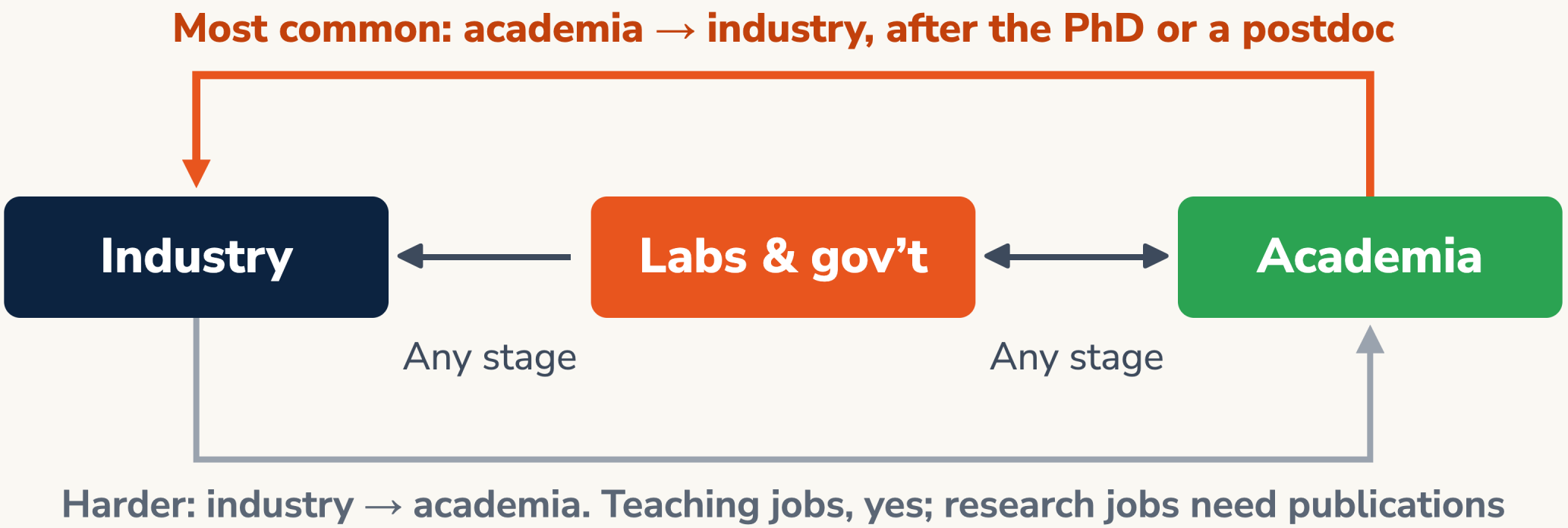
Three pathways side by side



Academia: research universities and teaching-focused colleges.

COMPARE AND CONTRAST · SWITCHING PATHS

You can move between paths



Also common: work a few years with a BS or MS, then return for a PhD.

PART 4 · K-12 TEACHING

Teaching middle and high school math

$72K

Median pay, U.S. high school teachers (BLS, May 2025)

At UTSA

BS in Mathematics for Teaching (with UTeachSA) leads to grades 7–12 math certification.

Texas certification: Mathematics 7–12

1. Bachelor's degree (no master's needed)
2. Approved educator preparation program: in your degree, or an alternative program after graduating
3. Pass two TExES exams: Mathematics 7–12 and Pedagogy & Professional Responsibilities
4. Supervised clinical (student) teaching
5. Background check, then apply to the state

PART 5

BS, MS, or PhD?

What degrees you need for what kind of jobs

PART 5 · BS, MS, OR PHD?

Which jobs each degree opens

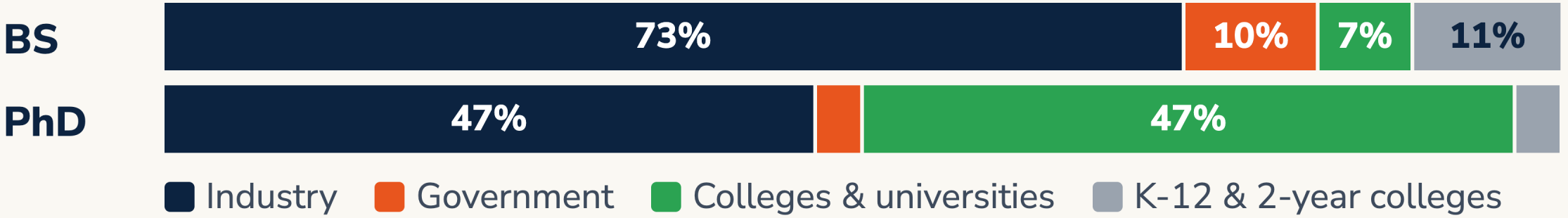
	BS	MS	PhD
Industry	Analyst, actuary, software developer	Data scientist, statistician, quant analyst	Research scientist, quant researcher, R&D lead
Academia	Developmental-math instructor, tutoring	Lecturer (teaching only); community college faculty	Postdoc, then faculty at any college
Labs & government	Analyst, technical staff	R&D staff, government statistician	Postdoc, then staff scientist leading projects
K-12 teaching	Teacher (with certification)	Teacher, often at a higher pay step	Rare; education research or leadership

A math PhD is usually funded: no tuition, plus a stipend. You are paid to study.

