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# Career Education

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# Career Exploration for Ph.D.s in Science, Technology, Engineering, and Math Disciplines

## CAREER EXPLORATION FOR PH.D.S IN SCIENCE, TECHNOLOGY, ENGINEERING, AND MATH DISCIPLINES

Graduate students are among the most well-educated members of society. However, since graduate students are always measuring their performance against that of their highly talented peers and mentors, they often underestimate their significant strengths and transferable skills.

Below you will find some information on non-academic careers in which the transferable skills of PhDs in the sciences are highly valued. There are, of course, many types of careers open to PhD students—we've included the more frequent options for students in the sciences here. Please feel free to schedule an appointment to speak with a CCE counselor regardless of where you are in your career decision-making process. To make an appointment, call 212-854-5609.

Additionally, there are a few resources we almost always recommend that will get you started in your search. Four of these are books: So What Are You Going to Do with That: Finding Careers Outside Academia by Susan Basalla and Maggie Debelius, Put Your Science to Work: The Take-Charge Career Guide for Scientists by Peter Fiske, Guide to Non-Traditional Careers in Science by Karen Young-Kreeger and Alternative Careers in Science: Leaving the Ivory Tower by Cynthia Robbins-Roth. We also recommend the job database on phds.org [1] and the job databases and career content on NatureJobs [2] and ScienceCareers [3]. Doing a keyword search in the ScienceCareers "Career Advice" section will help you tap into a useful archive of materials on non-academic positions for scientists and engineers. The New York Academy of Sciences Science Alliance is also a great resource for Columbia students – much of its programming is career related. They can be found at www.nyas.org [4].

## INDUSTRY

One of the first places that scientists and engineers look for opportunities outside of the academic environment is research in industry. These positions can be a great fit for someone who still enjoys the day-to-day work of research but is looking to do it in a different context. These positions are often highly competitive and sometimes require candidates to have a couple years of postdoctoral experience. This is especially true in the biomedical sciences. Anyone searching for industry positions should take care to make sure their academic CV is transformed into something that looks more like a resume before submitting it. Use active verbs and concise descriptions of your research so that a hiring manager can quickly get a sense of the work you've done.

Also, think about different industries that may need research and development scientists, including (just to name a few) perfume and flavor companies, cosmetics companies, textiles companies, and energy companies.

### Where to Look

There are many useful job databases for industry positions; you're probably familiar with many of them. Both indeed.com [5] and simplyhired.com [6] are job search aggregators that pull from different databases. This can be really useful in the job search, especially to check out common job titles, qualifications and descriptions. Also, don't forget to check out the careers website of particular companies that you are targeting. Here are a few websites that may be useful:

Pharma/Biotech

- *Nature* Jobs [2]
- *Science* Careers [7]
- MedZilla [8]
- BioSpace [9]
- BioCareers [10]

Physical Sciences and Engineering

Engineering

- IEEE job database [11]
- American Council of Engineering Companies [12]

Physical Sciences

- Materials-related employment [13]
- American Chemical Society job database [14]
- Perfumery/Flavor Chemistry—International Flavors and Fragrances [15]
- Optics, Photonics and Imaging—Spieworks [16]

## U.S. GOVERNMENT JOBS

*NOTE: Most federal government jobs are limited to U.S. citizens.*

The federal government has a long history of hiring engineers and other holders of advanced degrees in the sciences. These people work in jobs ranging from international development to systems design for NASA. Furthermore, because of the rapid advances in biotechnology over the past decade, as well as the threat posed by biological warfare and emerging diseases, much of the government's critical national security research is now in the biological sciences. Because government scientists are generally engaged in primary research, almost all of them tend to hold advanced degrees (PhDs or MDs).

The largest employer of engineers in the federal government is the Department of Defense, followed by NASA and the Departments of Transportation and Agriculture, although scientists work in many other agencies as well. The Department of the Interior hires wildlife biologists; the Department of Health and Human Services and the Centers for Disease Control hire molecular biologists; and the Department of Labor, among others, hires cognitive psychologists. These examples are only a few among many agencies and types of people they hire.

### Where to Look

Listed below are a few branches of the US Government that are particularly likely to have positions for PhDs in the sciences, but your options will vary greatly depending on your discipline.

