

***Nontraditional
Careers
for Women
and Men***

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INTRODUCTION

Looking for a high-paying, fast-growing career? Are you a confident person who enjoys being a trailblazer in your profession? If so, a nontraditional career might be an excellent fit for you.

The U.S. Department of Labor classifies nontraditional careers as those in which 25 percent or less of the people working in that particular career are of a particular gender. Nontraditional careers are found in all major occupational groups (from business and health care to construction, engineering, and public safety). Opportunities are available for people from all educational backgrounds—from apprenticeship training to graduate degrees.

Nontraditional Careers for Women & Men provides information on 22 nontraditional careers for women and 9 nontraditional careers for men. The U.S. Department of Labor (USDOL) reports that nontraditional careers are especially attractive to women “because they offer higher entry-level wages and a career ladder with pay between \$20 and \$40 per hour.” Additionally, the USDOL reports that “growth in the economy is projected to expand employment in many of these occupations and secondly, there will be strong demand for workers in these fields due to expected retirements or transfers of current workers to other occupations.”

The following paragraphs provide more information on the sections in each career article and other features in the book.

The **Fast Facts** sidebar appears at the beginning of each article. It provides a summary of recommended high school classes and personal skills; the minimum educational requirements to enter the field; the typical salary range; employment outlook; and acronyms and identification numbers for the following government classification indexes: the Occupational Information Network (O*NET)-Standard Occupational Classification System (SOC) index; the Guide for Occupational Exploration (GOE); the Dictionary of Occupational Titles (DOT); and the National Occupational Classification (NOC) Index. The O*NET-SOC, GOE, and DOT indexes have been created by the U.S. government; the NOC index is Canada’s career classification system. Readers can use the identification numbers listed in this section to obtain further information about a career. Print editions of the GOE (*Guide for Occupational Exploration*. Indianapolis, Ind.: JIST Works, 2001) and DOT (*Dictionary of Occupational Titles*. Indianapolis, Ind.: JIST Works, 1991) are available at libraries. Electronic versions of the DOT (www.oalj.dol.gov/libdot.htm), NOC (www5.hrsdc.gc.ca/NOC), and O*NET-SOC (www.onetonline.org) are available on the Internet. When no O*NET-SOC, GOE, DOT, or NOC numbers are listed, this means that the U.S. Department of Labor or Human Resources and Skills Development Canada have not created a numerical designation for this career. In this instance, you will see the acronym “N/A,” or not available.

The **Overview** section provides a capsule summary of work duties, educational requirements, the number of people employed in the field (including women or men), and employment outlook. **The Job** provides a detailed overview of primary and secondary job duties and typical work settings. The

Requirements section features four subsections: **High School** (which lists recommended high school classes), **Postsecondary Training** (which lists required post-high school training requirements to prepare for the field), **Certification and Licensing** (which details voluntary certification and mandatory licensing requirements, when applicable), and **Other Requirements** (which lists key personal and professional skills for success in the field). **Exploring** provides suggestions to young people about how they can explore the field while in school. Examples include books and magazines, websites, information interviews, membership in clubs and other organizations, hands-on activities, competitions, and summer and after-school programs. **Employers** lists the number of people employed in the occupation in the United States and details typical work settings. **Getting a Job** provides advice on how to land a job through employment and association websites, career service offices, networking, career fairs, and other methods. **Earnings** provides information on starting, median, and top salaries for workers. Information on salaries in particular industries is also provided for many careers. The **Employment Outlook** section provides an overview of the outlook for the career through the next decade. It lists the factors that are causing employment to grow and details career areas in which there will be especially strong growth. Outlook information is obtained from the U.S. Department of Labor and is augmented by information gathered from professional trade associations. Job growth terms follow those used in the *Occupational Outlook Handbook* (<http://stats.bls.gov/search/ooh.htm>). Growth described as “much faster than the average” means that employment will increase by 20 percent or more from 2008 to 2018. Growth described as “faster than the average” means an increase of 14 to 19 percent. Growth described as “about as fast as the average” means an increase of 7 to 13 percent. Each article ends with **For More Information**. This section provides contact information for professional associations that provide details on educational programs, career paths, scholarships, publications, youth programs, and other resources. Some exist specifically to serve women or males in nontraditional careers.

Additionally, most articles in *Nontraditional Careers for Women & Men* feature one or more interviews with professionals in that particular field, who provide useful advice on what it takes to land a job and be successful in the career—especially as a worker in a nontraditional field for their gender. Other features include informative sidebars, photographs, an index, and three appendixes: Women’s Construction Associations; Nontraditional Occupations of Employed Women in 2010; and Nontraditional Occupations of Employed Men in 2010.

We hope that *Nontraditional Careers for Women & Men* provides you with some great ideas for possible career paths. But this book is just the beginning. Contact the professional associations listed at the end of each article to obtain more information; perhaps they can even help arrange an information interview with a worker in a field that interests you. Follow the suggestions in the Exploring section of each article to get hands-on experience. That way, you will be able to try out each field before making the big decision of choosing a career. Learning about careers can be fun, and we hope this book is useful to you as you begin your search. All the best to you as you explore job opportunities in nontraditional careers!

NONTRADITIONAL
CAREERS
FOR WOMEN

ARCHITECTS

OVERVIEW

Architects design, plan, and oversee the construction of houses, other types of buildings, and the surrounding site. They are concerned with the aesthetic design of a building as well as its function and value to the public. Some architects specialize in the design of certain types of buildings such as skyscrapers or work in a particular aspect of the building process, for example, as project planners and designers. A minimum of a bachelor's degree in architecture is required to enter the field. There are approximately 122,000 architects employed in the United States. About 24.4 percent are women. Faster-than-average employment growth is expected for architects in the next decade.

