

Careers in STATISTICS

American Statistical Association

• manufacturing •

• research •

• national defense •

• biology •

• computer science •

• marketing •

• physics •

• agriculture •

• software design •

• epidemiology •

• geology •

• research •

• education •

• manufacturing •

• science •

• biopharmaceuticals •

• engineering •



A WORLD OF OPPORTUNITY

The American Statistical Association has a proud tradition of service to statisticians, quantitative scientists and users of statistics

American Statistical Association

The American Statistical Association, founded in 1839, is the second oldest professional society in the United States. For over 160 years, ASA has been providing its members and the public with up-to-date, useful information about statistics. ASA has a proud tradition of service to statisticians, quantitative scientists, and users of statistics across a wealth of academic areas and applications.



Key Activities

Career Services—ASA provides assistance in all aspects of career planning, placement, and enhancement through information, salary surveys, online job ads, and career development tools.

Education—ASA sponsors educational programs and meetings to enrich statistical knowledge and actively participates in K-12 education initiatives involving statistics and mathematics.

Awards and Honors—ASA acknowledges and recognizes members who have made outstanding contributions to statistics or the association by sponsoring awards, honors, and fellowships.

Meetings—ASA sponsors meetings and workshops around the United States, including the Joint Statistical Meetings (JSM) and many smaller, more specialized regional meetings.

Publications—ASA publishes scholarly journals, general interest magazines, statistical research guides, informational brochures, membership information, and books of interest to statisticians.

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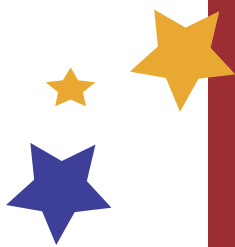
What is Statistics?

Statisticians collect and analyze data, then calculate results using a specific design. They are able to draw conclusions and make decisions in the face of uncertainty.



What Do Statisticians Do?

Statisticians look for patterns in data to help make decisions in business, industry, and the biological, physical, psychological, and social sciences. Statisticians help make important advances in scientific research and work in opinion polling, market research, survey management, data analysis, statistical experiments, and education. Statisticians use quantitative abilities, statistical knowledge, and computing and communication skills to collaborate with other scientists to work on challenging problems, including the following:



Studying the safety and economic viability of **nuclear power** plants and alternative energy sources

Evaluating the environmental impact of air, water, and soil **pollution**

Designing and analyzing studies to determine the safety and effectiveness of new **drugs**

Estimating the **unemployment** rate in the United States

Analyzing **consumer demand** for products and services

Planning studies for and analyzing data from **agricultural experiments**



“ I found that statistics used more reasoning and logic skills than the mathematics courses I had previously taken. The more I did statistics, the more I liked the “alternative” application of mathematics that it provided. I especially liked being able to use a lot of data and a little common sense to figure out problems. ”

Tiffany T. Sundelin, Moog, Inc.

Statisticians apply mathematical and statistical knowledge to social, economic, medical, political, and ecological problems. They work individually, but also as part of interdisciplinary teams on complex problems. Statisticians travel to consult with other professionals or to attend conferences, seminars, and continuing education activities. They communicate and confer with other professionals to understand practical problems and inform others of their solutions.

Statisticians use data from well-designed trials to discover results about a particular problem in a variety of fields. They combine their technical training skills with the knowledge of the field within which they are working to produce valuable results. Statisticians are at times educators, consultants, and theoretical researchers.

Business and Industry

Manufacturing

Industrial statisticians help build products and deliver services that satisfy customers and increase the company's market share and profit margin. Statisticians help design the best product, guide the transition from design to manufacturing, ensure a consistently excellent product, help manage customer satisfaction, and ensure a financially beneficial bottom line. Industry professionals use statistical methods for quality control and quality assurance in nearly all manufactured goods.



Marketing

Statistics is used to quantify the extent of variation in customers' needs and wants. Statisticians design experiments for new products, conduct focus groups and sample surveys to gather consumer feedback, and perform field experiments in test markets to determine product viability and marketability. Statistics and data mining are also used to analyze sales data and predict future trends.



W. Edwards Deming (1900–1993) was a pioneer of quality control and was best known for his work in post-World War II Japan. He was a professor of statistics at several universities and gave seminars on quality control, sampling, and productivity to top industrial executives around the world.



John Tukey (1915–2000) applied mathematical and theoretical statistics to a variety of scientific and engineering disciplines. In addition, he is credited with coining the term “bit,” a contraction of “binary digit,” which refers to a unit of information processed by a computer.

Engineering

Engineers work in electronics, chemicals, aerospace, pollution control, construction, and other industries. They may be responsible for leading large projects with significant costs, technical complexity, and responsibility. Statistical methods allow engineers to make a consistent product, detect problems, minimize chemical waste, and predict product life.



