

# Highest Paying Jobs That Require A Graduate Degree

## Table of Contents

<b><u>Physicians</u></b>	02
<b><u>Dentists</u></b>	08
<b><u>Professors</u></b>	11
<b><u>Lawyers</u></b>	19
<b><u>Optometrists</u></b>	27
<b><u>Judges</u></b>	30
<b><u>Physicists / Astronomers</u></b>	35
<b><u>Financial Managers</u></b>	40
<b><u>Chiropractors</u></b>	46
<b><u>Chemists</u></b>	50
<b><u>Pharmacists</u></b>	55
<b><u>Geologists</u></b>	60
<b><u>Economists</u></b>	66
<b><u>Psychologists</u></b>	71
<b><u>Speech Therapists</u></b>	77
<b><u>Management Analysts</u></b>	81
<b><u>Medical Scientists</u></b>	86
<b><u>Urban Planners</u></b>	91
<b><u>Physical Therapists</u></b>	95

*Data Compiled from the Federal Government's Bureau of Labor Statistics  
for the Year 2002 by [Resumagic.com](http://Resumagic.com)*

**Significant Points**

- Many physicians and surgeons work long, irregular hours; almost one-third of physicians worked 60 or more hours a week in 2002.
- New physicians are much less likely to enter solo practice and more likely to work as salaried employees of group medical practices, clinics, hospitals, or health networks.
- Formal education and training requirements are among the most demanding of any occupation, but earnings are among the highest.

**Nature of the Work**

Physicians and surgeons serve a fundamental role in our society and have an effect upon all our lives. They diagnose illnesses and prescribe and administer treatment for people suffering from injury or disease. Physicians examine patients, obtain medical histories, and order, perform, and interpret diagnostic tests. They counsel patients on diet, hygiene, and preventive healthcare.

There are two types of physicians: M.D.—Doctor of Medicine—and D.O.—Doctor of Osteopathic Medicine. M.D.s also are known as allopathic physicians. While both M.D.s and D.O.s may use all accepted methods of treatment, including drugs and surgery, D.O.s place special emphasis on the body's musculoskeletal system, preventive medicine, and holistic patient care. D.O.s are more likely than M.D.s to be primary care specialists although they can be found in all specialties. About half of D.O.s practice general or family medicine, general internal medicine, or general pediatrics.

Physicians work in one or more of several specialties, including, but not limited to, anesthesiology, family and general medicine, general internal medicine, general pediatrics, obstetrics and gynecology, psychiatry, and surgery.

**Anesthesiologists.** Anesthesiologists focus on the care of surgical patients and pain relief. Like other physicians, they evaluate and treat patients and direct the efforts of those on their staffs. Anesthesiologists confer with other physicians and surgeons about appropriate treatments and procedures before, during, and after operations. These critical specialists are responsible for maintenance of the patient's vital life functions—heart rate, body temperature, blood pressure, breathing—through continual monitoring and assessment during surgery.

**Family and general practitioners.** Family and general practitioners are often the first point of contact for people seeking health care, acting as the traditional family doctor. They assess and treat a wide range of conditions, ailments, and injuries, from sinus and respiratory infections to broken bones and scrapes. Family and general practitioners typically have a patient base of regular, long-term visitors. Patients with more serious conditions are referred to specialists or other healthcare facilities for more intensive care.

**General internists.** General internists diagnose and provide non-surgical treatment for diseases and injuries of internal organ systems. They provide care mainly for adults who have a wide range of problems associated with the internal organs, such as the stomach, kidneys, liver, and digestive tract. Internists use a variety of diagnostic techniques to treat patients through medication or hospitalization. Like general practitioners, general internists are commonly looked upon as primary care specialists. They have patients referred to them by other specialists, in turn referring patients to those and yet other specialists when more complex care is required.

**General pediatricians.** Providing care from birth to early adulthood, pediatricians are concerned with the health of infants, children, and teenagers. They specialize in the diagnosis and treatment of a variety of ailments specific to young people and track their patients' growth to adulthood. Like most physicians, pediatricians work with different healthcare workers, such as nurses and other physicians, to assess and treat children with various ailments, such as muscular dystrophy. Most of the work of pediatricians, however, involves treating day-to-day illnesses that are common to children—minor injuries, infectious diseases, and immunizations—much as a general practitioner treats adults. Some pediatricians specialize in serious medical conditions and pediatric surgery, treating autoimmune disorders or serious chronic ailments.

**Obstetricians and gynecologists.** Obstetricians and gynecologists (ob/gyns) are specialists whose focus is women's health. They are responsible for general medical care for women, but also provide care related to pregnancy and the reproductive system. Like general practitioners, ob/gyns are concerned with the prevention, diagnosis, and treatment of general health problems, but they focus on ailments specific to the female anatomy, such as breast and cervical cancer, urinary tract and pelvic disorders, and hormonal disorders. Ob/gyns also specialize in childbirth, treating and counseling women throughout their pregnancy, from giving prenatal diagnoses to delivery and postpartum care. Ob/gyns track the health of, and treat, both mother and fetus as the pregnancy progresses.

**Psychiatrists.** Psychiatrists are the primary caregivers in the area of mental health. They assess and treat mental illnesses through a combination of psychotherapy, psychoanalysis, hospitalization, and medication. Psychotherapy involves regular discussions with patients about their problems; the psychiatrist helps them find solutions through changes in their behavioral patterns, the exploration of their experiences, and group and family therapy sessions. Psychoanalysis involves long-term psychotherapy and counseling for patients. In many cases, medications are administered to correct chemical imbalances that may be causing emotional problems. Psychiatrists may also administer electroconvulsive therapy to those of their patients who do not respond to, or who cannot take, medications.

**Surgeons.** Surgeons are physicians who specialize in the treatment of injury, disease, and deformity through operations. Using a variety of instruments, and with patients under general or local anesthesia, a surgeon corrects physical deformities, repairs bone and tissue after injuries, or performs preventive surgeries on patients with debilitating diseases or disorders. Although a large number perform general surgery, many surgeons choose to specialize in a specific area. One of the most prevalent specialties is orthopedic surgery: the treatment of the skeletal system and associated organs. Others include neurological surgery (treatment of the brain and nervous system), ophthalmology (treatment of the eye), orthopedic surgery, otolaryngology (treatment of the ear, nose, and throat), and plastic or reconstructive

surgery. Like primary care and other specialist physicians, surgeons also examine patients, perform and interpret diagnostic tests, and counsel patients on preventive health care.

A number of other medical specialists, including allergists, cardiologists, dermatologists, emergency physicians, gastroenterologists, pathologists, and radiologists, also work in clinics, hospitals, and private offices.

### **Working Conditions**

Many physicians—primarily general and family practitioners, general internists, pediatricians, ob/gyns, and psychiatrists—work in small private offices or clinics, often assisted by a small staff of nurses and other administrative personnel. Increasingly, physicians are practicing in groups or healthcare organizations that provide backup coverage and allow for more time off. These physicians often work as part of a team coordinating care for a population of patients; they are less independent than solo practitioners of the past.

Surgeons and anesthesiologists typically work in well-lighted, sterile environments while performing surgery and often stand for long periods. Most work in hospitals or in surgical outpatient centers. Many physicians and surgeons work long, irregular hours. Almost one-third of physicians worked 60 hours or more a week in 2002. Physicians and surgeons must travel frequently between office and hospital to care for their patients. Those who are on call deal with many patients' concerns over the phone and may make emergency visits to hospitals or nursing homes.

### **Employment**

Physicians and surgeons held about 583,000 jobs in 2002; approximately 1 out of 6 was self-employed. About half of salaried physicians and surgeons were in office-based practice, and almost a quarter were employed by hospitals. Others practiced in Federal, State, and local government; educational services; and outpatient care centers.

A growing number of physicians are partners or salaried employees of group practices. Organized as clinics or as associations of physicians, medical groups can afford expensive medical equipment and realize other business advantages.

The New England and Middle Atlantic States have the highest ratio of physicians to population; the South Central States have the lowest. D.O.s are more likely than M.D.s to practice in small cities and towns and in rural areas. M.D.s tend to locate in urban areas, close to hospital and education centers.

### **Training, Other Qualifications, and Advancement**

It takes many years of education and training to become a physician: 4 years of undergraduate school, 4 years of medical school, and 3 to 8 years of internship and residency, depending on the specialty selected. A few medical schools offer a combined undergraduate and medical school programs that last 6 rather than the customary 8 years.

Premedical students must complete undergraduate work in physics, biology, mathematics, English, and inorganic and organic chemistry. Students also take courses in the humanities and the social sciences. Some students volunteer at local hospitals or clinics to gain practical experience in the health professions.

The minimum educational requirement for entry into a medical school is 3 years of college; most applicants, however, have at least a bachelor's degree, and many have advanced degrees. There are 146 medical schools in the United States—126 teach allopathic medicine and award a Doctor of Medicine (M.D.) degree; 20 teach osteopathic medicine and award the Doctor of Osteopathic Medicine (D.O.) degree. Acceptance to medical school is highly competitive. Applicants must submit transcripts, scores from the Medical College Admission Test, and letters of recommendation. Schools also consider applicants' character, personality, leadership qualities, and participation in extracurricular activities. Most schools require an interview with members of the admissions committee.

Students spend most of the first 2 years of medical school in laboratories and classrooms, taking courses such as anatomy, biochemistry, physiology, pharmacology, psychology, microbiology, pathology, medical ethics, and laws governing medicine. They also learn to take medical histories, examine patients, and diagnose illnesses. During their last 2 years, students work with patients under the supervision of experienced physicians in hospitals and clinics, learning acute, chronic, preventive, and rehabilitative care. Through rotations in internal medicine, family practice, obstetrics and gynecology, pediatrics, psychiatry, and surgery, they gain experience in the diagnosis and treatment of illness.

Following medical school, almost all M.D.s enter a residency—graduate medical education in a specialty that takes the form of paid on-the-job training, usually in a hospital. Most D.O.s serve a 12-month rotating internship after graduation and before entering a residency, which may last 2 to 6 years.

All States, the District of Columbia, and U.S. territories license physicians. To be licensed, physicians must graduate from an accredited medical school, pass a licensing examination, and complete 1 to 7 years of graduate medical education. Although physicians licensed in one State usually can get a license to practice in another without further examination, some States limit reciprocity. Graduates of foreign medical schools generally can qualify for licensure after passing an examination and completing a U.S. residency.

M.D.s and D.O.s seeking board certification in a specialty may spend up to 7 years in residency training, depending on the specialty. A final examination immediately after residency or after 1 or 2 years of practice also is necessary for certification by the American Board of Medical Specialists or the American Osteopathic Association. There are 24 specialty boards, ranging from allergy and immunology to urology. For certification in a subspecialty, physicians usually need another 1 to 2 years of residency.

A physician's training is costly. More than 80 percent of medical students borrow money to cover their expenses.

People who wish to become physicians must have a desire to serve patients, be self-motivated, and be able to survive the pressures and long hours of medical education

and practice. Physicians also must have a good bedside manner, emotional stability, and the ability to make decisions in emergencies. Prospective physicians must be willing to study throughout their career in order to keep up with medical advances.

### **Job Outlook**

Employment of physicians and surgeons will grow about as fast as the average for all occupations through the year 2012 due to continued expansion of the health services industries. The growing and aging population will drive overall growth in the demand for physician services, as consumers continue to demand high levels of care using the latest technologies, diagnostic tests, and therapies.

Demand for physicians' services is highly sensitive to changes in consumer preferences, healthcare reimbursement policies, and legislation. For example, if changes to health coverage result in consumers facing higher out-of-pocket costs, they may demand fewer physician services. Demand for physician services may also be tempered by patients relying more on other healthcare providers—such as physician assistants, nurse practitioners, optometrists, and nurse anesthetists—for some healthcare services. In addition, new technologies will increase physician productivity. Telemedicine will allow physicians to treat patients or consult with other providers remotely. Increasing use of electronic medical records, test and prescription orders, billing, and scheduling will also improve physician productivity.

Opportunities for individuals interested in becoming physicians and surgeons are expected to be favorable. Reports of shortages in some specialties or geographic areas should attract new entrants, encouraging schools to expand programs and hospitals to expand available residency slots. However, because physician training is so lengthy, employment change happens gradually. In the short term, to meet increased demand, experienced physicians may work longer hours, delay retirement, or take measures to increase productivity, such as using more support staff to provide services. Opportunities should be particularly good in rural and low-income areas, because some physicians find these areas unattractive due to lower earnings potential, isolation from medical colleagues, or other reasons.

Unlike their predecessors, newly trained physicians face radically different choices of where and how to practice. New physicians are much less likely to enter solo practice and more likely to take salaried jobs in group medical practices, clinics, and health networks.

### **Earnings**

Physicians have among the highest earnings of any occupation. According to the Medical Group Management Association's Physician Compensation and Production Survey, median total compensation for physicians in 2002 varied by specialty, as shown in table 1. Total compensation for physicians reflects the amount reported as direct compensation for tax purposes, plus all voluntary salary reductions. Salary, bonus and/or incentive payments, research stipends, honoraria, and distribution of profits were included in total compensation.

**Table 1. Total compensation of physicians by specialty, 2002**

<b>Anesthesiology</b>	\$306,964
<b>Surgery, general</b>	255,438
<b>Obstetrics/gynecology</b>	233,061
<b>Psychiatry</b>	163,144
<b>Internal medicine</b>	155,530
<b>Pediatrics/adolescent medicine</b>	152,690
<b>Family practice (without obstetrics)</b>	150,267
Footnotes:	
(1) SOURCE: Medical Group Management Association, Physician Compensation and Production Report, 2003.	

Self-employed physicians—those who own or are part owners of their medical practice—generally have higher median incomes than salaried physicians. Earnings vary according to number of years in practice, geographic region, hours worked, and skill, personality, and professional reputation. Self-employed physicians and surgeons must provide for their own health insurance and retirement.

### Sources of Additional Information

For a list of medical schools and residency programs, as well as general information on premedical education, financial aid, and medicine as a career, contact:

- Association of American Medical Colleges, Section for Student Services, 2450 N St. NW., Washington, DC 20037-1126. Internet: <http://www.aamc.org>
- American Association of Colleges of Osteopathic Medicine, 5550 Friendship Blvd., Suite 310, Chevy Chase, MD 20815-7231. Internet: <http://www.aacom.org>

For general information on physicians, contact:

- American Medical Association, Department of Communications and Public Relations, 515 N. State St., Chicago, IL 60610. Internet: <http://www.ama-assn.org>
- American Osteopathic Association, Division of Public Relations, 142 East Ontario St., Chicago, IL 60611. Internet: <http://www.aoa-net.org>

For information about various medical specialties, contact:

- American Society of Anesthesiologists, 520 N. Northwest Hwy., Park Ridge, IL 60068-2573. Internet: <http://www.asahq.org>
- American Board of Anesthesiology, 4101 Lake Boone Trail, Suite 510, Raleigh, NC 27607-7506. Internet: <http://www.abanes.org>
- Society of General Internal Medicine, 2501 M St. NW., Suite 575, Washington, DC 20037. Internet: <http://www.sгим.org>

- American Academy of Pediatrics, 141 Northwest Point Blvd., Elk Grove Village, IL 60007-1098. Internet: <http://www.aap.org>
- American Board of Obstetrics and Gynecology, 2915 Vine St., Dallas, TX 75204. Internet: <http://www.abog.org>
- American College of Obstetrics and Gynecologists, 409 12th St. SW., P.O. Box 96920, Washington, DC 20090-6920. Internet: <http://www.acog.org>
- American Psychiatric Association, 1000 Wilson Blvd., Suite 1825, Arlington, VA 22209-3901. Internet: <http://www.psych.org>
- American College of Surgeons, 633 North Saint Clair St., Chicago, IL 60611-3211. Internet: <http://www.facs.org>

Information on Federal scholarships and loans is available from the directors of student financial aid at schools of medicine. Information on licensing is available from State boards of examiners.

## Dentists

[Return to Menu](#)

### Significant Points

- Most dentists are solo practitioners.
- Dentists usually complete at least 8 years of education beyond high school.
- Employment is projected to grow more slowly than average, and most job openings will result from the need to replace the large number of dentists expected to retire.
- Job prospects should be good.

### Nature of Work

Dentists diagnose, prevent, and treat problems with teeth or mouth tissue. They remove decay, fill cavities, examine x rays, place protective plastic sealants on children's teeth, straighten teeth, and repair fractured teeth. They also perform corrective surgery on gums and supporting bones to treat gum diseases. Dentists extract teeth and make models and measurements for dentures to replace missing teeth. They provide instruction on diet, brushing, flossing, the use of fluorides, and other aspects of dental care. They also administer anesthetics and write prescriptions for antibiotics and other medications.

Dentists use a variety of equipment, including x-ray machines, drills, and instruments such as mouth mirrors, probes, forceps, brushes, and scalpels. They wear masks, gloves, and safety glasses to protect themselves and their patients from infectious diseases.

Dentists in private practice oversee a variety of administrative tasks, including bookkeeping and buying equipment and supplies. They may employ and supervise dental hygienists, dental assistants, dental laboratory technicians, and receptionists.

Most dentists are general practitioners, handling a variety of dental needs. Other dentists practice in any of nine specialty areas. **Orthodontists**, the largest group of specialists, straighten teeth by applying pressure to the teeth with braces or

retainers. The next largest group, **oral and maxillofacial surgeons**, operates on the mouth and jaws. The remainder may specialize as **pediatric dentists** (focusing on dentistry for children); **periodontists** (treating gums and bone supporting the teeth); **prosthodontists** (replacing missing teeth with permanent fixtures, such as crowns and bridges, or removable fixtures, such as dentures); **endodontists** (performing root canal therapy); **public-health dentists** (promoting good dental health and preventing dental diseases within the community); **oral pathologists** (studying oral diseases); or **oral and maxillofacial radiologists** (diagnosing diseases in the head and neck through the use of imaging technologies).

### **Working Conditions**

Most dentists work 4 or 5 days a week. Some work evenings and weekends to meet their patients' needs. Most full-time dentists work between 35 and 40 hours a week, but others work more. Initially, dentists may work more hours as they establish their practice. Experienced dentists often work fewer hours. A considerable number continue in part-time practice well beyond the usual retirement age.

Most dentists are solo practitioners, meaning that they own their own businesses and work alone or with a small staff. Some dentists have partners, and a few work for other dentists as associate dentists.

### **Employment**

Dentists held about 153,000 jobs in 2002. About 2 in 5 dentists were self-employed. Almost all dentists work in private practice. According to the American Dental Association (ADA), about 80 percent of dentists in private practice are sole proprietors, and 13 percent belong to a partnership. A small number of salaried dentists work in hospitals and offices of physicians.

### **Training, Other Qualifications, and Advancement**

All 50 States and the District of Columbia require dentists to be licensed. To qualify for a license in most States, a candidate must graduate from one of the 55 dental schools accredited by the ADA's Commission on Dental Accreditation in 2002 and also must pass written and practical examinations. Candidates may fulfill the written part of the State licensing requirements by passing the National Board Dental Examinations. Individual States or regional testing agencies administer the written or practical examinations.

Dental schools require a minimum of 2 years of college-level predental education, regardless of the major chosen. However, most dental students have at least a bachelor's degree. Predental education emphasizes course work in science, and many applicants to dental school major in a science such as biology or chemistry, while other applicants major in another subject and take many science courses as well. A small number of applicants are accepted to dental school after 2 or 3 years of college and complete their bachelor's degree while attending dental school.

All dental schools require applicants to take the Dental Admissions Test (DAT). When selecting students, schools consider scores earned on the DAT, applicants' grade

point averages, and information gathered through recommendations and interviews. Competition for admission to dental school is keen.

Dental school usually lasts 4 academic years. Studies begin with classroom instruction and laboratory work in basic sciences, including anatomy, microbiology, biochemistry, and physiology. Beginning courses in clinical sciences, including laboratory techniques, also are provided at this time. During the last 2 years, students treat patients, usually in dental clinics, under the supervision of licensed dentists.

Most dental schools award the degree of Doctor of Dental Surgery (DDS). The rest award an equivalent degree, Doctor of Dental Medicine (DMD).

Currently, about 17 States license or certify dentists who intend to practice in a specialty area. Requirements include 2 to 4 years of postgraduate education and, in some cases, the completion of a special State examination. Most State licenses permit dentists to engage in both general and specialized practice. Dentists who want to teach or conduct research usually spend an additional 2 to 5 years in advanced dental training, in programs operated by dental schools or hospitals.

Dentistry requires diagnostic ability and manual skills. Dentists should have good visual memory, excellent judgment regarding space and shape, a high degree of manual dexterity, and scientific ability. Good business sense, self-discipline, and good communication skills are helpful for success in private practice. High school and college students who want to become dentists should take courses in biology, chemistry, physics, health, and mathematics.

Some dental school graduates work for established dentists as associates for a year or two in order to gain experience and save money to equip an office of their own. Most dental school graduates, however, purchase an established practice or open a new one immediately after graduation. According to the ADA, each year about 12 percent of new graduates enroll in postgraduate training programs to prepare for a dental specialty.

### **Job Outlook**

Employment of dentists is expected to grow more slowly than the average for all occupations through 2012. Although employment growth will provide some job opportunities, most jobs will result from the need to replace the large number of dentists projected to retire. Job prospects should be good as new dentists take over established practices or start their own.

Demand for dental care should grow substantially through 2012. As members of the baby-boom generation advance into middle age, a large number will need maintenance on complicated dental work, such as bridges. In addition, elderly people are more likely to retain their teeth than were their predecessors, so they will require much more care than in the past. The younger generation will continue to need preventive checkups despite treatments such as fluoridation of the water supply, which decreases the incidence of tooth decay. However, employment of dentists is not expected to grow as rapidly as the demand for dental services, because, as their practices expand, dentists are likely to hire more dental hygienists and dental assistants to handle routine services.

Dental care will focus more on prevention, including teaching people how to take better care of their teeth. Dentists will increasingly provide care that is aimed at preventing the loss of teeth—rather than simply providing treatments, such as fillings. Improvements in dental technology also will allow dentists to offer more effective and less painful treatment to their patients.

### **Earnings**

Median annual earnings of salaried dentists were \$123,210 in 2002. Earnings vary according to number of years in practice, location, hours worked, and specialty.

Self-employed dentists in private practice tend to earn more than salaried dentists. A relatively large proportion of dentists is self-employed. Like other business owners, these dentists must provide their own health insurance, life insurance, and retirement benefits.

### **Sources of Additional Information**

For information on dentistry as a career, a list of accredited dental schools, and a list of State boards of dental examiners, contact:

- American Dental Association, Commission on Dental Accreditation, 211 E. Chicago Ave., Chicago, IL 60611. Internet: <http://www.ada.org>
- American Dental Education Association, 1625 Massachusetts Ave. NW., Suite 600, Washington, DC 20036. Internet: <http://www.adea.org>

Persons interested in practicing dentistry should obtain the requirements for licensure from the board of dental examiners of the State in which they plan to work.

Prospective dental students should contact the office of student financial aid at the schools to which they apply, in order to obtain information on scholarships, grants, and loans, including Federal financial aid.

## Professors (Teachers—Postsecondary)

[Return to Menu](#)

### **Significant Points**

- Opportunities for college and university teaching jobs are expected to improve, but many new openings will be for part-time or non-tenure-track positions.
- Prospects for teaching jobs will continue to be better in academic fields that offer attractive alternative nonacademic job opportunities—health specialties, business, and computer science, for example—which attract fewer applicants for academic positions.
- Educational qualifications for postsecondary teacher jobs range from expertise in a particular field to a Ph.D, depending on the subject being taught and the type of educational institution.
- One out of eight postsecondary teachers is a graduate teaching assistant—and one out of ten is a vocational or career and technical education teacher.

## **Nature of the Work**

Postsecondary teachers instruct students in a wide variety of academic and vocational subjects beyond the high school level that may lead to a degree or simply to improvement in one's knowledge or skills. These teachers include college and university faculty, postsecondary career and technical education teachers, and graduate teaching assistants.

**College and university faculty** make up the majority of postsecondary teachers. They teach and advise more than 15 million full- and part-time college students and perform a significant part of our Nation's research. Faculty also keep up with new developments in their field and may consult with government, business, nonprofit, and community organizations.

Faculty usually are organized into departments or divisions, based on academic subject or field. They usually teach several different related courses in their subject—algebra, calculus, and statistics, for example. They may instruct undergraduate or graduate students, or both. College and university faculty may give lectures to several hundred students in large halls, lead small seminars, or supervise students in laboratories. They prepare lectures, exercises, and laboratory experiments; grade exams and papers; and advise and work with students individually. In universities, they also supervise graduate students' teaching and research. College faculty work with an increasingly varied student population made up of growing shares of part-time, older, and culturally and racially diverse students.

Faculty keep abreast of developments in their field by reading current literature, talking with colleagues, and participating in professional conferences. They may also do their own research to expand knowledge in their field. They may perform experiments; collect and analyze data; and examine original documents, literature, and other source material. From this process, they arrive at conclusions, and publish their findings in scholarly journals, books, and electronic media.

Most college and university faculty extensively use computer technology, including the Internet; electronic mail; software programs, such as statistical packages; and CD-ROMs. They may use computers in the classroom as teaching aids and may post course content, class notes, class schedules, and other information on the Internet. Some faculty are increasingly using sophisticated telecommunications and videoconferencing equipment and the Internet to teach courses to students at remote sites. The use of e-mail, chat rooms, and other techniques has greatly improved communications between students and teachers and among students.

Most faculty members serve on academic or administrative committees that deal with the policies of their institution, departmental matters, academic issues, curricula, budgets, equipment purchases, and hiring. Some work with student and community organizations. Department chairpersons are faculty members who usually teach some courses but have heavier administrative responsibilities.

The proportion of time spent on research, teaching, administrative, and other duties varies by individual circumstance and type of institution. Faculty members at universities normally spend a significant part of their time doing research; those in 4-year colleges, somewhat less; and those in 2-year colleges, relatively little. The teaching load, however, often is heavier in 2-year colleges and somewhat lighter at

4-year institutions. Full professors at all types of institutions usually spend a larger portion of their time conducting research than do assistant professors, instructors, and lecturers.

**Postsecondary vocational education teachers**, also known as **postsecondary career and technical education teachers**, provide instruction for occupations that require specialized training, but may not require a 4-year degree, such as welder, dental hygienist, x-ray technician, auto mechanic, and cosmetologist. Classes often are taught in an industrial or laboratory setting where students are provided hands-on experience. For example, welding instructors show students various welding techniques and essential safety practices, watch them use tools and equipment, and have them repeat procedures until they meet the specific standards required by the trade. Increasingly, career and technical education teachers are integrating academic and vocational curriculums so that students obtain a variety of skills that can be applied to the “real world.”

