



Science Technician Overview

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The Field

Science technicians use the principles and theories of science and mathematics to solve problems in research and development and to help invent and improve products and processes. However, their jobs are more practically oriented than those of scientists. Technicians set up, operate, and maintain laboratory instruments, monitor experiments, make observations, calculate and record results, and often develop conclusions. They must keep detailed logs of all of their work. Those who perform production work monitor manufacturing processes and may ensure quality by testing products for proper proportions of ingredients, for purity, or for strength and durability.



As laboratory instrumentation and procedures have become more complex, the role of science technicians in research and development has expanded. In addition to performing routine tasks, many technicians, under the direction of scientists, now develop and adapt laboratory procedures to achieve the best results, interpret data, and devise solutions to problems. Technicians must develop expert knowledge of laboratory equipment so that they can adjust settings when necessary and recognize when equipment is malfunctioning.

Most science technicians specialize, learning their skills and working in the same disciplines in which scientists work. Occupational titles, therefore, tend to follow the same structure as those for scientists. Other science technicians perform a wide range of activities. Some collect weather information or assist oceanographers; others work as laser technicians or radiographers.

Specialty Areas

There are several specialty areas and occupational titles within science technology. Each is profiled separately on the Sloan Career Cornerstone Center.

- ▶ Agricultural and Food Science Technology
- ▶ Biology Technology
- ▶ Chemical Technology
- ▶ Environmental Science and Protection Technology
- ▶ Forensic Science Technology
- ▶ Forest and Conservation Technology
- ▶ Geological and Petroleum Technology

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Preparation

Most science technicians need an associate degree or a certificate in applied science or science-related technology. Biological and forensic science technicians usually need a bachelor's degree. Science technicians with a high school diploma and no college degree typically begin work as trainees under the direct supervision of a more experienced technician, and eventually earn a 2-year degree in science technology.



There are several ways to qualify for a job as a science technician. Many employers prefer applicants who have at least 2 years of specialized training or an associate degree in applied science or science-related technology. Because employers' preferences vary, however, some science technicians have a bachelor's degree in chemistry, biology, or forensic science or have completed several science and math courses at a 4-year college.

Most biological technician jobs, for example, require a bachelor's degree in biology or a closely related field. Forensic science positions also typically require a bachelor's degree to work in the field. Knowledge and understanding of legal procedures also can be helpful. Chemical technician positions in research and development also often have a bachelor's degree, but most chemical process technicians have a 2-year degree instead, usually an associate degree in process technology. In some cases, a high school diploma is sufficient. These workers usually receive additional on-the-job training. Entry-level workers whose college training encompasses extensive hands-on experience with a variety of diagnostic laboratory equipment generally require less on-the-job training.

Whatever their degree, science technicians usually need hands-on training either in school or on the job. Most can get good career preparation through 2-year formal training programs that combine the teaching of scientific principles and theory with practical hands-on application in a laboratory setting with up-to-date equipment. Graduates of bachelor's degree programs in science who have considerable experience in laboratory-based courses, have completed internships, or have held summer jobs in laboratories also are well qualified for science technician positions and are preferred by some employers.



Job candidates, who have extensive hands-on experience with a variety of laboratory equipment, including computers and related equipment, usually require a short period of on-the-job training. Those with a high school diploma and no college degree typically begin work as trainees under the direct supervision of a more experienced technician. Many with a high school diploma eventually earn a 2-year degree in science technology, often paid for by their employer.

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Many technical and community colleges offer associate degrees in a specific technology or more general education in science and mathematics. A number of associate degree programs are designed to provide easy transfer to bachelor's degree programs at colleges or universities. Technical institutes usually offer technician training, but they provide less theory and general education than do community colleges. The length of programs at technical institutes varies, although 1-year certificate programs and 2-year associate degree programs are common. Prospective forestry and conservation technicians can choose from more than 20 associate degree programs in forest technology accredited by the Society of American Foresters.

Approximately 30 colleges and universities offer a bachelor's degree program in forensic science; about another 25 schools offer a bachelor's degree in a natural science with an emphasis on forensic science or criminology; a few additional schools offer a bachelor's degree with an emphasis in a specialty area, such as criminology, pathology, jurisprudence, investigation, odontology, toxicology, or forensic accounting.

Some schools offer cooperative-education or internship programs, allowing students the opportunity to work at a local company or some other workplace while attending classes during alternate terms. Participation in such programs can significantly enhance a student's employment prospects.

People interested in careers as science technicians should take as many high school science and math courses as possible. Science courses taken beyond high school, in an associate or bachelor's degree program, should be laboratory oriented, with an emphasis on bench skills. A solid background in applied chemistry, physics, and math is vital.

