

Resources for Students Seeking Internships

Prepared by MCIM participants and director (Gilad Lerman) in September 2015 and being continuously updated

Listings of Internships

Internships and career information for graduate and undergraduate students in mathematics/applied mathematics by the Society for Industrial and Applied Mathematics: <https://siam.org/programs-initiatives/professional-development/internships/>.

Internships for graduate and undergraduate students in statistics or related fields by the American Statistical Association: <http://www.amstat.org/education/internships.cfm>

Handshake (for UMN students and alumni): <https://handshake.umn.edu/>. You may also access through it the “USA Career Guides.”

Career fairs at UMN: <https://cse.umn.edu/r/career-fair/> (of CSE at early fall and spring terms), <http://jobfair.umn.edu/> (University-wide at Spring). Check in advance specific details on positions in Goldpass (if you don't have an account make sure to set it up before the fair as you may use it during the fair).

Comprehensive industry databases such as The Million Dollar Database and Reference USA. You can search by organization size, industry type, location, etc. UMN students can access these through <https://www.lib.umn.edu/business>, by clicking on “Companies” and looking under “Directories for Locations, Headquarters and Subsidiaries”.

LinkedIn - search keywords such as “data science” or “quantitative analysis”

Websites of companies of interest to you for internships

National Labs (Sandia, LANL, LLNL, etc) typically have student applications sections for the summer. If you go to the website of the one you want, you usually navigate through a general “Careers” tab and then it will either have student specific jobs or you can narrow the job search by selecting only the ones hired over the summer. There is generally a longer wait on hearing back from national labs, so applying early to these if you are wanting a position over the summer is recommended.

Furthermore, <https://cse.umn.edu/college/career/job-search-resources> has substantial information for internship and job search.

It is recommended to meet in person with speakers of the IMA/MCIM industrial problem seminar <https://cse.umn.edu/ima/industrial-problems-seminar>

It may lead to successful internships. Also, make sure to work closely with the MCIM director on your search for internships.

Specific Internships (not in above or with more details)

NSA opportunities: <https://www.intelligencecareers.gov/nsa/nsastudents.html>

a few highlighted NSA summer internships:

- for undergraduates in math: Director's Summer Program (DSP)

- for undergraduates in math/CS: Cryptanalysis and Exploitation Services Summer Program (CES SP)

- for undergrad and grad students in CS: Computer Science Intern Program (CSIP)

- for graduate students in math: Graduate Math Program (GMP)

- for graduate students in OR: Summer Program for Operations Research Technology (SPORT)

NGA internships <https://www.nga.mil/Careers/StudentOpp/Pages/default.aspx>

RAND http://www.rand.org/about/edu_op/fellowships/gsap.html

Los Alamos Computational Physics Student summer workshop:

<https://organizations.lanl.gov/xcp/computational-physics-student-summer-workshop/>

Boeing has posted positions for its Graduate Researcher Program for Summer 2024:

<https://jobs.boeing.com/job/huntsville/boeing-research-and-technology-graduate-researcher-applied-mathematics-statistics-and-operations-re/185/53984037504>

and

<https://jobs.boeing.com/job/huntsville/boeing-research-and-technology-graduate-researcher-engineering/185/53984039648>

Special Opportunities

NSF Mathematical Sciences Graduate Internship Program:

The National Science Foundation (NSF) Division of Mathematical Sciences (DMS) aims to provide opportunities to enrich the training of graduate doctoral students in the Mathematical Sciences through the provision of a NSF DMS funded summer research internship program. Towards this objective, DMS has partnered with the Oak Ridge Institute for Science and Education (ORISE) which is managed by Oak Ridge Associated Universities (ORAU) for the Department of Energy, to establish the NSF Mathematical Sciences Graduate Internship program.

The immediate goal of the program is to fund approximately twenty internships, primarily at the National Laboratories. The longer-term goals are to expand the program and to include private industries and nonprofit organizations as hosts. The program is intended to introduce doctoral students in mathematics to interesting applications of mathematical or statistical theories outside of academia. The internships are aimed at students who are interested in understanding the application of advanced mathematical and statistical techniques to "real world" problems, regardless of whether they plan to pursue an academic or nonacademic career.

Students in full-time enrollment as a graduate student at an accredited US college or university located in the US during the academic year will be considered. They should be pursuing a doctoral degree in the mathematical sciences and be able to provide two relevant letters of recommendation. These letters should address the student's academic record and potential for success in an internship, as indicated by communication and teamwork skills.

Further details and the application procedure is described at: <https://orise.orau.gov/nsf-msgi/> (for questions email at NSF-MSGI@ORISE.ORAU.GOV). A different NSF program is <https://www.nsf.gov/od/oia/activities/interns/>

DOE/EERE Internships: The Department of Energy's Office of Energy Efficiency and Renewable Energy (EERE) offers exciting student volunteer internships through the year at DOE Headquarters in Washington, DC and the Golden Field Office in Golden, CO. Positions are limited and offered on a competitive basis. This and additional opportunities are described in <https://www.energy.gov/eere/education/find-internships>

The insight data science fellows program: <http://insightdatascience.com/>.

It is a 7 week, full-time, postdoctoral data science training fellowship in Silicon Valley or New York City. Full tuition scholarship is awarded for all fellows. Self-directed, project-based learning under the guidance of industry data scientists. Interviews at top companies immediately following the program.

The Data Incubator fellowship: <https://www.thedataincubator.com/fellowship.html>

It is an 8 week fellowship that prepares masters students, PhDs, and postdocs for industry careers in data science. The program is free for Fellows.