Career and technical education teachers have many of the same responsibilities that other college and university faculty have. They must prepare lessons, grade papers, attend faculty meetings, and keep abreast of developments in their field. Career and technical education teachers at community colleges and career and technical schools also often play a key role in students’ transition from school to work by helping to establish internship programs for students and by providing information about prospective employers.

**Graduate teaching assistants**, often referred to as graduate TAs, assist faculty, department chairs, or other professional staff at colleges and universities by performing teaching or teaching-related duties. In addition to their work responsibilities, assistants have their own school commitments, as they are also students who are working towards earning a graduate degree, such as a Ph.D. Some teaching assistants have full responsibility for teaching a course—usually one that is introductory in nature—which can include preparation of lectures and exams, and assigning final grades to students. Others provide assistance to faculty members, which may consist of a variety of tasks such as grading papers, monitoring exams, holding office hours or help-sessions for students, conducting laboratory sessions, or administering quizzes to the class. Teaching assistants generally meet initially with the faculty member whom they are going to assist in order to determine exactly what is expected of them, as each faculty member may have his or her own needs. For example, some faculty members prefer assistants to sit in on classes, while others assign them other tasks to do during class time. Graduate teaching assistants may work one-on-one with a faculty member or, for large classes; they may be one of several assistants.

### **Working Conditions**

Postsecondary teachers usually have flexible schedules. They must be present for classes, usually 12 to 16 hours per week, and for faculty and committee meetings. Most establish regular office hours for student consultations, usually 3 to 6 hours per week. Otherwise, teachers are free to decide when and where they will work, and how much time to devote to course preparation, grading, study, research, graduate student supervision, and other activities.

Some teach night and weekend classes. This is particularly true for teachers at 2-year community colleges or institutions with large enrollments of older students who have full-time jobs or family responsibilities. Most colleges and universities require teachers to work 9 months of the year, which allows them the time to teach additional courses, do research, travel, or pursue nonacademic interests during the summer and school holidays. Colleges and universities usually have funds to support research or other professional development needs, including travel to conferences and research sites.

About 3 out of 10 college and university faculty worked part time in 2002. Some part-timers, known as “adjunct faculty,” have primary jobs outside of academia—in government, private industry, or nonprofit research—and teach “on the side.” Others prefer to work part-time hours or seek full-time jobs but are unable to obtain them due to intense competition for available openings. Some work part time in more than one institution. Many adjunct faculty are not qualified for tenure-track positions because they lack a doctoral degree.

University faculty may experience a conflict between their responsibilities to teach students and the pressure to do research and publish their findings. This may be a particular problem for young faculty seeking advancement in 4-year research universities. Also, recent cutbacks and the hiring of more part-time faculty have put a greater administrative burden on full-time faculty. Requirements to teach online classes also have added greatly to the workloads of postsecondary teachers. Many find that developing the courses to put online, plus learning how to operate the technology and answering large amounts of e-mail, is very time-consuming.

Like college and university faculty, there is usually a great deal of flexibility in graduate TAs’ work schedules, which allows them the time to pursue their own academic coursework and studies. The number of hours that TAs work varies depending on their assignments. Work may be stressful, particularly when assistants are given full responsibility for teaching a class; however, these types of positions allow graduate students the opportunity to gain valuable teaching experience. This experience is especially helpful for those graduate teaching assistants who seek to become faculty members at colleges and universities after completing their degree.

## **Employment**

Postsecondary teachers held nearly 1.6 million jobs in 2002. Most were employed in public and private 4-year colleges and universities and in 2-year community colleges. Postsecondary career and technical education teachers also are employed by schools and institutes that specialize in training people in a specific field, such as technology centers or culinary schools. Some career and technical education teachers work for State and local governments and job training facilities. The following tabulation shows postsecondary teaching jobs in specialties having 20,000 or more jobs in 2002:

Graduate teaching assistants	128,000
Vocational education teachers	119,000
Health specialties teachers	86,000
Business teachers	67,000
Art, drama, and music teachers	58,000

English language and literature teachers	55,000
Education teachers	42,000
Biological science teachers	47,000
Mathematical science teachers	41,000
Nursing instructors and teachers	37,000
Computer science teachers	33,000
Engineering teachers	29,000
Psychology teachers	26,000

### **Training, Other Qualifications, and Advancement**

The education and training required of postsecondary teachers varies widely, depending on the subject taught and educational institution employing them. Educational requirements for teachers are generally the highest at 4-year research universities but, at career and technical institutes, experience and expertise in a related occupation is the most valuable qualification.

Postsecondary teachers should communicate and relate well with students, enjoy working with them, and be able to motivate them. They should have inquiring and analytical minds, and a strong desire to pursue and disseminate knowledge. Additionally, they must be self-motivated and able to work in an environment in which they receive little direct supervision.

Training requirements for postsecondary career and technical education teachers vary by State and by subject. In general, teachers need a bachelor's or higher degree, plus work or other experience in their field. In some fields, a license or certificate that demonstrates one's qualifications may be all that is required. Teachers update their skills through continuing education, in order to maintain certification. They must also maintain ongoing dialogue with businesses to determine the most current skills needed in the workplace.

Four-year colleges and universities usually consider doctoral degree holders for full-time, tenure-track positions, but may hire master's degree holders or doctoral candidates for certain disciplines, such as the arts, or for part-time and temporary jobs. Most college and university faculty are in four academic ranks—professor, associate professor, assistant professor, and instructor. These positions usually are considered to be tenure-track positions. Most faculty members are hired as instructors or assistant professors. A smaller number of additional faculty members, called lecturers, are usually employed on contracts for a single academic term and are not on the tenure track.

In 2-year colleges, master's degree holders fill most full-time positions. However, with increasing competition for available jobs, institutions can be more selective in their hiring practices. Many 2-year institutions increasingly prefer job applicants to have some teaching experience or experience with distance learning. Preference also may be given to those holding dual master's degrees, because they can teach more subjects. In addition, with greater competition for jobs, master's degree holders may find it increasingly difficult to obtain employment as they are passed over in favor of candidates holding a Ph.D.

Doctoral programs take an average of 6 to 8 years of full-time study beyond the bachelor's degree; including time spent completing a master's degree and a dissertation. Some programs, such as those in the humanities, take longer to complete; others, such as those in engineering, usually are shorter. Candidates specialize in a subfield of a discipline—for example, organic chemistry, counseling psychology, or European history—but also take courses covering the entire discipline. Programs include 20 or more increasingly specialized courses and seminars plus comprehensive examinations on all major areas of the field. Candidates also must complete a dissertation—a written report on original research in the candidate's major field of study. The dissertation sets forth an original hypothesis or proposes a model and tests it. Students in the natural sciences and engineering usually do laboratory work; in the humanities, they study original documents and other published material. The dissertation is done under the guidance of one or more faculty advisors and usually takes 1 or 2 years of full-time work.

In some fields, particularly the natural sciences, some students spend an additional 2 years on postdoctoral research and study before taking a faculty position. Some Ph.D.s extend postdoctoral appointments, or take new ones, if they are unable to find a faculty job. Most of these appointments offer a nominal salary.

Obtaining a position as a graduate teaching assistant is a good way to gain college teaching experience. To qualify, candidates must be enrolled in a graduate school program. In addition, some colleges and universities require teaching assistants to attend classes or take some training prior to being given responsibility for a course.

Although graduate teaching assistants usually work at the institution and in the department where they are earning their degree, teaching or internship positions for graduate students at institutions that do not grant a graduate degree have become more common in recent years. For example, a program called Preparing Future Faculty, administered by the Association of American Colleges and Universities and the Council of Graduate Schools, has led to the creation of many now-independent programs that offer graduate students at research universities the opportunity to work as teaching assistants at other types of institutions, such as liberal arts or community colleges. Working with a mentor, the graduate students teach classes and learn how to improve their teaching techniques. They may attend faculty and committee meetings, develop a curriculum, and learn how to balance the teaching, research, and administrative roles that faculty play. These programs provide valuable learning opportunities for graduate students interested in teaching at the postsecondary level, and also help to make these students aware of the differences among the various types of institutions at which they may someday work.

For faculty, a major step in the traditional academic career is attaining tenure. New tenure-track faculty usually are hired as instructors or assistant professors, and must serve a period—usually 7 years—under term contracts. At the end of the period, their record of teaching, research, and overall contribution to the institution is reviewed; tenure is granted if the review is favorable. Those denied tenure usually must leave the institution. Tenured professors cannot be fired without just cause and due process. Tenure protects the faculty's academic freedom—the ability to teach and conduct research without fear of being fired for advocating unpopular ideas. It also gives both faculty and institutions the stability needed for effective research and teaching, and provides financial security for faculty. Some institutions have adopted post-tenure review policies to encourage ongoing evaluation of tenured faculty.

The number of tenure-track positions is expected to decline as institutions seek flexibility in dealing with financial matters and changing student interests. Institutions will rely more heavily on limited term contracts and part-time, or adjunct, faculty, thus shrinking the total pool of tenured faculty. In a trend that is expected to continue, some institutions now offer limited-term contracts to prospective faculty—typically 2-, 3-, or 5-year, full-time contracts. These contracts may be terminated or extended when they expire. Institutions are not obligated to grant tenure to the contract holders. In addition, some institutions have limited the percentage of faculty who can be tenured.

For most postsecondary teachers, advancement involves a move into administrative and managerial positions, such as departmental chairperson, dean, and president. At 4-year institutions, such advancement requires a doctoral degree. At 2-year colleges, a doctorate is helpful but not usually required, except for advancement to some top administrative positions.

### **Job Outlook**

Overall, employment of postsecondary teachers is expected to grow much faster than the average for all occupations through 2012. A significant proportion of these new jobs will be part-time positions. Good job opportunities are expected as retirements of current postsecondary teachers and continued increases in student enrollments create numerous openings for teachers at all types of postsecondary institutions.

Projected growth in college and university enrollment over the next decade stems largely from the expected increase in the population of 18- to 24-year-olds. Adults returning to college and an increase in foreign-born students also will add to the number of students, particularly in the fastest growing States of California, Texas, Florida, New York, and Arizona. In addition, workers' growing need to regularly update their skills will continue to create new opportunities for postsecondary teachers, particularly at community colleges and for-profit institutions that cater to working adults. However, many postsecondary educational institutions receive a significant portion of their funding from State and local governments, and, over the early years of the projection period, tight State and local budgets will limit the ability of many schools to expand. Nevertheless, a significant number of openings also is expected to arise due to the need to replace the large numbers of postsecondary teachers who are likely to retire over the next decade. Many postsecondary teachers were hired in the late 1960s and 1970s to teach the baby boomers, and they are expected to retire in growing numbers in the years ahead.

Postsecondary institutions are a major employer of workers holding doctoral degrees, and opportunities for Ph.D. recipients seeking jobs as postsecondary teachers are expected to be somewhat better than in previous decades. The number of earned doctorate degrees is projected to rise by only 4 percent over the 2002-12 period, sharply lower than the 10-percent increase over the previous decade. In spite of this positive trend, competition will remain tight for those seeking tenure-track positions at 4-year colleges and universities, as many of the job openings are expected to be either part-time or renewable, term appointments.

Opportunities for graduate teaching assistants are expected to be very good. Graduate enrollments over the 2002-12 period are projected to increase at a rate

that is somewhat slower than that of the previous decade, while total undergraduate enrollments in degree-granting institutions are expected to increase at nearly twice the rate of the preceding decade, creating many teaching opportunities. Constituting more than 12 percent of all postsecondary teachers, graduate teaching assistants play an integral role in the postsecondary education system, and they are expected to continue to do so in the future.

Because one of the main reasons why students attend postsecondary institutions is to obtain a job, the best job prospects for postsecondary teachers are likely to be in fields where job growth is expected to be strong over the next decade. These will include fields such as business, health specialties, nursing, and computer and biological sciences. Community colleges and other institutions offering career and technical education have been among the most rapidly growing, and these institutions are expected to offer some of the best opportunities for postsecondary teachers.

### **Earnings**

Median annual earnings of all postsecondary teachers in 2002 were \$49,040. The middle 50 percent earned between \$34,310 and \$69,580. The lowest 10 percent earned less than \$23,080, and the highest 10 percent earned more than \$92,430.

Earnings for college faculty vary according to rank and type of institution, geographic area, and field. According to a 2002-03 survey by the American Association of University Professors, salaries for full-time faculty averaged \$64,455. By rank, the average was \$86,437 for professors, \$61,732 for associate professors, \$51,545 for assistant professors, \$37,737 for instructors, and \$43,914 for lecturers. Faculty in 4-year institutions earn higher salaries, on average, than do those in 2-year schools. In 2002-03, average faculty salaries in public institutions—\$63,974—were lower than those in private independent institutions—\$74,359—but higher than those in religiously affiliated private colleges and universities—\$57,564. In fields with high-paying nonacademic alternatives—medicine, law, engineering, and business, among others—earnings exceed these averages. In others—such as the humanities and education—they are lower.

Many faculty members have significant earnings, in addition to their base salary, from consulting, teaching additional courses, research, writing for publication, or other employment. In addition, many college and university faculty enjoy some unique benefits, including access to campus facilities, tuition waivers for dependents, housing and travel allowances, and paid sabbatical leaves. Part-time faculty usually have fewer benefits than do full-time faculty.

Earnings for postsecondary career and technical education teachers vary widely by subject, academic credentials, experience, and region of the country. Part-time instructors usually receive few benefits.

### **Sources of Additional Information**

Professional societies related to a field of study often provide information on academic and nonacademic employment opportunities. Names and addresses of many of these societies appear in statements elsewhere in the *Handbook*.

Special publications on higher education, such as *The Chronicle of Higher Education*, list specific employment opportunities for faculty. These publications are available in libraries.

For information on the Preparing Future Faculty program, contact:

- Association of American Colleges and Universities, 1818 R St. NW., Washington, DC 20009. Internet: <http://www.aacu-edu.org>

For information on postsecondary career and technical education teaching positions, contact State departments of career and technical education.

General information on adult and career and technical education is available from:

- Association for Career and Technical Education, 1410 King St., Alexandria, VA 22314. Internet: <http://www.acteonline.org>

---

## Lawyers

[Return to Menu](#)

### Significant Points

- Formal educational requirements for lawyers include a 4-year college degree, 3 years in law school, and the passing of a written bar examination. Competition for admission to most law schools is intense.
- Demand for lawyers will be spurred by the growth of legal action in such areas as health care, intellectual property, international law, elder law, environmental law, and sexual harassment.

### Nature of the Work

The legal system affects nearly every aspect of our society, from buying a home to crossing the street. Lawyers form the backbone of this vital system, linking it to society in myriad ways. For that reason, they hold positions of great responsibility and are obligated to adhere to a strict code of ethics.

Lawyers, also called attorneys, act as both advocates and advisors in our society. As advocates, they represent one of the parties in criminal and civil trials by presenting evidence and arguing in court to support their client. As advisors, lawyers counsel their clients concerning their legal rights and obligations and suggest particular courses of action in business and personal matters. Whether acting as an advocate or an advisor, all attorneys research the intent of laws and judicial decisions and apply the law to the specific circumstances faced by their client.

The more detailed aspects of a lawyer's job depend upon his or her field of specialization and position. Although all lawyers are licensed to represent parties in court, some appear in court more frequently than others. Trial lawyers, who specialize in trial work, must be able to think quickly and speak with ease and authority. In addition, familiarity with courtroom rules and strategy is particularly

important in trial work. Still, trial lawyers spend the majority of their time outside the courtroom, conducting research, interviewing clients and witnesses, and handling other details in preparation for trial.

Lawyers may specialize in a number of different areas, such as bankruptcy, probate, international, or elder law. Those specializing in environmental law, for example, may represent public-interest groups, waste disposal companies, or construction firms in their dealings with the U.S. Environmental Protection Agency (EPA) and other Federal and State agencies. These lawyers help clients prepare and file for licenses and applications for approval before certain activities may occur. In addition, they represent clients' interests in administrative adjudications.

Some lawyers concentrate in the growing field of intellectual property, helping to protect clients' claims to copyrights, artwork under contract, product designs, and computer programs. Still other lawyers advise insurance companies about the legality of insurance transactions, writing insurance policies to conform with the law and to protect companies from unwarranted claims. When claims are filed against insurance companies, these attorneys review the claims and represent the companies in court.

Most lawyers are found in private practice, where they concentrate on criminal or civil law. In criminal law, lawyers represent individuals who have been charged with crimes and argue their cases in courts of law. Attorneys dealing with civil law assist clients with litigation, wills, trusts, contracts, mortgages, titles, and leases. Other lawyers handle only public-interest cases—civil or criminal—which may have an impact extending well beyond the individual client.

Lawyers are sometimes employed full time by a single client. If the client is a corporation, the lawyer is known as "house counsel" and usually advises the company concerning legal issues related to its business activities. These issues might involve patents, government regulations, contracts with other companies, property interests, or collective-bargaining agreements with unions.

A significant number of attorneys are employed at the various levels of government. Lawyers who work for State attorneys general, prosecutors, public defenders, and courts play a key role in the criminal justice system. At the Federal level, attorneys investigate cases for the U.S. Department of Justice and other agencies. Government lawyers also help develop programs, draft and interpret laws and legislation, establish enforcement procedures, and argue civil and criminal cases on behalf of the government.

Other lawyers work for legal-aid societies—private, nonprofit organizations established to serve disadvantaged people. These lawyers generally handle civil, rather than criminal, cases. A relatively small number of trained attorneys work in law schools. Most are faculty members who specialize in one or more subjects; however, some serve as administrators. Others work full time in nonacademic settings and teach part time.

Lawyers are increasingly using various forms of technology to perform their varied tasks more efficiently. While all lawyers continue to use law libraries to prepare cases, some supplement their search of conventional printed sources with computer sources, such as the Internet and legal databases. Software is used to search this

legal literature automatically and to identify legal texts relevant to a specific case. In litigation involving many supporting documents, lawyers may use computers to organize and index material. Lawyers also utilize electronic filing, videoconferencing, and voice-recognition technology to share information more effectively with other parties involved in a case.

### **Working Conditions**

Lawyers do most of their work in offices, law libraries, and courtrooms. They sometimes meet in clients' homes or places of business and, when necessary, in hospitals or prisons. They may travel to attend meetings, gather evidence, and appear before courts, legislative bodies, and other authorities.

Salaried lawyers usually have structured work schedules. Lawyers who are in private practice may work irregular hours while conducting research, conferring with clients, or preparing briefs during non-office hours. Lawyers often work long hours, and of those who regularly work full time, about half work 50 hours or more per week. They may face particularly heavy pressure, especially when a case is being tried. Preparation for court includes keeping abreast of the latest laws and judicial decisions.

Although legal work generally is not seasonal, the work of tax lawyers and other specialists may be an exception. Because lawyers in private practice often can determine their own workload and the point at which they will retire, many stay in practice well beyond the usual retirement age.

### **Employment**

Lawyers held about 695,000 jobs in 2002. About 3 out of 4 lawyers practiced privately, either in law firms or in solo practices. Most of the remaining lawyers held positions in government and with corporations and nonprofit organizations. For those working in government, the greatest number were employed at the local level. In the Federal Government, lawyers work for many different agencies, but are concentrated in the Departments of Justice, Treasury, and Defense. For those working outside of government, lawyers are employed as house counsel by public utilities, banks, insurance companies, real-estate agencies, manufacturing firms, and other business firms and nonprofit organizations. Some salaried lawyers also have part-time independent practices; others work part time as lawyers and full time in another occupation.

### **Training, Other Qualifications, and Advancement**

To practice law in the courts of any State or other jurisdiction, a person must be licensed, or admitted to its bar, under rules established by the jurisdiction's highest court. All States require that applicants for admission to the bar pass a written bar examination; most jurisdictions also require applicants to pass a separate written ethics examination. Lawyers who have been admitted to the bar in one jurisdiction occasionally may be admitted to the bar in another without taking an examination if they meet the latter jurisdiction's standards of good moral character and have a specified period of legal experience. Federal courts and agencies set their own qualifications for those practicing before or in them.

To qualify for the bar examination in most States, an applicant usually must earn a college degree and graduate from a law school accredited by the American Bar Association (ABA) or the proper State authorities. ABA accreditation signifies that the law school—particularly its library and faculty—meets certain standards developed to promote quality legal education. ABA currently accredits 188 law schools; others are approved by State authorities only. With certain exceptions, graduates of schools not approved by the ABA are restricted to taking the bar examination and practicing in the State or other jurisdiction in which the school is located; most of these schools are in California. In 2002, eight States accepted the study of law in a law office as qualification for taking the bar examination; three jurisdictions—California, the District of Columbia, and New Mexico—now accept the study of law by correspondence. Several States require registration and approval of students by the State Board of Law Examiners, either before the students enter law school or during their early years of legal study.

Although there is no nationwide bar examination, 48 States, the District of Columbia, Guam, the Northern Mariana Islands, Puerto Rico, and the Virgin Islands require the 6-hour Multistate Bar Examination (MBE) as part of the overall bar examination; the MBE is not required in Louisiana and Washington. The MBE covers issues of broad interest, and sometimes a locally prepared State bar examination is given in addition to the MBE. The 3-hour Multistate Essay Examination (MEE) is used as part of the bar examination in several States. States vary in their use of MBE and MEE scores.

Many States have begun to require Multistate Performance Testing (MPT) to test the practical skills of beginning lawyers. This program has been well received, and many more States are expected to require performance testing in the future. Requirements vary by State, although the test usually is taken at the same time as the bar exam and is a one-time requirement.

The required college and law school education usually takes 7 years of full-time study after high school—4 years of undergraduate study, followed by 3 years of law school. Law school applicants must have a bachelor's degree to qualify for admission. To meet the needs of students who can attend only part time, a number of law schools have night or part-time divisions, which usually require 4 years of study; about 1 in 10 graduates from ABA-approved schools attended part time.

Although there is no recommended "prelaw" major, prospective lawyers should develop proficiency in writing and speaking, reading, researching, analyzing, and thinking logically—skills needed to succeed both in law school and in the profession. Regardless of major, a multidisciplinary background is recommended. Courses in English, foreign languages, public speaking, government, philosophy, history, economics, mathematics, and computer science, among others, are useful. Students interested in a particular aspect of law may find related courses helpful. For example, prospective patent lawyers need a strong background in engineering or science, and future tax lawyers must have extensive knowledge of accounting.

Acceptance by most law schools depends on the applicant's ability to demonstrate an aptitude for the study of law, usually through good undergraduate grades, the Law School Admission Test (LSAT), the quality of the applicant's undergraduate school, any prior work experience, and, sometimes, a personal interview. However, law schools vary in the weight they place on each of these and other factors.

All law schools approved by the ABA, except those in Puerto Rico, require applicants to take the LSAT. Nearly all law schools require applicants to have certified transcripts sent to the Law School Data Assembly Service, which then submits applicants' LSAT scores and their standardized records of college grades to the law schools of their choice. Both this service and the LSAT are administered by the Law School Admission Council. Competition for admission to many law schools—especially the most prestigious ones—generally is intense, with the number of applicants to most law schools greatly exceeding the number that can be admitted.

During the first year or year and a half of law school, students usually study core courses, such as constitutional law, contracts, property law, torts, civil procedure, and legal writing. In the remaining time, they may elect specialized courses in fields such as tax, labor, or corporate law. Law students often acquire practical experience by participating in school-sponsored legal clinic activities; in the school's moot court competitions, in which students conduct appellate arguments; in practice trials under the supervision of experienced lawyers and judges; and through research and writing on legal issues for the school's law journal.

A number of law schools have clinical programs in which students gain legal experience through practice trials and projects under the supervision of practicing lawyers and law school faculty. Law school clinical programs might include work in legal-aid clinics, for example, or on the staff of legislative committees. Part-time or summer clerkships in law firms, government agencies, and corporate legal departments also provide valuable experience. Such training can lead directly to a job after graduation and can help students decide what kind of practice best suits them. Clerkships may also be an important source of financial aid.

In 2001, law students in 52 jurisdictions were required to pass the Multistate Professional Responsibility Examination (MPRE), which tests their knowledge of the ABA codes on professional responsibility and judicial conduct. In some States, the MPRE may be taken during law school, usually after completing a course on legal ethics.

Law school graduates receive the degree of *juris doctor* (J.D.) as the first professional degree. Advanced law degrees may be desirable for those planning to specialize, research, or teach. Some law students pursue joint degree programs, which usually require an additional semester or year of study. Joint degree programs are offered in a number of areas, including law and business administration or public administration.

After graduation, lawyers must keep informed about legal and nonlegal developments that affect their practice. Currently, 40 States and jurisdictions mandate continuing legal education (CLE). Many law schools and State and local bar associations provide continuing education courses that help lawyers stay abreast of recent developments. Some States allow CLE credits to be obtained through participation in seminars on the Internet.

The practice of law involves a great deal of responsibility. Individuals planning careers in law should like to work with people and be able to win the respect and confidence of their clients, associates, and the public. Perseverance, creativity, and reasoning ability also are essential to lawyers, who often analyze complex cases and handle new and unique legal problems.

Most beginning lawyers start in salaried positions. Newly hired salaried attorneys usually start as associates and work with more experienced lawyers or judges. After several years of gaining more responsibilities, some lawyers are admitted to partnership in their firm or go into practice for themselves. Some experienced lawyers are nominated or elected to judgeships. Others become full-time law school faculty or administrators; a growing number of these lawyers have advanced degrees in other fields as well.

Some attorneys use their legal training in administrative or managerial positions in various departments of large corporations. A transfer from a corporation's legal department to another department often is viewed as a way to gain administrative experience and rise in the ranks of management.

### **Job Outlook**

Employment of lawyers is expected to grow about as fast as the average through 2012, primarily as a result of growth in the population and in the general level of business activities. Employment growth of lawyers also will result from growth in demand for legal services in such areas as elder, antitrust, environmental, and intellectual-property law. In addition, the wider availability and affordability of legal clinics and prepaid legal service programs should result in increased use of legal services by middle-income people.

Growth in demand will be somewhat mitigated, because, in an effort to reduce money spent on legal fees, many businesses increasingly are using large accounting firms and paralegals to perform some of the same functions that lawyers do. For example, accounting firms may provide employee-benefit counseling, process documents, or handle various other services previously performed by a law firm. Also, mediation and dispute resolution increasingly are being used as alternatives to litigation.

Competition for job openings should continue to be keen because of the large number of students graduating from law school each year. Graduates with superior academic records from well-regarded law schools will have the best job opportunities. Perhaps as a result of competition for attorney positions, lawyers are increasingly finding work in nontraditional areas for which legal training is an asset, but not normally a requirement—for example, administrative, managerial, and business positions in banks, insurance firms, real-estate companies, government agencies, and other organizations. Employment opportunities are expected to continue to arise in these organizations at a growing rate.

As in the past, some graduates may have to accept positions in areas outside of their field of interest or for which they feel overqualified. Some recent law school graduates who have been unable to find permanent positions are turning to the growing number of temporary staffing firms that place attorneys in short-term jobs until they are able to secure full-time positions. This service allows companies to hire lawyers on an "as-needed" basis and permits beginning lawyers to develop practical skills while looking for permanent positions.

