**Careers in Statistics Evolve and Expand**

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## Careers in Statistics Evolve and Expand

By

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"The graph for demand is up and to the right." —Sam Wholley

**Workers** with statistics backgrounds have long been in healthy demand for academic, actuarial, pharmaceutical, or government jobs. Those traditional statistics jobs aren't going away anytime soon, as long as society continues to need workers who can advance statistics theory, assess drugs' risks and efficacy, or do any of the other things statisticians have done for years.

But, as several statisticians and analysts tell Science Careers, the range of statistics jobs is expanding, and many traditional jobs are changing. As technology proliferates, the mathematical methods at the heart of the discipline are reaching into new fields. Personal electronics, the Internet, scientific instruments (notably in genomics), and e-business are spitting out troves of data that are crying out for analysis, spawning a "big data" revolution. All that new data has the potential to provide new insights for businesses, new research possibilities for scholars, and new information that policymakers can draw on, among many other possibilities. It also means new jobs.

Those data sets are often so vast and numerous that traditional software tools—paired with traditional statistics—aren't powerful enough to sort and analyze the data on reasonable time scales. So, employers are especially looking to hire people who combine knowledge of statistics with skills in computer science and engineering, often alongside the core disciplines the data arise from. The result is a new, interdisciplinary field called "data science"—a fusion of statistics, computer science, and analytics in which researchers analyze large quantities of data, identify meaningful trends, and then find a way to exploit the resulting knowledge. A career in data science typically requires at least a master's degree, and so far there aren't enough qualified workers to go around; that's a very good thing for people seeking science-related careers.

## The demand side

The Bureau of Labor Statistics doesn't yet track statistics for data science jobs; the field is too new. But the bureau does track and project the employment of statisticians. It projects that statistics jobs will grow 27% from 2012 to 2022, putting the profession in the "much faster than the average for all occupations" growth category. The bureau puts statisticians' median annual salary in 2012 at $75,560.

Meanwhile, a report from the McKinsey Global Institute, a consulting firm, says that businesses spanning virtually all sectors—from technology and social networking to pharmaceuticals and health care—are using information gleaned from large data sets to help them operate more smoothly or to provide better products or services. In order to meet the demands of the big data age, the study says, the United States must train 140,000 to 190,000 more quantitatively or analytically skilled people by 2018 than the country is on track to train.

Signs of this demand for data scientists are mostly anecdotal, but they're easy to see. The median salary for a data scientist in the United States is [$117,500](http://www.glassdoor.com/Salaries/us-data-scientists-salary-SRCH_IL.0,2_IN1_KO3,18.htm), according to the career website GlassDoor.com. Those salaries are increasing, especially in the technology and online sector, because employers aren't finding enough people to fill their open positions, says [Sam Wholley](http://rivierapartners.com/teammembers/sam-wholley/), a partner at technology recruiting and talent search firm Riviera Partners in San Francisco, California. "The graph for demand is up and to the right," he says. Every year, technology companies call his firm seeking candidates for data scientist jobs more than they did the previous year, he says.

Hal Varian, Google's chief economist, tells Science Careers that companies like his need data scientists in a variety of contexts. For example, Google often conducts experiments on proposed new search algorithms by changing them for a tiny subset of searchers. By analyzing data these experiments generate, data scientists can provide insights that can improve the company's algorithms and, thus, its search results. "There's a lot of value to be unlocked by understanding that data," Varian says.



Courtesy of UC, Berkeley

Hal Varian

Data science also has an increasing presence in academic fields, including the life and physical sciences, so faculty opportunities have also increased for people who understand statistics and computer science alongside their core disciplines.

The life sciences—notably including epidemiology, environmental health, molecular biology, medicine, and pharmacology—have long drawn on statistics. Today these fields are generating far more data than they used to, and the rate of data collection is accelerating. Modern molecular biology and biotechnology tools let scientists analyze whole genomes and study the activity of all the genes in cells—and their role in human health—at one time, says [Xihong Lin](http://www.hsph.harvard.edu/xihong-lin/), a statistical geneticist and genomicist at Harvard University School of Public Health. "So there's much more demand for people who have the quantitative background in handling large [amounts of] health science data," she says.

Fields that didn't draw much on statistics in the past are becoming more open to it, possibly because the big data boom is boosting awareness of the value of statistics, says [Cassandra Wolos Pattanayak](http://www.wellesley.edu/lts/about/ris/staff/pattanayak), a 2011 Harvard University Ph.D. graduate in statistics. She now serves as Guthman director of the Quantitative Analysis Institute at Wellesley College in Massachusetts, which promotes statistics programming on campus and provides statistics consulting for researchers and students at Wellesley. She also has worked with legal scholars—something that might not have happened much in the past. "There's so much more receptiveness now to a statistician walking up to somebody like a lawyer and saying, 'Hey, can we apply quantitative tools to study what you're doing?' " she says.



Courtesy of Xihong Lin

Xihong Lin

Even sports, politics, and journalism increasingly draw on people with statistics training, as evidenced by the success of sports and politics statistician [Nate Silver](http://en.wikipedia.org/wiki/Nate_Silver), says [Montserrat Fuentes](http://www.stat.ncsu.edu/people/fuentes/), head of the statistics department at North Carolina State University (NCSU) in Raleigh. Media outlets such as The New York Times and Silver's [FiveThirtyEight](http://www.fivethirtyeight.com/) have hired statistics- and computing-savvy people to advance their data journalism initiatives. Fuentes says that one recent NCSU statistics graduate got a job helping with The New York Times' initiative.

## The supply side

Big data has helped fuel a rise in students' interest in statistics, Fuentes says. Silver's success may also be spurring interest, she suggests. Whatever the reasons, training programs are expanding, and student enrollment in statistics classes and degree programs is on the rise.

At NCSU, the number of undergraduate statistics majors has more than doubled since 2008, from around 60 to more than 120, Fuentes says. At the University of California (UC), Berkeley, enrollment in statistics courses has grown from 84 to 450 in 5 years, even though the university heightened requirements for entry into the major, says [AnnaLee Saxenian](http://www.ischool.berkeley.edu/people/faculty/annaleesaxenian), dean of the university's School of Information.

Nationally, the number of students earning degrees in statistics has surged. Bachelor's degrees have doubled since 2008, and master's degrees have doubled since the early 2000s, according to the National Center for Education Statistics.



Courtesy of UC Berkeley

AnnaLee Saxenian

Beyond accommodating more students, NCSU's statistics department is requiring undergraduate majors to learn more about computer science and visualization. And, mindful that statistics employment increasingly means working in industry or consulting with experts in other fields, the department is considering extending a consulting class—already mandatory for graduate students—to its undergraduates. "We believe it is essential to get that experience," Fuentes says.

Graduate programs are also expanding, and others are changing their curricula. At Harvard's School of Public Health, the biostatistics curriculum now includes more than just biology, health science, and statistics coursework. "Now we teach them machine learning and advanced programming, and we teach them more about data structures, algorithms, and more about software engineering," Harvard's Lin says. Biostatistics candidates now even do lab rotations—"wet" labs with basic scientists, and "dry" labs to analyze data. Dozens of schools now offer fully fledged programs in data science or analytics. Columbia University, New York University, and UC Berkeley have launched master's-level data-science programs in the past year.

What does the future hold? Right now, opportunities in statistics—especially data science—are strong. How strong they will be in 5 years, or 10, depends on which expands faster: demand for statisticians or the supply. But there is reason for optimism—reason to believe that job opportunities will remain strong for years to come. That's a question that, as far as we know, the data scientists haven't analyzed yet.

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