Statistical Computing

Reliable and accurate statistical software is arguably the most important tool available to statisticians in every field. Developing code that is both user-friendly and sufficiently complex is a challenging task, as is exploiting the rapidly occurring improvements in hardware platforms, graphics, and algorithms. Opportunities in this field include software design and development, software testing, quality assurance, technical support, education, documentation, marketing, and sales.



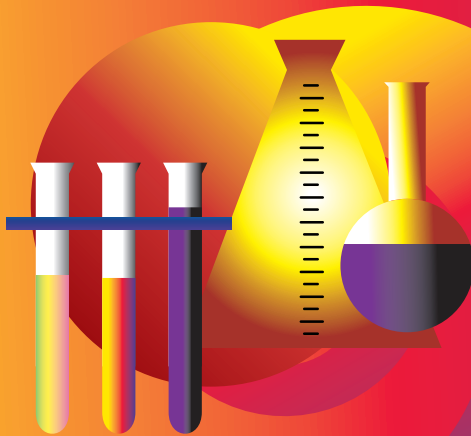
Health and Medicine

Epidemiology

Epidemiological statisticians work on projects such as calculating cancer incidence rates or the rates of chronic and infectious diseases, monitoring and reporting on disease outbreaks, and monitoring changes in health-related behaviors such as smoking and physical activity. Fields of practice include nutritional, environmental, genetic, and social epidemiology, as well as pharmacoepidemiology.

Public Health

Public health statisticians work on preventing disease, prolonging life, and promoting health through organized community efforts. These include sanitation, control of contagious infections, hygiene education, early diagnosis and preventive treatment, and adequate living standards. This requires understanding of epidemiology, nutrition, antiseptic practices, and social science. In the United States, public health is studied and coordinated on a national level by the Centers for Disease Control and Prevention; internationally, the World Health Organization plays an equivalent role.



Florence Nightingale (1820–1910) was a member of the Royal Statistical Society and one of the first people to collect statistics on health policy. She was also a pioneer for women statisticians. Her work led to health policy reforms in 19th century Britain and saved the lives of countless British soldiers.

Pharmacology

Statisticians in pharmacology work in pharmaceuticals, animal health, and government research. They are key to all aspects of drug discovery, development, approval, and marketing. They work in pre-clinical research, clinical trials, epidemiology, health economics, and market research. Statisticians are essential in the drug development process because they ensure the validity and accuracy of findings at all stages of the process.



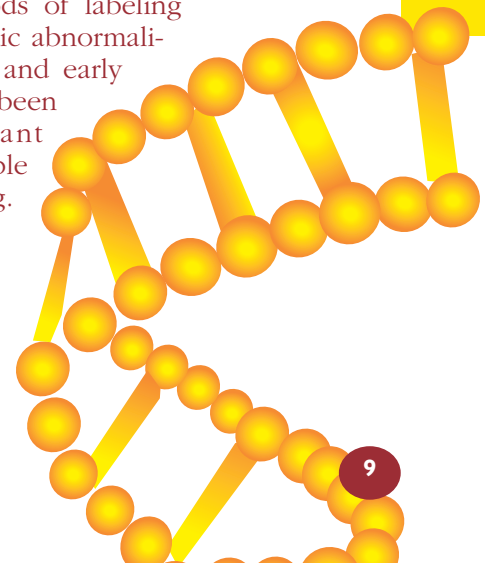
“ I regularly collaborate with epidemiologists, ecologists, biologists, environmental scientists, geographers, and medical doctors. A background in statistics offers me the ability to work with others in a variety of areas, and allows me to contribute to scientific developments in each one. ”

— Lance Waller, Emory University



Genetics

Statistics has been used in human genetics to create automated methods of labeling possible indicators of genetic abnormalities, such as birth defects and early aging. Statistics has also been used in animal and plant genetics to breed desirable characteristics in offspring. Using complex statistical models, statisticians aid in formulating sound decisions by distinguishing between environmental and genetic effects.



“Learning is not compulsory...neither is survival.”

W. Edwards Deming



Learning

Education

Education is one of the country's biggest industries and the tasks that the educational statistician can choose to undertake are diverse. Statisticians teach students from kindergarten through doctoral programs. They may help assess teacher effectiveness, analyze a large database to understand a particular issue, or develop better statistical models to represent the amount of learning attained by one student or by all students in a school district, state, or nation.

Science Writing and Journalism

Science writers are employed by the mass media, universities, and corporations to produce news briefs, articles, news releases, and other reports. Writers with scientific backgrounds are especially in demand because of their ability to explain complicated statistical or scientific data in easy-to-understand articles for nonstatisticians and the general public.

