

From PhD to Industry

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Me in bullets

Graduated from UNC: August 2022

Advisor: Jeremy Marzuola

Track: Applied Math

Field: Numerical PDEs

Employer: Johns Hopkins Applied Physics Laboratory

My industry experience:

- Work on multiple projects
- Less pressure for results
- Program most days
- More meetings
- Some reading (but not research)

Job hunt timeline in grad school

Intern: Summers of 3rd and 4th year
(Helpful and ideal, but certainly not required!)

Finish research: Last year - Fall semester

Apply to jobs: Last year - December to February

Interview: March

Accept an offer: April

Graduate: Spring / Summer

MOVE ON :D

Tip: Set aside a month to move

Some good internship opportunities

Aerospace

Amazon

APL (Johns Hopkins Applied Physics Laboratory)

Google

IBM

National Laboratories

NASA

NSA - Laboratory of Physical Sciences

NSF - [MSGI](#)

Simons Foundation - [Flatiron Institute](#)

What type of job will make you happy?

Do you want to publish a lot?

Do you need to know how the big picture works?

Do you want to work with the big picture or details?

Do you want to do technical work?

Do you want to program all day?

Do you care where you work?

Do you want to work in an office or from home?

Is salary important or is the work more important?

How to search for jobs

It's not what you know

it's who you know

(but also, it's what you know)

How to “know” people:

- Talk to people at conferences
 - Find papers related to your research and track down the authors and their grad students who are less intimidating
- Talk to alumni
 - What are UNC graduates doing now?
 - Join our [LinkedIn alumni group](#)
- Find people who have jobs you want and ask to chat

How to “talk” to people

- Be direct - they know what this is about and being coy gets no one anywhere fast
- Never be modest to employers
- But don't be afraid to be vulnerable with alumni / employees you randomly hit up. Sometimes they have great advice!

If nothing else:

- You can know me
- You can talk to me :)
- [LinkedIn](#)

How to search for jobs

Location

Austin

Baltimore - D.C.

Boston

CO Springs / Denver / Boulder

LA / Bay area

Seattle

Raleigh

Companies

Research and Development

National Laboratories

Government Contractors

Government Agencies

Search Engines

Google jobs

LinkedIn

Company websites

Terms: researcher, computational, simulation, (mathematical) modeling, quantum computing, fluid dynamics, software

Who wants mathematicians?

Research and Development

- Aerospace Corporation
- Amazon
- Applied Physics Laboratory
 - Recently Awarded PhDs or Postdocs Opportunities
- Google
- Honeywell
- IBM
- Intel
- Mathworks
- Simons Foundation (Flatiron Institute)
 - CCQ, CCM, SCC
- NVIDIA
- Universities Space Research Association

National Laboratories

- Brookhaven
- Lawrence Livermore
- Los Alamos
- MIT Lincoln Laboratory
- Oak Ridge National Laboratory (ORNL)
 - ORAU
 - ORISE
- Sandia

Who wants mathematicians?

Government Agencies

- DEVCOM
- Department of Energy (DOE)
- NASA
- NIST (Feels more like academia)
 - [Applied and Computational Mathematics Division](#)
- NSA
 - Laboratory of Physical Sciences

Government Contractors

- Applied Research Associates (ARA)
- Aquila Technology
- Axient
- Boeing
- Lockheed Martin
- MITRE
- Northrop Grumman
- Raytheon
- Thiokol

Who wants mathematicians?

Other options

- Industry postdocs (~\$90k)
 - Department of Energy
 - National Laboratories
 - ORISE: [IC Postdoctoral Fellowship](#)
 - Simons Foundation - [Flatiron Institute](#)
- Start ups
 - Google your field of interest to find them!
- Consulting
 - Bane & Company
 - McKinsey & Company
 - Boston Consulting Group

Note: These jobs are WILLING and **EXPECT** to train you

My job hunt data

Applications: 72
Call backs: 13
Interviews: 9
Offers: 6

- Aerospace Corporation
 - Applied: Feb 10th
 - Chat: Feb 14th (Two hiring managers)
 - Interview: March 3rd (Job talk)
 - Offer: March 14th
- Applied Physics Laboratory (APL)
 - Applied: Jan 31st
 - Chat: N/A
 - Interview: March 11th (Job talk and group interview)
 - Interview: March 18th (KFA group)
 - Offer: April 01st
- Atom Computing
 - Applied: Feb 09th
 - Chat: March 10th (Recruiter)
 - Interview: N/A (I declined)
 - Offer: N/A
- Lockheed Martin
 - Applied: Jan 24th
 - Chat: Feb 8th (Recruiter)
 - Interview: Feb 24th (Team Zoom interview)
 - Offer: March 1st
- NIST - Applied and Computational Math Division
 - Applied: Feb 11th
 - Chat: N/A
 - Interview: March 10th (Job Talk)
 - Offer: April 14th
- Northrop Grumman
 - Applied: March 8th
 - Chat: N/A
 - Interview: March 21st (Team phone interview)
 - Offer: March 28th
- NSA - Laboratory of Physical Sciences
 - Applied: Jan 24th
 - Chat: March 10th (Hiring managers)
 - Interview: N/A (Job talk) (I declined)
 - Offer: N/A
- Sandia
 - Applied: Jan 05th
 - Chat: Feb 23rd & 28th (Postdoc advisor)
 - Interview: March 21st (Job talk)
 - Offer: March 30th

How to be a good applicant

Do not apply to your dream job first

- Practice makes perfect

Be visible

- LinkedIn
- Website
- GitHub

Cover letter

- Highlight what you couldn't put into your resume
- Let YOU come through! They are actually interested in you as a person

Have a **CV** and a **1 page** Resume

- Things that stood out to employers:
 - Awards / funding
 - Internships
 - Project skills (especially programming)
 - Contributing to open source code really sticks out!