FAST FACTS

High School Subjects

Art
Mathematics

Personal Skills

Artistic
Critical-thinking skills
Problem solving
Strong communication skills

Minimum Education Level

Bachelor's degree

Salary Range

\$42,860 to \$72,550 to
\$119,500+

Employment Outlook

Faster than the average

O*NET-SOC

17-1011.00

GOE

02.07.03

DOT

001

NOC

2151

THE JOB

Any building, shopping center, church or other religious structure, or even the house down the street, was built as a result of the vision and talent of an architect. Architects are not just responsible for the unique details of a building—its façade, cross-hipped roof, or side courtyard—but also for the building's functionality and safety.

There are different ways a new project may come to fruition. Some clients may approach an architect or architectural firm with specific plans for a building. At times, especially with a larger project, architects may court a prospective client with proposals or preliminary designs. Often multiple architects may vie to work on a project.

When meeting with a client, architects ask specific questions regarding the intended use of a building. Will it house corporate headquarters? A multisport complex? Or perhaps a family's dream vacation house? Once they learn about the type of project, for example, a house, they ask further questions. These include, How many bedrooms and bathrooms do the owners want? What type of architectural style? How many floors? Do they want ecofriendly features such as green construction techniques, energy-efficient features, or even solar panels or a small wind turbine on the

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home's roof? Depending on the scope of the project, architects may need more than one consultation meeting. Once all the information is gathered, the architect must picture the client's needs and translate this into a design. Some architects create blueprints by hand on a drawing board or drafting table, but most use computer-aided design and drafting and building information modeling technology programs to create their designs. Architects often create a detailed layout or scaled drawings to present their designs, or build miniature models of the finished structure, complete with landscaping or other accents.

Along with their hard-copy or electronic drawings, architects must also submit a written construction bid document, translated from their proposed design. This construction bid is only an estimate since final costs may, and often do, change depending on the types of materials used, construction time, or other variables.

You May Not Know...

The editors of *Nontraditional Careers for Women & Men* asked Miranda Kumler, a licensed architect and an associate at DLR Group, to name a few things that young people may not know about a career as an architect:

"There are many different roles that architects can play within a firm, and everyone finds their specialty. Some find enjoyment out of being in a management role, some in a design role, while others enjoy the technical aspect of how a building is constructed. Also, having an architecture degree can make for other career possibilities: construction, art, photography, product sales, and teaching. A person may find that a related field gives them more enjoyment but their architecture education provides that flexibility."

Simultaneously, architects may make suggestions to the client regarding the types of building materials, alternative design elements, or even color schemes. Architects also consult with clients on the proposed site locations for the building, or they may help scout a better location.

Many times, architects will meet with government officials regarding different issues such as zoning compliance or building regulations. For example, many towns have covenants governing the height and appearance of a building, or the materials used in its construction. Architects often represent the client at town meetings regarding building conflicts with established covenant. Other times, citizens may have concerns about a proposed building (such as noise or traffic issues created by the construction of a large restaurant or shopping center), in which case the architect may be needed to make necessary changes or reach a compromise.

Once the design is approved and a location is secured, architects work

with other building and design professionals to translate the design into a construction bid document. They work with engineers, including electrical, civil, and mechanical, as well as building planners or designers, to create these specifications. Architects are integral in the coordination of these vari-

ous engineering professionals and other consultants. They also help secure construction bids and the creation of a construction contract and schedule.

Architects play a visible role throughout the construction phase to ensure their plans are properly implemented. They may sometimes need to tweak details of their designs per the client's wishes, or construction constraints.

Architects can also work as consultants, preparing cost and land-use studies. Others may participate in long-range planning or land development. Many architects specialize in a particular design or type of building; some have become well known for their specialty.

An architect's work environment changes depending on the project at hand. Developing designs for a new building, for example, may be done at a drafting table or at a computer inside a comfortable, well-lit building. Many times designs may need several revisions due to clients' requests or construction constraints.

Architects also work outdoors. They travel to potential building sites in order to study the location or existing structures. They may also visit the construction site several times during the construction phase to check in on the project.

Architects also travel to meet with potential clients, concerned citizens, or city officials before and during the construction phase. They are often present during groundbreaking ceremonies and for the grand opening or dedication ceremonies for large commercial or government projects.

Architects employed by architectural firms usually work 40 hours a week, though overtime may be required to meet deadlines or make urgent design changes. Architects who are self-employed may have longer working hours due to their additional administrative duties. Approximately 20 percent of architects work more than 50 hours per week, according to the U.S. Department of Labor.



Successful architects have strong problem-solving and communication skills.
(Photo courtesy of Photos.com)

REQUIREMENTS

HIGH SCHOOL

To prepare for a career in architecture, take a college-preparatory course load that includes classes in mathematics, physics, computer science (especially computer-aided design), art, business, English, speech, history, social studies, and foreign languages.

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POSTSECONDARY TRAINING

Most states require that architects hold a professional degree in architecture from one of the more than 120 schools of architecture that have degree programs accredited by the National Architectural Accrediting Board (NAAB). Visit www.naab.org/architecture_programs for a list of accredited programs. Most states require that architects who are seeking licensure have a degree from one of these accredited schools; a few states may license architects who do not have a degree from a NAAB-accredited school.