- USAjobs.gov [17]
- Partnership for Public Service [18]
- Making the Difference [19]
- Department of Defense [20]
- National Aeronautics and Space Administration [21]
- Department of Transportation [22]
- Environmental Protection Agency [23]

- Department of Energy [24]
- Department of Agriculture [25]
- Department of the Interior [26]
- Department of Health and Human Services [27]
- National Institutes of Health [28]
- National Science Foundation [29]
- Centers for Disease Control [30]
- U.S. Agency for International Development [31]
- Food and Drug Administration [32]
- National Security Administration [33]
- Department of State [34]
- Central Intelligence Agency [35]
- Federal Bureau of Investigation [36]

## SCIENCE POLICY/NON-PROFIT

In addition to the more research-focused roles described above, many scientists have satisfying work making and influencing national policy.   These roles exist both within the federal government and in the many nonprofit organizations that work to influence policy on wide range of issues—the environment, science education, healthcare, and energy, for example.  Below you'll find links to fellowships in this area and the major job database for not-for-profit positions.

### Where to Look

- AAAS Science and Technology Fellowships [37]
- Presidential Management Fellowship [38]
- American Chemical Society [39]
- United Nations [40] (various offices)
- Idealist.org [41]

## SECONDARY SCHOOL TEACHING

Secondary school teaching has long been an alternative for PhDs and ABDs who find true satisfaction in teaching and mentoring young scientists and engineers. Many PhDs choose private schools and charter schools because, unlike public schools, they generally do not require teaching certification. Increasingly, PhD students in the sciences and engineering choose public schools due to possibilities for emergency certification in areas of need (such as the sciences and mathematics) and the existence of programs such as Teach for America. The opportunity to interact with students in a variety of arenas (classrooms, athletics, theatre, student clubs, class trips) and a sense of making a difference in students' lives are cited over and over again by secondary teachers as reasons why they enjoy the profession.

Experience with students is an important preparation for a career in secondary-school teaching. While your PhD states that you are clearly qualified to teach the subject, you need to emphasize your investment and interest in students. There are several ways to get this experience. Contact schools in your area for substitute or part-time openings or volunteer to tutor in your subject at a local school. Also, look for jobs teaching in one of the summer programs run by independent schools.

### Where to Look

- Parent's League [42] – maintains a list of independent schools in New York
- National Association of Independent Schools [43]
- Carney Sandoe [44] and Associates
- Independent School Placement [45]
- Teach for America [46]
- New York Teaching Fellows [47]
- Math for America [48]
- National Science Teachers Association [49]
- NYC Charter School Center [50]
- Department of Education [51]

## SCIENTIFIC/TECHNICAL WRITING AND PUBLISHING

Scientific/medical writing and publishing is an excellent alternative for PhDs with strong writing skills who want to stay involved in the scientific community without spending hours in the lab or field.  There are many different contexts in which a PhD can use writing skills: large and small scientific journals, medical writing companies that produce content for pharmaceutical companies, and technology companies that need strong writers to produce "how-to" content.  Academic and technical journals, in particular, prefer hiring PhDs for editing positions; however, publishing firms in a variety of fields also seek PhDs for editing, marketing, sales, production, design, information technology, and business positions.

### Where to Look

- American Medical Writers Association [52]
- National Association of Science Writers [53]

- Also check *Nature* Jobs [2] which often posts publishing positions

## PATENTS AND INTELLECTUAL PROPERTY

Patent agents or scientific advisors at law firms assist firm partners in due diligence, litigation, opinions, and other tasks similar to those of associates, but do not hold law degrees (although advanced science degrees are required). A scientific advisor at a law firm will deal with cutting-edge science every day, and this kind of work has the potential to expose the employee to a broader range of science and technology than would a career in research.

PhDs who are hired as scientific advisors do not have to go to law school but are often expected to become patent agents and to draft, prosecute, and secure patents. Some firms will pay for an employee's law school in order for him or her to become a patent attorney.   Look for law firms with a focus on intellectual property.

### Where to Look

- Intellectual Property and Patents jobs [54]
- Martindales [55]—a great resource for researching firms

## TECHNOLOGY TRANSFER

Technology transfer refers to the process of identifying technology that is appropriate for commercialization and supporting researchers in that process.  Most U.S. research universities and hospitals have a technology transfer office that aids researchers as they apply for patents, explore licensing possibilities, and establish start-up companies.  Many PhD scientists and engineers have found work in technology transfer to be satisfying, as the work blends the worlds of science and business in an engaging way.  In addition, many companies like Monsanto will have an intellectual property or technology office.

Where to Look

- Columbia Tech Ventures [56]
- Association of University Technology Managers [57]

## CONSULTING

Duke University's Fuqua School of Business defines consulting as "the business of providing advice to firms in trouble, on the move, or trying to do what they do better, faster, and more cheaply." Consulting firms offer PhDs the opportunity to use and expand upon their knowledge base in exciting, varied positions with interesting and highly motivated colleagues. Consultants also have impact within the companies they work for and are able to see the results of change quickly.