The Kleiner Perkins Fellows Program: It matches students to companies in Silicon Valley for summer work experiences. The program includes additional events for the selected fellows. Applications for the Kleiner Perkins Engineering Fellows Program are on <https://fellows.kleinerperkins.com/>

Students' Tips for Job and Internship Interviews

Interview's 3 Focuses:

1. Technical Skills
2. People skills
3. Analytical adaptability

The technical skills part depends on the job requirements (see some relevant material later). In many positions Ph.D. students have sufficient technical skills and should put more focus onto focuses 2 and 3, which are often overlooked in academia. Moreover, the interview will most likely focus on your fit into the company / people skills and your ability to work on business problems. Some quick points on this front are

- be yourself
- avoid jokes (usually come off bad)
- look energetic like you want the job but not desperate
- practice answering common behavioral questions almost till they become second nature (see relevant material later)

Also, due to the volume of candidates hiring managers see, candidates are remembered due to something noticeable (very bad or very good) from the interview. And writing a thank you email that is personalized (references something from the interview) will help them remember you in a good way. Also, those vague problem solving questions that don't necessarily have a clear cut answer are used to determine critical thinking processes, so thinking out loud is better so that they understand where you're going.

Long-Term Preparation for Successful Internships and Positions in Industry

Perhaps the most important skill you can learn to work in industry is programming and working with data. There are many places online to learn coding if you do not know how yet - if you need a place to get started check out [Coursera](#) or [Udacity](#). You should also get experience working with real data. This serves as a nice way to learn both programming and data oriented skills. For example, [Kaggle](#) has competitions, datasets, and example scripts you can use to explore and learn. Another good way to learn is to find some computational work that interests you, maybe in a related field, and try to implement and replicate some experiments. This allows you to have a quick sanity check that your implementation works and also helps you to understand a work more deeply.

In the following, I will give a (maybe biased) view on some useful coursework to make yourself a better candidate for industry. A good understanding of linear algebra is essential. Learn the various matrix decompositions and become comfortable manipulating matrices on a computer. A good class at the University of Minnesota is CSCI 5034: Computational Aspects of Matrix Theory. Another important topic to study is optimization. Optimization underlies pretty much all techniques in data science and is deeply ingrained in many applied communities (see statistics, electrical engineering, computer science, industrial engineering/operations research, to name a

few). Pick a course on nonlinear optimization if you can find it, for example, at the University of Minnesota, a good option is EE5239: Introduction to Nonlinear Optimization. You can also look for courses in an Industrial Engineering department.

Another tip is to have a minor program in Statistics, or better yet, get a Master's degree in Statistics. As a Mathematics student, you are well suited to quickly pick up concepts in Statistics. These concepts form the foundation of modern data science and will help you pick up the lingo and speak intelligently if you choose to enter this domain. A minimum recommended program might include some basic theory and applied courses in Statistics. For example, at the University of Minnesota, the following statistics courses are recommended:

- Theory courses:
 - STAT 8101, 8102: Theory of Statistics I and II. As a math student, you should be well-suited to jump into statistics at this level
- Applied courses, all of these should use R:
 - STAT 5701: Statistical Computing (good if you are new to programming and fitting statistical models)
 - Moderate - STAT 5302: Applied Regression Analysis
 - Advanced - STAT 8051: Advanced Regression Techniques: linear, nonlinear and nonparametric methods

Additional tips by Luis Duque can be found [here](#).

Resources on Searching for Internships and Jobs

Material of talk in <http://www.ima.umn.edu/industrial/2015-2016/> by Whitney Moore (Sep. 2015)

Video of the talk: ([flv](#))

Slides of talk: [Effective Strategies for Your Job and Internship Search](#)

Supplementary files (handed in):

[Internship Job Search Guide](#)

[Graduate Resume CV Guide](#)

Resources on Preparing Resume and CV

Material of talk in <http://www.ima.umn.edu/industrial/2010-2011/> by Darren Kaltved (Sep. 2010)

Video of the talk: ([flv](#))

Slides of talk:

[Resume_and_CV_Presentation-IMA.ppt](#)

[Resumes_and_CV_Presentation-IMA.pdf](#)

Supplementary files:

What NOT to Include on a Resume.pdf

25_Words_That_Can_Hurt_Your_Résumé.pdf

Information on on GoldPASS and mock interview week

Important tip for UMN students: work on your resume with a career counselor at the CSE career center

Resources on Preparing for an Interview

Material of talk in <http://www.ima.umn.edu/industrial/2015-2016/> by Whitney Moore (Jan. 2016) is in [Interviewing Tips for Industry](#) (video, slides and handouts)

[Interviewing Guide](#)

Look up interview questions for a specific company and position on [Glassdoor](#)

Mock interviews on [pramp](#)

Practice interview questions on [leetcode](#)

For data science related interviews:

<http://www.datasciencecentral.com/profiles/blogs/66-job-interview-questions-for-data-scientists>

General Resources for Career in Industrial Research

[Next gen PhD: a guide to career paths in science](#), by Melanie V. Sinche. Harvard University Press, 2016.

["So What Are You Going to Do with That?" Finding Careers Outside Academia](#), by Susan Basalla and Maggie Debelius. University Of Chicago Press; Third edition, 2014

[SIAM Webpage for Careers in Applied Mathematics—Options for STEM Majors](#) and more generally [SIAM Career Webpage](#) and [SIAM News Articles on Careers](#).

[What Characteristics Make Mathematicians Suited for Industry?](#) by Bill Satzer, SIAM News, July-August 2017

The [Big Math Network](#) has useful links