Talk to people from the company

- Recruiters
- Employees that have the job you want

CV

Details

Qualitative

Give talk details

Projects w/ abstracts

[My CV](#)

Resume

No details

Quantitative

Number of talks

Project title

Summary of skills

[My Resume](#)

Tip: Cater your application to the job! (Some jobs want different skills or formatting. Adjust accordingly.)

Interviews: What to expect

You won't necessarily be asked technical questions!

Especially if you give a job talk! (I had zero technical interviews.)

Know your selling points and how to work them into conversation

Know your weaknesses and how to “down play” / alleviate their fears

Basic knowledge of their company and how the industry works

Know how to explain what you know to non-math people

They *will* want **you** to ask them questions

Interviews: Questions

Questions I often answered

- Tell us a little about yourself (short academic bio)
- Tell us about your research (again, non-mathy!)
- Why do you want this job? / What stood out about this job posting to you?
- Tell me a time you had to develop an algorithm
- Tell me a time when you put forth a lot of effort to do something and what was the result
- Tell me a time you put forth a lot of effort and things didn't work out
- What do you think makes you a unique candidate?

Questions I often asked

- Can you tell me about an example or favorite project that you have worked on?
- What does an average week look like? In particular, the first month vs after a year?
- What does a normal workload look like? One big project with long term goals? Three simultaneous projects with shorter term goals?
- Who would I talk to / interact with in an average week? (Covers everything from meetings I'd have to attend, to who I can turn to for help.)
- What does the work-life balance look like?
- What types of growth or education opportunities are there?
- What are natural career paths?
- What should I expect next? (Always ask this!)

Interviews: What do you say?

How to answer any interview question: Tell a story!

How to write a story:

- Problem or challenge you faced
- What action did you take?
- What was the end result?
- Be concise (If they want more, they'll ask!)

Stories to have on hand

- 2 stories where you are a hero
- 1 story about interpersonal relationships
- 1 story where things didn't go right and you learned from it

(Write out your responses beforehand and rehearse. It doesn't make you sound robotic, you just sound prepared and it's more like you're building muscle memory.)

Interviews: My responses

Tell us a little about yourself. (Summarize your background and your goals.)

Since I was an undergraduate, I knew I wanted to use mathematics to solve tangible problems in the world around me. This motivated me to study physics in addition to mathematics. In one of my physics classes, I had to model a 3-body system in Fortran. I loved taking my analytical work and turning it into this computer jargon that made a video simulation that I could show my friends. That's when I decided I also wanted to earn a certificate in scientific computing and simulation. I have continued on this journey with my dissertation thesis which involves using the object-oriented programming feature in Matlab to develop a package that models different types of wave equations on quantum graphs. Now I am looking to use my skills somewhere that I can continue to use mathematical modeling to make a positive impact.

What do you think makes you a unique candidate?

Because of my mathematical background, I bring a unique level of precision and my PhD has helped me develop a very different method of critical thinking. I also have an undergraduate degree in physics so I tend understand where a lot of other people are coming from. I'm also a very good communicator so I'm very effective at working with a diverse range of people and keeping everyone on the same page.

(None of those are super unique skills. But having all those skills made me unique enough.)

Interviews: Giving a Job Talk

Do's

- Introduce yourself
- Have a summary slide at the beginning
- On the summary slide, cover:
 - What problem are you trying to solve
 - Why it is important
 - Your specific contribution
- Stay high-level
- Highlight skills you used
- Highlight your toolkit

Don'ts

- Put lots of math
- Put too much information
- GO OVER TIME (Industry is WAY more strict about this. Most times, they aren't super interested in your actual research.)

My job talk [slides](#) (Note: these are *peak* mathiness)

The Offer

- Know what you want (eg: \$130,000)
- Know what you would accept (eg: \$115,000)
- It's fine to ask for more
 - Sometimes it's expected!
 - You can ask for an extra month to make the decision
 - You can ask for a higher salary. 10% more is not an unreasonable amount if you don't like the initial offer
- Factors to consider
 - Health insurance
 - 401k
 - Paid time off
 - Work-life balance
- Ask questions about the offer
 - (Hiring managers respect people who are interested in their career)
 - What is the range for this position
 - What are the range of "levels" i can progress through
 - Are there bonus, merit or other monetary compensations on an annual basis
 - How are raises handled at your company

Summary

TALK TO PEOPLE AND BE TRANSPARENT!

- Your advisor to stay on track to graduate
- Your friends for support
 - Run your interview answers by them!
- Recruiters for information about their companies
- Alumni for their mentorship
- Anyone in industry with a job that you want so you can get even *more* mentorship
- Me because I'm offering and am relatively nice