While rewarding, consulting is also a demanding field. Most consultants travel extensively—they may spend three weeks a month on the road—and often work 60 to 80 hours a week. It is important to weigh the costs and benefits of a demanding schedule with the opportunities before diving into a consulting job. Attending information sessions, networking with industry professionals, and performing company research will assist you in learning about the field and deciding whether it is a good fit.

In addition to general management consulting, many firms have specialized practices in energy, IT, government, and healthcare.  As an example, we've listed a few of the specialized functions in IT below.  These are just a few of the specialized functions a consultant might undertake over the course of a career.

**System Integration** - This is one of the traditional jobs of the IT consultant and a growth area today as companies add more IT systems to their business processes. When two companies merge, or a single company wants to implement new hardware or software, they turn to consultants to make all the technology compatible.

**Outsourcing** - Business process outsourcing (BPO) is the bread and butter of many firms. Some companies find it easier and more cost-effective to pay somebody else to manage their technology for them. The consultants, in effect, become the client's IT department. They handle everything from help desk and call center operations to server maintenance to passkey and ID tag issuance.

**IT Strategy** - IT consulting engagements that involve a broad view of the client's business or high-level technology decisions are usually called simply "consulting" or "strategy" projects and often involve aligning a client's IT infrastructure with its overall business strategy. Most of the large, brand-name management consulting firms have technology strategy practices: Booz Allen's technology strategy group; Accenture's Strategic IT Effectiveness (SITE) group within its business consulting (i.e., distinct from IT consulting) division.

**Web Services** - Along the domain of design and hosting companies based in Silicon Alley (New York's tech center), web services include e-commerce implementation and other secure-transaction work, though consultancies do some page design and site hosting as part of their overall deliverables as well. This specialty is receiving a lot of attention from major technology players such as IBM, Hewlett-Packard, and Accenture.

**Security** - IT businesses have realized there's money to be made in designing and implementing better security and identification methods. Strides have been made in biometrics (the science of identifying a person via retina patterns, voice, fingerprints, and other unique biological characteristics), contraband detection, and secure communications.

**Research and Development** - Some consultants spend their time in the lab creating new hardware and software. Often, this work is geared toward creating new products (servers, analysis software, and the like) that will help the consultancy sell work or complete the engagements it undertakes. In other cases, the consultants must create something entirely new for a client's use; for example, military contractors such as Raytheon.

### Where to Look

What follows is a list of sites that will be useful for those interested in learning more about consulting, as well as a sampling of firms know to hire PhDs.  Also be sure to read "Case in Point" written by Marc Cosentino.

- Columbia Graduate Consulting Club [58]
- Vault and WetFeet Guides [59] (see links to Vault and WetFeet on the left)
- The Boston Consulting Group [60] – look at the Bridge to BCG program
- McKinsey [61] – look at the Insight Program
- Caseinterview.com

## FINANCIAL SERVICES

Many PhDs have found a strong fit for their high-level quantitative (in particular statistics, stochastic calculus, and related disciplines), research, and programming skills in financial services. Financial services companies – both large and small (and embracing everything from universal banks, to hedge funds, to private trading companies) need PhDs from the sciences, mathematics, and engineering to fill a wide variety of roles requiring these distinctive skills. These roles encompass sales and trading, product development, analytics, risk monitoring and assessment, and fixed income and equity research. But this is by no means an exhaustive list and many additional opportunities can be identified. These roles are frequently clustered under the heading of financial engineering and/or risk management. These terms often refer to the application of quantitative, analytical, and programming skills to the identification and exploitation of anomalies in the price or value of securities, commodities, and markets. These terms also comprise the assessment and management of risk, portfolio value, and the analysis of investment opportunities. As a consequence, a very broad range of opportunities exists within financial services for students with skills in mathematics, engineering, and the sciences.