Due to the competition for jobs, a law graduate's geographic mobility and work experience assume greater importance. The willingness to relocate may be an advantage in getting a job, but, to be licensed in another State, a lawyer may have

to take an additional State bar examination. In addition, employers are increasingly seeking graduates who have advanced law degrees and experience in a specialty, such as tax, patent, or admiralty law.

Employment growth for lawyers will continue to be concentrated in salaried jobs, as businesses and all levels of government employ a growing number of staff attorneys and as employment in the legal services industry grows. Most salaried positions are in urban areas where government agencies, law firms, and big corporations are concentrated. The number of self-employed lawyers is expected to decrease slowly, reflecting the difficulty of establishing a profitable new practice in the face of competition from larger, established law firms. Moreover, the growing complexity of law, which encourages specialization, along with the cost of maintaining up-to-date legal research materials, favors larger firms.

For lawyers who wish to work independently, establishing a new practice will probably be easiest in small towns and expanding suburban areas. In such communities, competition from larger, established law firms is likely to be less keen than in big cities, and new lawyers may find it easier to become known to potential clients.

Some lawyers are adversely affected by cyclical swings in the economy. During recessions, demand declines for some discretionary legal services, such as planning estates, drafting wills, and handling real-estate transactions. Also, corporations are less likely to litigate cases when declining sales and profits result in budgetary restrictions. Some corporations and law firms will not hire new attorneys until business improves, and these establishments may even cut staff to contain costs. Several factors, however, mitigate the overall impact of recessions on lawyers; during recessions, for example, individuals and corporations face other legal problems, such as bankruptcies, foreclosures, and divorces requiring legal action.

## **Earnings**

In 2002, the median annual earnings of all lawyers was \$90,290. The middle half of the occupation earned between \$61,060 and \$136,810. The lowest paid 10 percent earned less than \$44,490; at least 10 percent earned more than \$145,600. Median annual earnings in the industries employing the largest numbers of lawyers in 2002 are given in the following tabulation:

Management of companies and enterprises	\$131,970
Federal government	98,790
Legal services	93,970
Local government	69,710
State government	67,910

Median salaries of lawyers 6 months after graduation from law school in 2001 varied by type of work, as indicated by table 1.

**Table 1. Median salaries of lawyers 6 months after graduation, 2001**

Type of work	Salary
<b>All graduates</b>	\$60,000
<b>Private practice</b>	90,000
<b>Business/industry</b>	60,000
<b>Judicial clerkship and government</b>	40,300
<b>Academe</b>	40,000
Footnotes: (1) Source: National Association of Law Placement	

Salaries of experienced attorneys vary widely according to the type, size, and location of their employer. Lawyers who own their own practices usually earn less than do those who are partners in law firms. Lawyers starting their own practice may need to work part time in other occupations to supplement their income until their practice is well established.

Most salaried lawyers are provided health and life insurance, and contributions are made on their behalf to retirement plans. Lawyers who practice independently are covered only if they arrange and pay for such benefits themselves.

### **Sources of Additional Information**

Information on law schools and a career in law may be obtained from:

- American Bar Association, 750 North Lake Shore Dr., Chicago, IL 60611. Internet: <http://www.abanet.org>

Information on the LSAT, the Law School Data Assembly Service, the law school application process, and the financial aid available to law students may be obtained from:

- Law School Admission Council, P.O. Box 40, Newtown, PA 18940. Internet: <http://www.lsac.org>

Information on obtaining a job as a lawyer with the Federal Government is available from the Office of Personnel Management at the Internet site <http://www.usajobs.opm.gov>.

The requirements for admission to the bar in a particular State or other jurisdiction also may be obtained at the State capital, from the clerk of the Supreme Court, or from the administrator of the State Board of Bar Examiners.

**Significant Points**

- Licensed optometrists must earn a Doctor of Optometry degree from an accredited optometry school and pass a written and a clinical State board examination.
- Admission to optometry school is competitive.
- Optometrists usually remain in practice until they retire, so relatively few job openings arise from the need to replace those who leave the occupation.

**Nature of the Work**

Optometrists, also known as doctors of optometry, or ODs, provide most primary vision care. They examine people's eyes to diagnose vision problems and eye diseases, and they test patients' visual acuity, depth and color perception, and ability to focus and coordinate the eyes. Optometrists prescribe eyeglasses and contact lenses and provide vision therapy and low-vision rehabilitation. Optometrists analyze test results and develop a treatment plan. They administer drugs to patients to aid in the diagnosis of vision problems and prescribe drugs to treat some eye diseases. Optometrists often provide preoperative and postoperative care to cataract patients, as well as patients who have had laser vision correction or other eye surgery. They also diagnose conditions due to systemic diseases such as diabetes and high blood pressure, referring patients to other health practitioners as needed.

Optometrists should not be confused with ophthalmologists or dispensing opticians. Ophthalmologists are physicians who perform eye surgery, and diagnose and treat eye diseases and injuries. Like optometrists, they also examine eyes and prescribe eyeglasses and contact lenses. Dispensing opticians fit and adjust eyeglasses and, in some States, may fit contact lenses according to prescriptions written by ophthalmologists or optometrists.

Most optometrists are in general practice. Some specialize in work with the elderly, children, or partially sighted persons who need specialized visual devices. Others develop and implement ways to protect workers' eyes from on-the-job strain or injury. Some specialize in contact lenses, sports vision, or vision therapy. A few teach optometry, perform research, or consult.

Most optometrists are private practitioners who also handle the business aspects of running an office, such as developing a patient base, hiring employees, keeping records, and ordering equipment and supplies. Optometrists who operate franchise optical stores also may have some of these duties.

**Working Conditions**

Optometrists work in places—usually their own offices—that are clean, well lighted, and comfortable. Most full-time optometrists work about 40 hours a week. Many work weekends and evenings to suit the needs of patients. Emergency calls, once uncommon, have increased with the passage of therapeutic-drug laws expanding optometrists' ability to prescribe medications.

## **Employment**

Optometrists held about 32,000 jobs in 2002. The number of jobs is greater than the number of practicing optometrists because some optometrists hold two or more jobs. For example, an optometrist may have a private practice, but also work in another practice, in a clinic, or in a vision care center. According to the American Optometric Association, about two-thirds of practicing optometrists are in private practice. Although many optometrists practice alone, a growing number are in a partnership or group practice.

Salaried jobs for optometrists were primarily in offices of other health practitioners, including optometrists; offices of physicians, including ophthalmologists; or health and personal care stores, including optical goods stores. A small number of salaried jobs for optometrists were in hospitals; the Federal government; or outpatient care centers, including health maintenance organizations. Almost a third of optometrists were self-employed.

## **Training, Other Qualifications, and Advancement**

All States and the District of Columbia require that optometrists be licensed. Applicants for a license must have a Doctor of Optometry degree from an accredited optometry school and pass both a written and a clinical State board examination. In many States, applicants can substitute the examinations of the National Board of Examiners in Optometry, usually taken during the student's academic career, for part or all of the written examination. Licenses are renewed every 1 to 3 years, and, in all States, continuing education credits are needed for renewal.

The Doctor of Optometry degree requires the completion of a 4-year program at an accredited optometry school, preceded by at least 3 years of pre-optometric study at an accredited college or university. Most optometry students hold a bachelor's or higher degree. In 2002, 17 U.S. schools and colleges of optometry held an accredited status with the Accreditation Council on Optometric Education of the American Optometric Association.

Requirements for admission to schools of optometry include courses in English, mathematics, physics, chemistry, and biology. A few schools also require or recommend courses in psychology, history, sociology, speech, or business. Since a strong background in science is important, many applicants to optometry school major in a science such as biology or chemistry, while other applicants major in another subject and take many science courses as well. Applicants must take the Optometry Admissions Test, which measures academic ability and scientific comprehension. Most applicants take the test after their sophomore or junior year, allowing them an opportunity to take the test again and raise their score. A small number of applicants are accepted to optometry school after 3 years of college and complete their bachelor's degree while attending optometry school. Admission to optometry school is competitive.

Optometry programs include classroom and laboratory study of health and visual sciences, as well as clinical training in the diagnosis and treatment of eye disorders. Courses in pharmacology, optics, vision science, biochemistry, and systemic disease are included.

Business ability, self-discipline, and the ability to deal tactfully with patients are important for success. The work of optometrists requires attention to detail and manual dexterity.

Optometrists wishing to teach or do research may study for a master's or Ph.D. degree in visual science, physiological optics, neurophysiology, public health, health administration, health information and communication, or health education. One-year postgraduate clinical residency programs are available for optometrists who wish to specialize in family practice optometry, pediatric optometry, geriatric optometry, vision therapy, contact lenses, hospital-based optometry, primary care optometry, or ocular disease.

### **Job Outlook**

Employment of optometrists is expected to grow about as fast as the average for all occupations through 2012, in response to the vision care needs of a growing and aging population. As baby boomers age, they will be more likely to visit optometrists and ophthalmologists because of the onset of vision problems in middle age, including those resulting from the extensive use of computers. The demand for optometric services also will increase because of growth in the oldest age group, with its increased likelihood of cataracts, glaucoma, diabetes, and hypertension. Greater recognition of the importance of vision care, rising personal incomes, and growth in employee vision care plans will spur employment growth, as well.

Employment of optometrists would grow more rapidly were it not for anticipated productivity gains that will allow each optometrist to see more patients. These expected gains stem from greater use of optometric assistants and other support personnel, who will reduce the amount of time optometrists need with each patient. Also, laser surgery that can correct some vision problems is available, but expensive. Optometrists will still be needed to perform preoperative and postoperative care for laser surgery; however, patients who successfully undergo this surgery may not require optometrists to prescribe glasses or contacts for several years.

In addition to growth, the need to replace optometrists who leave the occupation will create employment opportunities. Relatively few opportunities from this source are expected, however, because optometrists usually continue to practice until they retire; few transfer to other occupations.

### **Earnings**

Median annual earnings of salaried optometrists were \$86,090 in 2002. The middle 50 percent earned between \$62,030 and \$115,550. Median annual earnings of salaried optometrists in 2002 were \$87,070 in offices of other health practitioners. Salaried optometrists tend to earn more initially than do optometrists who set up their own independent practice. In the long run, however, those in private practice usually earn more.

According to the American Optometric Association, median net annual income for all optometrists, including the self-employed, was \$110,000 in 2002. The middle 50 percent earned between \$82,500 and \$156,500.

## Sources of Additional Information

For information on optometry as a career and a list of accredited optometric educational institutions, contact:

- Association of Schools and Colleges of Optometry, 6110 Executive Blvd., Suite 510, Rockville, MD 20852. Internet: <http://www.opted.org>

Additional career information is available from:

- American Optometric Association, Educational Services, 243 North Lindbergh Blvd., St. Louis, MO 63141-7881. Internet: <http://www.aoanet.org>

The Board of Optometry in each State can supply information on licensing requirements. For information on specific admission requirements and sources of financial aid, contact the admissions officers of individual optometry schools.

## Judges, Magistrates, and Other Judicial Workers

[Return to Menu](#)

### Significant Points

- A bachelor's degree and work experience are the minimum requirements for a judgeship or magistrate position, but most workers filling these positions also have law degrees.
- Judges and magistrates should encounter some competition for jobs.
- Demand for arbitrators, mediators, and conciliators is growing because of the high cost and long delays associated with litigation.

### Nature of the Work

Judges, magistrates, and other judicial workers apply the law and oversee the legal process in courts according to local, State, and Federal statutes. They preside over cases concerning every aspect of society, from traffic offenses, to disputes over the management of professional sports, to issues concerning the rights of huge corporations, to questions over disconnecting life-support equipment connected to terminally ill persons. All judicial workers must ensure that trials and hearings are conducted fairly and that the court administers justice in a manner which safeguards the legal rights of all parties involved.

The most visible responsibility of judges is presiding over trials or hearings and listening as attorneys represent the parties present. Judges rule on the admissibility of evidence and the methods of conducting testimony, and they may be called upon to settle disputes between opposing attorneys. Also, they ensure that rules and procedures are followed, and if unusual circumstances arise for which standard procedures have not been established, they determine the manner in which the trial will proceed, on the basis of their interpretation of the law.

Judges often hold pretrial hearings for cases. They listen to allegations and determine whether the evidence presented merits a trial. In criminal cases, judges may decide that persons charged with crimes should be held in jail pending their trial, or they may set conditions for their release. In civil cases, they occasionally impose restrictions upon the parties until a trial is held.

In many trials, juries are selected to decide guilt or innocence in criminal cases or liability and compensation in civil cases. Judges instruct juries on applicable laws, direct them to deduce the facts from the evidence presented, and hear their verdict. When the law does not require a jury trial or when the parties waive their right to a jury, judges decide the cases. In such instances, in a criminal case, the judge determines guilt and imposes sentences; in civil cases, the judge awards relief—such as compensation for damages—to the parties to the lawsuit (called litigants). Judges also work outside the courtroom, “in chambers.” In these, their private offices, judges read documents on pleadings and motions, research legal issues, write opinions, and oversee the court’s operations. In some jurisdictions, judges also manage the courts’ administrative and clerical staff.

Judges’ duties vary according to the extent of their jurisdictions and powers. General trial court judges of the Federal and State court systems have jurisdiction over any case in their system. They usually try civil cases transcending the jurisdiction of lower courts and all cases involving felony offenses. Federal and State appellate court judges, although few in number, have the power to overrule decisions made by trial court or administrative law judges if they determine that legal errors were made in a case or if legal precedent does not support the judgment of the lower court. Appellate court judges rule on a small number of cases and rarely have direct contacts with litigants. Instead, they usually base their decisions on lower court records and lawyers’ written and oral arguments.

Many State court judges preside in courts whose jurisdiction is limited by law to certain types of cases. A variety of titles are assigned to these judges; among the most common are municipal court judge, county court judge, magistrate, and justice of the peace. Traffic violations, misdemeanors, small-claims cases, and pretrial hearings constitute the bulk of the work of State court judges, but some States allow them to handle cases involving domestic relations, probate, contracts, and other selected areas of the law.

Administrative law judges, sometimes called hearing officers or adjudicators, are employed by government agencies to make determinations for administrative agencies. These judges make decisions, for example, on a person’s eligibility for various Social Security or worker’s compensation benefits, on protection of the environment, on the enforcement of health and safety regulations, on employment discrimination, and on compliance with economic regulatory requirements.

Arbitration, mediation, and conciliation—called appropriate dispute resolution (ADR)—are alternative processes that can be used to settle disputes between parties. All ADR hearings are private and confidential, and the processes are less formal than a court trial. If no settlement is reached through ADR, any statements made during the proceedings are inadmissible as evidence in any subsequent litigation.

During arbitration, opposing parties submit their dispute to one or more impartial persons, called arbitrators, for a final and binding decision. Arbitrators usually are attorneys or businesspersons with expertise in a particular field. The parties identify beforehand the issues to be resolved by arbitration, the scope of the relief to be awarded, and many of the procedural aspects of the process. Few awards are reviewed by the courts, because the parties have agreed to be bound by the decision of their arbitrator, although in some cases, it is prearranged that the award will be only advisory. Mediation involves an attempt by the parties to resolve their dispute with the aid of a neutral third party and generally is used when the parties wish to preserve their relationship. A mediator may offer suggestions, but resolution of the dispute rests with the parties themselves. Mediation proceedings are also confidential and private. If the parties are unable to reach a settlement, they are free to pursue other options. The parties usually decide in advance how they will contribute to the cost of mediation.

Conciliation is similar to mediation. The conciliator's role is to guide the parties to a settlement. The parties must decide in advance whether they will be bound by the conciliator's recommendations; they generally share equally in the cost of the conciliation.

### **Working Conditions**

Judges, magistrates, and other judicial workers do most of their work in offices, law libraries, and courtrooms. Work in these occupations presents few hazards, although sitting in the same position in the courtroom for long periods can be tiring. Most judges wear robes when they are in a courtroom. Judges typically work a standard 40-hour week, but many work more than 50 hours per week. Some judges with limited jurisdiction are employed part time and divide their time between their judicial responsibilities and other careers.

Arbitrators, mediators, and conciliators usually work in private offices or meeting rooms; no public record is made of the proceedings.

### **Employment**

Judges, magistrates, and magistrate judges held 27,000 jobs in 2002, primarily in State and local government. Administrative law judges, adjudicators, and hearing officers held about 19,000 jobs; 57 percent worked in State governments, 24 percent in the Federal Government, and 16 percent in local governments. Arbitrators, mediators, and conciliators held another 6,100 jobs. Approximately half worked for State and local governments. The remainder worked for labor organizations, law offices, insurance carriers, and other private companies and for organizations that specialize in providing dispute resolution services.

### **Training, Other Qualifications, and Advancement**

A bachelor's degree and work experience usually constitute the minimum requirement for a judgeship or magistrate position. A number of lawyers become judges, and most judges have first been lawyers. In fact, Federal and State judges usually are required to be lawyers. About 40 States allow non lawyers to hold limited-jurisdiction judgeships, but opportunities are better for those with law experience. Federal administrative law judges must be lawyers and pass a

competitive examination administered by the U.S. Office of Personnel Management. Some State administrative law judges and other hearing officials are not required to be lawyers.

Federal administrative law judges are appointed by various Federal agencies, with virtually lifetime tenure. Federal magistrate judges are appointed by district judges—the life-tenured Federal judges of a district court—to serve in a United States district court for a period of 8 years. A part-time federal magistrate judge’s term of office is 4 years. Some State judges are appointed, but the remainder are elected in partisan or nonpartisan State elections. Many State and local judges serve fixed renewable terms ranging from 4 or 6 years for some trial court judgeships to as long as 14 years or even life for other trial or appellate court judges. Judicial nominating commissions, composed of members of the bar and the public, are used to screen candidates for judgeships in many States and for some Federal judgeships.

All States have some type of orientation for newly elected or appointed judges. The Federal Judicial Center, American Bar Association, National Judicial College, and National Center for State Courts provide judicial education and training for judges and other judicial-branch personnel. General and continuing education courses usually last from a couple of days to 3 weeks in length. More than half of all States, as well as Puerto Rico, require judges to enroll in continuing education courses while serving on the bench.

Training and education requirements for arbitrators, mediators, and conciliators differ from those for judges. Mediators who practice in State- or court-funded mediation programs usually must meet specific training or experience standards, which vary by State and court. In most States, individuals who offer private mediation services do not need a license, certification, or specific course work; however, many private mediators and most of those affiliated with mediation organizations and programs have completed mediation training and agreed to comply with certain ethical standards. For example, the American Arbitration Association (AAA) requires mediators listed on its mediation panel to complete an AAA training course, receive recommendations from the trainers, and complete an apprenticeship.

Training for arbitrators, mediators, and conciliators is available through independent mediation programs, national and local mediation membership organizations, and postsecondary schools. In 2002, 16 colleges or universities in the United States offered master’s degrees in dispute resolution or conflict management, and 2 offered doctoral degrees. Many more schools offer conflict-management specializations within other degree programs. Degrees in public policy, law, and related fields also provide good background for prospective arbitrators, mediators, and conciliators.

### **Job Outlook**

Employment of judges and magistrates is expected to grow more slowly than the average through 2012. Budgetary pressures at all levels of government will hold down the hiring of judges, despite rising caseloads, particularly in Federal courts. Most job openings will arise as judges retire. However, additional openings occur when new judgeships positions are authorized by law or when judges are elevated to a higher judicial office.

Public concerns about crime and safety, as well as a public increasingly willing to go to court to settle disputes, should spur demand for judges. Not only has the quantity of a judge's work increased, but many cases have become more complex because of developments in information technology, medical science, e-commerce, and globalization. The prestige associated with serving on the bench should ensure competition for judge and magistrate positions. However, a growing number of judges and candidates for judgeships are choosing to forgo the bench and work in the private sector, where pay is significantly higher. This movement may lessen the competition somewhat. Becoming a judge also is often difficult because, not only must judicial candidates compete with other qualified people, but also, they frequently must also gain political support in order to be elected or appointed, and getting that support can be expensive.

Employment of arbitrators, mediators, and conciliators is expected to grow as fast as the average for all occupations through 2012. Many individuals and businesses try to avoid litigation, which can involve lengthy delays, high costs, unwanted publicity, and ill will. Arbitration and other alternatives to litigation usually are faster, less expensive, and more conclusive, spurring demand for the services of arbitrators, mediators, and conciliators. Administrative law judges are expected to experience little to no change in employment, due to a slowing of growth in the Federal sector.

## **Earnings**

Judges, magistrate judges, and magistrates had median annual earnings of \$94,070 in 2002. The middle 50 percent earned between \$44,970 and \$120,390. The top 10 percent earned more than \$138,300, while the bottom 10 percent earned less than \$24,250. Median annual earnings in the industries employing the largest numbers of judges, magistrate judges, and magistrates in 2002 were \$112,720 in State government and \$54,750 in local government. Administrative law judges, adjudicators, and hearing officers earned a median of \$64,540, and arbitrators, mediators, and conciliators earned a median of \$47,320.

In Federal courts, the following salaries apply: the Chief Justice of the United States Supreme Court earned \$198,600, and the Associate Justices earned \$190,100. Federal court of appeals judges earned \$164,100 a year in 2001 while district court judges had salaries of \$154,700, as did judges in the Court of Federal Claims and the Court of International Trade. Federal judges with limited jurisdiction, such as magistrates and bankruptcy court judges, had salaries of \$142,324.

According to a survey by the National Center for State Courts, annual salaries of associate justices of States' highest courts averaged \$120,100 in 2002 and ranged from about \$89,381 to \$170,319. Salaries of State intermediate appellate court judges averaged \$116,064 and ranged from \$91,469 to \$159,657. Salaries of State judges of general jurisdiction trial courts averaged \$109,811 and ranged from \$82,600 to \$150,000.

Most salaried judges are provided health and life insurance, and contributions to retirement plans are made on their behalf.

## Sources of Additional Information

Information on judges, magistrates, and other judicial workers may be obtained from:

- National Center for State Courts, 300 Newport Ave., Williamsburg, VA 23185. Internet: <http://www.ncsconline.org>

Information on arbitrators, mediators, and conciliators may be obtained from:

- American Arbitration Association, 335 Madison Ave., Floor 10, New York, NY 10017. Internet: <http://www.adr.org>

---

## Physicists and Astronomers

[Return to Menu](#)

### Significant Points

- Scientific research and development services firms and the Federal Government employ 3 out of 5 physicists and astronomers.
- Most jobs are in basic research and development, usually requiring a doctoral degree; master's degree holders qualify for many jobs in applied research and development, while bachelor's degree holders may qualify as technicians or research assistants.
- Ph.D. graduates will face competition for basic research jobs.

### Nature of the Work

Physicists explore and identify basic principles governing the structure and behavior of matter, the generation and transfer of energy, and the interaction of matter and energy. Some physicists use these principles in theoretical areas, such as the nature of time and the origin of the universe; others apply their physics knowledge to practical areas, such as the development of advanced materials, electronic and optical devices, and medical equipment.

Physicists design and perform experiments with lasers, particle accelerators, telescopes, mass spectrometers, and other equipment. Based on observations and analysis, they attempt to discover and explain laws describing the forces of nature, such as gravity, electromagnetism, and nuclear interactions. Physicists also find ways to apply physical laws and theories to problems in nuclear energy, electronics, optics, materials, communications, aerospace technology, and medical instrumentation.

Astronomy is sometimes considered a subfield of physics. *Astronomers* use the principles of physics and mathematics to learn about the fundamental nature of the universe, including the sun, moon, planets, stars, and galaxies. They also apply their knowledge to solve problems in navigation, space flight, and satellite communications, and to develop the instrumentation and techniques used to observe and collect astronomical data.

Most physicists work in research and development. Some do basic research to increase scientific knowledge. Physicists who conduct applied research build upon the discoveries made through basic research and work to develop new devices, products, and processes. For example, basic research in solid-state physics led to the development of transistors and, then, integrated circuits used in computers.

Physicists also design research equipment. This equipment often has additional unanticipated uses. For example, lasers are used in surgery, microwave devices are used in ovens, and measuring instruments can analyze blood or the chemical content of foods. A small number of physicists work in inspection, testing, quality control, and other production-related jobs in industry.

Much physics research is done in small or medium-sized laboratories. However, experiments in plasma, nuclear, and high energy and in some other areas of physics require extremely large, expensive equipment, such as particle accelerators. Physicists in these subfields often work in large teams. Although physics research may require extensive experimentation in laboratories, research physicists still spend time in offices planning, recording, analyzing, and reporting on research.

Almost all astronomers do research. Some are theoreticians, working on the laws governing the structure and evolution of astronomical objects. Others analyze large quantities of data gathered by observatories and satellites, and write scientific papers or reports on their findings. Some astronomers actually operate large space- or ground-based telescopes, usually as part of a team. However, astronomers may spend only a few weeks each year making observations with optical telescopes, radio telescopes, and other instruments. For many years, satellites and other space-based instruments, such as the Hubble space telescope, have provided tremendous amounts of astronomical data. New technology resulting in improvements in analytical techniques and instruments, such as computers and optical telescopes and mounts, is leading to resurgence in ground-based research. A small number of astronomers work in museums housing planetariums. These astronomers develop and revise programs presented to the public, and may direct planetarium operations.

Physicists generally specialize in one of many subfields—elementary particle physics, nuclear physics, atomic and molecular physics, physics of condensed matter (solid-state physics), optics, acoustics, space physics, plasma physics, or the physics of fluids. Some specialize in a subdivision of one of these subfields. For example, within condensed matter physics, specialties include superconductivity, crystallography, and semiconductors. However, all physics involves the same fundamental principles, so specialties may overlap, and physicists may switch from one subfield to another. In addition, growing numbers of physicists work in interdisciplinary fields, such as biophysics, chemical physics, and geophysics.

### **Working Conditions**

Physicists often work regular hours in laboratories and offices. At times, however, those who are deeply involved in research may work long or irregular hours. Most do not encounter unusual hazards in their work. Some physicists temporarily work away from home at national or international facilities with unique equipment, such as particle accelerators. Astronomers who make observations using ground-based telescopes may spend long periods in observatories; this work usually involves travel to remote locations and may require long hours, including night work.

Physicists and astronomers whose work depends on grant money often are under pressure to write grant proposals to keep their work funded.

## **Employment**

Physicists and astronomers held about 14,000 jobs in 2002. Jobs for astronomers accounted for only 7 percent of the total. Nearly one-third of physicists and astronomers worked for scientific research and development services firms. The Federal Government employed 29 percent, mostly in the U.S. Department of Defense, but also in the National Aeronautics and Space Administration (NASA), and in the U.S. Departments of Commerce, Health and Human Services, and Energy. Other physicists and astronomers worked in colleges and universities in non-faculty, usually research, positions, or for State governments, information technology companies, pharmaceutical and medicine manufacturing companies, or electronic equipment manufacturers.