Students can earn architecture degrees through either a five-year bachelor's program, a three- or four-year master's program, or a two-year master of architecture program for students who have earned a preprofessional undergraduate degree in architecture or a related field.

All state architectural registration boards require architecture graduates to obtain three years of experience under the supervision of a licensed architect before applying for licensure. Internship experience completed during one's college study can often count toward the completion of the three years.

Best Firms to Work For

Each year, ZweigWhite, publisher of *CE News* and *Structural Engineer*, creates a list of the best architectural firms to work for. The companies are selected "based on comprehensive evaluations of firm culture, workplace practices, employee benefits, employee retention rates, professional development, and more." Here were the top three firms in 2011:

- 1.) Barker Rinker Seacat Architecture (Denver, Colorado)
- 2.) Corgan Associates, Inc. (Dallas, Texas)
- 3.) BLRB Architects (Tacoma, Washington)

CERTIFICATION AND LICENSING

The U.S. Department of Labor reports that "all states and the District of Columbia require individuals to be licensed (registered) before they may call themselves architects and contract to provide architectural services." To become licensed, architects must have a professional degree in architecture, obtain at least three years of practical work, undergo training, and pass the Architect Registration Examination (www.ncarb.org/are), which is offered by the National Council of Architectural Registration Boards (NCARB). Additionally, architects can obtain voluntary certification from the NCARB. This licensing is especially useful when an architect seeks to work in a different state or in Canada.

OTHER REQUIREMENTS

Successful architects have good computer design skills. They have strong communication skills because they need to effectively explain their design ideas to clients and communicate with construction managers, engineers, and others in the planning and construction process. Other important traits for architects include the ability to understand spatial relationships, creativ-

ity, self-discipline, mathematical ability, good organizational and problem-solving skills, and the ability to work alone and as a member of a team.

EXPLORING

There are many ways to learn more about a career as an architect. You can take architectural tours in your town or city or read books about becoming an architect, such as *Becoming an Architect: A Guide to Careers in Design*, 2nd ed. (Wiley, 2009), by Lee W. Waldrep. There are also helpful websites such as ARCHcareers.org. Perhaps there is an architecture club at your school. If not, talk to a school counselor about starting one. Talk to architects about their careers. The American Institute of Architects offers a database of architecture firms at its website, www.architectfinder.aia.org. Finally, read *Building Women*, which is published by the National Association of Home Builders Professional Women in Building Council. Visit www.nahb.org for subscription information.

EMPLOYERS

There are approximately 122,000 architects employed in the United States. About 24.4 percent are women. Almost 70 percent of architects work for architectural, engineering, and related services firms. A small number work for residential and nonresidential building construction firms and for government agencies. Twenty-one percent of architects are self-employed.

GETTING A JOB

Many architects obtain their first jobs as a result of contacts made through college internships, career fairs, or networking events. Others seek assistance in obtaining job leads from college career services offices, newspaper want ads, and employment websites. The American Institute of Architects (AIA) offers job listings at its website, <http://careercenter.aia.org/search.cfm>. The AIA offers an Intern Development Program that helps architecture students transition to become licensed professionals, as well as a mentorship program for young architects. Contact the AIA for more information.

Did You Know?

Louise Blanchard Bethune (1856-1913) was the first American woman to work as a professional architect. During her career, she designed many industrial and public facilities such as hotels and schools. Many of her works have been demolished, but one of her best designs, the Lafayette Hotel in Buffalo, New York, still stands. It is listed on the National Register of Historic Places.

EARNINGS

The U.S. Department of Labor (USDOL) does not provide salary information for female architects. Median annual salaries for all architects were \$72,550 in May 2010. Salaries ranged from less than \$42,860 to \$119,500 or more. The

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USDL reports the following mean annual earnings for architects by employer: federal government, \$88,980; residential building construction, \$81,460; architectural, engineering, and related services firms, \$78,040; nonresidential building construction, \$75,600; and state government, \$74,500.

Employers offer a variety of benefits, including the following: medical, dental, and life insurance; paid holidays, vacations, and sick and personal days; 401(k) plans; profit-sharing plans; retirement and pension plans; and educational-assistance programs. Self-employed architects must provide their own benefits.

EMPLOYMENT OUTLOOK

Employment for architects is expected to grow faster than the average for all careers during the next decade, according to the U.S. Department of Labor. The U.S. population is growing and aging, which will create demand for more new structures such as health care facilities, schools, nursing homes, and retirement communities. Despite this prediction, there will be strong competition for top jobs. Architects who are extremely creative, who have completed one or more internships, and who are willing to relocate for jobs will have the best job prospects.

One growing specialty area for architects is green design (also known as sustainable design). This discipline stresses the wise use of energy, water, and building materials in building design and everyday use.

FOR MORE INFORMATION

For information on education, careers, and the Women in Architecture and Design online community, contact
American Institute of Architects
1735 New York Avenue, NW
Washington, DC 20006-5292
800-AIA-3837
infocentral@aia.org
www.aia.org

For information on education, summer programs, and membership for high school students, contact
American Institute of Architecture Students
1735 New York Avenue, NW
Washington, DC 20006-5292
202-626-7472
mailbox@aia.org
www.aia.org

For information on schools of architecture, contact
Association of Collegiate Schools of Architecture
1735 New York Avenue, NW
Washington, DC 20006-5292
www.acsa-arch.org

For information on career opportunities for women in construction, contact
National Association of Home Builders Professional Women in Building Council
www.nahb.org/page.aspx/category/sectionID=467

For information on certification, contact
National Council of Architectural Registration Boards
1801 K Street, NW, Suite 700-K
Washington, DC 20006-1301
www.ncarb.org

Interview: Miranda Kumler

Miranda Kumler is a licensed architect and an associate at DLR Group. She is also the director of Women in Design Kansas City. Miranda discussed her career with the editors of *Nontraditional Careers for Women & Men*.