### Where to Look

- Vault and Wetfeet Guides [62]
- American Finance Association [63]
- American Association of Finance & Accounting [64]
- New York Society of Security Analysts [65]
- Association for Financial Professionals [66]
- Financial Management Association International [67]
- 85 Broads [68]

- Careers in Business [69]
- Career exploration site providing general overview of industry sectors
- Glass Door [70]
- Peer-to-peer information about the interview process and offer negotiations
- Seeking Alpha [71]
- Stock market analysis from market experts including quarterly earnings for over 1,500 public companies
- The Epicurean Dealmaker [72]
- A smart, snarky, and somewhat cynical commentary on Wall Street and global finance

### Print Resources

- *How I Became a Quant: Insights from 25 of Wall Street's Elite*, by B. Schachter and R. Lindsey, Wiley, 2007
- *My Life as a Quant: Reflections on Physics and Finance*, by E. Derman, Wiley, 2004
- *Working the Street: What You Need to Know About Life on Wall Street*, by E. Banks, Palgrave MacMillan, 2004
- *Liar's Poker, Rising through the Wreckage on Wall Street*, by M. Lewis, Penguin, 1990
- *Fooled by Randomness: The Hidden Role of Chance in Life and in the Markets*, by N.N. Taleb, Random House, 2004
- *The Complete Guide to Capital Markets for Quantitative Professionals*, by A. Kuznetsov, McGraw-Hill, 2007


*Additional Resources*

- VersatilePhD.com [62]
- LinkedIn [73] Group

- 
  - PhD Careers Outside of Academia

- 
  - Doctorates Without Borders

- The Science Alliance

**Source URL:** <u>http://www.careereducation.columbia.edu/resources/tipsheets/non-academic-career-options-phds-sciences-engineering-and-mathematics</u>

**Links:**
[1] http://www.phds.org/
[2] http://www.nature.com/naturejobs/index.html
[3] http://www.sciencecareers.org/
[4] http://www.nyas.org/
[5] http://www.indeed.com/
[6] http://www.simplyhired.com/
[7] http://sciencecareers.sciencemag.org/
[8] http://www.medzilla.com/
[9] http://www.biospace.com/
[10] http://biocareers.com/job-seekers
[11] http://careers.ieee.org/
[12] http://www.acec.org/
[13] http://materialsjobs.com/
[14] http://chemistryjobs.acs.org/jobs
[15] http://www.iff.com/
[16] http://www.spieworks.com/
[17] http://www.usajobs.gov/
[18] http://www.ourpublicservice.org/OPS/
[19] http://www.makingthedifference.org/index.shtml
[20] http://www.defenselink.mil/
[21] http://www.nasa.gov/
[22] http://www.dot.gov/
[23] http://www.epa.gov/
[24] http://www.doe.gov/
[25] http://www.usda.gov/
[26] http://www.doi.gov/
[27] http://www.hhs.gov/
[28] http://www.nih.gov/
[29] http://www.nsf.gov/
[30] http://www.cdc.gov/
[31] http://www.usaid.gov/
[32] http://www.fda.gov/
[33] http://www.nsa.gov/
[34] http://www.state.gov/
[35] https://www.cia.gov/
[36] http://www.fbi.gov/
[37] http://fellowships.aaas.org/
[38] http://www.pmf.gov/
[39] http://portal.acs.org/portal/acs/corg/content?_nfpb=true&amp;_pageLabel=PP_TRANSITIONMAIN&amp;node_id=1291&amp;use_sec=false&amp;sec_url_var=region1&amp;__uuid=2149be41-b2b0-4842-a6a7-04a2d4b4a0e2
[40] http://www.un.org/en/
[41] http://www.idealist.org/
[42] http://www.parentsleague.org/advisory_services/nyc_k12_independent_schools__boarding_schools/index.aspx
[43] http://www.nais.org/
[44] http://www.carneysandoe.com/
[45] http://www.ispnewyork.com/
[46] http://www.teachforamerica.org/
[47] http://www.nycteachingfellows.org/
[48] http://www.mathforamerica.org/home
[49] http://www.nsta.org/default.aspx
[50] http://www.nyccharterschools.org/
[51] http://www.ed.gov/
[52] http://www.amwa.org/
[53] http://www.nasw.org/
[54] http://www.intelproplaw.com/JobsAvailable/
[55] http://www.martindale.com/
[56] http://www.techventures.columbia.edu/
[57] http://www.autm.net/
[58] http://www.columbia.edu/cu/consultingclub

[59] http://www.cce.columbia.edu/resources/library
[60] http://www.bcg.com/
[61] http://www.mckinsey.com/
[62] http://www.careereducation.columbia.edu/resources/library
[63] http://www.afajof.org/
[64] http://www.aafa.com/
[65] http://www.nyssa.org/
[66] http://www.afponline.org/
[67] http://www.fma.org/
[68] http://www.85broads.com/
[69] http://www.careers-in-business.com/
[70] http://www.glassdoor.com/index.htm
[71] http://seekingalpha.com/
[72] http://epicureandealmaker.blogspot.com/
[73] http://linkedin.com/