Besides the jobs described above, many physicists and astronomers held faculty positions in colleges and universities.

Although physicists and astronomers are employed in all parts of the country, most work in areas in which universities, large research and development laboratories, or observatories are located.

## **Training, Other Qualifications, and Advancement**

Because most jobs are in basic research and development, a doctoral degree is the usual educational requirement for physicists and astronomers. Additional experience and training in a postdoctoral research appointment, although not required, is important for physicists and astronomers aspiring to permanent positions in basic research in universities and government laboratories. Many physics and astronomy Ph.D. holders ultimately teach at the college or university level.

Master's degree holders usually do not qualify for basic research positions but do qualify for many kinds of jobs requiring a physics background, including positions in manufacturing and applied research and development. Increasingly, many master's degree programs specifically prepare students for physics-related research and development that does not require a Ph.D. degree. These master's degree programs teach students specific research skills that can be used in private industry jobs. A master's degree may suffice for teaching jobs in high schools or at 2-year colleges.

Those with bachelor's degrees in physics are rarely qualified to fill positions in research or in teaching at the college level. They are, however, usually qualified to work as technicians or research assistants in engineering-related areas, in software development and other scientific fields, or in setting up computer networks and sophisticated laboratory equipment. Some may qualify for applied research jobs in private industry or non-research positions in the Federal Government. Some become science teachers in secondary schools. Astronomy bachelor's or master's degree holders often enter a field unrelated to astronomy, and they are qualified to work in planetariums running science shows, to assist astronomers doing research, and to operate space-based and ground-based telescopes and other astronomical instrumentation.

More than 500 colleges and universities offer a bachelor's degree in physics. Undergraduate programs provide a broad background in the natural sciences and mathematics. Typical physics courses include electromagnetism, optics, thermodynamics, atomic physics, and quantum mechanics.

About 180 colleges and universities have departments offering Ph.D. degrees in physics. More than 70 additional colleges offer a master's as their highest degree in physics. Graduate students usually concentrate in a subfield of physics, such as elementary particles or condensed matter. Many begin studying for their doctorate immediately after receiving their bachelor's degree.

About 70 universities grant degrees in astronomy, either through an astronomy, physics, or combined physics/astronomy department. Currently, more than 30 departments are combined with the physics department and nearly 40 are administered separately. With fewer than 40 doctoral programs in astronomy, applicants face considerable competition for available slots. Those planning a career in astronomy should have a very strong physics background. In fact, an undergraduate degree in either physics or astronomy is excellent preparation, followed by a Ph.D. in astronomy.

Mathematical ability, problem-solving and analytical skills, an inquisitive mind, imagination, and initiative are important traits for anyone planning a career in physics or astronomy. Prospective physicists who hope to work in industrial laboratories applying physics knowledge to practical problems should broaden their educational background to include courses outside of physics, such as economics, information technology, and business management. Good oral and written communication skills also are important because many physicists work as part of a team, write research papers or proposals, or have contact with clients or customers with non-physics backgrounds.

Many physics and astronomy Ph.D. holders begin their careers in a postdoctoral research position, in which they may work with experienced physicists as they continue to learn about their specialty and develop ideas and results to be used in later work. Initial work may be under the close supervision of senior scientists. After some experience, physicists perform increasingly complex tasks and work more independently. Those who develop new products or processes sometimes form their own companies or join new firms to exploit their own ideas.

### **Job Outlook**

Employment of physicists and astronomers is expected to grow more slowly than the average for all occupations through 2012. Federal research expenditures are the major source of physics-related and astronomy-related research funds, especially for basic research. Although these expenditures are expected to steadily increase over the 2002-12 projection period, resulting in some growth in employment and opportunities, the limited research funds available still will result in competition among Ph.D. holders for basic research jobs. The need to replace physicists and astronomers who retire or otherwise leave the occupation permanently will account for most expected job openings.

Although research and development budgets in private industry will continue to grow, many research laboratories in private industry are expected to continue to

reduce basic research, which includes much physics research, in favor of applied or manufacturing research and product and software development. Nevertheless, persons with a physics background continue to be in demand in the areas of information technology, semiconductor technology, and other applied sciences. This trend is expected to continue; however, many of the new workers will have job titles such as computer software engineer, computer programmer, engineer, and systems developer, rather than physicist.

Through the 1990s, the number of doctorates granted in physics was much greater than the number of job openings for physicists, resulting in keen competition, particularly for research positions in colleges and universities and in research and development centers. Competitive conditions have eased somewhat because the number of doctorate degrees awarded has been dropping for several years, in line with declining enrollment in graduate physics programs. Recent increases in undergraduate physics enrollments, however, may again lead to growth in enrollments in graduate physics programs, meaning that, toward the end of the projection period, there may be an increase in the number of doctoral degrees granted that will intensify the competition for job openings.

Opportunities may be more numerous for those with a master's degree, particularly graduates from programs preparing students for applied research and development, product design, and manufacturing positions in private industry. Many of these positions, however, will have titles other than physicist, such as engineer or computer scientist.

Persons with only a bachelor's degree in physics or astronomy are not qualified to enter most physicist or astronomer research jobs but may qualify for a wide range of positions related to engineering, mathematics, computer science, and environmental science. Those who meet State certification requirements can become high school physics teachers, an occupation in strong demand in many school districts. Most States require new teachers to obtain a master's degree in education within a certain time. Despite competition for traditional physics and astronomy research jobs, individuals with a physics degree at any level will find their knowledge of science and mathematics useful for entry to many other occupations.

## **Earnings**

Median annual earnings of physicists were \$85,020 in 2002. The middle 50 percent earned between \$66,680 and \$107,410. The lowest 10 percent earned less than \$50,350, and the highest 10 percent earned more than \$129,250.

Median annual earnings of astronomers were \$81,690 in 2002. The middle 50 percent earned between \$53,390 and \$106,230; the lowest 10 percent, less than \$40,140, and the highest 10 percent more than \$126,320.

According to a 2003 National Association of Colleges and Employers survey, the average annual starting salary offer to physics doctoral degree candidates was \$55,485.

The American Institute of Physics reported a median annual salary of \$95,000 in 2002 for its full time members with Ph.D.'s (excluding those in postdoctoral positions); the median was \$87,000 for those with master's degrees, and \$78,000

for bachelor's degree holders. Those working in temporary postdoctoral positions earned significantly less.

The average annual salary for physicists employed by the Federal Government was \$95,685 in 2003; for astronomy and space scientists, it was \$100,591.

### **Sources of Additional Information**

General information on career opportunities in physics is available from:

- American Institute of Physics, Career Services Division and Education and Employment Division, One Physics Ellipse, College Park, MD 20740-3843.  
Internet: <http://www.aip.org>
- The American Physical Society, One Physics Ellipse, College Park, MD 20740-3844.  
Internet: <http://www.aps.org>

## Financial Managers

[Return to Menu](#)

### **Significant Points**

- A bachelor's degree in finance, accounting, or a related field is the minimum academic preparation, but many employers increasingly seek graduates with a master's degree.
- Employment will grow as the economy expands and increases the need for workers with financial expertise.

### **Nature of the Work**

Almost every firm, government agency, and organization has one or more financial managers who oversee the preparation of financial reports, direct investment activities, and implement cash management strategies. As computers are increasingly used to record and organize data, many financial managers are spending more time developing strategies and implementing the long-term goals of their organization.

The duties of financial managers vary with their specific titles, which include controller, treasurer or finance officer, credit manager, cash manager, and risk and insurance manager. **Controllers** direct the preparation of financial reports that summarize and forecast the organization's financial position, such as income statements, balance sheets, and analyses of future earnings or expenses. Controllers also are in charge of preparing special reports required by regulatory authorities. Often, controllers oversee the accounting, audit, and budget departments. **Treasurers** and **finance officers** direct the organization's financial goals, objectives, and budgets. They oversee the investment of funds and manage associated risks, supervise cash management activities, execute capital-raising strategies to support a firm's expansion, and deal with mergers and acquisitions. **Credit managers** oversee the firm's issuance of credit. They establish credit-rating criteria, determine credit ceilings, and monitor the collections of past-due accounts.

Managers specializing in international finance develop financial and accounting systems for the banking transactions of multinational organizations.

**Cash managers** monitor and control the flow of cash receipts and disbursements to meet the business and investment needs of the firm. For example, cash flow projections are needed to determine whether loans must be obtained to meet cash requirements or whether surplus cash should be invested in interest-bearing instruments. **Risk and insurance managers** oversee programs to minimize risks and losses that might arise from financial transactions and business operations undertaken by the institution. They also manage the organization's insurance budget.

Financial institutions, such as commercial banks, savings and loan associations, credit unions, and mortgage and finance companies, employ additional financial managers who oversee various functions, such as lending, trusts, mortgages, and investments, or programs, including sales, operations, or electronic financial services. These managers may be required to solicit business, authorize loans, and direct the investment of funds, always adhering to Federal and State laws and regulations.

Branch managers of financial institutions administer and manage all of the functions of a branch office, which may include hiring personnel, approving loans and lines of credit, establishing a rapport with the community to attract business, and assisting customers with account problems. Financial managers who work for financial institutions must keep abreast of the rapidly growing array of financial services and products.

In addition to the general duties described above, all financial managers perform tasks unique to their organization or industry. For example, government financial managers must be experts on the government appropriations and budgeting processes, whereas healthcare financial managers must be knowledgeable about issues surrounding healthcare financing. Moreover, financial managers must be aware of special tax laws and regulations that affect their industry.

Financial managers play an increasingly important role in mergers and consolidations, and in global expansion and related financing. These areas require extensive, specialized knowledge on the part of the financial manager to reduce risks and maximize profit. Financial managers increasingly are hired on a temporary basis to advise senior managers on these and other matters. In fact, some small firms contract out all accounting and financial functions to companies that provide these services.

The role of the financial manager, particularly in business, is changing in response to technological advances that have significantly reduced the amount of time it takes to produce financial reports. Financial managers now perform more data analysis and use it to offer senior managers ideas on how to maximize profits. They often work on teams, acting as business advisors to top management. Financial managers need to keep abreast of the latest computer technology in order to increase the efficiency of their firm's financial operations.

## **Working Conditions**

Financial managers work in comfortable offices, often close to top managers and to departments that develop the financial data these managers need. They typically have direct access to state-of-the-art computer systems and information services. Financial managers commonly work long hours, often up to 50 or 60 per week. They generally are required to attend meetings of financial and economic associations and may travel to visit subsidiary firms or to meet customers.

## **Employment**

Financial managers held about 599,000 jobs in 2002. While the vast majority is employed in private industry, nearly 1 in 10 work for the different branches of government. In addition, although they can be found in every industry, approximately 1 out of 4 are employed by insurance and finance establishments, such as banks, savings institutions, finance companies, credit unions, and securities dealers.

## **Training, Other Qualifications, and Advancement**

A bachelor's degree in finance, accounting, economics, or business administration is the minimum academic preparation for financial managers. However, many employers now seek graduates with a master's degree, preferably in business administration, economics, finance, or risk management. These academic programs develop analytical skills and provide knowledge of the latest financial analysis methods and technology.

Experience may be more important than formal education for some financial manager positions—notably, branch managers in banks. Banks typically fill branch manager positions by promoting experienced loan officers and other professionals who excel at their jobs. Other financial managers may enter the profession through formal management training programs offered by the company.

Continuing education is vital for financial managers, who must cope with the growing complexity of global trade, changes in Federal and State laws and regulations, and the proliferation of new and complex financial instruments. Firms often provide opportunities for workers to broaden their knowledge and skills by encouraging employees to take graduate courses at colleges and universities or attend conferences related to their specialty. Financial management, banking, and credit union associations, often in cooperation with colleges and universities, sponsor numerous national and local training programs. Persons enrolled prepare extensively at home and then attend sessions on subjects such as accounting management, budget management, corporate cash management, financial analysis, international banking, and information systems. Many firms pay all or part of the costs for employees who successfully complete courses. Although experience, ability, and leadership are emphasized for promotion, advancement may be accelerated by this type of special study.

In some cases, financial managers also may broaden their skills and exhibit their competency by attaining professional certification. There are many different associations that offer professional certification programs. For example, the Association for Investment Management and Research confers the Chartered

Financial Analyst designation on investment professionals who have a bachelor's degree, pass three sequential examinations, and meet work experience requirements. The Association for Financial Professionals (AFP) confers the Certified Cash Manager credential to those who pass a computer-based exam and have a minimum of 2 years of relevant experience. The Institute of Management Accountants offers a Certified in Financial Management designation to members with a BA and at least 2 years of work experience who pass the institute's four-part examination and fulfill continuing education requirements. Also, financial managers who specialize in accounting may earn the Certified Public Accountant (CPA) or Certified Management Accountant (CMA) designations.

Candidates for financial management positions need a broad range of skills. Interpersonal skills are important because these jobs involve managing people and working as part of a team to solve problems. Financial managers must have excellent communication skills to explain complex financial data. Because financial managers work extensively with various departments in their firm, a broad overview of the business is essential.

Financial managers should be creative thinkers and problem-solvers, applying their analytical skills to business. They must be comfortable with the latest computer technology. As financial operations increasingly are affected by the global economy, financial managers must have knowledge of international finance. Proficiency in a foreign language also may be important.

Because financial management is critical for efficient business operations, well-trained, experienced financial managers who display a strong grasp of the operations of various departments within their organization are prime candidates for promotion to top management positions. Some financial managers transfer to closely related positions in other industries. Those with extensive experience and access to sufficient capital may start their own consulting firms.

## **Job Outlook**

Employment of financial managers is expected to grow about as fast as the average for all occupations through 2012. Growth is expected to be steady and will increase in line with the growth of the economy as a whole. However, jobseekers are likely to face keen competition for jobs, as the number of job openings is expected to be less than the number of applicants. Candidates with expertise in accounting and finance, particularly those with a master's degree, should enjoy the best job prospects. Strong computer skills and knowledge of international finance are important; so are excellent communication skills, because financial management jobs involve working on strategic planning teams.

As the economy expands, job growth for financial managers will stem from both the expansion of established companies and from the creation of new businesses. Over the short term, employment in this occupation is negatively impacted by economic downturns, during which companies are more likely to close departments, or even go out of business—decreasing the need for financial managers. Mergers, acquisitions, and corporate downsizing also are likely to adversely affect employment of financial managers. However, the growing need for financial expertise as the economy expands will ensure job growth over the next decade.

The banking industry, which employs more than 1 out of 10 financial managers, will continue to consolidate, although at a slower rate than in previous years. In spite of this trend, employment of bank branch managers is expected to increase as banks begin to refocus on the importance of their existing branches and as new branches are created to service a growing population. As banks expand the range of products and services they offer to include insurance and investment products, branch managers with knowledge in these areas will be needed. As a result, candidates who are licensed to sell insurance or securities will have the most favorable prospects.

Despite the current downturn in the securities and commodities industry, the long-run prospects for financial managers in that industry should be favorable, as more will be needed to handle increasingly complex financial transactions and manage a growing amount of investments. Financial managers also will be needed to handle mergers and acquisitions, raise capital, and assess global financial transactions. Risk managers, who assess risks for insurance and investment purposes, also will be in demand.

Some companies may hire financial managers on a temporary basis, to see the organization through a short-term crisis or to offer suggestions for boosting profits. Other companies may contract out all accounting and financial operations. Even in these cases, however, financial managers may be needed to oversee the contracts.

Computer technology has reduced the time and staff required to produce financial reports. As a result, forecasting earnings, profits, and costs, and generating ideas and creative ways to increase profitability will become a major role of corporate financial managers over the next decade. Financial managers who are familiar with computer software that can assist them in this role will be needed.

## **Earnings**

Median annual earnings of financial managers were \$73,340 in 2002. The middle 50 percent earned between \$52,490 and \$100,660. The lowest 10 percent had earnings of less than \$39,120, while the top 10 percent earned over \$142,260. Median annual earnings in the industries employing the largest numbers of financial managers in 2002 were as follows:

Securities and commodity contracts intermediation and brokerage	\$125,220
Management of companies and enterprises	88,310
Nondepository credit intermediation	78,400
Local government	63,090
Depository credit intermediation	58,790

According to a 2002 survey by Robert Half International, a staffing services firm specializing in accounting and finance professionals, directors of finance earned between \$75,000 and \$204,500, and corporate controllers earned between \$54,000 and \$138,750.

The Association for Financial Professionals' 14th annual compensation survey showed that financial officers' average total compensation in 2002, including bonuses and

deferred compensation, was \$130,900. Selected financial manager positions had average total compensation as follows:

Vice president of finance	\$183,500
Treasurer	150,600
Assistant vice president-finance	141,300
Controller/comptroller	134,300
Director	113,600
Assistant treasurer	111,900
Assistant controller/comptroller	115,500
Manager	84,500
Cash manager	64,700

Large organizations often pay more than small ones, and salary levels also can depend on the type of industry and location. Many financial managers in both public and private industry receive additional compensation in the form of bonuses, which also vary substantially by size of firm. Deferred compensation in the form of stock options is becoming more common, especially for senior level executives.

#### **Sources of Additional Information**

For information about careers and certification in financial management, contact:

- Financial Management Association International, College of Business Administration, University of South Florida, Tampa, FL 33620-5500. Internet: <http://www.fma.org>

For information about careers in financial and treasury management and the Certified Cash Manager program, contact:

- Association for Financial Professionals, 7315 Wisconsin Ave., Suite 600 West, Bethesda, MD 20814. Internet: <http://www.afponline.org>

For information about the Chartered Financial Analyst program, contact:

- CFA Institute, P.O. Box 3668, 560 Ray Hunt Dr., Charlottesville, VA 22903-0668. Internet: <http://www.cfainstitute.org>

For information about the Certified in Financial Management designation, contact:

- Institute of Management Accountants, 10 Paragon Drive, Montvale, NJ, 07645-1759. Internet: <http://www.imanet.org/>

**Significant Points**

- Chiropractors must be licensed, requiring 2 to 4 years of undergraduate education, completion of a 4-year chiropractic college course, and passing scores on national and State examinations.
- Employment is expected to increase faster than average as a result of research and changing attitudes about alternative healthcare practices.
- Job prospects should be good; establishing a new practice will be easiest in areas with a low concentration of chiropractors.
- As with other types of independent practice, earnings for chiropractors are relatively low in the beginning, but increase as the practice grows.

**Nature of the Work**

Chiropractors, also known as doctors of chiropractic or chiropractic physicians, diagnose and treat patients whose health problems are associated with the body's muscular, nervous, and skeletal systems, especially the spine. Chiropractors believe that interference with these systems impairs the body's normal functions and lowers its resistance to disease. They also hold that spinal or vertebral dysfunction alters many important body functions by affecting the nervous system and that skeletal imbalance through joint or articular dysfunction, especially in the spine, can cause pain.

The chiropractic approach to healthcare is holistic, stressing the patient's overall health and wellness. It recognizes that many factors affect health, including exercise, diet, rest, environment, and heredity. Chiropractors provide natural, drugless, nonsurgical health treatments and rely on the body's inherent recuperative abilities. They also recommend changes in lifestyle—in eating, exercise, and sleeping habits, for example—to their patients. When appropriate, chiropractors consult with and refer patients to other health practitioners.

Like other health practitioners, chiropractors follow a standard routine to secure the information they need for diagnosis and treatment. They take the patient's medical history, conduct physical, neurological, and orthopedic examinations, and may order laboratory tests. X rays and other diagnostic images are important tools because of the chiropractor's emphasis on the spine and its proper function. Chiropractors also employ a postural and spinal analysis common to chiropractic diagnosis.

In cases in which difficulties can be traced to the involvement of musculoskeletal structures, chiropractors manually adjust the spinal column. Some chiropractors use water, light, massage, ultrasound, electric, and heat therapy. They also may apply supports such as straps, tapes, and braces. Chiropractors counsel patients about wellness concepts such as nutrition, exercise, changes in lifestyle, and stress management, but do not prescribe drugs or perform surgery.

Some chiropractors specialize in sports injuries, neurology, orthopedics, pediatrics, nutrition, internal disorders, or diagnostic imaging.

Many chiropractors are solo or group practitioners who also have the administrative responsibilities of running a practice. In larger offices, chiropractors delegate these tasks to office managers and chiropractic assistants. Chiropractors in private practice are responsible for developing a patient base, hiring employees, and keeping records.

### **Working Conditions**

Chiropractors work in clean, comfortable offices. Their average workweek is about 40 hours, although longer hours are not uncommon. Solo practitioners set their own hours, but may work evenings or weekends to accommodate patients.

Like other health practitioners, chiropractors are sometimes on their feet for long periods. Chiropractors who take x rays must employ appropriate precautions against the dangers of repeated exposure to radiation.

### **Employment**

Chiropractors held about 49,000 jobs in 2002. Most chiropractors are in solo practice, although some are in group practice or work for other chiropractors. A small number teach, conduct research at chiropractic institutions, or work in hospitals and clinics.

Many chiropractors are located in small communities. There are geographic imbalances in the distribution of chiropractors, in part because many establish practices close to chiropractic institutions.

### **Training, Other Qualifications, and Advancement**

All States and the District of Columbia regulate the practice of chiropractic and grant licenses to chiropractors who meet educational and examination requirements established by the State. Chiropractors can practice only in States where they are licensed. Some States have agreements permitting chiropractors licensed in one State to obtain a license in another without further examination, provided that their educational, examination, and practice credentials meet State specifications.

Most State boards require at least 2 years of undergraduate education; an increasing number are requiring a 4-year bachelor's degree. All boards require the completion of a 4-year program at an accredited chiropractic college leading to the Doctor of Chiropractic degree.

For licensure, most State boards recognize either all or part of the four-part test administered by the National Board of Chiropractic Examiners. State examinations may supplement the National Board tests, depending on State requirements.

To maintain licensure, almost all States require the completion of a specified number of hours of continuing education each year. Chiropractic associations and accredited chiropractic programs and institutions offer continuing education programs. Specialty councils within some chiropractic associations also offer programs leading to clinical specialty certification, called "diplomate" certification, in areas such as orthopedics,

neurology, sports injuries, occupational and industrial health, nutrition, diagnostic imaging, thermography, and internal disorders.

In 2003, 16 chiropractic programs and 2 chiropractic institutions in the United States were accredited by the Council on Chiropractic Education. Applicants are required to have at least 90 semester hours of undergraduate study leading toward a bachelor's degree, including courses in English, the social sciences or humanities, organic and inorganic chemistry, biology, physics, and psychology. Many applicants have a bachelor's degree, which may eventually become the minimum entry requirement. Several chiropractic colleges offer pre-chiropractic study, as well as a bachelor's degree program. Recognition of pre-chiropractic education offered by chiropractic colleges varies among the State boards.

During the first 2 years, most chiropractic programs emphasize classroom and laboratory work in basic science subjects such as anatomy, physiology, public health, microbiology, pathology, and biochemistry. The last 2 years stress courses in manipulation and spinal adjustment and provide clinical experience in physical and laboratory diagnosis, neurology, orthopedics, geriatrics, physiotherapy, and nutrition. Chiropractic programs and institutions grant the degree of Doctor of Chiropractic.

Chiropractic requires keen observation to detect physical abnormalities. It also takes considerable manual dexterity, but not unusual strength or endurance, to perform adjustments. Chiropractors should be able to work independently and handle responsibility. As in other health-related occupations, empathy, understanding, and the desire to help others are good qualities for dealing effectively with patients.

Newly licensed chiropractors can set up a new practice, purchase an established one, or enter into partnership with an established practitioner. They also may take a salaried position with an established chiropractor, a group practice, or a healthcare facility.

### **Job Outlook**

Job prospects are expected to be good for persons who enter the practice of chiropractic. Employment of chiropractors is expected to grow faster than the average for all occupations through the year 2012 as consumer demand for alternative healthcare grows. Chiropractors emphasize the importance of healthy lifestyles and do not prescribe drugs or perform surgery. As a result, chiropractic care is appealing to many health-conscious Americans. Chiropractic treatment of the back, neck, extremities, and joints has become more accepted as a result of research and changing attitudes about alternative, noninvasive healthcare practices. The rapidly expanding older population, with its increased likelihood of mechanical and structural problems, also will increase demand for chiropractors.

Demand for chiropractic treatment also is related to the ability of patients to pay, either directly or through health insurance. Although more insurance plans now cover chiropractic services, the extent of such coverage varies among plans. Increasingly, chiropractors must educate communities about the benefits of chiropractic care in order to establish a successful practice.

In this occupation, replacement needs arise almost entirely from retirements. Chiropractors usually remain in the occupation until they retire; few transfer to other

occupations. Establishing a new practice will be easiest in areas with a low concentration of chiropractors.

### **Earnings**

Median annual earnings of salaried chiropractors were \$65,330 in 2002. The middle 50 percent earned between \$44,140 and \$102,400 a year.

Self-employed chiropractors usually earn more than salaried chiropractors. According to the American Chiropractic Association, in 2000, the average income for all chiropractors, including the self-employed, was about \$81,500 after expenses. In chiropractic, as in other types of independent practice, earnings are relatively low in the beginning and increase as the practice grows. Geographic location and the characteristics and qualifications of the practitioner also may influence earnings. Self-employed chiropractors must provide for their own health insurance and retirement.

### **Sources of Additional Information**

General information on chiropractic as a career is available from:

- American Chiropractic Association, 1701 Clarendon Blvd., Arlington, VA 22209. Internet: <http://www.amerchiro.org>
- International Chiropractors Association, 1110 North Glebe Rd., Suite 1000, Arlington, VA 22201. Internet: <http://www.chiropractic.org>
- World Chiropractic Alliance, 2950 N. Dobson Rd., Suite 1, Chandler, AZ 85224-1802.
- Dynamic Chiropractic, P.O. Box 40109, Huntington, CA 92605-4109.

For a list of chiropractic programs and institutions, as well as general information on chiropractic education, contact:

- Council on Chiropractic Education, 8049 North 85th Way, Scottsdale, AZ 85258-4321. Internet: <http://www.cce-usa.org>

For information on State education and licensure requirements, contact:

- Federation of Chiropractic Licensing Boards, 901 54th Ave., Suite 101, Greeley, CO 80634-4400. Internet: <http://www.fclb.org>

For information on admission requirements to a specific chiropractic college, as well as scholarship and loan information, contact the college's admissions office.

**Significant Points**

- A bachelor's degree in chemistry or a related discipline is the minimum educational requirement; however, many research jobs require a Ph.D.
- Job growth will be concentrated in pharmaceutical and medicine manufacturing companies and in scientific research and development services firms.
- Graduates with a master's degree, and particularly those with a Ph.D., will enjoy better opportunities than those with a bachelor's degree.