Q. How long have you worked in the field? What made you want to become an architect?

A. I have been out of school and working at my firm for more than four years. Thankfully, I had a very committed art teacher in middle school who recognized I had an interest in design. She encouraged me to take up drawing of buildings and interiors. My mother bought me a drafting table and I would spend evenings drawing anything I could find. I knew the built environment was what inspired me, and I couldn't imagine doing anything else.

Q. What are the pros and cons of your job?

A. The great reward about my job is seeing what I've designed as a finished product, and the intended users enjoying the spaces. There is nothing more rewarding than seeing the end result, and it is also the biggest learning opportunity. The biggest con to my job is that sometimes a client may not have the ability to envision the designs early in the process, so it is harder to convince the client of innovative design. The key is to find a balance of the pros and cons that give an end result you can be proud of.

Q. What advice would you give to young women who are interested in the field?

A. Take advantage of local architecture firms. They may be very willing to allow students a chance to job shadow, which gives the student a better perspective on the profession. This may help you find a professional who can be your mentor and can assist you through your education and beyond. Also, tour several colleges and compare what each architecture curriculum entails (i.e., design courses, study abroad opportunities, internships). No matter if you are male or female your architecture career is what you make of it, and the earlier you get started, the better.

Q. Have you faced any special challenges as a female working in such a male-dominated field? If so, how did you deal with these challenges?

A. In college, there were a relatively equal number of female and male architecture students. It remains somewhat the same for people at my level in the profession. The difference is in the lack of females leading design firms, starting their own design firms, and serving in management roles. In order to overcome this, I attend leadership summits and get involved in various organizations that will help me become an effective leader. Hopefully with time, this trend in architecture will start to change.

AUTOMOTIVE MECHANICS

OVERVIEW

Automotive mechanics, also known as *automotive technicians*, inspect, maintain, and repair automobiles and small trucks. They perform tasks that range from oil changes and tune-ups to more complicated procedures such as transmission repair and engine overhauls. Automotive mechanics use basic tools and equipment, but they are becoming increasingly reliant on computerized diagnostic systems to help them repair new-model automobiles and trucks, all of which are controlled by sophisticated electronic programs. There are approximately 595,000 automotive mechanics employed in the United States. About 2 percent are women. Automotive mechanics prepare for the field by completing postsecondary or on-the-job training. Employment opportunities are expected to be good during the next decade.

FAST FACTS

High School Subjects

Computer science
Mathematics
Shop

Personal Skills

Complex problem solving
Critical thinking
Mechanical
Troubleshooting

Minimum Education Level

High school diploma, plus
some postsecondary or
on-the-job training

Salary Range

\$20,200 to \$35,790 to \$59,590+

Employment Outlook

More slowly than the average

O*NET-SOC

49-3023.00, 49-3021.00,
49-3023.01, 49-3023.02

GOE

05.03.01

DOT

620

NOC

7216, 7321

THE JOB

Automotive mechanics troubleshoot, repair, and maintain automobiles and small trucks. Their work includes simple tune-ups and maintenance (such as oil changes and the replacement of worn parts) to more complicated procedures and major repairs of heating and cooling systems, alternators, brake systems, or transmission systems.

When a car is brought into the shop, automotive mechanics discuss the nature of the problem with the car's owner. The owner may describe strange engine noises, difficulty in steering or accelerating the vehicle, or other issues, and the mechanic asks additional questions to help pinpoint the problem. She may drive the car to detect any potential abnormalities. Automotive mechanics use hydraulic lifts to better view the undercarriage of the vehicle. Diagnosing automotive problems is a detailed process. When assessing a vehi-

cle, mechanics first find out what parts and systems are working properly; from there, they can isolate any problems or errors.

Let's say a customer brings in the family car, complaining of a screech every time the brakes are applied. A mechanic will not automatically rebuild the entire brake system. After careful inspection and testing of all parts for wear and tear, and disassembling of units, many times the mechanic will need only to replace worn brake pads in order to solve the problem.

Other routine maintenance tasks include the overhaul and replacement of parts—valves, bearings, rods, distributors, shock absorbers, alternators, and master cylinders. Mechanics also install and repair automotive accessories including radios and MP3 players, windshields and mirrors, seat heaters, lights, and remote-control ignition systems.

"The pros of this career are that it is never dull, there is always a new challenge, and I find a great satisfaction in finishing something."

—Bogi Lateiner, Automotive Mechanic

Automotive mechanics use many traditional hand tools (such as screwdrivers, pliers, and strut compressors) and power tools (such as impact wrenches, air hammers, air ratchets, tire machines, and tire balancers); pneumatic grinders, pipe benders, and flaring tools to rebuild brake systems, and torches or welding tools to remove and repair exhaust systems (torches are also used for any other part on the car that is rusty).

All mass-produced vehicles today are mostly operated by complicated electronic components or computerized systems. These systems include transmission, integrated global positioning systems, electronic stability control systems, anti-lock braking systems, reverse cameras, and even keyless ignitions. While these innovations have made driving easier, and certainly more luxurious, they make it harder for automotive mechanics to diagnose and repair such systems.