Communication skills are important because technicians are often required to report their findings both orally and in writing. In addition, technicians should be able to work well with others. Because computers often are used in research and development laboratories, technicians should also have strong computer skills, especially in computer modeling. Organizational ability, an eye for detail, and skill in interpreting scientific results are important as well, as are a high mechanical aptitude, attention to detail, and analytical thinking.

Technicians usually begin work as trainees in routine positions under the direct supervision of a scientist or a more experienced technician. As they gain experience, technicians take on more responsibility and carry out assignments under only general supervision, and some eventually become supervisors. However, technicians employed at universities often have job prospects tied to those of particular professors; when those professors retire or leave, these technicians face uncertain employment prospects.



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Day in the Life

Science technicians work under a wide variety of conditions. Most work indoors, usually in laboratories, and have regular hours. Some occasionally work irregular hours to monitor experiments that cannot be completed during regular working hours. Production technicians often work in 8-hour shifts around the clock. Others, such as agricultural, forest and conservation, geological and petroleum, and environmental science and protection technicians, perform much of their work outdoors, sometimes in remote locations.



Advances in automation and information technology require technicians to operate more sophisticated laboratory equipment. Science technicians make extensive use of computers, electronic measuring equipment, and traditional experimental apparatus.

Some science technicians may be exposed to hazards from equipment, chemicals, or toxic materials. Chemical technicians sometimes work with toxic chemicals or radioactive isotopes; nuclear technicians may be exposed to radiation, and biological technicians sometimes work with disease-causing organisms or radioactive agents. Forensic science technicians often are exposed to human body fluids and firearms. However, these working conditions pose little risk if proper safety procedures are followed. For forensic science technicians, collecting evidence from crime scenes can be distressing and unpleasant.

Earnings

According to the U.S. Bureau of Labor Statistics, the median hourly earnings of science technicians is as follows:

Geological and petroleum technicians	\$22.19
Forensic science technicians	\$21.79
Chemical technicians	\$18.87
Environmental science and protection technicians, including health	\$18.31
Biological technicians	\$17.17
Agricultural and food science technicians	\$15.26
Forest and conservation technicians	\$14.84

In 2007, the average annual salary in the Federal Government was \$40,629 for biological science technicians; \$53,026 for physical science technicians; \$40,534 for forestry technicians; \$54,081 for geodetic technicians; \$50,337 for hydrologic technicians; and \$63,396 for meteorological technicians.

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Employment

Science technicians hold about 267,000 jobs in the United States. As indicated by the following tabulation, chemical and biological technicians accounted for 52 percent of all jobs:

Biological technicians	79,000
Chemical technicians	61,000
Environmental science and protection technicians, including health	37,000
Forest and conservation technicians	34,000
Agricultural and food science technicians	26,000
Forensic science technicians	13,000
Geological and petroleum technicians	12,000

About 30 percent of biological technicians work in professional, scientific, or technical services firms; most other biological technicians work in educational services, Federal, State, and local governments, or pharmaceutical and medicine manufacturing. Chemical technicians hold jobs in a wide range of manufacturing and service-providing industries. About 39 percent work in chemical manufacturing and another 30 percent work in professional, scientific, or technical services firms. Most environmental science and protection technicians work for State and local governments and professional, scientific, and technical services firms. About 76 percent of forest and conservation technicians hold jobs in the Federal Government, mostly in the Forest Service; another 17 percent work for State governments. Around 32 percent of agricultural and food science technicians work in educational services and 20 percent work for food processing companies; most of the rest are employed in agriculture. Forensic science technicians work primarily for State and local governments. Approximately 37 percent of all geological and petroleum technicians work for oil and gas extraction companies.



Career Path Forecast

According to the U.S. Bureau of Labor Statistics, employment of science technicians is projected to grow about as fast as the average, although employment change will vary by specialty. Job opportunities are expected to be best for graduates of applied science technology programs who are well trained on equipment used in laboratories or production facilities. Overall employment of science technicians is expected to grow 12 percent during the 2006-16 decade, about as fast as the average for all occupations. The continued growth of scientific and medical research -- particularly research related to biotechnology -- will be the primary driver of employment growth, but the development and production of technical products should also stimulate demand for science technicians in many industries.



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Employment of biological technicians should increase faster than the average, as the growing number of agricultural and medicinal products developed with the use of biotechnology techniques boosts demand for these workers. Also, an aging population and stronger competition among pharmaceutical companies are expected to contribute to the need for innovative and improved drugs, further spurring demand. Most growth in employment will be in professional, scientific, and technical services and in educational services.