“Whether we are measuring fish crackers, counting Skittles to construct confidence intervals, catapulting gummy bears in a unit on design of experiments, or comparing the color counts of M&Ms, students are engaged in gathering, analyzing, and thinking about data. When they compose and then revise their survey questions and experience the struggles of getting a random sample and then organizing all that data so that it makes sense to others, there is excitement and genuine interest.”

– Gretchen Davis, High School Teacher





Research

Government

Statistical methods are used in government regulation on topics such as stock trading rules, air purity standards, and new drug approvals. Statistics are cited in court proceedings, congressional hearings, and lobbying arguments. Politics involve statistics in the form of approval rating surveys, voter registration, campaigning, and election predictions. Statisticians participate in government agencies such as the Food and Drug Administration, the Census Bureau, the Bureau of Labor Statistics, the Office of Management and Budget, the Bureau of Transportation Statistics, the National Institutes of Health, and the Department of Agriculture. Federal agencies provide data that are used in making federal, state, and local government policies.



Janet Norwood was the first woman Commissioner of the U.S. Bureau of Labor Statistics. She has made major contributions to government statistics, especially the Consumer Price Index and unemployment statistics. She also served as president of ASA in 1989, was a Senior Fellow at the Urban Institute, and is currently a Counselor and Senior Fellow at the New York Conference Board.

Survey Methods

Statisticians work on surveys in government, the social sciences, education, law, forestry, agriculture, biology, medicine, business, and e-commerce. A survey statistician might study efficient survey design, experimental methods for increasing response rates, accounting for nonresponse and undercoverage, or how to release data to the public while maintaining the confidentiality of respondents. Other important issues include question wording and design and deciding where and how to take samples that will include traditionally under-represented groups.



Social Sciences

Consulting

Independent statistical consultants work on many of the same projects as other statisticians, but they usually are hired on a temporary basis to solve a specific problem that requires statistical expertise not available within the hiring company. Since the field of statistics is so broad, many statistical consultants specialize in some area, such as quality improvement or pharmaceuticals. Consultants may be hired with grant money to work on short-term projects in medicine, agriculture, engineering, or business.

Law

Statistics are becoming more and more important as court cases address increasingly complex problems. Sometimes the statistician analyzes data that can help the jury or judge decide whether someone is guilty of a crime or must pay damages for causing injuries. Court cases involving statistical analyses include DNA testing, salary discrepancies, consumer surveys, and disease clusters.



Natural Resources

Agriculture

Statisticians have teamed up with experts in agriculture in order to study a number of challenging questions, including chemical pesticides, hydrogeology, veterinary sciences, genetics, and crop management. Statisticians are involved in studies ranging from small laboratory experiments to large projects conducted over many hundreds or thousands of square miles. They work on data from the smallest scale of organisms, like viruses and bacteria, to plants, insects, animals, and humans. They work with scientists from fields such as bacteriology, genetics, biochemistry, dairy science, environmental studies, entomology, plant sciences, rural sociology, veterinary medicine, wildlife, and ecology.

Ecology

Statisticians play a major role in addressing questions about the earth's natural environment, including animal populations, agricultural protections, and fertilizer and pesticide safety. Most states employ wildlife statisticians. Statisticians are employed by state and federal environmental agencies as well as companies that collect environmental data. Increasingly, companies need statisticians to help assess how a new product or plant will affect the surrounding environment. Scientific researchers also work with statisticians, often at universities, to design experiments that will answer basic questions about the environment.





American Statistical Association

How to become a statistician

Many education and career paths can lead to becoming a statistician. They all focus on relevant education and training as keys to success in the field. Employment opportunities provide statisticians with professional flexibility, exciting opportunities, and rewarding, challenging, and lucrative careers.

Education and Training

Statisticians typically study statistics, mathematics, and/or some related field of statistical application. A comprehensive list of Schools Offering Degrees in Statistics is available at www.amstat.org/education/sods. More and more opportunities are available for statisticians with bachelor's degrees. Many jobs, however, require either a master's degree or doctorate.

Continuing education is available through the American Statistical Association at events like the Joint Statistical Meetings and traveling "LearnSTAT" courses. Employers often encourage, or even require, their employees to earn continuing education credits.

Skills

Statisticians often develop skills in a particular field of study, such as medicine, public policy, economics, biology, psychology, or agriculture.

Language and communication skills are important because statisticians must convey the results of their investigations in oral and/or written reports. The ability to explain findings clearly and concisely is essential and requires knowledge of grammar and comprehensive writing skills.