Mechanics rely on high-technology tools and computerized diagnostic programs to help them identify problems. Automotive mechanics must read digital manuals and service information to keep up to date on new information. In addition, mechanics keep abreast of manufacturing recalls and other important industry developments via technical service bulletins and classes that teach new procedures to fix common automotive problems.

Some automotive mechanics specialize in a particular type of repair. For example, *transmission technicians* rebuild or repair gear trains, couplings, or hydraulic pumps. *Automotive air-conditioning and/or heating repairers* make sure vehicles are cool in the summer and warm in the winter. They achieve this by testing, replacing, or repairing compressors, condensers, and other parts. *Alternative fuel vehicle technicians* repair cars that are fueled by alternative fuels or power systems, such as ethanol, biobutanol, and electricity. Other specialties include engine rebuilding, hybrid repair, and diesel repair.

Automotive mechanics may also specialize in a particular brand of automobile, especially foreign imports or luxury vehicles.

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Automotive mechanics work a normal 40-hour week, with some time scheduled during the evenings and weekends to accommodate customers. During busy times, automotive mechanics may be required to work overtime. They wear protective clothing, including skid-free shoes, coveralls, and gloves.



Auto mechanics must have good manual dexterity, be attentive to detail, and have patience to conduct sometimes demanding repairs. (Photo courtesy of Photos.com)

Mechanics typically work indoors in well-lighted and well-ventilated areas. Much of the work is now done using computerized systems and tools, though mechanics still rely on hand and pneumatic tools. Depending on the type of automotive repair, mechanics may be required to stoop under the hood of a car, lay under the body, or work in its cramped interiors. The work is often messy, since mechanics handle dirty and greasy automotive parts, including small nuts and screws or large heavy engine pieces.

Automotive mechanics must be careful to avoid injuries sustained when working with sharp tools or metal pieces. Due to the often noisy environment, mechanics should take precautions to protect their hearing.

REQUIREMENTS

HIGH SCHOOL

In high school, take courses in English, computer science, electronics, chemistry, physics, mathematics, and, of course, automotive repair. If you plan to run your own shop, you should take classes such as business, marketing, and advertising.

Some people prepare for the career by completing high school vocational programs in automotive repair technology, although a growing number of shops are seeking applicants who have completed some postsecondary training in the field. The quality of high school automotive technology training

programs varies greatly. Some of the more respected programs are affiliated with Automotive Youth Education Service (AYES), a partnership between high school automotive repair programs, franchised automotive dealers, and automotive manufacturers. AYES high school programs are certified by the National Institute for Automotive Service Excellence, which ensures that they have met stringent education standards.

POSTSECONDARY TRAINING

Postsecondary training in automotive repair is offered by trade and technical school programs (which last six months to a year and result in the awarding of a certificate) and community colleges (one to two years, certificate or associate's degree, respectively). Students learn about automotive repair via a combination of classroom instruction and hands-on practice. Additionally, the U.S. Department of Labor reports that "various automobile manufacturers and participating franchised dealers also sponsor two-year associate's degree programs at postsecondary schools across the nation. Students in these programs typically spend alternate six-week to 12-week periods attending classes full time and working full time in the service departments of sponsoring dealers." Once hired, mechanics also receive extensive on-the-job training. It usually takes two to five years for a new mechanic to become a fully qualified service mechanic, and longer still to master transmission repair.

The National Automotive Technicians Education Foundation accredits secondary and postsecondary automotive repair programs. Visit www.natef.org/certified.cfm for a list of accredited programs in your area. The Accrediting Commission of Career Schools and Colleges (www.accsct.org) also accredits postsecondary automotive repair programs.

"I love being a mechanic, and I think that it is definitely a viable career choice for anyone who is self motivated and independent and tough."

—Demeny Pollitt, Automotive Mechanic

CERTIFICATION AND LICENSING

The National Institute for Automotive Service Excellence (ASE) offers voluntary certification to automotive mechanics. Certification is offered in a variety of areas. Those who receive certification in multiple areas are known as master mechanics. Many employers require their mechanics to be ASE-certified. Mechanics who are certified typically receive higher pay and have a better opportunity to advance.

OTHER REQUIREMENTS

Do you like solving problems? Are you good with computers? A strong communicator? Do you have good manual dexterity? Willing to get dirty while fixing vehicles? Willing to stay up to date on your profession throughout your career by reading technical manuals, attending seminars, and learning new service and repair procedures? If so, you will make a good automotive

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mechanic. Other important traits for auto mechanics include good analytical ability, strong interpersonal skills (when interacting with customers and colleagues), self motivation, good physical condition, honesty, professionalism, a detail-oriented personality, patience, and strong business skills (if you own a repair business).

EXPLORING

The Internet is a great source of information for aspiring automotive mechanics. Automotive Careers Today (www.autocareerstoday.net) offers a wealth of information about education and careers in the field. You should also visit the websites of the associations listed at the end of this article. Talk to auto mechanics about their careers. Take as many automotive repair classes in high school classes as possible, and try to perform basic auto repairs and maintenance (changing the oil, replacing fuel filters, etc.) with your friends and family. Read books and magazines about the field.

EMPLOYERS

There are approximately 595,000 automobile mechanics employed in the United States. About 2 percent are women. Most mechanics are employed by automotive repair and maintenance shops and automobile dealers. Other employers include gas stations; automotive parts, accessories, and tire stores; automotive equipment rental and leasing companies; federal, state, and local government agencies; and other organizations.