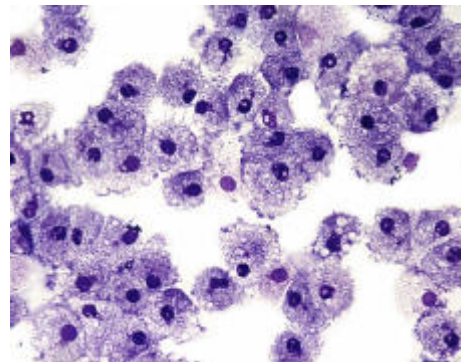
Job growth for chemical technicians is projected to grow more slowly than the average. The chemical manufacturing industry, except pharmaceutical and medicine manufacturing, is anticipated to experience a decline in overall employment as companies downsize and turn to outside contractors to provide specialized services. Some of these contractors will be in other countries with lower average wages, further limiting employment growth. An increasing focus on quality assurance will require a greater number of process technicians, however, stimulating demand for these workers.

Employment of environmental science and protection technicians is expected to grow much faster than the average; these workers will be needed to help regulate waste products; to collect air, water, and soil samples for measuring levels of pollutants; to monitor compliance with environmental regulations; and to clean up contaminated sites. Over 80 percent of this growth is expected to be in professional, scientific, and technical services as environmental monitoring, management, and regulatory compliance increase.



An expected decline in employment of forest and conservation technicians within the Federal Government will lead to little or no change in employment in this specialty, due to budgetary constraints and continued reductions in demand for timber management on Federal lands. However, opportunities at State and local governments within specialties such as urban forestry may provide some new jobs. In addition, an increased emphasis on specific conservation issues, such as environmental protection, preservation of water resources, and control of exotic and invasive pests, may provide some employment opportunities.

Employment of agricultural and food science technicians is projected to grow about as fast as the average. Research in biotechnology and other areas of agricultural science will increase as it becomes more important to balance greater agricultural output with protection and preservation of soil, water, and the ecosystem. In particular, research will be needed to combat insects and diseases as they adapt to pesticides and as soil fertility and water quality continue to need improvement.



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Jobs for forensic science technicians are expected to increase much faster than the average. Employment growth in State and local government should be driven by the increasing application of forensic science to examine, solve, and prevent crime. Crime scene technicians who work for State and county crime labs should experience favorable employment prospects resulting from strong job growth.

Average employment growth is expected for geological and petroleum technicians. Job growth should be strongest in professional, scientific, and technical services firms because geological and petroleum technicians will be needed to assist environmental scientists and geoscientists as they provide consultation services for companies regarding environmental policy and Federal Government mandates, such as those requiring lower sulfur emissions.

In addition to job openings created by growth, many openings should arise from the need to replace technicians who retire or leave the labor force for other reasons. Job opportunities are expected to be best for graduates of applied science technology programs who are well trained on equipment used in laboratories or production facilities. As the instrumentation and techniques used in industrial research, development, and production become increasingly more complex, employers will seek individuals with highly developed technical skills. Good communication skills are also increasingly sought by employers.

Job opportunities vary by specialty. The best opportunities for agricultural and food science technicians will be in agricultural biotechnology, specifically in research and development on biofuels. Geological and petroleum technicians should experience little competition for positions because of the relatively small number of new entrants. Forensic science technicians with a bachelor's degree in a forensic science will enjoy much better opportunities than those with an associate degree. During periods of economic recession, science technicians may be laid off.

Professional Organizations

Professional societies provide an excellent means of keeping current and in touch with other professionals in the field. These groups can play a key role in your development and keep you abreast of what is happening in your field. Associations promote the interests of their members and provide a network of contacts that can help you find jobs and move your career forward. They can offer a variety of services including job referral services, continuing education courses, insurance, travel benefits, periodicals, and meeting and conference opportunities. The following is a partial list of professional associations serving science technicians.

- ▶ **American Academy of Forensic Sciences (www.aafs.org)**
- ▶ **American Association of Petroleum Geologists (www.aapg.org)**
- ▶ **American Chemical Society (www.acs.org)**
- ▶ **American Geological Institute (www.agiweb.org)**
- ▶ **American Society of Agronomy (www.agronomy.org)**
- ▶ **Association for Women Geoscientists (www.awg.org)**
- ▶ **Crop Science Society of America (www.crops.org)**
- ▶ **Institute of Food Technologists (www.ift.org)**
- ▶ **National Registry of Environmental Professionals (www.nrep.org)**
- ▶ **Society of American Foresters (www.safnet.org)**
- ▶ **Society of Petroleum Engineers (www.spe.org)**
- ▶ **Soil Science Society of America (www.soils.org)**

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