**Nature of the Work**

Everything in the environment, whether naturally occurring or of human design, is composed of chemicals. Chemists and materials scientists search for and use new knowledge about chemicals. Chemical research has led to the discovery and development of new and improved synthetic fibers, paints, adhesives, drugs, cosmetics, electronic components, lubricants, and thousands of other products. Chemists and materials scientists also develop processes that save energy and reduce pollution, such as improved oil refining and petrochemical processing methods. Research on the chemistry of living things spurs advances in medicine, agriculture, food processing, and other fields.

Materials scientists research and study the structures and chemical properties of various materials to develop new products or enhance existing ones. They also determine ways to strengthen or combine materials or develop new materials for use in a variety of products. Materials science encompasses the natural and synthetic materials used in a wide range of products and structures, from airplanes, cars, and bridges to clothing and household goods. Companies whose products are made of metals, ceramics, and rubber employ most materials scientists. Other applications of materials science include studies of superconducting materials, graphite materials, integrated-circuit chips, and fuel cells. Materials scientists, applying chemistry and physics, study all aspects of these materials. Chemistry plays an increasingly dominant role in materials science, because it provides information about the structure and composition of materials. Materials scientists often specialize in specific areas such as ceramics or metals.

Many chemists and materials scientists work in research and development (R&D). In basic research, they investigate properties, composition, and structure of matter and the laws that govern the combination of elements and reactions of substances. In applied R&D, they create new products and processes or improve existing ones, often using knowledge gained from basic research. For example, synthetic rubber and plastics resulted from research on small molecules uniting to form large ones, a process called polymerization. R&D chemists and materials scientists use computers and a wide variety of sophisticated laboratory instrumentation for modeling and simulation in their work.

The use of computers to analyze complex data has had the dramatic impact of allowing chemists and materials scientists to practice combinatorial chemistry. This technique makes and tests large quantities of chemical compounds simultaneously in

order to find compounds with certain desired properties. As an integral part of drug and materials discovery, combinatorial chemistry speeds up materials design and R&D, permitting useful compounds to be developed more quickly and inexpensively than was formerly possible. Combinatorial chemistry has allowed chemists to produce thousands of compounds each year and to assist in the completion of the sequencing of human genes. Today, chemists are working with life scientists to translate this knowledge into viable new drugs.

Chemists also work in production and quality control in chemical manufacturing plants. They prepare instructions for plant workers that specify ingredients, mixing times, and temperatures for each stage in the process. They also monitor automated processes to ensure proper product yield, and test samples of raw materials or finished products to make certain that they meet industry and government standards, including the regulations governing pollution. Chemists report and document test results and analyze those results in hopes of further improving existing theories or developing new test methods.

Chemists often specialize. **Analytical chemists** determine the structure, composition, and nature of substances by examining and identifying the various elements or compounds that make up a substance. These chemists are absolutely crucial to the pharmaceutical industry because pharmaceutical companies need to know the identity of compounds that they hope to turn into drugs. Furthermore, they study the relations and interactions of the parts of compounds and develop analytical techniques. They also identify the presence and concentration of chemical pollutants in air, water, and soil. **Organic chemists** study the chemistry of the vast number of carbon compounds that make up all living things. Organic chemists who synthesize elements or simple compounds to create new compounds or substances that have different properties and applications have developed many commercial products, such as drugs, plastics, and elastomers (elastic substances similar to rubber). **Inorganic chemists** study compounds consisting mainly of elements other than carbon, such as those in electronic components. **Physical and theoretical chemists** study the physical characteristics of atoms and molecules and the theoretical properties of matter, and investigate how chemical reactions work. Their research may result in new and better energy sources. **Macromolecular chemists** study the behavior of atoms and molecules. **Medicinal chemists** study the structural properties of compounds intended for applications to human medicine. **Materials chemists** study and develop new materials to improve existing products or make new ones. In fact, virtually all chemists are involved in this quest in one way or another. Developments in the field of chemistry that involve life sciences will expand, resulting in more interaction among biologists, engineers, and chemists.

### **Working Conditions**

Chemists and materials scientists usually work regular hours in offices and laboratories. R&D chemists and materials scientists spend much time in laboratories, but also work in offices when they do theoretical research or plan, record, and report on their lab research. Although some laboratories are small, others are large enough to incorporate prototype chemical manufacturing facilities as well as advanced equipment for chemists. In addition to working in a laboratory, materials scientists also work with engineers and processing specialists in industrial manufacturing facilities. After a material is sold, materials scientists often help customers tailor the material to suit their needs. Chemists do some of their work in a chemical plant or

outdoors—while gathering water samples to test for pollutants, for example. Some chemists are exposed to health or safety hazards when handling certain chemicals, but there is little risk if proper procedures are followed.

## **Employment**

Chemists and materials scientists held about 91,000 jobs in 2002. About 44 percent of all chemists and material scientists are employed in manufacturing firms—mostly in the chemical manufacturing industry, which includes firms that produce plastics and synthetic materials, drugs, soaps and cleaners, pesticides and fertilizers, paint, industrial organic chemicals, and other chemical products. About 15 percent of chemists and material scientists work in scientific research and development services; another 13 percent work in architectural, engineering, and related services. In addition, thousands of persons with a background in chemistry and materials science hold teaching positions in high schools and in colleges and universities.

Chemists and materials scientists are employed in all parts of the country, but they are mainly concentrated in large industrial areas.

## **Training, Other Qualifications, and Advancement**

A bachelor's degree in chemistry or a related discipline usually is the minimum educational requirement for entry-level chemist jobs. However, many research jobs require a master's degree, or more often a Ph.D. While some materials scientists hold a degree in materials science, a bachelor's degree in chemistry, physics, or electric engineering also is accepted. Similar to chemists, many R&D jobs require a Ph.D. in materials science or a related science.

Many colleges and universities offer a bachelor's degree program in chemistry; about 620 are approved by the American Chemical Society (ACS). The number of colleges that offer a degree program in materials science is small, but gradually increasing. Several hundred colleges and universities also offer advanced degree programs in chemistry; around 320 master's programs and about 190 doctoral programs are ACS-approved.

Students planning careers as chemists and materials scientists should take courses in science and mathematics, should like working with their hands building scientific apparatus and performing laboratory experiments, and should like computer modeling. Perseverance, curiosity, and the ability to concentrate on detail and to work independently are essential. Interaction among specialists in this field is increasing, especially for chemists in drug development. One type of chemist often relies on the findings of another type of chemist. For example, an organic chemist must understand findings on the identity of compounds prepared by an analytical chemist.

In addition to required courses in analytical, inorganic, organic, and physical chemistry, undergraduate chemistry majors usually study biological sciences, mathematics, and physics. Those interested in the environmental field also should take courses in environmental studies and become familiar with current legislation and regulations. Computer courses are essential, because employers prefer job applicants who are able to apply computer skills to modeling and simulation tasks and operate computerized laboratory equipment. This is increasingly important as

combinatorial chemistry techniques are more widely applied. Additionally, courses in statistics are useful because both chemists and materials scientists need the ability to apply basic statistical techniques.

Because R&D chemists and materials scientists are increasingly expected to work on interdisciplinary teams, some understanding of other disciplines, including business and marketing or economics, is desirable, along with leadership ability and good oral and written communication skills. Experience, either in academic laboratories or through internships, fellowships, or work-study programs in industry, also is useful. Some employers of research chemists, particularly in the pharmaceutical industry, prefer to hire individuals with several years of postdoctoral experience.

Graduate students typically specialize in a subfield of chemistry, such as analytical chemistry or polymer chemistry, depending on their interests and the kind of work they wish to do. For example, those interested in doing drug research in the pharmaceutical industry usually develop a strong background in synthetic organic chemistry. However, students normally need not specialize at the undergraduate level. In fact, undergraduates who are broadly trained have more flexibility when job hunting or changing jobs than if they had narrowly defined their interests. Most employers provide new graduates additional training or education.

In government or industry, beginning chemists with a bachelor's degree work in quality control, perform analytical testing, or assist senior chemists in R&D laboratories. Many employers prefer chemists and materials scientists with a Ph.D., or at least a master's degree, to lead basic and applied research. Nonetheless, relevant work experience is an asset. Chemists who hold a Ph.D. and have previous industrial experience may be particularly attractive to employers because such people are more likely to understand the complex regulations that apply to the pharmaceutical industry. Within materials science, a broad background in various sciences is preferred. This broad base may be obtained through degrees in physics, engineering, or chemistry. While many companies prefer hiring Ph.D.s, many materials scientists have bachelor's and master's degrees.

## **Job Outlook**

Employment of chemists is expected to grow about as fast as the average for all occupations through 2012. Job growth will be concentrated in pharmaceutical and medicine manufacturing and in scientific research and development services firms. The chemical industry, the major employer of chemists, should face continued demand for goods such as new and better pharmaceuticals and personal care products, as well as for more specialty chemicals designed to address specific problems or applications. To meet these demands, some chemical firms will continue to devote money to research and development—through in-house teams or outside contractors—spurring employment growth of chemists. Those with at least a master's degree, and particularly those with a Ph.D., will enjoy better opportunities than those with just a bachelor's degree for most research and upper management positions. Opportunities for individuals with a bachelor's degree are expected to be more competitive. The number of science-related jobs in sales, marketing, and middle management, for which bachelor's and master's degree holders may qualify, are expected to be fewer as companies continue to streamline their operations. Some bachelor's and master's degree holders become chemical technicians or technologists or high school chemistry teachers.

Within the chemical industry, job opportunities are expected to be most plentiful in pharmaceutical and biotechnology firms. Biotechnological research, including studies of human genes, continues to offer possibilities for the development of new drugs and products to combat illnesses and diseases that have previously been unresponsive to treatments derived by traditional chemical processes. Stronger competition among drug companies and an aging population are contributing to the need for innovative and improved drugs discovered through scientific research.

Employment in the remaining segments of the chemical industry is expected to decline as companies downsize and turn to outside contractors to provide specialized services. As a result, scientific research and development services firms will experience healthy growth. To control costs, some chemical companies, including drug manufacturers, are increasingly turning to these firms to perform specialized research and other work formerly done by in-house chemists. Despite downsizing, some job openings will result from the need to replace chemists who retire or otherwise leave the labor force. Quality control will continue to be an important issue in chemical manufacturing and other industries that use chemicals in their manufacturing processes.

Chemists also will be needed to develop and improve the technologies and processes used to produce chemicals for all purposes, and to monitor and measure air and water pollutants to ensure compliance with local, State, and Federal environmental regulations. Environmental research will offer many new opportunities for chemists and materials scientists. To satisfy public concerns and to comply with government regulations, the chemical industry will continue to invest billions of dollars each year in technology that reduces pollution and cleans up existing wastesites. Chemists also are needed to find ways to use less energy and to discover new sources of energy.

During periods of economic recession, layoffs of chemists may occur—especially in the industrial chemicals industry. This industry provides many of the raw materials to the auto manufacturing and construction industries, both of which are vulnerable to temporary slowdowns during recessions.

## **Earnings**

Median annual earnings of chemists in 2002 were \$52,890. The middle 50 percent earned between \$39,410 and \$71,710. The lowest 10 percent earned less than \$30,980, and the highest 10 percent earned more than \$92,170. Median annual earnings of materials scientists in 2002 were \$64,590. The middle 50 percent earned between \$46,280 and \$86,240. The lowest 10 percent earned less than \$33,480, and the highest 10 percent earned more than \$107,400. Median annual earnings in the industries employing the largest numbers of chemists in 2002 were:

Federal government	\$72,010
Scientific research and development services	60,400
Pharmaceutical and medicine manufacturing	53,070
Architectural, engineering, and related services	38,780

The American Chemical Society reports that the median salary of all of its members with a bachelor's degree was \$32,800 a year in 2002; for those with a master's degree, it was \$50,000; and for those with a Ph.D., it was \$68,000. Median salaries

were highest for those working in private industry; those in academia earned the least. According to an ACS survey of recent graduates, inexperienced chemistry graduates with a bachelor's degree earned a median starting salary of \$31,000 in 2002; those with a master's degree earned a median salary of \$45,000; and those with a Ph.D. made median earnings of \$67,500. Among bachelor's degree graduates, those who had completed internships or had other work experience while in school commanded the highest starting salaries.

In 2003, chemists in non-supervisory, supervisory, and managerial positions in the Federal Government averaged \$76,857 a year.

## Pharmacists

[Return to Menu](#)

### Significant Points

- Pharmacists are becoming more involved in drug therapy decision making and patient counseling.
- A license is required; one must graduate from an accredited college of pharmacy and pass a State examination.
- Very good employment opportunities are expected.
- Earnings are very high, but some pharmacists work long hours, nights, weekends, and holidays.

### Nature of the Work

Pharmacists dispense drugs prescribed by physicians and other health practitioners and provide information to patients about medications and their use. They advise physicians and other health practitioners on the selection, dosages, interactions, and side effects of medications. Pharmacists also monitor the health and progress of patients in response to drug therapy to ensure safe and effective use of medication. Pharmacists must understand the use, clinical effects, and composition of drugs, including their chemical, biological, and physical properties. Compounding—the actual mixing of ingredients to form powders, tablets, capsules, ointments, and solutions—is a small part of a pharmacist's practice, because most medicines are produced by pharmaceutical companies in a standard dosage and drug delivery form. Traditionally, most pharmacists work in a community setting, such as a retail drugstore, or in a healthcare facility, such as a hospital, nursing home, mental health institution, or neighborhood health clinic.

Pharmacists in community and retail pharmacies counsel patients and answer questions about prescription drugs, including questions regarding possible side effects or interactions among various drugs. They provide information about over-the-counter drugs and make recommendations after talking with the patient. They also may give advice about diet, exercise, or stress management, or about durable medical equipment and home healthcare supplies. They also may complete third-party insurance forms and other paperwork. Those who own or manage community pharmacies may sell non-health-related merchandise, hire and supervise personnel, and oversee the general operation of the pharmacy. Some community pharmacists provide specialized services to help patients manage conditions such as diabetes,

asthma, smoking cessation, or high blood pressure. Some community pharmacists are also certified to administer vaccinations.

Pharmacists in healthcare facilities dispense medications and advise the medical staff on the selection and effects of drugs. They may make sterile solutions and buy medical supplies. They also assess, plan, and monitor drug programs or regimens. They counsel patients on the use of drugs while in the hospital, and on their use at home when the patients are discharged. Pharmacists also may evaluate drug use patterns and outcomes for patients in hospitals or managed care organizations.

Pharmacists who work in home healthcare monitor drug therapy and prepare infusions—solutions that are injected into patients—and other medications for use in the home.

Some pharmacists specialize in specific drug therapy areas, such as intravenous nutrition support, oncology (cancer), nuclear pharmacy (used for chemotherapy), geriatric pharmacy, and psychopharmacotherapy (the treatment of mental disorders with drugs).

Most pharmacists keep confidential computerized records of patients' drug therapies to ensure that harmful drug interactions do not occur. Pharmacists are responsible for the accuracy of every prescription that is filled, but they often rely upon pharmacy technicians and pharmacy aides to assist them in the dispensing process. Thus, the pharmacist may delegate prescription-filling and administrative tasks and supervise their completion. They also frequently oversee pharmacy students serving as interns in preparation for graduation and licensure.

Increasingly, pharmacists pursue nontraditional pharmacy work. Some are involved in research for pharmaceutical manufacturers, developing new drugs and therapies and testing their effects on people. Others work in marketing or sales, providing expertise to clients on a drug's use, effectiveness, and possible side effects. Some pharmacists also work for health insurance companies, developing pharmacy benefit packages and carrying out cost-benefit analyses on certain drugs. Other pharmacists work for the government and pharmacy associations. Finally, some pharmacists are employed full time or part time as college faculty, teaching classes and performing research in a wide range of areas.

### **Working Conditions**

Pharmacists work in clean, well-lighted, and well-ventilated areas. Many pharmacists spend most of their workday on their feet. When working with sterile or potentially dangerous pharmaceutical products, pharmacists wear gloves and masks and work with other special protective equipment. Many community and hospital pharmacies are open for extended hours or around the clock, so pharmacists may work evenings, nights, weekends, and holidays. Consultant pharmacists may travel to nursing homes or other facilities to monitor patients' drug therapy.

About 19 percent of pharmacists worked part time in 2002. Most full-time salaried pharmacists worked about 40 hours a week. Some, including many self-employed pharmacists, worked more than 50 hours a week.

## **Employment**

Pharmacists held about 230,000 jobs in 2002. About 62 percent work in community pharmacies that are either independently owned or part of a drugstore chain, grocery store, department store, or mass merchandiser. Most community pharmacists are salaried employees, but some are self-employed owners. About 22 percent of salaried pharmacists work in hospitals, and others work in clinics, mail-order pharmacies, pharmaceutical wholesalers, home healthcare agencies, or the Federal Government.

## **Training, Other Qualifications, and Advancement**

A license to practice pharmacy is required in all States, the District of Columbia, and U.S. territories. To obtain a license, one must graduate from a college of pharmacy accredited by the American Council on Pharmaceutical Education (ACPE) and pass an examination. All States except California require the North American Pharmacist Licensure Exam (NAPLEX) and the Multistate Pharmacy Jurisprudence Exam (MPJE), both administered by the National Association of Boards of Pharmacy. California has its own pharmacist licensure exam. In addition to the NAPLEX and MPJE, some States require additional exams unique to their State. All States except California currently grant a license without extensive re-examination to qualified pharmacists already licensed by another State. In Florida, reexamination is not required if a pharmacist passed the NAPLEX and MPJE within 12 years of his or her application for license transfer. Many pharmacists are licensed to practice in more than one State. States may require continuing education for license renewal. Persons interested in a career as a pharmacist should check with State boards of pharmacy for details on examination requirements and license transfer procedures.

In 2002, 85 colleges of pharmacy were accredited to confer degrees by the American Council on Pharmaceutical Education. Pharmacy programs grant the degree of Doctor of Pharmacy (Pharm.D.), which requires at least 6 years of postsecondary study and the passing of the licensure examination of a State board of pharmacy. Courses offered at colleges of pharmacy are designed to teach students how to dispense prescriptions and communicate with patients and other health care providers about drug information and patient care. Students also learn professional ethics.. In addition to classroom study, students in the Pharm.D. program are provided in-depth exposure to and active participation in a variety of pharmacy practice settings under the supervision of licensed pharmacists. The Pharm.D. degree has replaced the Bachelor of Pharmacy (B.Pharm.) degree, which is no longer offered to new students and will cease to be awarded after 2005.

The Pharm.D. is a 4-year program that requires at least 2 years of college study prior to admittance, although most applicants have 3 years prior to entering the program. Entry requirements usually include courses in mathematics and natural sciences, such as chemistry, biology, and physics, as well as courses in the humanities and social sciences. Approximately half of all colleges require the applicant to take the Pharmacy College Admissions Test (PCAT).

In 2003, the American Association of Colleges of Pharmacy (AACCP) launched the Pharmacy College Application Service, known as PharmCAS, for students interested in applying to schools and colleges of pharmacy. This centralized service allows applicants to use a single Web-based application and one set of transcripts to apply

to multiple Pharm.D. degree programs. A total of 43 pharmacy programs participated in 2003.

In the 2002-03 academic year, 66 colleges of pharmacy awarded the master of science degree or the Ph.D. degree. Both the master's and Ph.D. degrees are awarded after completion of a Pharm.D. degree. These degrees are designed for those who want more laboratory and research experience. Many master's and Ph.D. degree holders do research for a drug company or teach at a university. Other options for pharmacy graduates who are interested in further training include 1- or 2-year residency programs or fellowships. Pharmacy residencies are postgraduate training programs in pharmacy practice, and usually require the completion of a research study. Pharmacy fellowships are highly individualized programs designed to prepare participants to work in research laboratories. Some pharmacists who run their own pharmacy obtain a master's degree in business administration (MBA).

Areas of graduate study include pharmaceuticals and pharmaceutical chemistry (physical and chemical properties of drugs and dosage forms), pharmacology (effects of drugs on the body), and pharmacy administration.

Prospective pharmacists should have scientific aptitude, good communication skills, and a desire to help others. They also must be conscientious and pay close attention to detail, because the decisions they make affect human lives.

In community pharmacies, pharmacists usually begin at the staff level. In independent pharmacies, after they gain experience and secure the necessary capital, some become owners or part owners of pharmacies. Pharmacists in chain drugstores may be promoted to pharmacy supervisor or manager at the store level, then to manager at the district or regional level, and later to an executive position within the chain's headquarters.

Hospital pharmacists may advance to supervisory or administrative positions. Pharmacists in the pharmaceutical industry may advance in marketing, sales, research, quality control, production, packaging, or other areas.

### **Job Outlook**

Very good employment opportunities are expected for pharmacists over the 2002-12 period because the number of degrees granted in pharmacy is expected to be less than the number of job openings created by employment growth and the need to replace pharmacists who retire or otherwise leave the occupation. Recently, enrollments in pharmacy programs are rising as more students are attracted by high salaries and good job prospects. Despite this increase in enrollments, pharmacist jobs should still be more numerous than those seeking employment.

Employment of pharmacists is expected to grow faster than the average for all occupations through the year 2012, due to the increased pharmaceutical needs of a growing elderly population and increased use of medications. The growing numbers of middle-aged and elderly people—who, on average, use more prescription drugs than do younger people—will continue to spur demand for pharmacists in all employment settings. Other factors likely to increase the demand for pharmacists include scientific advances that will make more drug products available, new developments in genome research and medication distribution systems, increasingly

sophisticated consumers seeking more information about drugs, and coverage of prescription drugs by a greater number of health insurance plans and by Medicare.

Community pharmacies are taking steps to manage increasing prescription volume. Automation of drug dispensing and greater employment of pharmacy technicians and pharmacy aides will help these establishments to dispense more prescriptions.

With its emphasis on cost control, managed care encourages the use of lower cost prescription drug distributors, such as mail-order firms and online pharmacies, for purchases of certain medications. Prescriptions ordered through the mail via the Internet are filled in a central location and shipped to the patient at a lower cost. Mail-order and online pharmacies typically use automated technology to dispense medication and employ fewer pharmacists. If the utilization of mail-order pharmacies increases rapidly, job growth among pharmacists could be limited.

Employment of pharmacists will not grow as fast in hospitals as in other industries, as hospitals reduce inpatient stays, downsize, and consolidate departments. The increase in outpatient surgeries means more patients are discharged and purchase medications through retail, supermarket, or mail-order pharmacies, rather than through the hospital. An aging population means more pharmacy services are required in nursing homes, assisted living facilities, and home care settings, where the most rapid job growth among pharmacists is expected.

New opportunities are emerging for pharmacists in managed-care organizations, where they may analyze trends and patterns in medication use for their populations of patients, and for pharmacists trained in research, disease management, and pharmacoconomics—determining the costs and benefits of different drug therapies. Pharmacists also will have opportunities to work in research and development as well as sales and marketing for pharmaceutical manufacturing firms. New breakthroughs in biotechnology will increase the potential for drugs to treat diseases and expand the opportunities for pharmacists to conduct research and sell medications.

Job opportunities for pharmacists in patient care will arise as cost-conscious insurers and health systems continue to emphasize the role of pharmacists in primary and preventive health services. Health insurance companies realize that the expense of using medication to treat diseases and various health conditions often is considerably less than the potential costs for patients whose conditions go untreated. Pharmacists also can reduce the expenses resulting from unexpected complications due to allergic reactions or medication interactions.

## **Earnings**

Median annual wage and salary earnings of pharmacists in 2002 were \$77,050. The middle 50 percent earned between \$66,210 and \$87,250 a year. The lowest 10 percent earned less than \$54,110, and the highest 10 percent earned more than \$94,570 a year. Median annual earnings in the industries employing the largest numbers of pharmacists in 2002 were as follows:

Grocery stores	\$78,270
Health and personal care stores	76,800
General medical and surgical hospitals	76,620

## Sources of Additional Information

For information on pharmacy as a career, pre-professional and professional requirements, programs offered by colleges of pharmacy, and student financial aid, contact:

- American Association of Colleges of Pharmacy, 1426 Prince St., Alexandria, VA 22314. Internet: <http://www.aacp.org>

General information on careers in pharmacy is available from:

- American Society of Health-System Pharmacists, 7272 Wisconsin Ave., Bethesda, MD 20814. Internet: <http://www.ashp.org>
- National Association of Chain Drug Stores, 413 N. Lee St., P.O. Box 1417-D49, Alexandria, VA 22313-1480. Internet: <http://www.nacds.org>

Information on the North American Pharmacist Licensure Exam (NAPLEX) and the Multistate Pharmacy Jurisprudence Exam (MPJE) is available from:

- National Association of Boards of Pharmacy, 700 Busse Hwy., Park Ridge, IL 60068. Internet: <http://www.nabp.net>

State licensure requirements are available from each State's Board of Pharmacy. Information on specific college entrance requirements, curriculums, and financial aid is available from any college of pharmacy.

## Geologists (Environmental Scientists / Geoscientists) [Return to Menu](#)

### Significant Points

- Work at remote field sites is common.
- Federal, State, and local governments employ nearly one-half of all environmental scientists and geoscientists.
- A bachelor's degree is adequate for a few entry-level jobs, but a master's degree is usually the minimum educational requirement; a Ph.D. degree is required for most high-level research positions.
- Employment of geoscientists is expected to grow as fast as average, while environmental scientists and hydrologists will experience faster than average growth.

### Nature of the Work

Environmental scientists and geoscientists use their knowledge of the physical makeup and history of the Earth to protect the environment; locate water, mineral, and energy resources; predict future geologic hazards; and offer advice on construction and land-use projects.

**Environmental scientists** conduct research to identify and abate or eliminate sources of pollutants that affect people, wildlife, and their environments. These workers analyze and report measurements and observations of air, water, soil, and other sources and make recommendations on how best to clean and preserve the environment. Understanding the issues involved in protecting the environment—degradation, conservation, recycling, and replenishment—is central to the work of environmental scientists, who often use their skills and knowledge to design and monitor waste disposal sites, preserve water supplies, and reclaim contaminated land and water to comply with Federal environmental regulations.

Many environmental scientists do work and have training that is similar to other physical or life scientists, but is applied to environmental areas. Many specialize in some specific area, such as environmental ecology and conservation, environmental chemistry, environmental biology, or fisheries science. Most environmental scientists are further classified by the specific activity they perform (although recent advances in the understanding of basic life processes within the ecosystem have blurred some traditional classifications). For example, **environmental ecologists** study the relationships between organisms and their environments and the effects of influences such as population size, pollutants, rainfall, temperature, and altitude. Utilizing their knowledge of various scientific disciplines, they may collect, study, and report data on air, food, soil, and water. **Ecological modelers** study ecosystems, the control of environmental pollution, and the management of resources. These environmental scientists may use mathematical modeling, systems analysis, thermodynamics, and computer techniques. **Environmental chemists** may study the toxicity of various chemicals—how those chemicals affect plants, animals, and people. **Geochemists** study the nature and distribution of chemical elements in ground water and Earth materials.