GETTING A JOB

The career services offices of trade and technical school programs and community colleges offer students help with the job search and also typically provide their students with job placement. You should also contact automotive repair shops, automobile dealers, and other employers directly for job opportunities. The National Automobile Dealers Association offers a jobs database at Automotive Careers Online (www.nada.org/nadauniversity/resourcetoolbox/autocareersonline). There are many other automotive industry job-search sites on the Internet. Visit www.autocareerstoday.net/opportunities for a list of sites.

EARNINGS

The U.S. Department of Labor (USDOL) does not provide salary information for women automotive mechanics. It does report that women employed in repair occupations earned annual salaries of \$35,516 in May 2010. Median annual salaries for all automotive mechanics were \$35,790 in May 2010. Salaries ranged from less than \$20,200 to \$59,590 or more. The USDOL reports the following mean annual earnings for automotive mechanics by employer: automobile dealers, \$42,830; automotive repair and maintenance shops, \$35,200; and gasoline stations, \$33,960.

Some employers pay mechanics on a per-job basis. For example, they pay mechanics a set fee for completing a brake job whether the work takes two

hours or five hours. This pay approach works well for mechanics who work quickly and encounter easy repair jobs. Those who are more methodical or have the bad fortune to be assigned consistently difficult jobs will not prosper working for employers that use this compensation method.

Some employers provide benefits, including the following: medical, dental, and life insurance; paid holidays, vacations, and sick and personal days; and 401(k) plans. Many experienced salaried mechanics receive a commission from their employer based on the labor costs charged to the customer. Mechanics who operate their own shops or work part-time must provide their own benefits.

EMPLOYMENT OUTLOOK

Employment for auto mechanics is expected to grow more slowly than the average for all careers during the next decade, according to the U.S. Department of Labor. Despite this prediction, opportunities are expected to be good for those who complete postsecondary training and receive ASE certification. Several factors are fueling the optimistic employment outlook. The U.S. population is increasing and leading to the purchase of more vehicles that will eventually need repair. Vehicles are being built to last longer, which will require more regular maintenance and repair. Finally, vehicles are becoming more complex and now feature advanced computer systems. They are also being built with alternative power and fuel systems, such as electric and ethanol. Specialized mechanics will be needed to work on these complicated systems.

FOR MORE INFORMATION

For information on accredited training programs, contact
Accrediting Commission of Career Schools and Colleges
 2101 Wilson Boulevard, Suite 302
 Arlington, VA 22201-3062
 703-247-4212
www.accsct.org

This automotive aftermarket industry “encompasses all products and services purchased for light and heavy duty vehicles after the original sale.” Visit its website for more information.
Automotive Aftermarket Industry Association
 7101 Wisconsin Avenue, Suite 1300
 Bethesda, MD 20814-3415
 301-654-6664

aaia@aftermarket.org
www.aftermarket.org

For industry information, contact
Automotive Service Association
 8190 Precinct Line Road, Suite 100
 Colleyville, TX 76034-7675
 800-272-7467
asainfo@asashop.org
www.asashop.org

For information on career opportunities for women in the automotive repair industry and profiles of award-winning female service professionals, visit
Car Care Council Women's Board
womensboard@carcare.org
www.carcare.org/womens_board
www.carcare.org/careers

continued on page 14

For More Info, continued from page 13

For industry information, including articles about women auto dealers, visit the association's website.

National Automobile Dealers Association

8400 Westpark Drive
McLean, VA 22102-5116
800-252-6232
help@nada.org
www.nada.org

For career brochures and information on certified educational programs, contact

National Automotive Technicians Education Foundation

101 Blue Seal Drive, Suite 101
Leesburg, VA 20175-5646
703-669-6650
www.natef.org

For information on certification, contact

National Institute for Automotive Service Excellence

101 Blue Seal Drive, SE, Suite 101
Leesburg, VA 20175-5646
703-669-6600
www.ase.com

For general information on biofuels, contact

Renewable Fuels Association

425 Third Street, SW, Suite 1150
Washington, DC 20024
202-289-3835
www.ethanolrfa.org

The Network represents women in the collision repair industry. Visit its website for more information.

Women's Industry Network

info@womensindustrynetwork.com
www.womensindustrynetwork.com

Interview: Bogi Lateiner

Bogi Lateiner is the owner of 180 Degrees Automotive (www.180auto.com) in Phoenix, Arizona. She has been a mechanic since 2001. Bogi discussed her career with the editors of *Nontraditional Careers for Women & Men*.

Q. Can you tell us a little about yourself and your business?

A. I am a master mechanic. After working for BMW for five years, I wanted to have more engagement and interaction with my customers, so I opened my own shop, 180 Degrees Automotive, about five years ago. I started 180 Auto with the idea of creating a shop that changed the way people think about their cars and the automotive repair experience in general. We specialize in educating our customers and bringing them into the repair experience as much as possible. We like to make everyone feel comfortable when they come into our shop, and we even teach basic car care classes for women. 180 Auto started small, but it is quickly growing into a full-service auto repair shop.

Q. What made you want to become an auto mechanic?

A. I first became interested in cars when I was 16 years old and bought my first vehicle (a Volkswagen bug) which, surprisingly, broke a lot! I didn't like the experience I had as a young, single woman getting my car serviced, or the way I was treated. In an attempt to educate myself on the basics, I began reading VW magazines. It quickly became clear to me that this was a world where women were not welcome unless they were in

bikinis and skimpy clothing, draped over hoods of these beautifully restored cars. I took this as a challenge to learn how to rebuild my car, and someday be featured in a VW magazine with my car. I enrolled in my high school auto shop program and convinced my teacher to use my car as a shop project. We rebuilt my transmission and engine and did a complete frame-off restoration over two years. Unfortunately I never got featured in a VW magazine, but in the end I would get something far better as a result of the experience.