PART 5 · WHERE A MATH DEGREE LEADS

Math BS vs. math PhD

Where they work



Median pay

	Early career	Later career
BS	**$70K** at ages 22–27	**$100K** at ages 35–45
PhD	**$150K** industry · **$68K** academia	**$130K** (industry $189K · univ. $99K)

Sources: NSF NSCG & SDR 2023; NSF SED 2024; New York Fed 2026.

PART 5 · GETTING THERE FROM HERE

What to build during college

Hard skills

- **Strong GPA** in upper-level math
- **Programming**: Python, R, MATLAB
- **Data and statistics** (for industry)

Soft skills

- **Communication** in writing and talks
- **Independent problem-solving**
- **Persistence** and time management

Experiences

- **Research** with a UTSA faculty member
- **REUs**: paid summer research; apply in winter
- **Internships** in industry or at a lab
- **Seminars** to learn about research out there
- **Faculty who know you**, for strong letters

Use AI tools critically: check their output instead of trusting it.

Three things to remember

1. **Paths aren’t one-way.** PhDs go to industry; people move between labs and universities; teachers go back to school.

2. **You don’t need to decide now.** You need information, and talking with people on each path is how you get it.

3. **Start building now.** Core courses, coding, research, and people who know your work help on every path.

YOUR TURN

Reflect

1. One thing that surprised you
2. One path you hadn’t considered
3. One question you still have

Write your answers down, and take your question to a professor, advisor, or someone on that path.

NEXT STEPS

Talk to someone on the path

Who to ask, what to do next, and how to write the email

INFORMATIONAL INTERVIEWS

Who to ask, and where to look

Good interviewees

- **PhD path:** a grad student, postdoc, or professor in your target field
- **Or:** a PhD working in industry or at a lab
- **Industry path:** someone 3–10 years into the role you want
- Not someone famous: someone a few steps ahead of you

Where to look

- Faculty and grad students in our department
- LinkedIn: search UTSA alumni by major and employer
- Professional societies (SIAM, AMS, MAA, ASA): student chapters, meetings, and career pages
- Your own network: family, friends, past teachers, and mentors

Your next steps

- Pick **one direction** to explore, plus a backup
- List **2–3 people** you could talk with and how you'd reach each one
- **Draft your email** from the template on the next slide; ask a professor or advisor to read it before you send

Then send your invitations, and **aim to talk with at least one person this semester**.

Asking for a conversation

Subject: UTSA math student: request for a 30-minute conversation about your career

Dear Dr./Mr./Ms. [Last name],

My name is [Name], and I am a [year] [major] student at UT San Antonio. I found your profile through [a professor / LinkedIn / your organization's website], and I was interested in your work as [role] at [organization], especially [one specific detail].

I am exploring careers in [field] and would love to hear how you got to where you are. Would you be willing to talk with me for about 30 minutes, by Zoom, phone, or in person, sometime between [date] and [date]?

Thank you for considering this.

Best regards, [Name] · [Major], UT San Antonio · [UTSA email]

INTERVIEW REQUEST

Before you hit send

Keep it short

Readable in under a minute

Make it personal

One line showing you looked at their work

Make it easy

30 minutes, their choice of format, a date window

Look professional

UTSA email, clear subject, proofread

Follow up once

No reply in 7–10 days? One polite nudge, then try your next name

Say thank you

A short thank-you email within a day of the interview

Respect their story: ask before you share anything they tell you.

APPENDIX

Extra detail

Job titles, job security, flexibility, and grad school

PART 1 · INDUSTRY · JOB TITLES (1 OF 2)

Job titles to search for

- 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

Source: SIAM, *Careers in the Mathematical Sciences* (2022) · siam.org

PART 1 · INDUSTRY · JOB TITLES (2 OF 2)

Job titles to search for

- 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

Source: SIAM, *Careers in the Mathematical Sciences* (2022) · siam.org

COMPARE AND CONTRAST · JOB SECURITY

How secure is the job?

Industry

Low — High

- At-will jobs: layoffs follow the company and the economy
- Depends on your level: specialized, senior roles are harder to replace

Labs & gov't

Low — High

- Lab staff must keep winning project funding to keep their role
- Budget cuts can freeze hiring

Academia

Low — High

- Once tenured: very secure
- Before that: a postdoc, then about 6 years on the tenure track

COMPARE AND CONTRAST · FLEXIBILITY

Freedom over what you do, and when

Industry

WHAT YOU WORK ON

Low — High

Set by business goals and your manager

YOUR SCHEDULE

Low — High

Business deadlines; some remote work

Labs & gov't

WHAT YOU WORK ON

Low — High

Your projects, within the lab's mission

YOUR SCHEDULE

Low — High

Set hours, usually at the lab

Academia

WHAT YOU WORK ON

Low — High

You choose your research questions

YOUR SCHEDULE

Low — High

Your own schedule around classes

PART 5 · BS, MS, OR PHD?

What changes with each degree

BS

Apply established methods to well-defined problems

MS

Deeper specialty; adapt and combine methods for new settings

PhD

Develop new methods when no existing one works; can lead research

Apply → Develop new

PART 5 · BS, MS, OR PHD?

How grad school works in math

Master's (MS)

- 1–2 years, mostly coursework
- Often self-funded; some assistantships
- Can be a step toward a PhD

Doctorate (PhD)

- About 5–6 years
- Years 1–2: courses and qualifying exams
- Then: research with an advisor, a dissertation

A math PhD is usually funded

No tuition, plus a stipend for teaching or research work. You are paid to study.