Some environmental scientists work in managerial positions, usually after spending some time performing research or learning about environmental laws and regulations. Many work as consultants to business firms or to government agencies, helping them comply with environmental policy, particularly with regard to ground-water contamination and flood control. Environmental scientists who determine policy may help identify how human behavior can be modified in the future to avoid such problems as ground-water contamination and depletion of the ozone layer.

**Geoscientists** study the composition, structure, and other physical aspects of the Earth. With the use of sophisticated instruments and by analyzing the composition of the earth and water, geoscientists study the Earth's geologic past and present. Many geoscientists are involved in searching for oil and gas, while others work closely with environmental scientists in preserving and cleaning up the environment.

Geoscientists usually study, and are subsequently classified into, one of several closely related fields of geoscience. **Geologists** study the composition, processes, and history of the Earth. They try to find out how rocks were formed and what has happened to them since their formation. They also study the evolution of life by analyzing plant and animal fossils. **Geophysicists** use the principles of physics, mathematics, and chemistry to study not only the Earth's surface, but also its internal composition; ground and surface waters; atmosphere; oceans; and magnetic, electrical, and gravitational forces.

Geoscientists can spend a large part of their time in the field, identifying and examining rocks, studying information collected by remote sensing instruments in satellites, conducting geological surveys, constructing field maps, and using instruments to measure the Earth's gravity and magnetic field. For example, they often perform seismic studies, which involve bouncing energy waves off buried rock layers, to search for oil and gas or to understand the structure of subsurface rock layers. Seismic signals generated by an earthquake are used to determine the earthquake's location and intensity. In laboratories, geologists and geophysicists examine the chemical and physical properties of specimens. They study fossil remains of animal and plant life or experiment with the flow of water and oil through rocks.

### **Working Conditions**

Some environmental scientists and geoscientists spend the majority of their time in an office, but many others divide their time between fieldwork and office or laboratory work. Many environmental scientists, such as environmental ecologists, environmental chemists, and hydrologists, often take field trips that involve physical activity. Environmental scientists in the field may work in warm or cold climates, in all kinds of weather. In their research, they may dig or chip with a hammer, scoop with a net, and carry equipment in a backpack. Oceanographers may spend considerable time at sea on academic research ships. Fieldwork often requires working long hours. Geologists frequently travel to remote field sites by helicopter or four-wheel-drive vehicles and cover large areas on foot. An increasing number of exploration geologists and geophysicists work in foreign countries, sometimes in remote areas and under difficult conditions. Travel often is required to meet with prospective clients or investors.

Environmental scientists and geoscientists in research positions with the Federal Government or in colleges and universities frequently are required to design programs and write grant proposals in order to continue their data collection and research. Environmental scientists and geoscientists in consulting jobs face similar pressures to market their skills and write proposals so that they will have steady work.

### **Employment**

Environmental scientists and geoscientists held about 101,000 jobs in 2002. Environmental scientists accounted for 65,000 of the total; geoscientists, 28,000; and hydrologists, 8,000. Many more individuals held environmental science and geoscience faculty positions in colleges and universities, but they are classified as college and university faculty.

About 47 percent of environmental scientists were employed in State and local governments, 14 percent in architectural, engineering and related services, 13 percent in management, scientific, and technical consulting services, and 9 percent in the Federal Government. About 1,900 were self-employed.

Among geoscientists, 30 percent were employed in architectural, engineering, and related services, and 15 percent worked for oil and gas extraction companies. In 2002, the Federal Government employed about 3,000 geoscientists, including geologists, geophysicists, and oceanographers, mostly within the U.S. Department of

the Interior for the U.S. Geological Survey (USGS) and within the U.S. Department of Defense. Another 3,400 worked for State agencies, such as State geological surveys and State departments of conservation. Nearly 3 percent of geoscientists were self-employed, most as consultants to industry or government.

Approximately 32 percent of hydrologists worked in the Federal Government in 2002, another 21 percent in architectural, engineering, and related services, 17 percent worked in management, scientific, and technical consulting services, and 16 percent for State governments.

### **Training, Other Qualifications, and Advancement**

A bachelor's degree is adequate for a few entry-level positions, but environmental scientists and geoscientists increasingly need a master's degree in a natural science. A master's degree also is the minimum educational requirement for most entry-level research positions in private industry, Federal agencies, and State geological surveys. A doctoral degree is necessary for most high-level research positions.

Many environmental scientists earn degrees in life science, chemistry, geology, geophysics, atmospheric science, or physics and then, either through further education or through their research interests and work experience, apply their education to environmental areas. Others earn a degree in environmental science. A bachelor's degree in environmental science offers an interdisciplinary approach to the natural sciences, with an emphasis on biology, chemistry, and geology. In addition, undergraduate environmental science majors should focus on data analysis and physical geography, particularly if they are interested in studying pollution abatement, water resources, or ecosystem protection, restoration, or management. Those students interested in working in the environmental or regulatory fields, either in environmental consulting firms or for Federal or State governments, should take courses in hydrology, hazardous waste management, environmental legislation, chemistry, fluid mechanics, and geologic logging. An understanding of environmental regulations and government permit issues also is valuable for those planning to work in mining and oil and gas extraction. Hydrologists and environmental scientists should have some knowledge of the potential liabilities associated with some environmental work. Students interested in the field of hydrology should take courses in the physical sciences, geophysics, chemistry, engineering science, soils, mathematics, aquatic biology, atmospheric science, meteorology, geology, oceanography, or the management or conservation of water resources. In some cases, graduates with a bachelor's degree in a hydrologic science are qualified for positions in environmental consulting and planning regarding water quality or wastewater treatment. Curricula for advanced degrees often emphasize the natural sciences, but not all universities offer all curricula.

Traditional geoscience courses emphasizing classical geologic methods and topics (such as mineralogy, petrology, paleontology, stratigraphy, and structural geology) are important for all geoscientists. Persons studying physics, chemistry, biology, mathematics, engineering, or computer science may also qualify for some geoscience positions if their course work includes study in geology or natural sciences.

Computer skills are essential for prospective environmental scientists and geoscientists; students who have some experience with computer modeling, data analysis and integration, digital mapping, remote sensing, and geographic

information systems will be the most prepared entering the job market. A knowledge of the Global Information System (GIS) and Global Positioning System (GPS)—a locator system that uses satellites—also is very helpful. Some employers seek applicants with field experience, so a summer internship may be beneficial to prospective geoscientists.

Environmental scientists and geoscientists must have excellent interpersonal skills, because they usually work as part of a team with other scientists, engineers, and technicians. Strong oral and written communication skills also are important, because writing technical reports and research proposals, as well as communicating research results to others, are important aspects of the work. Because many jobs require foreign travel, knowledge of a second language is becoming an important attribute to employers. Geoscientists must be inquisitive, be able to think logically, and have an open mind. Those involved in fieldwork must have physical stamina.

Environmental scientists and geoscientists often begin their careers in field exploration or as research assistants or technicians in laboratories or offices. They are given more difficult assignments as they gain experience. Eventually, they may be promoted to project leader, program manager, or some other management and research position.

### **Job Outlook**

Overall employment of environmental scientists and geoscientists is expected to grow about as fast as the average for all occupations through 2012. Driving job growth will be public policy, which will force companies and organizations to comply with environmental laws and regulations, particularly those regarding ground-water contamination, clean air, and flood control.

Projected employment growth varies by occupational specialty. Environmental scientists and hydrologists are expected to grow faster than average. A general heightened awareness regarding the need to monitor the quality of the environment, to interpret the impact of human actions on terrestrial and aquatic ecosystems, and to develop strategies for ecosystem restoration are all increasingly important issues that will drive demand for environmental scientists. Issues related to water conservation, deteriorating coastal environments, and rising sea levels also will stimulate employment growth of these workers. As the population increases and moves to more environmentally sensitive locations, environmental scientists and hydrologists will be needed to assess building sites for potential geologic hazards, to mitigate the effects of natural hazards such as floods, tornadoes, and earthquakes, and to address issues related to pollution control and waste disposal. Hydrologists and environmental scientists also will be needed to conduct research on hazardous-waste sites in order to determine the impact of hazardous pollutants on soil and ground water so that engineers can design remediation systems. Demand is growing for environmental scientists who understand both the science and engineering aspects of waste remediation.

In contrast to employment of environmental scientists and hydrologists, that of geoscientists is expected to grow about as fast as the average for all occupations. In the past, employment of geologists and some other geoscientists has been cyclical and largely affected by the price of oil and gas. When prices were low, oil and gas producers curtailed exploration activities and laid off geologists. When prices were

higher, companies had the funds and incentive to renew exploration efforts and hire geoscientists in large numbers. In recent years, a growing worldwide demand for oil and gas and for new exploration and recovery techniques—particularly in deep water and previously inaccessible sites—has returned a modicum of stability to the petroleum industry. Growth in this area, though, will be limited due to increasing efficiencies in finding oil and gas. Geoscientists who speak a foreign language and who are willing to work abroad should enjoy the best opportunities. An expected increase in highway building and other infrastructure projects will be a source of jobs for engineering geologists. The need to replace geoscientists who retire also will result in job openings over the next decade.

## Earnings

Median annual earnings of environmental scientists were \$47,600 in 2002. The middle 50 percent earned between \$36,820 and \$62,400. The lowest 10 percent earned less than \$29,920, and the highest 10 percent earned more than \$78,200.

Median annual earnings of geoscientists were \$67,470 in 2002. The middle 50 percent earned between \$48,370 and \$102,120; the lowest 10 percent, less than \$36,580 and the highest 10 percent more than \$133,310.

Median annual earnings of hydrologists were \$56,530 in 2002, with the middle 50 percent earning between \$44,080 and \$70,160, the lowest 10 percent less than \$36,790, and the highest 10 percent more than \$86,620.

Median annual earnings in the industries employing the largest number of environmental scientists in 2002 were as follows:

Federal Government	\$66,190
Management, scientific, and technical consulting services	45,560
Local government	45,270
Architectural, engineering, and related services	44,590
State government	44,580

According to the National Association of Colleges and Employers, beginning salary offers in 2003 for graduates with bachelor's degrees in geology and related sciences averaged about \$32,828 a year; graduates with a master's degree averaged \$47,981, and graduates with a doctoral degree averaged \$61,050.

In 2003, the Federal Government's average salary for geologists in managerial, supervisory, and nonsupervisory positions was \$76,389 for geologists, \$86,809 for geophysicists, \$70,525 for hydrologists, and \$79,023 for oceanographers.

The petroleum, mineral, and mining industries are vulnerable to recessions and to changes in oil and gas prices, among other factors, and usually release workers when exploration and drilling slow down. Consequently, they offer higher salaries, but less job security, than do other industries.

## Sources of Additional Information

Information on training and career opportunities for geologists is available from either of the following organizations:

- American Geological Institute, 4220 King St., Alexandria, VA 22302-1502.  
Internet: <http://www.agiweb.org>
- American Association of Petroleum Geologists, P.O. Box 979, Tulsa, OK 74101.  
Internet: <http://www.aapg.org>

---

## Economists

[Return to Menu](#)

### Significant Points

- Quantitative skills are important in all economics specialties.
- Employment of economists is expected to grow about as fast as the average; most new jobs will arise in private industry, including economic research and consulting firms.
- Candidates who hold a master's or Ph.D. degree in economics will have the best employment prospects and advancement opportunities.

### Nature of the Work

Economists study how society distributes scarce resources such as land, labor, raw materials, and machinery to produce goods and services. They conduct research, collect and analyze data, monitor economic trends, and develop forecasts. They research issues such as energy costs, inflation, interest rates, exchange rates, business cycles, taxes, or employment levels.

Economists devise methods and procedures for obtaining the data they need. For example, sampling techniques may be used to conduct a survey, and various mathematical modeling techniques may be used to develop forecasts. Preparing reports, including tables and charts, on research results is an important part of an economist's job. Presenting economic and statistical concepts in a clear and meaningful way is particularly important for economists whose research is directed toward making policies for an organization. Some economists might also provide economic analysis to the media.

Many economists specialize in a particular area of economics, although general knowledge of basic economic principles is useful in each area. **Microeconomists** study the supply and demand decisions of individuals and firms, such as how profits can be maximized and how much of a good or service consumers will demand at a certain price. **Industrial/organizational economists** study the market structure of particular industries in terms of the number of competitors, and the market decisions of competitive firms and monopolies. These economists may also be concerned with antitrust policy and its impact on market structure.

**Macroeconomists** study historical trends in the whole economy and forecast future trends in areas such as unemployment, inflation, economic growth, productivity, and investment. Closely related to macroeconomists are **monetary or financial**

**economists**, who study the money and banking system and the effects of rising interest rates. **International economists** study international financial markets, exchange rates, and the effects of various trade policies such as tariffs. **Labor or demographic economists** study the supply and demand for labor and the determination of wages. These economists also try to explain the reasons for unemployment, and the effects on labor markets of changing demographic trends such as an aging population and increasing immigration. **Public finance economists** primarily are involved in studying the role of the government in the economy and the effects of tax cuts, budget deficits, and welfare policies. **Econometricians** are involved in all areas of economics and use mathematical techniques such as calculus, game theory, and regression analysis to formulate economic models. These models help to explain economic relationships and are used to develop forecasts related to the nature and length of business cycles, the effects of a specific rate of inflation on the economy, the effects of tax legislation on unemployment levels, and other economic phenomena. Many economists have applied these fundamental areas of economics to more narrow areas with specific applications such as health, education, agriculture, urban and regional economics, law, history, energy, and the environment.

Most economists are concerned with practical applications of economic policy, and work for a variety of organizations. Economists working for corporations are involved primarily in microeconomic issues, such as forecasting consumer demand and sales of the firm's products. Economists working for corporations might also analyze their competitors' growth and market share and advise their company on how to handle the competition. Other economists working for corporations monitor legislation passed by Congress, such as environmental and worker safety regulations, and assess its impact on their business. Corporations with many international branches or subsidiaries might employ economists to monitor the economic situations in countries where they do business, or to provide a risk assessment of a country into which the company might expand.

Corporations that are too small or that do not have sufficient funding might hire economists working in economic consulting or research firms to perform the same tasks as staff economists. Economists in consulting firms also perform much of the macroeconomic analysis and forecasting that is completed in the United States. These economists collect data on various indicators, maintain databases, analyze historical trends, and develop models to forecast growth, inflation, unemployment, or interest rates. These analyses and forecasts are frequently published in newspapers and journal articles.

Another large employer of economists is government. Economists in the Federal Government administer most of the surveys and collect most of the economic data in the United States. For example, economists in the U.S. Department of Commerce collect and analyze data on the production, distribution, and consumption of commodities produced in the United States and overseas, while economists employed by the U.S. Department of Labor collect and analyze data on the domestic economy, including those having to do with prices, wages, employment, productivity, and safety and health. Economists who work for government agencies also assess economic conditions in the United States or abroad in order to estimate the economic effects of specific changes in legislation or public policy. Government economists advise policy makers in areas such as telecommunications deregulation, Social Security revamping, the effects of tax cuts on the budget deficit, and the

effectiveness of imposing tariffs on imported steel. An economist working in State or local government might analyze data on the growth of school-age or prison populations, and on employment and unemployment rates, in order to project future spending needs.

### **Working Conditions**

Economists have structured work schedules. They often work alone, writing reports, preparing statistical charts, and using computers, but they also may be an integral part of a research team. Most work under pressure of deadlines and tight schedules, which may require overtime. Their routine may be interrupted by special requests for data, and by the need to attend meetings or conferences. Frequent travel may be necessary.

### **Employment**

Economists held about 16,000 jobs in 2002. Private industry employed 53 percent of salaried economists, particularly in scientific research and development firms; management, scientific, and technical consulting firms; banks and securities firms, and business, professional, labor, and political organizations. A wide range of government agencies provided the remaining jobs. The U.S. Departments of Labor, Agriculture, and State are the largest Federal employers of economists. A number of economists combine a full-time job in government, academia, or business with part-time or consulting work in another setting. A little over 11 percent of economists are self-employed.

Employment of economists is concentrated in large cities. Some work abroad for companies with major international operations, for U.S. Government agencies, and for international organizations, such as the World Bank, International Monetary fund, and United Nations.

Besides the jobs described above, many economists hold faculty positions in colleges and universities. Economics faculties have flexible work schedules, and may divide their time among teaching, research, consulting, and administration.

### **Training, Other Qualifications, and Advancement**

A master's or Ph.D. degree in economics is required for many private sector economist jobs, and for advancement to more responsible positions. Economics includes many specialties at the graduate level, such as advanced economic theory, econometrics, international economics, and labor economics. Students should select graduate schools strong in specialties in which they are interested. Undergraduate economics majors can choose from a variety of courses, ranging from microeconomics, macroeconomics, and econometrics, to more philosophical courses, such as the history of economic thought. Because of the importance of quantitative skills to economists, courses in mathematics, statistics, econometrics, sampling theory and survey design, and computer science are extremely helpful. Some schools help graduate students find internships or part-time employment in government agencies, economic consulting or research firms, or financial institutions prior to graduation.

In the Federal Government, candidates for entry-level economist positions must have a bachelor's degree with a minimum of 21 semester hours of economics and 3 hours of statistics, accounting, or calculus.

Whether working in government, industry, research organizations, or consulting firms, economists with a bachelor's degree usually qualify for most entry-level positions as a research assistant, for administrative or management trainee positions, or for various sales jobs. A master's degree usually is required to qualify for more responsible research and administrative positions. Many businesses, research and consulting firms, and government agencies seek individuals who have strong computer and quantitative skills and can perform complex research. A Ph.D. is necessary for top economist positions in many organizations. Many corporation and government executives have a strong background in economics.

A master's degree is usually the minimum requirement for a job as an instructor in junior and community colleges. In most colleges and universities, however, a Ph.D. is necessary for appointment as an instructor. A Ph.D. and extensive publications in academic journals are required for a professorship, tenure, and promotion.

Aspiring economists should gain experience gathering and analyzing data, conducting interviews or surveys, and writing reports on their findings while in college. This experience can prove invaluable later in obtaining a full-time position in the field, because much of the economist's work, especially in the beginning, may center on these duties. With experience, economists eventually are assigned their own research projects. Related job experience, such as work as a stock or bond trader, might be advantageous.

Those considering careers as economists should be able to pay attention to details because much time is spent on precise data analysis. Patience and persistence are necessary qualities because economists must spend long hours on independent study and problem solving. Economists must be able to present their findings, both orally and in writing, in a clear, concise manner.

### **Job Outlook**

Employment of economists is expected to grow about as fast as the average for all occupations through 2012. Many job openings are likely to result from the need to replace experienced workers who transfer to other occupations or who retire or leave the labor force for other reasons.

Opportunities for economists should be best in private industry, especially in scientific research and development, and consulting firms, as more companies contract out for economic research services. Rising demand for economists should stem from the growing complexity of the global economy, competition, and increased reliance on quantitative methods for analyzing and forecasting business, sales, and other economic trends. A greater need for economic analyses in virtually every industry could result in additional jobs for economists, although some corporations are eliminating some or all of their economist positions in favor of hiring economic consultants. Employment of economists in the Federal Government should decline, but not by as much as other occupations in the Federal workforce. Average employment growth is expected among economists in State and local government.

A master's or Ph.D. degree, coupled with a strong background in economic theory, mathematics, statistics, and econometrics, provides the basis for acquiring any specialty within the economics field. Those skilled in quantitative techniques and their application to economic modeling and forecasting, and who have good communications skills, should have the best job opportunities. Like those in many other disciplines, however, Ph.D. holders are likely to face keen competition for tenured teaching positions in colleges and universities.

Bachelor's degree holders may face competition for the limited number of economist positions for which they qualify. They will qualify for a number of other positions, however, in which they can take advantage of their economic knowledge by conducting research, developing surveys, or analyzing data. Many graduates with bachelor's degrees will find jobs in industry and business as management or sales trainees, or as administrative assistants. Bachelor's degree holders with good quantitative skills and a strong background in mathematics, statistics, survey design, and computer science also may be hired by private firms as researchers. Some will find jobs in government.

Candidates who meet State certification requirements may become high school economics teachers. The demand for secondary school economics teachers is expected to grow, as economics becomes an increasingly important and popular course.

### **Earnings**

Median annual wage and salary earnings of economists were \$68,550 in 2002. The middle 50 percent earned between \$50,560 and \$90,710. The lowest 10 percent earned less than \$38,690, and the highest 10 percent earned more than \$120,440.

The Federal Government recognizes education and experience in certifying applicants for entry-level positions. The entrance salary for economists having a bachelor's degree was about \$23,442 a year in 2003; however, those with superior academic records could begin at \$29,037. Those having a master's degree could qualify for positions at an annual salary of \$35,519. Those with a Ph.D. could begin at \$42,976, while some individuals with experience and an advanced degree could start at \$51,508. Starting salaries were slightly higher in selected areas where the prevailing local pay was higher. The average annual salary for economists employed by the Federal Government was \$81,852 a year in 2003.

### **Sources of Additional Information**

For information on careers in business economics, contact:

- National Association for Business Economics, 1233 20th St. NW., Suite 505, Washington, DC 20036.

Information on obtaining a position as an economist with the Federal Government is available at <http://www.usajobs.opm.gov>.

### Significant Points

- More than 1 out of 4 psychologists are self-employed, nearly four times the average for professional workers.
- Most specialists, including clinical and counseling psychologists, need a doctoral degree; school and industrial-organizational psychologists need a master's degree.
- Opportunities in psychology are limited for those with only a bachelor's degree.

### Nature of the Work

Psychologists study the human mind and human behavior. Research psychologists investigate the physical, cognitive, emotional, or social aspects of human behavior. Psychologists in health service provider fields provide mental health care in hospitals, clinics, schools, or private settings. Psychologists employed in applied settings such as business, industry, government or non-profits provide training, conduct research, design systems, and act as advocates for psychology.

Like other social scientists, psychologists formulate hypotheses and collect data to test their validity. Research methods vary depending on the topic under study. Psychologists sometimes gather information through controlled laboratory experiments or by administering personality, performance, aptitude, and intelligence tests. Other methods include observation, interviews, questionnaires, clinical studies, and surveys.

Psychologists apply their knowledge to a wide range of endeavors, including health and human services, management, education, law, and sports. In addition to working in a variety of settings, psychologists usually specialize in one of a number of different areas.

**Clinical psychologists**—who constitute the largest specialty—most often work in counseling centers, independent or group practices, hospitals, or clinics. They help mentally and emotionally disturbed clients adjust to life and may help medical and surgical patients deal with illnesses or injuries. Some clinical psychologists work in physical rehabilitation settings, treating patients with spinal cord injuries, chronic pain or illness, stroke, arthritis, and neurological conditions. Others help people deal with times of personal crisis, such as divorce or the death of a loved one.

Clinical psychologists often interview patients and give diagnostic tests. They may provide individual, family, or group psychotherapy, and design and implement behavior modification programs. Some clinical psychologists collaborate with physicians and other specialists to develop and implement treatment and intervention programs that patients can understand and comply with. Other clinical psychologists work in universities and medical schools, where they train graduate students in the delivery of mental health and behavioral medicine services. Some administer community mental health programs.

Areas of specialization within clinical psychology include health psychology, neuropsychology, and geropsychology. **Health psychologists** promote good health through health maintenance counseling programs designed to help people achieve

goals, such as to stop smoking or lose weight. **Neuropsychologists** study the relation between the brain and behavior. They often work in stroke and head injury programs. **Geropsychologists** deal with the special problems faced by the elderly. The emergence and growth of these specialties reflects the increasing participation of psychologists in providing direct services to special patient populations.

Often, clinical psychologists will consult with other medical personnel regarding the best treatment for patients, especially treatment that includes medications. Clinical psychologists generally are not permitted to prescribe medications to treat patients; only psychiatrists and other medical doctors may prescribe medications. However, one State, New Mexico, has passed legislation allowing clinical psychologists who undergo additional training to prescribe medication, and similar proposals have been made in additional States.

**Counseling psychologists** use various techniques, including interviewing and testing, to advise people on how to deal with problems of everyday living. They work in settings such as university counseling centers, hospitals, and individual or group practices.

**School psychologists** work in elementary and secondary schools or school district offices to resolve students' learning and behavior problems. They collaborate with teachers, parents, and school personnel to improve classroom management strategies or parenting skills, counter substance abuse, work with students with disabilities or gifted and talented students, and improve teaching and learning strategies. They may evaluate the effectiveness of academic programs, behavior management procedures, and other services provided in the school setting.

**Industrial-organizational psychologists** apply psychological principles and research methods to the workplace in the interest of improving productivity and the quality of work life. They also are involved in research on management and marketing problems. They conduct applicant screening, training and development, counseling, and organizational development and analysis. An industrial psychologist might work with management to reorganize the work setting to improve productivity or quality of life in the workplace. They frequently act as consultants, brought in by management in order to solve a particular problem.

**Developmental psychologists** study the physiological, cognitive, and social development that takes place throughout life. Some specialize in behavior during infancy, childhood, and adolescence, or changes that occur during maturity or old age. They also may study developmental disabilities and their effects. Increasingly, research is developing ways to help elderly people remain independent as long as possible.

**Social psychologists** examine people's interactions with others and with the social environment. They work in organizational consultation, marketing research, systems design, or other applied psychology fields. Prominent areas of study include group behavior, leadership, attitudes, and perception.

**Experimental or research psychologists** work in university and private research centers and in business, nonprofit, and governmental organizations. They study behavior processes using human beings and animals, such as rats, monkeys, and pigeons. Prominent areas of study in experimental research include motivation,

thought, attention, learning and memory, sensory and perceptual processes, effects of substance abuse, and genetic and neurological factors affecting behavior.

### **Working Conditions**

A psychologist's subfield and place of employment determine working conditions. Clinical, school, and counseling psychologists in private practice have their own offices and set their own hours. However, they often offer evening and weekend hours to accommodate their clients. Those employed in hospitals, nursing homes, and other health facilities may work shifts including evenings and weekends, while those who work in schools and clinics generally work regular hours.

Psychologists employed as faculty by colleges and universities divide their time between teaching and research and may have administrative responsibilities. Many have part-time consulting practices. Most psychologists in government and industry have structured schedules.

Increasingly, many psychologists work as part of a team and consult with other psychologists and professionals. Many experience pressures due to deadlines, tight schedules, and overtime work. Their routine may be interrupted frequently. Travel usually is required, in order to attend conferences or conduct research.

### **Employment**

Psychologists held about 139,000 jobs in 2002. Educational institutions employed about 3 out of 10 salaried psychologists in positions other than teaching, such as counseling, testing, research, and administration. Three out of 10 were employed in health care, primarily in offices of mental health practitioners and in outpatient care facilities, private hospitals, nursing and residential care facilities, and individual and family service organizations. Government agencies at the State and local levels employed 1 in 10 psychologists, primarily in public hospitals, clinics, correctional facilities, and other settings. Some psychologists work in, research organizations, management consulting firms, marketing research firms, religious organizations, and other businesses.