Since it was originally only supposed to be a hobby, I went off to college to become a lawyer. I studied prelaw and women's studies, with the intention of going to work for a women's nonprofit organization after graduation. However, during college, I found I got a lot of enjoyment out of teaching my friends about their cars, how the systems worked, and helping them with their oil changes. It made me realize I was interested in cars, and in teaching people about them, as more than just a hobby. Instead of going to law school, I went to technical school, moved out to Arizona, went to Universal Technical Institute, and then on to BMW school. What started out as me trying to prove a point, turned into my passion—not only fixing cars but also to educate and empower others (particularly women) through the knowledge of automotive basics.

Q. What are the pros and cons of work in your career?

- A.** There are no two ways about it—the automotive industry has its challenges. The work itself is physically difficult and hard on the body. The technology changes so rapidly that if you blink you can miss it, so you really have to work to keep yourself up to date on new developments. It's even more challenging as an independent technician than at a dealership, since you are dealing with all makes and models. However, the pros of this career are that it is never dull, there is always a new challenge, and I find a great satisfaction in finishing something. In the academic world, you never get to finish anything—there is always more editing to be done, more research, etc., but when a car comes into your bay broken, and leaves driving the way it did when it was new, there is an extreme sense of satisfaction in that. I also really enjoy the fact that because people generally know so little about cars, it's exciting to be able to help people understand their vehicles by taking a small amount of time to explain something about their cars to them. Another benefit is how self-directed it is. You really control how much you make and how far you go in the industry. Because of the way you are paid as a mechanic, and the way you work, it's a great job for someone who is self motivated and who can work well both on their own and as a team, which is both a pro and a con depending on how you look at it.

Q. What are the most important personal and professional qualities for auto mechanics?

- A.** You have to be self motivated. Patience is crucial. You have to like puzzles and figuring things out. A lot of the industry is about facts and knowledge, but there is a lot of art to it as well. You have to be able to take the rules and figure out how they apply to each job. You are an investigator and a diagnostician, so you have to like the figuring out part of it. You have to have a desire to always be learning. Interest in attention to detail and a good amount of manual dexterity definitely helps, too. If as a kid, you took things apart just to put them back together, you'd probably

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make a good mechanic. Also I think one of the things that separate the good mechanics from the great ones is how much you care about the people behind the vehicle. It's not just about cars. It's about the people who drive them, as well as the rest of the team you work with.

Q. Have you faced any special challenges as a female working in a male-dominated field? If so, how did you deal with these challenges?

- A.** Absolutely, although that has changed now that I work for myself. My customers and employees really self select. I don't encounter the sexism anymore since anyone who doesn't want to work with or for a female mechanic is not going to come to my shop. However, as a woman, there are definitely some unique challenges. We are physically smaller, which at times is really helpful, since we can fit in places and reach things that many men can't, but it can make lifting and adjusting certain things much harder, so we have to find different ways of doing things and finding what works for us.

Women make up less than 1.8 percent of auto mechanics. Even though there are quite a few in the field, for the most part you are likely to be the only woman at the shop, which means most people you are going to work with have never worked with a female mechanic before. This means you constantly have to prove yourself and teach people how to react to a woman mechanic, and accept that some people just might never accept you or your presence in their shop. It can make for some interesting customer interactions as well, because most people are not prepared to hear "she's going to be working on your car." You get a lot of "wait, she...what?" Now that I'm in business for myself it's an asset since generally I find it helps build a relationship, since it makes most women feel more comfortable. As far as how to handle it, it's really about finding a mentor. There are many men in the industry who are incredibly supportive and want to see you succeed. Also reach out and find the other women in the industry who have been there before, or even women in other nontraditional fields. Having good mentors—both technically and emotionally—makes all the difference in the world. Also I found that for me, the more people resisted me and didn't feel that I or any women should be in the industry, the harder I worked to prove them wrong. If you're there for the right reason and you excel, whether other people accept it or not cannot be your focus, and I had to learn that. Having the right tools makes a big difference in overcoming obstacles, and realizing that you have to do things differently than men do. As much as I hate to say it, in a lot of ways you have to grow a thick skin and turn a deaf ear to the things people say and do. And then, if you stick it out and stay true to yourself, sometimes the harshest critics and the most resistant became some of your biggest supporters and fans.

Q. What advice would you give to young women who are interested in the field?

- A.** If it's something that you are really interested in and are drawn to, go for it. Find mentors and find your support, because there are a lot of opportunities and places to go in this field, but make sure you are aware of what you are going into. A lot of women go into this field not realizing just how much resistance they will run into, and it surprises them, making it harder. As long as you are prepared for it, and are willing to overcome it, and find your support system, go for it.

Interview: Demeny Pollitt

Demeny Pollitt is an automotive mechanic and the owner of Girlington Garage LLC (<http://girlingtongarage.com>) in South Burlington, Vermont. She has worked in the field since 2004. Demeny discussed her career with the editors of *Nontraditional Careers for Women & Men*.

Q. Can you tell us about your educational background and your business?

- A.** I graduated in 2006 from Vermont Technical College (VTC) in Randolph, Vermont, with my associate's in automotive technology.

Girlington Garage is a five-bay shop. We do almost everything that could ever need to be done on a car or truck. It's probably easier to tell you what we don't do. We don't rebuild engines or transmissions and we don't do body work, detailing, or auto-glass (windshields, etc). I have two full-time technicians and one part-time technician who is going to school right now for her associate's in automotive technology. We have two part-time office people and one man with developmental disabilities who does odd jobs around the shop. Then there is my mom and me.