Employment Prospects

The demand for statisticians is currently high and is growing. According to the Occupational Outlook Handbook, published by the Bureau of Labor Statistics, the number of nonacademic jobs for statisticians is expected to increase through 2008. Furthermore, colleges and universities will be hiring more and more faculty members in statistical fields. Salaries and opportunities for advancement are competitive and reflect the current demand.

Resources

Print Brochures

Careers in Statistics

www.amstat.org/careers/brochure.html

Women in Statistics

www.amstat.org/careers/womenstat.html

Minorities in Statistics

www.amstat.org/careers/minorities.html

Careers in Statistics: Business and Industry

www.amstat.org/careers/bicareers.html

Careers in Statistics: Government

www.amstat.org/careers/govtcareers.html

Careers in Statistics: Health and Medicine

www.amstat.org/careers/bmcareers.html

Online Brochures

Committee of Presidents of Statistical Societies (COPSS)

www.amstat.org/careers/copss/

What Is a Survey? Series

www.amstat.org/sections/srms/whatsurvey.html

More Resources

“**Careers in Statistics: Possibilities and Opportunities**” –animated PowerPoint slide show that provides an overview of the field of statistics and highlights the opportunities available to those who become statisticians

Careers in Statistics issue of *Amstat News* –annual September issue including biographies of famous statisticians, career advice, and “Day in the Life” articles of current practicing statisticians

“**Career Corner**” articles in *Amstat News* –monthly articles highlighting a topic of importance to students of statistics and young statisticians

Schools Offering Degrees in Statistics

www.amstat.org/education/sods

Jobs in Statistics

<http://jobs.amstat.org/>

Internships

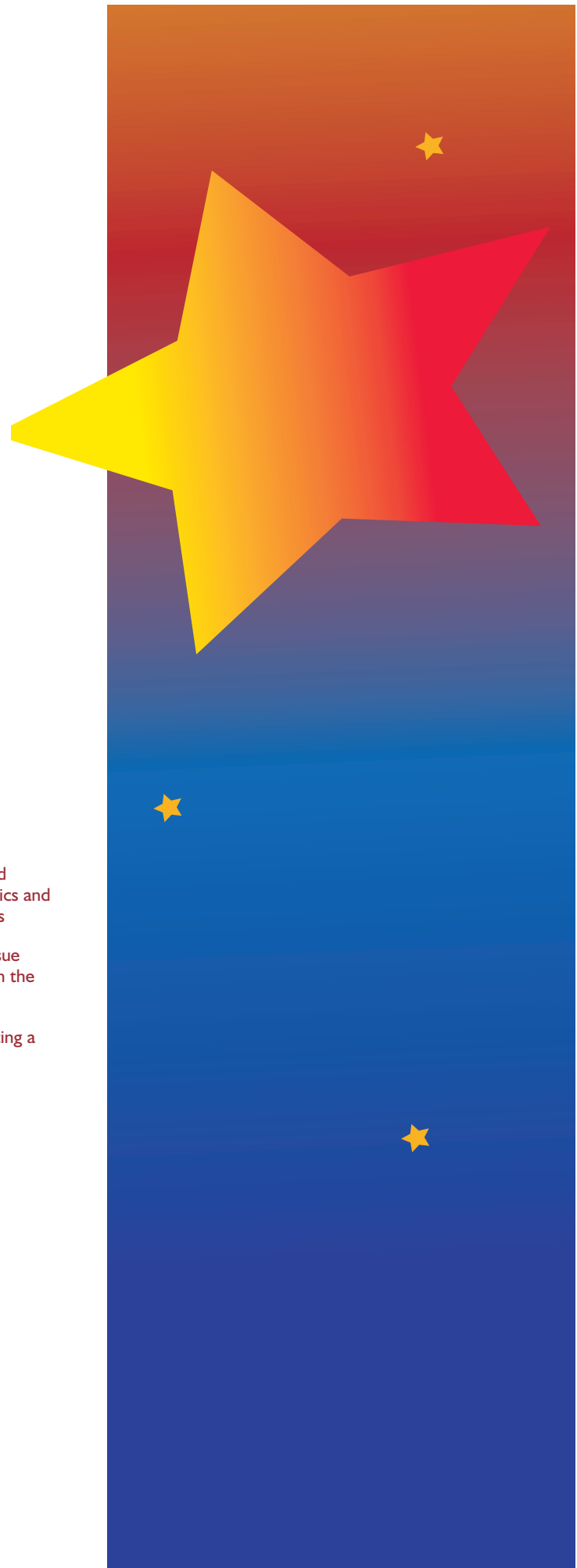
www.amstat.org/education/internships.html

Fellowships and Grants

www.amstat.org/research_grants

Salary Reports

www.amstat.org/profession







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