After several years of experience, some psychologists—usually those with doctoral degrees—enter private practice or set up private research or consulting firms. More than 1 out of 4 psychologists were self-employed.

In addition to the jobs described above, many psychologists held faculty positions at colleges and universities, and as high school psychology teachers.

### **Training, Other Qualifications, and Advancement**

A doctoral degree usually is required for employment as an independent licensed clinical or counseling psychologist. Psychologists with a Ph.D. qualify for a wide range of teaching, research, clinical, and counseling positions in universities, healthcare services, elementary and secondary schools, private industry, and government. Psychologists with a Doctor of Psychology (Psy.D.) degree usually work in clinical positions or in private practices.

A doctoral degree usually requires 5 to 7 years of graduate study. The Ph.D. degree culminates in a dissertation based on original research. Courses in quantitative research methods, which include the use of computer-based analysis, are an integral part of graduate study and are necessary to complete the dissertation. The Psy.D. may be based on practical work and examinations rather than a dissertation. In clinical or counseling psychology, the requirements for the doctoral degree usually include at least a 1-year internship.

Persons with a master's degree in psychology may work as industrial-organizational psychologists or school psychologists. They also may work as psychological assistants, under the supervision of doctoral-level psychologists, and conduct research or psychological evaluations. A master's degree in psychology requires at least 2 years of full-time graduate study. Requirements usually include practical experience in an applied setting and a master's thesis based on an original research project. Competition for admission to graduate programs is keen. Some universities require applicants to have an undergraduate major in psychology. Others prefer only coursework in basic psychology with courses in the biological, physical, and social sciences; and statistics and mathematics.

A bachelor's degree in psychology qualifies a person to assist psychologists and other professionals in community mental health centers, vocational rehabilitation offices, and correctional programs. They may work as research or administrative assistants or become sales or management trainees in business. Some work as technicians in related fields, such as marketing research.

In the Federal Government, candidates having at least 24 semester hours in psychology and one course in statistics qualify for entry-level positions. However, competition for these jobs is keen because this is one of the few areas in which one can work as a psychologist without an advanced degree.

The American Psychological Association (APA) presently accredits doctoral training programs in clinical, counseling, and school psychology. The National Council for Accreditation of Teacher Education, with the assistance of the National Association of School Psychologists, also is involved in the accreditation of advanced degree programs in school psychology. The APA also accredits institutions that provide internships for doctoral students in school, clinical, and counseling psychology.

Psychologists in independent practice or those who offer any type of patient care—including clinical, counseling, and school psychologists—must meet certification or licensing requirements in all States and the District of Columbia. Licensing laws vary by State and by type of position and require licensed or certified psychologists to limit their practice to areas in which they have developed professional competence through training and experience. Clinical and counseling psychologists usually require a doctorate in psychology, completion of an approved internship, and 1 to 2 years of professional experience. In addition, all States require that applicants pass an examination. Most State licensing boards administer a standardized test, and many supplement that with additional oral or essay questions. Most States certify those with a master's degree as school psychologists after completion of an internship. Some States require continuing education for license renewal.

The National Association of School Psychologists (NASP) awards the Nationally Certified School Psychologist (NCSP) designation, which recognizes professional

competency in school psychology at a national level, rather than at a State level. Currently, 22 States recognize the NCSP and allow those with the certification to transfer credentials from one State to another without taking a new State certification exam. In those States that recognize the NCSP, the requirements for State licensure and the NCSP often are the same or similar. Requirements for the NCSP include completion of 60 graduate semester hours in school psychology; a 1,200-hour internship, 600 hours of which must be completed in a school setting; and a passing score on the National School Psychology Examination.

The American Board of Professional Psychology (ABPP) recognizes professional achievement by awarding specialty certification, primarily in clinical psychology, clinical neuropsychology, and counseling, forensic, industrial-organizational, and school psychology. Candidates for ABPP certification need a doctorate in psychology, postdoctoral training in their specialty, 5 years of experience, professional endorsements, and a passing grade on an examination.

Aspiring psychologists who are interested in direct patient care must be emotionally stable, mature, and able to deal effectively with people. Sensitivity, compassion, good communication skills, and the ability to lead and inspire others are particularly important qualities for persons wishing to do clinical work and counseling. Research psychologists should be able to do detailed work independently and as part of a team. Patience and perseverance are vital qualities because achieving results from psychological treatment of patients or from research usually takes a long time.

### **Job Outlook**

Overall employment of psychologists is expected to grow faster than the average for all occupations through 2012, due to increased demand for psychological services in schools, hospitals, social service agencies, mental health centers, substance abuse treatment clinics, consulting firms, and private companies. Clinical, counseling, and school psychologists will grow faster than the average, while industrial-organizational psychologists will have average growth.

Among the specialties in this field, school psychologists may enjoy the best job opportunities. Growing awareness of how students' mental health and behavioral problems, such as bullying, affect learning is increasing demand for school psychologists to offer student counseling and mental health services. Clinical and counseling psychologists will be needed to help people deal with depression and other mental disorders, marriage and family problems, job stress, and addiction. The rise in healthcare costs associated with unhealthy lifestyles, such as smoking, alcoholism, and obesity, has made prevention and treatment more critical. The increase in the number of employee assistance programs, which help workers deal with personal problems, also should spur job growth in clinical and counseling specialties. Industrial-organizational psychologists will be in demand to help to boost worker productivity and retention rates in a wide range of businesses. Industrial-organizational psychologists will help companies deal with issues such as workplace diversity and antidiscrimination policies. Companies also will use psychologists' expertise in survey design, analysis, and research to develop tools for marketing evaluation and statistical analysis.

Demand should be particularly strong for persons holding doctorates from leading universities in applied specialties, such as counseling, health, and school psychology.

Psychologists with extensive training in quantitative research methods and computer science may have a competitive edge over applicants without this background.

Master's degree holders in fields other than school or industrial-organizational psychology will face keen competition for jobs, because of the limited number of positions that require only a master's degree. Master's degree holders may find jobs as psychological assistants or counselors, providing mental health services under the direct supervision of a licensed psychologist. Still others may find jobs involving research and data collection and analysis in universities, government, or private companies.

Opportunities directly related to psychology will be limited for bachelor's degree holders. Some may find jobs as assistants in rehabilitation centers, or in other jobs involving data collection and analysis. Those who meet State certification requirements may become high school psychology teachers.

### **Earnings**

Median annual earnings of wage and salary clinical, counseling, and school psychologists in 2002 were \$51,170. The middle 50 percent earned between \$38,560 and \$66,970. The lowest 10 percent earned less than \$30,090, and the highest 10 percent earned more than \$87,060. Median annual earnings in the industries employing the largest numbers of clinical, counseling, and school psychologists in 2002 were as follows:

Offices of other health practitioners	\$59,600
Elementary and secondary schools	54,480
Offices of physicians	51,140
Outpatient care centers	44,010
Individual and family services	37,490

Median annual earnings of wage and salary industrial-organizational psychologists in 2002 were \$63,710. The middle 50 percent earned between \$48,540 and \$81,880. The lowest 10 percent earned less than \$36,620, and the highest 10 percent earned more than \$112,660.

### **Sources of Additional Information**

For information on careers, educational requirements, financial assistance, and licensing in all fields of psychology, contact:

- American Psychological Association, 750 1st St. NE., Washington, DC 20002. Internet: <http://www.apa.org>
- National Association of School Psychologists, 4340 East West Hwy., Suite 402, Bethesda, MD 20814. Internet: <http://www.nasponline.org>

Information about State licensing requirements is available from:

- Association of State and Provincial Psychology Boards, P.O. Box 241245, Montgomery, AL 36124-1245. Internet: <http://www.asppb.org>

Information about psychology specialty certifications is available from:

- American Board of Professional Psychology, Inc., 514 East Capitol Ave., Jefferson City, MO 65101. Internet: <http://www.abpp.org>

## Speech-Language Pathologists

[Return to Menu](#)

### Significant Points

- Employment of speech-language pathologists is expected to grow rapidly because the expanding population in older age groups is prone to medical conditions that result in speech, language, and swallowing problems.
- About half worked in educational services, and most others were employed by healthcare and social assistance facilities.
- A master's degree in speech-language pathology is the standard credential.

### Nature of the Work

Speech-language pathologists, sometimes called **speech therapists**, assess, diagnose, treat, and help to prevent speech, language, cognitive, communication, voice, swallowing, fluency, and other related disorders.

Speech-language pathologists work with people who cannot make speech sounds, or cannot make them clearly; those with speech rhythm and fluency problems, such as stuttering; people with voice quality problems, such as inappropriate pitch or harsh voice; those with problems understanding and producing language; those who wish to improve their communication skills by modifying an accent; those with cognitive communication impairments, such as attention, memory, and problem solving disorders; and those with hearing loss who use hearing aids or cochlear implants in order to develop auditory skills and improve communication. They also work with people who have swallowing difficulties.

Speech and language difficulties can result from a variety of causes including stroke, brain injury or deterioration, developmental delays, cerebral palsy, cleft palate, voice pathology, mental retardation, hearing impairment, or emotional problems. Problems can be congenital, developmental, or acquired. Speech-language pathologists use written and oral tests, as well as special instruments, to diagnose the nature and extent of impairment and to record and analyze speech, language, and swallowing irregularities. Speech-language pathologists develop an individualized plan of care, tailored to each patient's needs. For individuals with little or no speech capability, speech-language pathologists may select augmentative or alternative communication methods, including automated devices and sign language, and teach their use. They teach these individuals how to make sounds, improve their voices, or increase their language skills to communicate more effectively. Speech-language pathologists help patients develop, or recover, reliable communication skills so patients can fulfill their educational, vocational, and social roles.

Most speech-language pathologists provide direct clinical services to individuals with communication or swallowing disorders. In speech and language clinics, they may

independently develop and carry out treatment programs. In medical facilities, they may work with physicians, social workers, psychologists, and other therapists. Speech-language pathologists in schools develop individual or group programs, counsel parents, and may assist teachers with classroom activities.

Speech-language pathologists keep records on the initial evaluation, progress, and discharge of clients. This helps pinpoint problems, tracks client progress, and justifies the cost of treatment when applying for reimbursement. They counsel individuals and their families concerning communication disorders and how to cope with the stress and misunderstanding that often accompany them. They also work with family members to recognize and change behavior patterns that impede communication and treatment and show them communication-enhancing techniques to use at home.

Some speech-language pathologists conduct research on how people communicate. Others design and develop equipment or techniques for diagnosing and treating speech problems.

### **Working Conditions**

Speech-language pathologists usually work at a desk or table in clean comfortable surroundings. In medical settings, they may work at the patient's bedside and assist in positioning the patient. In school settings, they may participate in classroom activities. While the job is not physically demanding, it requires attention to detail and intense concentration. The emotional needs of clients and their families may be demanding. Most full-time speech-language pathologists work between 35 and 40 hours per week; some work part time. Those who work on a contract basis may spend a substantial amount of time traveling between facilities.

### **Employment**

Speech-language pathologists held about 94,000 jobs in 2002. About half of jobs were in educational services, including preschools, elementary and secondary schools, and colleges and universities. Others were in hospitals; offices of other health practitioners, including speech-language pathologists; nursing care facilities; home healthcare services; individual and family services; outpatient care centers; child day care services; or other facilities.

A few speech-language pathologists are self-employed in private practice. They contract to provide services in schools, offices of physicians, hospitals, or nursing care facilities, or work as consultants to industry.

### **Training, Other Qualifications, and Advancement**

Of the 46 States that regulate licensing, almost all require a master's degree or equivalent. A passing score on a national examination on speech-language pathology offered through the Praxis Series of the Educational Testing Service is needed, as well. Other requirements are 300 to 375 hours of supervised clinical experience and 9 months of postgraduate professional clinical experience. Thirty-eight States have continuing education requirements for licensure renewal. Medicaid, Medicare, and

private health insurers generally require a practitioner to be licensed to qualify for reimbursement.

About 233 colleges and universities offer graduate programs in speech-language pathology. Courses cover anatomy and physiology of the areas of the body involved in speech, language, swallowing, and hearing; the development of normal speech, language, swallowing, and hearing; the nature of disorders; acoustics; and psychological aspects of communication. Graduate students also learn to evaluate and treat speech, language, swallowing, and hearing disorders and receive supervised clinical training in communication disorders.

Speech-language pathologists can acquire the Certificate of Clinical Competence in Speech-Language Pathology (CCC-SLP) offered by the American Speech-Language-Hearing Association. To earn a CCC, a person must have a graduate degree and 375 hours of supervised clinical experience, complete a 36-week postgraduate clinical fellowship, and pass the Praxis Series examination in speech-language pathology administered by the Educational Testing Service (ETS).

Speech-language pathologists should be able to effectively communicate diagnostic test results, diagnoses, and proposed treatment in a manner easily understood by their clients. They must be able to approach problems objectively and provide support to clients and their families. Because a client's progress may be slow, patience, compassion, and good listening skills are necessary.

### **Job Outlook**

Employment of speech-language pathologists is expected to grow faster than the average for all occupations through the year 2012. Members of the baby boom generation are now entering middle age, when the possibility of neurological disorders and associated speech, language, swallowing, and hearing impairments increases. Medical advances are also improving the survival rate of premature infants and trauma and stroke victims, who then need assessment and possible treatment. Many States now require that all newborns be screened for hearing loss and receive appropriate early intervention services.

In health services facilities, the impact of proposed Federal legislation imposing limits on reimbursement for therapy services may adversely affect the short-term job outlook for therapy providers. However, over the long run, the demand for therapists should continue to rise as growth in the number of individuals with disabilities or limited function spurs demand for therapy services.

Employment in educational services will increase along with growth in elementary and secondary school enrollments, including enrollment of special education students. Federal law guarantees special education and related services to all eligible children with disabilities. Greater awareness of the importance of early identification and diagnosis of speech, language, swallowing, and hearing disorders will also increase employment.

The number of speech-language pathologists in private practice will rise due to the increasing use of contract services by hospitals, schools, and nursing care facilities. In addition to job openings stemming from employment growth, a number of

openings for speech-language pathologists will arise from the need to replace those who leave the occupation.

### **Earnings**

Median annual earnings of speech-language pathologists were \$49,450 in 2002. The middle 50 percent earned between \$39,930 and \$60,190. The lowest 10 percent earned less than \$32,580, and the highest 10 percent earned more than \$74,010. Median annual earnings in the industries employing the largest numbers of speech-language pathologists in 2002 were as follows:

Offices of other health practitioners	\$53,090
General medical and surgical hospitals	52,940
Elementary and secondary schools	46,060

According to a 2003 survey by the American Speech-Language-Hearing Association, the median annual salary for full-time certified speech-language pathologists who worked on a calendar-year basis, generally 11 or 12 months annually, was \$48,000. For those who worked on an academic-year basis, usually 9 or 10 months annually, the median annual salary was \$44,800. Certified speech-language pathologists who worked 25 or fewer hours per week had a median hourly salary of \$40.00. Starting salaries for certified speech-language pathologists with one to three years experience were \$42,000 for those who worked on a calendar-year basis and \$37,000 for those who worked on an academic-year basis.

### **Sources of Additional Information**

State licensing boards can provide information on licensure requirements. State departments of education can supply information on certification requirements for those who wish to work in public schools. General information on careers in speech-language pathology is available from:

- American Speech-Language-Hearing Association, 10801 Rockville Pike, Rockville, MD 20852. Internet: <http://www.asha.org>

## **Management Analysts**

[Return to Menu](#)

### **Significant Points**

- Thirty percent are self-employed, about one and a half times the average for other management, business, and financial occupations.
- Most positions in private industry require a master's degree and additional years of specialized experience; a bachelor's degree is sufficient for entry-level government jobs.
- Despite projected faster-than-average employment growth, intense competition is expected for jobs.

## Nature of the Work

As business becomes more complex, the Nation's firms are continually faced with new challenges. Firms increasingly rely on management analysts to help them remain competitive amidst these changes. Management analysts, often referred to as **management consultants** in private industry, analyze and propose ways to improve an organization's structure, efficiency, or profits. For example, a small but rapidly growing company that needs help improving the system of control over inventories and expenses may decide to employ a consultant who is an expert in just-in-time inventory management. In another case, a large company that has recently acquired a new division may hire management analysts to help reorganize the corporate structure and eliminate duplicate or nonessential jobs. In recent years, information technology and electronic commerce have provided new opportunities for management analysts. Companies hire consultants to develop strategies for entering and remaining competitive in the new electronic marketplace.)

Firms providing management analysis range in size from a single practitioner to large international organizations employing thousands of consultants. Some analysts and consultants specialize in a specific industry, such as healthcare or telecommunications, while others specialize by type of business function, such as human resources, marketing, logistics, or information systems. In government, management analysts tend to specialize by type of agency. The work of management analysts and consultants varies with each client or employer, and from project to project. Some projects require a team of consultants, each specializing in one area. In other projects, consultants work independently with the organization's managers. In all cases, analysts and consultants collect, review, and analyze information in order to make recommendations to managers.

Both public and private organizations use consultants for a variety of reasons. Some lack the internal resources needed to handle a project, while others need a consultant's expertise to determine what resources will be required and what problems may be encountered if they pursue a particular opportunity. To retain a consultant, a company first solicits proposals from a number of consulting firms specializing in the area in which it needs assistance. These proposals include the estimated cost and scope of the project, staffing requirements, references from a number of previous clients, and a completion deadline. The company then selects the proposal that best suits its needs.

After obtaining an assignment or contract, management analysts first define the nature and extent of the problem. During this phase, they analyze relevant data, which may include annual revenues, employment, or expenditures, and interview managers and employees while observing their operations. The analyst or consultant then develops solutions to the problem. In the course of preparing their recommendations, they take into account the nature of the organization, the relationship it has with others in the industry, and its internal organization and culture. Insight into the problem often is gained by building and solving mathematical models.

Once they have decided on a course of action, consultants report their findings and recommendations to the client. These suggestions usually are submitted in writing, but oral presentations regarding findings also are common. For some projects,

management analysts are retained to help implement the suggestions they have made.

Management analysts in government agencies use the same skills as their private-sector colleagues to advise managers on many types of issues, most of which are similar to the problems faced by private firms. For example, if an agency is planning to purchase personal computers, it must first determine which type to buy, given its budget and data processing needs. In this case, management analysts would assess the prices and characteristics of various machines and determine which best meets the agency's needs.

### **Working Conditions**

Management analysts usually divide their time between their offices and the client's site. In either situation, much of an analyst's time is spent indoors in clean, well-lit offices. Because they must spend a significant portion of their time with clients, analysts travel frequently.

Analysts and consultants generally work at least 40 hours a week. Uncompensated overtime is common, especially when project deadlines are approaching. Analysts may experience a great deal of stress as a result of trying to meet a client's demands, often on a tight schedule.

Self-employed consultants can set their workload and hours and work at home. On the other hand, their livelihood depends on their ability to maintain and expand their client base. Salaried consultants also must impress potential clients to get and keep clients for their company.

### **Employment**

Management analysts held about 577,000 jobs in 2002. Thirty percent of these workers were self-employed, about one and a half times the average for other management, business, and financial occupations. Management analysts are found throughout the country, but employment is concentrated in large metropolitan areas. Most work in management, scientific, and technical consulting firms, in computer systems design and related services firms, and for Federal, State, and local governments. The majority of those working for the Federal Government are in the U.S. Department of Defense.

### **Training, Other Qualifications, and Advancement**

Educational requirements for entry-level jobs in this field vary widely between private industry and government. Most employers in private industry generally seek individuals with a master's degree in business administration or a related discipline. Some employers also require additional years of experience in the field in which the worker plans to consult, in addition to a master's degree. Some will hire workers with a bachelor's degree as a research analyst or associate. Research analysts usually need to pursue a master's degree in order to advance to a consulting position. Most government agencies hire people with a bachelor's degree and no pertinent work experience for entry-level management analyst positions.

Few universities or colleges offer formal programs of study in management consulting; however, many fields of study provide a suitable educational background for this occupation because of the wide range of areas addressed by management analysts. These include most academic programs in business and management, such as accounting and marketing, as well as economics, computer and information sciences, and engineering. In addition to the appropriate formal education, most entrants to this occupation have years of experience in management, human resources, information technology, or other specialties. Analysts also routinely attend conferences to keep abreast of current developments in their field.

Management analysts often work with minimal supervision, so they need to be self-motivated and disciplined. Analytical skills, the ability to get along with a wide range of people, strong oral and written communication skills, good judgment, time management skills, and creativity are other desirable qualities. The ability to work in teams also is an important attribute as consulting teams become more common.

As consultants gain experience, they often become solely responsible for a specific project, taking on more responsibility and managing their own hours. At the senior level, consultants may supervise lower level workers and become more involved in seeking out new business. Those with exceptional skills may eventually become a partner in the firm. Others with entrepreneurial ambition may open their own firm.

A high percentage of management consultants are self-employed, partly because business startup costs are low. Self-employed consultants also can share office space, administrative help, and other resources with other self-employed consultants or small consulting firms, thus reducing overhead costs. Because many small consulting firms fail each year for lack of managerial expertise and clients, persons interested in opening their own firm must have good organizational and marketing skills and several years of consulting experience.

The Institute of Management Consultants USA, Inc. (IMC USA) offers a wide range of professional development programs and resources, such as meetings and workshops, which can be helpful for management consultants. The IMC USA also offers the Certified Management Consultant (CMC) designation to those who meet minimum levels of education and experience, submit client reviews, and pass an interview and exam covering the IMC USA's Code of Ethics. Management consultants with a CMC designation must be recertified every 3 years. Certification is not mandatory for management consultants, but it may give a jobseeker a competitive advantage.

### **Job Outlook**

Despite projected rapid employment growth, keen competition is expected for jobs as management analysts. Because analysts can come from such diverse educational backgrounds, the pool of applicants from which employers can draw is quite large. Furthermore, the independent and challenging nature of the work, combined with high earnings potential, makes this occupation attractive to many. Job opportunities are expected to be best for those with a graduate degree, industry expertise, and a talent for salesmanship and public relations.

Employment of management analysts is expected to grow faster than the average for all occupations through 2012, as industry and government increasingly rely on outside expertise to improve the performance of their organizations. Job growth is

projected in very large consulting firms with international expertise and in smaller consulting firms that specialize in specific areas, such as biotechnology, healthcare, information technology, human resources, engineering, and marketing. Growth in the number of individual practitioners may be hindered, however, by increasing use of consulting teams, which permits examination of a variety of different issues and problems within an organization.

Employment growth of management analysts and consultants has been driven by a number of changes in the business environment that have forced firms to take a closer look at their operations. These changes include developments in information technology and the growth of electronic commerce. Traditional companies hire analysts to help design intranets or company Web sites, or establish online businesses. New Internet start-up companies hire analysts not only to design Web sites, but also to advise them in more traditional business practices, such as pricing strategies, marketing, and inventory and human resource management. In order to offer clients better quality and a wider variety of services, consulting firms are partnering with traditional computer software and technology firms. Also, many computer firms are developing consulting practices of their own in order to take advantage of this expanding market. Although information technology consulting should remain one of the fastest growing consulting areas, the volatility of the computer services industry necessitates that the most successful management analysts have knowledge of traditional business practices in addition to computer applications, systems integration, and Web design and management skills.

The growth of international business also has contributed to an increase in demand for management analysts. As U.S. firms expand their business abroad, many will hire management analysts to help them form the right strategy for entering the market; advise on legal matters pertaining to specific countries; or help with organizational, administrative, and other issues, especially if the U.S. company is involved in a partnership or merger with a local firm. These trends provide management analysts with more opportunities to travel or work abroad, but also require them to have a more comprehensive knowledge of international business and foreign cultures and languages.

Furthermore, as international and domestic markets have become more competitive, firms have needed to use resources more efficiently. Management analysts increasingly are sought to help reduce costs, streamline operations, and develop marketing strategies. As this process continues and businesses downsize, even more opportunities will be created for analysts to perform duties that previously were handled internally. Finally, management analysts also will be in greater demand in the public sector, as Federal, State, and local government agencies seek ways to become more efficient.

Though management consultants are continually expanding their services, employment growth could be hampered by increasing competition for clients from occupations that do not traditionally perform consulting work, such as accountants, financial analysts, lawyers, and computer systems analysts. Furthermore, economic downturns also can have adverse effects on employment for some management consultants. In these times, businesses look to cut costs and consultants can be considered excess expense. On the other hand, some consultants might experience an increase in work during recessions because they advise businesses on how to cut costs and remain profitable.

## Earnings

Salaries for management analysts vary widely by years of experience and education, geographic location, sector of expertise, and size of employer. Generally, management analysts employed in large firms or in metropolitan areas have the highest salaries. Median annual wage and salary earnings of management analysts in 2002 were \$60,340. The middle 50 percent earned between \$46,160 and \$83,590. The lowest 10 percent earned less than \$35,990, and the highest 10 percent earned more than \$115,670. Median annual earnings in the industries employing the largest numbers of management analysts and consultants in 2002 were:

Management, scientific, and technical consulting services	\$71,790
Computer systems design and related services	66,120
Federal Government	65,480
Insurance carriers	51,780
State government	47,340

According to a 2002 survey by the Association of Management Consulting Firms, earnings—including bonuses and profit sharing—averaged \$47,826 for research associates in member firms; \$61,496 for entry-level consultants, \$78,932 for management consultants, \$112,716 for senior consultants, \$168,998 for junior partners, and \$254,817 for senior partners.

Salaried management analysts usually receive common benefits such as health and life insurance, a retirement plan, vacation, and sick leave, as well as less common benefits such as profit sharing and bonuses for outstanding work. In addition, all travel expenses usually are reimbursed by the employer. Self-employed consultants have to maintain their own office and provide their own benefits.

## Sources of Additional Information

Information about career opportunities in management consulting is available from:

- Association of Management Consulting Firms, 380 Lexington Ave., Suite 1700, New York, NY 10168. Internet: <http://www.amcf.org>
- Institute of Management Consultants USA, Inc., 2025 M St. NW., Suite 800, Washington DC 20036. Internet: <http://www.imcusa.org>

Information on obtaining a management analyst position with the Federal Government is available at: <http://www.usajobs.opm.gov>.

**Significant Points**

- Epidemiologists typically require a master's degree in public health or, in some cases, a medical degree; other medical scientists need a Ph.D. degree in a biological science.
- Competition is expected for most positions.
- Most medical scientists work in research and development.

**Nature of the Work**

Medical scientists research human diseases in order to improve human health. Most medical scientists work in research and development. Some conduct basic research to advance knowledge of living organisms, including viruses, bacteria, and other infectious agents. Past research has resulted in the development of vaccines, medicines, and treatments for many diseases. Basic medical research continues to provide the building blocks necessary to develop solutions to human health problems. Medical scientists also engage in clinical investigation, technical writing, drug application review, patent examination, or related activities.

Medical scientists study biological systems to understand the causes of disease and other health problems and to develop treatments. They try to identify changes in a cell or chromosomes that signal the development of medical problems, such as different types of cancer. For example, a medical scientist involved in cancer research may formulate a combination of drugs that will lessen the effects of the disease. Medical scientists who are also physicians can administer these drugs to patients in clinical trials, monitor their reactions, and observe the results. Those who are not physicians normally collaborate with a physician who deals directly with patients. Medical scientists examine the results of clinical trials and, if necessary, adjust the dosage levels to reduce negative side effects or to try to induce even better results. In addition to developing treatments for health problems, medical scientists attempt to discover ways to prevent health problems, such as affirming the link between smoking and lung cancer, or between alcoholism and liver disease.

Many medical scientists work independently in private industry, university, or government laboratories, often exploring new areas of research or expanding on specialized research that they started in graduate school. Medical scientists working in colleges and universities, hospitals, and nonprofit medical research organizations typically submit grant proposals to obtain funding for their projects. Colleges and universities, private industry, and Federal Government agencies, such as the National Institutes of Health and the National Science Foundation, contribute to the support of scientists whose research proposals are determined to be financially feasible and have the potential to advance new ideas or processes.

Medical scientists who work in applied research or product development use knowledge provided by basic research to develop new drugs and medical treatments. They usually have less autonomy than basic researchers to choose the emphasis of their research, relying instead on market-driven directions based on the firm's products and goals. Medical scientists doing applied research and product

development in private industry may be required to express their research plans or results to nonscientists who are in a position to veto or approve their ideas, and they must understand the impact of their work on business. Scientists increasingly work as part of teams, interacting with engineers, scientists of other disciplines, business managers, and technicians.

Medical scientists who conduct research usually work in laboratories and use electron microscopes, computers, thermal cyclers, or a wide variety of other equipment. Some may work directly with individual patients or larger groups as they administer drugs and monitor and observe the patients during clinical trials. Medical scientists who are also physicians may administer gene therapy to human patients, draw blood, excise tissue, or perform other invasive procedures.

Some medical scientists work in managerial, consulting, or administrative positions, usually after spending some time doing research and learning about the firm, agency, or project. In the 1980s, swift advances in basic medical knowledge related to genetics and molecules spurred growth in the field of biotechnology. Medical scientists using this technology manipulate the genetic material of animals, attempting to make organisms more productive or resistant to disease. Research using biotechnology techniques, such as recombining DNA, has led to the discovery of important drugs, including human insulin and growth hormone. Many other substances not previously available in large quantities are now produced by biotechnological means; some may be useful in treating diseases such as Parkinson's or Alzheimer's. Today, many medical scientists are involved in the science of genetic engineering—isolating, identifying, and sequencing human genes and then determining their functionality. This work continues to lead to the discovery of the genes associated with specific diseases and inherited traits, such as certain types of cancer or obesity. These advances in biotechnology have opened up research opportunities in almost all areas of medical science.

Some medical scientists specialize in epidemiology. This branch of medical science investigates and describes the determinants of disease, disability, and other health outcomes and develops the means for prevention and control. Epidemiologists may study many different diseases such as tuberculosis, influenza, or cholera, often focusing on epidemics.

Epidemiologists can be separated into two groups, research and clinical. Research epidemiologists conduct basic and advanced research on infectious diseases that affect the entire body, such as AIDS or typhus—attempting to eradicate or control these diseases. Others may focus only on localized infections of the brain, lungs, or digestive tract, for example. Research epidemiologists work at colleges and universities, schools of public health, medical schools, and research and development services firms. For example, Government agencies such as the Department of Defense may contract with a research firm's epidemiologists to evaluate the incidence of malaria in certain parts of the world. While some perform consulting services, other research epidemiologists may work as college and university faculty.

Clinical epidemiologists work primarily in consulting roles at hospitals, informing the medical staff of infectious outbreaks and providing containment solutions. These clinical epidemiologists sometimes are referred to as infection control professionals. Consequently, many epidemiologists in this specific area often are physicians. Epidemiologists who are not physicians often collaborate with physicians to find ways

to contain diseases and outbreaks. In addition to traditional duties of studying and controlling diseases, clinical epidemiologists also may be required to develop standards and guidelines for the treatment and control of communicable diseases. Some clinical epidemiologists may work in outpatient settings.

### **Working Conditions**

Medical scientists typically work regular hours in offices or laboratories and usually are not exposed to unsafe or unhealthy conditions. Those who work with dangerous organisms or toxic substances in the laboratory must follow strict safety procedures to avoid contamination. Medical scientists also spend time working in clinics and hospitals administering drugs and treatments to patients in clinical trials. On occasion, epidemiologists may be required to work evenings and weekends to attend meetings and hearings for medical investigations.

Some medical scientists depend on grant money to support their research. They may be under pressure to meet deadlines and to conform to rigid grant-writing specifications when preparing proposals to seek new or extended funding.

### **Employment**

Medical scientists, including epidemiologists, held about 62,000 jobs in 2002. Medical scientists accounted for 58,000 of the total; epidemiologists, 3,900. In addition, many medical scientists held faculty positions in colleges and universities, but they are classified as college or university faculty.

Almost 30 percent of medical scientists were employed in scientific research and development services firms, another 24 percent worked in Government, 14 percent in pharmaceutical and medicine manufacturing, 13 percent in private hospitals, and most of the remainder worked in private educational services and ambulatory health care services. About 1,000 were self-employed.

Among epidemiologists, nearly 45 percent were employed in Government, another 20 percent worked in management, scientific, and technical consulting services firms, 14 percent in private hospitals, and 12 percent in scientific research and development services firms.

### **Training, Other Qualifications, and Advancement**

A Ph.D. degree in a biological science is the minimum education required for most prospective medical scientists, except epidemiologists, because the work of medical scientists is almost entirely research oriented. A Ph.D. degree qualifies one to do research on basic life processes or on particular medical problems or diseases, and to analyze and interpret the results of experiments on patients. Some medical scientists obtain a medical degree instead of a Ph.D., but may not be licensed physicians because they have not taken the State licensing examination or completed a residency program, typically because they prefer research to clinical practice. Medical scientists who administer drug or gene therapy to human patients, or who otherwise interact medically with patients—drawing blood, excising tissue, or performing other invasive procedures—must be licensed physicians. To be licensed, physicians must graduate from an accredited medical school, pass a licensing examination, and

complete 1 to 7 years of graduate medical education. It is particularly helpful for medical scientists to earn both Ph.D. and medical degrees.

Students planning careers as medical scientists should have a bachelor's degree in a biological science. In addition to required courses in chemistry and biology, undergraduates should study allied disciplines such as mathematics, physics, and computer science, or courses in their field of interest. Once they have completed undergraduate studies, they can then select a specialty area for their advanced degree, such as cytology, genomics, or pathology. In addition to formal education, medical scientists usually spend several years in a postdoctoral position before they apply for permanent jobs. Postdoctoral work provides valuable laboratory experience, including experience in specific processes and techniques such as gene splicing, which is transferable to other research projects. In some institutions, the postdoctoral position can lead to a permanent job.

Medical scientists should be able to work independently or as part of a team and be able to communicate clearly and concisely, both orally and in writing. Those in private industry, especially those who aspire to consulting and administrative positions, should possess strong communication skills so they can provide instruction and advice to physicians and other healthcare professionals.

The minimum educational requirement for epidemiology is a master's degree from a school of public health. Some jobs require a Ph.D. or medical degree, depending on the work performed. Epidemiologists who work in hospitals and healthcare centers often must have a medical degree with specific training in infectious diseases. Currently, 134 infectious disease training programs exist in 42 States. Some employees in research epidemiology positions are required to be licensed physicians, as they are required to administer drugs in clinical trials.

Epidemiologists who perform laboratory tests often require the knowledge and expertise of a licensed physician in order to administer drugs to patients in clinical trials. Epidemiologists who are not physicians frequently work closely with one.

Very few students select epidemiology for undergraduate study. Undergraduates, nonetheless, should study biological sciences and should have a solid background in chemistry, mathematics, and computer science. Once a student is prepared for graduate studies, he or she can choose a specialty within epidemiology. For example, those interested in studying environmental epidemiology should focus on environmental coursework, such as water pollution, air pollution, or pesticide use. The core work of environmental studies includes toxicology and molecular biology, and students may continue with advanced coursework in environmental or occupational epidemiology. Some epidemiologists are registered nurses and medical technologists seeking advancement.

## **Job Outlook**

Employment of medical scientists is expected to grow faster than the average for all occupations through 2012. Despite projected rapid job growth for medical scientists, doctoral degree holders can expect to face considerable competition for basic research positions. The Federal Government funds much basic research and development, including many areas of medical research. Recent budget increases at the National Institutes of Health have led to large increases in Federal basic research

and development expenditures, with the number of grants awarded to researchers growing in number and dollar amount. At the same time, the number of newly trained medical scientists has continued to increase at least as fast as employment opportunities, so both new and established scientists have experienced greater difficulty winning and renewing research grants. If the number of advanced degrees awarded continues to grow unabated, as expected, this competitive situation is likely to persist.

Medical scientists enjoyed rapid gains in employment between the mid-1980s and mid-1990s, in part reflecting increased staffing requirements in new biotechnology companies. Employment growth should slow somewhat as increases in the number of new biotechnology firms slow and existing firms merge or are absorbed into larger ones. However, much of the basic medical research done in recent years has resulted in new knowledge, including the isolation and identification of new genes. Medical scientists will be needed to take this knowledge to the next stage, which is understanding how certain genes function within an entire organism, so that gene therapies can be developed to treat diseases. Even pharmaceutical and other firms not solely engaged in biotechnology are expected to increasingly use biotechnology techniques, thus creating employment for medical scientists.

Expected expansion in research related to health issues such as AIDS, cancer, and Alzheimer's disease also should result in employment growth. Although medical scientists greatly contributed to developing many vaccines and antibiotics, more medical research will be required to better understand these and other epidemics and to improve human health.

Opportunities in epidemiology also should be highly competitive, as the number of available positions remains limited. However, an increasing focus on monitoring patients at hospitals and healthcare centers to ensure positive patient outcomes will contribute to job growth. In addition, a heightened awareness of bioterrorism and infectious diseases such as West Nile Virus or SARS should also spur demand for these workers. As hospitals enhance their infection control programs, many will seek to boost the quality and quantity of their staff. Besides job openings due to employment growth, additional openings will result as workers leave the labor force or transfer to other occupations. Because employment of epidemiologists is somewhat tied to the healthcare industry, industry conditions will influence occupational demand.

Medical scientists and some epidemiologists are less likely to lose their jobs during recessions than are those in many other occupations because they are employed on long-term research projects. However, a recession could influence the amount of money allocated to new research and development efforts, particularly in areas of risky or innovative medical research. A recession also could limit the possibility of extension or renewal of existing projects.

## **Earnings**

Median annual earnings of medical scientists, except epidemiologists, were \$56,980 in 2002. The middle 50 percent earned between \$40,180 and \$82,720. The lowest 10 percent earned less than \$29,980, and the highest 10 percent earned more than \$114,640. Median annual earnings in the industries employing the largest numbers of medical scientists in 2002 were:

Pharmaceutical and medicine manufacturing	\$72,330
Scientific research and development services	61,470
General medical and surgical hospitals	50,660
Colleges, universities, and professional schools	35,520

Median annual earnings of epidemiologists were \$53,840 in 2002. The middle 50 percent earned between \$44,900 and \$66,510. The lowest 10 percent earned less than \$35,910, and the highest 10 percent earned more than \$85,930.

### **Sources of Additional Information**

For a brochure entitled *Is a Career in the Pharmaceutical Sciences Right for Me*, contact:

- American Association of Pharmaceutical Scientists (AAPS), 2107 Wilson Blvd., Suite #700, Arlington, VA 22201.

For a career brochure entitled *A Million and One*, contact:

- American Society for Microbiology, Education Department, 1752 N St. NW., Washington, D.C. 20036-2804. Internet: <http://www.asm.org>

Information on obtaining a medical scientist position with the Federal Government is available from the Office of Personnel Management (OPM) Internet site: <http://www.usajobs.opm.gov>.

## Urban and Regional Planners

[Return to Menu](#)

### **Significant Points**

- Local governments employ 7 out of 10 urban and regional planners.
- Most entry-level jobs require a master's degree; bachelor's degree holders may find some entry-level positions, but advancement opportunities are limited.
- Most new jobs will arise in affluent, rapidly growing urban and suburban communities.

### **Nature of the Work**

Planners develop long-term and short-term plans to use land for the growth and revitalization of urban, suburban, and rural communities, while helping local officials make decisions concerning social, economic, and environmental problems. Because local governments employ the majority of urban and regional planners, they often are referred to as community, regional, or city planners.

Planners promote the best use of a community's land and resources for residential, commercial, institutional, and recreational purposes. Planners may be involved in various other activities, including making decisions relating to establishing

alternative public transportation systems, developing resources, and protecting ecologically sensitive regions. Urban and regional planners address issues such as traffic congestion, air pollution, and the effects of growth and change on a community. They may formulate plans relating to the construction of new school buildings, public housing, or other kinds of infrastructure. Some planners are involved in environmental issues ranging from pollution control to wetland preservation, forest conservation, and the location of new landfills. Planners also may be involved in drafting legislation on environmental, social, and economic issues, such as sheltering the homeless, planning a new park, or meeting the demand for new correctional facilities.

Planners examine proposed community facilities, such as schools, to be sure that these facilities will meet the changing demands placed upon them over time. They keep abreast of economic and legal issues involved in zoning codes, building codes, and environmental regulations. They ensure that builders and developers follow these codes and regulations. Planners also deal with land-use issues created by population movements. For example, as suburban growth and economic development create more new jobs outside cities, the need for public transportation that enables workers to get to those jobs increases. In response, planners develop transportation models and explain their details to planning boards and the general public.

Before preparing plans for community development, planners report on the current use of land for residential, business, and community purposes. Their reports include information on the location and capacity of streets, highways, airports, water and sewer lines, schools, libraries, and cultural and recreational sites. They also provide data on the types of industries in the community, the characteristics of the population, and employment and economic trends. Using this information, along with input from citizens' advisory committees, planners design the layout of land uses for buildings and other facilities such as subway lines and stations. Planners prepare reports showing how their programs can be carried out and what they will cost.

Planners use computers to record and analyze information and to prepare reports and recommendations for government executives and others. Computer databases, spreadsheets, and analytical techniques are widely utilized to project program costs and forecast future trends in employment, housing, transportation, or population. Computerized geographic information systems enable planners to map land areas, to overlay maps with geographic variables such as population density, and to combine or manipulate geographic information to produce alternative plans for land use or development.

Urban and regional planners often confer with land developers, civic leaders, and public officials and may function as mediators in community disputes, presenting alternatives that are acceptable to opposing parties. Planners may prepare material for community relations programs, speak at civic meetings, and appear before legislative committees and elected officials to explain and defend their proposals.

In large organizations, planners usually specialize in a single area, such as transportation, demography, housing, historic preservation, urban design, environmental and regulatory issues, or economic development. In small organizations, planners do various kinds of planning.

## **Working Conditions**

Urban and regional planners often travel to inspect the features of land under consideration for development or regulation, including its current use and the types of structures on it. Some local government planners involved in site development inspections spend most of their time in the field. Although most planners have a scheduled 40-hour workweek, they frequently attend evening or weekend meetings or public hearings with citizens' groups. Planners may experience the pressure of deadlines and tight work schedules, as well as political pressure generated by interest groups affected by proposals related to urban development and land use.

## **Employment**

Urban and regional planners held about 32,000 jobs in 2002. About 7 out of 10 were employed by local governments. Companies involved with architectural, engineering, and related services, as well as management, scientific, and technical consulting services, employ an increasing proportion of planners in the private sector. Others are employed in State government agencies dealing with housing, transportation, or environmental protection, and a small number work for the Federal Government.

## **Training, Other Qualifications, and Advancement**

For jobs as urban and regional planners, employers prefer workers who have advanced training. Most entry-level jobs in Federal, State, and local government agencies require a master's degree from an accredited program in urban or regional planning or a master's degree in a related field, such as urban design or geography. A bachelor's degree from an accredited planning program, coupled with a master's degree in architecture, landscape architecture, or civil engineering, is good preparation for entry-level planning jobs in various areas, including urban design, transportation, and the environment. A master's degree from an accredited planning program provides the best training for a wide range of planning fields. Although graduates from one of the limited number of accredited bachelor's degree programs qualify for some entry-level positions, their advancement opportunities often are limited, unless they acquire an advanced degree.

Courses in related disciplines, such as architecture, law, earth sciences, demography, economics, finance, health administration, geographic information systems, and management, are highly recommended. Because familiarity with computer models and statistical techniques is important, courses in statistics and computer science also are recommended.

In 2003, 67 colleges and universities offered an accredited master's degree program, and 13 offered an accredited bachelor's degree program, in urban or regional planning. Accreditation for these programs is from the Planning Accreditation Board, which consists of representatives of the American Institute of Certified Planners, the American Planning Association, and the Association of Collegiate Schools of Planning. Most graduate programs in planning require a minimum of 2 years of study.

Specializations most commonly offered by planning schools are environmental planning, land use and comprehensive planning, economic development, housing, historic preservation, and social planning. Other popular offerings include community development, transportation, and urban design. Graduate students spend

considerable time in studios, workshops, and laboratory courses learning to analyze and solve planning problems. They often are required to work in a planning office part time or during the summer. Local government planning offices frequently offer students internships, providing experience that proves invaluable in obtaining a full-time planning position after graduation.

The American Institute of Certified Planners, a professional institute within the American Planning Association, grants certification to individuals who have the appropriate combination of education and professional experience and who pass an examination. Certification may be helpful for promotion.

Planners must be able to think in terms of spatial relationships and visualize the effects of their plans and designs. They should be flexible and be able to reconcile different viewpoints and make constructive policy recommendations. The ability to communicate effectively, both orally and in writing, is necessary for anyone interested in this field.

After a few years of experience, planners may advance to assignments requiring a high degree of independent judgment, such as designing the physical layout of a large development or recommending policy and budget options. Some public-sector planners are promoted to community planning director and spend a great deal of time meeting with officials, speaking to civic groups, and supervising a staff. Further advancement occurs through a transfer to a larger jurisdiction with more complex problems and greater responsibilities or into related occupations, such as director of community or director of economic development.

### **Job Outlook**

Employment of urban and regional planners is expected to grow about as fast as the average for all occupations through 2012. Employment growth will be driven by the need for State and local governments to provide public services such as regulation of commercial development, the environment, transportation, housing, and land use and development for an expanding population. Nongovernmental initiatives dealing with historic preservation and redevelopment will provide additional openings. Some job openings also will arise from the need to replace experienced planners who transfer to other occupations, retire, or leave the labor force for other reasons. Graduates with a degree from an accredited program should have an advantage in the job market.

Most planners work for local governments with limited resources and many demands for services. When communities need to cut expenditures, planning services may be cut before basic services, such as police, firefighting, and education. Budget constraints could limit job growth in government; as a result, the number of openings for consulting positions in private industry is expected to grow more rapidly than the number of openings in government.

Most new jobs for urban and regional planners will arise in affluent, rapidly expanding communities. Local governments need planners to address an array of problems associated with population growth. For example, new housing developments require roads, sewer systems, fire stations, schools, libraries, and recreation facilities that must be planned for in the midst of a consideration of budgetary constraints. Small town chambers of commerce, economic development

authorities, and tourism bureaus may hire planners, preferably with some background in marketing and public relations.

### **Earnings**

Median annual earnings of urban and regional planners were \$49,880 in 2002. The middle 50 percent earned between \$39,210 and \$62,710. The lowest 10 percent earned less than \$31,830, and the highest 10 percent earned more than \$76,700. Median annual earnings in local government, the industry employing the largest number of urban and regional planners, were \$48,950.

### **Sources of Additional Information**

Information on careers, salaries, and certification in urban and regional planning is available from:

- American Planning Association, Education Division, 122 South Michigan Ave., Suite 1600, Chicago, IL 60603-6107. Internet: <http://www.planning.org>
- Association of Collegiate Schools of Planning, 6311 Mallard Trace, Tallahassee, FL 32312. Internet: <http://www.acsp.org>

## **Physical Therapists**

[Return to Menu](#)

### **Significant Points**

- Employment is expected to increase faster than the average, as growth in the number of individuals with disabilities or limited function spurs demand for therapy services.
- After graduating from an accredited physical therapist educational program, therapists must pass a licensure exam before they can practice.
- About two-thirds of physical therapists work either in hospitals or in offices of physical therapists.

### **Nature of the Work**

Physical therapists (PTs) provide services that help restore function, improve mobility, relieve pain, and prevent or limit permanent physical disabilities of patients suffering from injuries or disease. They restore, maintain, and promote overall fitness and health. Their patients include accident victims and individuals with disabling conditions such as low-back pain, arthritis, heart disease, fractures, head injuries, and cerebral palsy.

Therapists examine patients' medical histories and then test and measure the patients' strength, range of motion, balance and coordination, posture, muscle performance, respiration, and motor function. They also determine patients' ability to be independent and reintegrate into the community or workplace after injury or illness. Next, physical therapists develop treatment plans describing a treatment strategy, its purpose, and its anticipated outcome. Physical therapist assistants, under the direction and supervision of a physical therapist, may be involved in

implementing treatment plans with patients. Physical therapist aides perform routine support tasks, as directed by the therapist.

Treatment often includes exercise for patients who have been immobilized and lack flexibility, strength, or endurance. Physical therapists encourage patients to use their own muscles to increase their flexibility and range of motion before finally advancing to other exercises that improve strength, balance, coordination, and endurance. The goal is to improve how an individual functions at work and at home.

Physical therapists also use electrical stimulation, hot packs or cold compresses, and ultrasound to relieve pain and reduce swelling. They may use traction or deep-tissue massage to relieve pain. Therapists also teach patients to use assistive and adaptive devices, such as crutches, prostheses, and wheelchairs. They also may show patients exercises to do at home to expedite their recovery.

As treatment continues, physical therapists document the patient's progress, conduct periodic examinations, and modify treatments when necessary. Besides tracking the patient's progress, such documentation identifies areas requiring more or less attention.

Physical therapists often consult and practice with a variety of other professionals, such as physicians, dentists, nurses, educators, social workers, occupational therapists, speech-language pathologists, and audiologists.

Some physical therapists treat a wide range of ailments; others specialize in areas such as pediatrics, geriatrics, orthopedics, sports medicine, neurology, and cardiopulmonary physical therapy.

### **Working Conditions**

Physical therapists practice in hospitals, clinics, and private offices that have specially equipped facilities, or they treat patients in hospital rooms, homes, or schools.

In 2002, most full-time physical therapists worked a 40-hour week; some worked evenings and weekends to fit their patients' schedules. More than 1 in 5 physical therapists worked part time. The job can be physically demanding because therapists often have to stoop, kneel, crouch, lift, and stand for long periods. In addition, physical therapists move heavy equipment and lift patients or help them turn, stand, or walk.

### **Employment**

Physical therapists held about 137,000 jobs in 2002. The number of jobs is greater than the number of practicing physical therapists, because some physical therapists hold two or more jobs. For example, some may work in a private practice, but also work part time in another healthcare facility.

About two-thirds of jobs for physical therapists were either in hospitals or in offices of other health practitioners (which includes offices of physical therapists). Other

jobs were in home healthcare services, nursing care facilities, outpatient care centers, and offices of physicians.

Some physical therapists were self-employed in private practices, seeing individual patients and contracting to provide services in hospitals, rehabilitation centers, nursing care facilities, home healthcare agencies, adult daycare programs, and schools. Physical therapists also teach in academic institutions and conduct research.

### **Training, Other Qualifications, and Advancement**

All States require physical therapists to pass a licensure exam before they can practice, after graduating from an accredited physical therapist educational program.

According to the American Physical Therapy Association, there were 203 accredited physical therapist programs in 2003. Of the accredited programs, 113 offered master's degrees, and 90 offered doctoral degrees. All physical therapist programs seeking accreditation are required to offer degrees at the master's degree level and above, in accordance with the Commission on Accreditation in Physical Therapy Education.

Physical therapist programs start with basic science courses such as biology, chemistry, and physics and then introduce specialized courses, including biomechanics, neuroanatomy, human growth and development, manifestations of disease, examination techniques, and therapeutic procedures. Besides getting classroom and laboratory instruction, students receive supervised clinical experience. Among the courses that are useful when one applies to a physical therapist educational program are anatomy, biology, chemistry, social science, mathematics, and physics. Before granting admission, many professional education programs require experience as a volunteer in a physical therapy department of a hospital or clinic.

Physical therapists should have strong interpersonal skills in order to be able to educate patients about their physical therapy treatments. PTs also should be compassionate and possess a desire to help patients. Similar traits are needed to interact with the patient's family.

Physical therapists are expected to continue their professional development by participating in continuing education courses and workshops. In fact, a number of States require continuing education as a condition of maintaining one's licensure.

### **Job Outlook**

Employment of physical therapists is expected to grow faster than the average for all occupations through 2012. The impact of proposed Federal legislation imposing limits on reimbursement for therapy services may adversely affect the short-term job outlook for physical therapists. However, over the long run, the demand for physical therapists should continue to rise as growth in the number of individuals with disabilities or limited function spurs demand for therapy services. The growing elderly population is particularly vulnerable to chronic and debilitating conditions that require therapeutic services. Also, the baby-boom generation is entering the prime age for heart attacks and strokes, increasing the demand for cardiac and physical

rehabilitation. Further, young people will need physical therapy as technological advances save the lives of a larger proportion of newborns with severe birth defects.

Future medical developments also should permit a higher percentage of trauma victims to survive, creating additional demand for rehabilitative care. In addition, growth may result from advances in medical technology that could permit the treatment of more disabling conditions.

Widespread interest in health promotion also should increase demand for physical therapy services. A growing number of employers are using physical therapists to evaluate worksites, develop exercise programs, and teach safe work habits to employees in the hope of reducing injuries.

### **Earnings**

Median annual earnings of physical therapists were \$57,330 in 2002. The middle 50 percent earned between \$48,480 and \$70,050. The lowest 10 percent earned less than \$40,200, and the highest 10 percent earned more than \$86,260. Median annual earnings in the industries employing the largest numbers of physical therapists in 2002 were as follows:

Home health care services	\$62,480
Offices of other health practitioners	58,510
Offices of physicians	57,640
Nursing care facilities	57,570
General medical and surgical hospitals	57,200

### **Sources of Additional Information**

Additional career information and a list of accredited educational programs in physical therapy are available from:

- American Physical Therapy Association, 1111 North Fairfax St., Alexandria, VA 22314-1488. Internet: <http://www.apta.org>

**[End -- Back to Table of Contents](#)**