Girlington Garage is a different kind of shop. It is very clean and bright and welcoming. Customers are always commenting on how nice the shop looks and how differently they feel walking in here than when they go into other shops. The technicians vacuum every car and leave a sweet treat on every dashboard for our customers. My staff is friendly and patient and they understand that the most important part of their job (besides fixing the cars right) is to make sure that our customers leave happy. Whether that means spending the time to show them their vehicle and what is wrong with it, or using plain English and simple non-technical terms to explain what job a certain part does and why it is important to have it fixed, the staff here knows that they need to do what is necessary to give our customers a clear understanding of what is going on with their vehicles.

We opened in June of 2009 and have been so successful that we often can't keep up with all the work that we get. We have begun planning our expansion and what that will look like.

Q. What made you want to become an auto mechanic?

- A.** I had been working as a social worker for many years and I was living paycheck to paycheck. Every time that I saved even a little bit of money my car would break down. As I didn't know anything about cars at all, and, while I wanted very much to learn, I had no one who was willing to teach me, I would have to spend every penny I had on fixing it. I realized that I was tired of being so poor and that I needed to find a job that would actually support me. The only two things that I thought I would find interesting for a long period of time were psychology and car repair. After a small amount of research I learned that it would take me six years to earn a psychology degree but only two to earn an automotive degree. My decision was made for me!

Q. What are the pros and cons of work in your career?

- A.** The pros and cons of my career are both pretty strong. Being a mechanic is an incredibly interesting and immediately rewarding job. A car comes in broken, you solve the mystery of the broken car, you fix the problem with the broken car, and the car is no longer broken! It doesn't get much

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more satisfying than that. It is a job that will never, as long as we still have cars, go away. I can go almost anywhere in the world, and I will always have a job. This is a job that requires constant learning so it is always new. There are new advances in design and technology every day and a technician must remain knowledgeable in those changes in order to stay at the top of their field. It is a relatively good paying job if you are fast and proficient at what you do. As a woman there are incredible opportunities out there as there are so few women in the field.

"As a woman there are incredible opportunities out there as there are so few women in the field."

—Demeny Pollitt, Automotive Mechanic

As to the cons. Becoming a technician requires a huge initial financial investment and a pretty large ongoing financial investment. Because cars are so advanced nowadays you can't just pick up the job from messing around in your back yard. You actually have to go to school to be able to do any work on the electrical systems that control every minute process within the car. We still do a lot of mechanical work on cars, of course, but a very large part of the job is just electrical

diagnostics. Technicians must be highly skilled and educated in order to work on any car that comes through our doors. That education is not cheap.

Every technician has to have her own set of tools in order to get a job. A basic set of tools and the box to put them in costs tens of thousands of dollars. And then, due to the constant changes and advances in technology and design a technician must continue to buy thousands of dollars in tools every year to keep up with the job.

You are also working with extremely hazardous chemicals and materials every day and the majority of the repairs are awkward and heavy and bad for your body. It is one of the least respected jobs out there. And it is one of the lowest paid of the skilled trades.

- Q. Have you faced any special challenges as a female working in a male-dominated field (or in automotive technology school)? If so, how did you deal with these challenges?**
- A.** I have never experienced any overt sexism or harassment, either at school or in the field. My challenges were more subtle. There were, of course, [jerks] that I had to deal with, but I would have had to deal with people like them anywhere, regardless of my profession.

We had two teachers at VTC and one of them was a woman who had been a technician for years. She was so good at what she did. She was an excellent teacher and she absolutely demanded respect. Having her to guide me through that process was amazing. And I am sure that her presence minimized the nastiness that I could have had to experience without her. I am so thankful to have had her as my teacher.

The majority of the difficulties I experienced were after school at various jobs. I've had couple of "touchers" over my career. The hardest one to deal with was a man who was my boss and my mentor. The touching wasn't obviously sexual. It was a hand on the small of my back or my waist as he passed me, or leaving his hand on my thigh as he worked in a very small space with me. I had never experienced this before and I

was unsure if it was even inappropriate. I thought that maybe I was being overly sensitive. I tried very hard to just ignore it, because in every other way he was kind and helpful and enthusiastic about teaching me. But in the end, I couldn't ignore it and I was too scared to say anything about it, so I developed a really nasty attitude that created an unpleasant work environment for both of us. This lasted until I left that job.

With time and reflection I was able to take a step back and see more clearly what had happened. The next time I had to work beside someone like that (again, someone I was trying to learn from and who held a position higher than I) I was able to get my courage up and tell him that I was uncomfortable and I didn't want him touching me, even if was just an innocent hand somewhere in passing.

Another difficulty I had was in actually understanding and accepting that I was treated differently because I was a girl. My generation grew up being told that there was no difference between girls and boys. Girls could be anything that boys could be. We learned about feminism in the past tense because it had already happened. Inequality was in the past. And in my sheltered white lower middle-class liberal upbringing that had been the truth. Smart powerful women were a given in my life and they were accorded the respect that they deserved. It didn't even occur to me that there was another way. Women and men were both just people and the only thing that mattered was what you did as a person. But in my new career it turned out that that didn't hold true.

Most technicians are paid "flat rate." That means that they get paid by the job, rather than by the hour. When they do a brake job they get paid 1.6 hours whether it takes them 2.5 hours or .5 hours. When one is paid in this manner it is absolutely necessary that one has work to do. If you are at work, just standing around waiting for a job, you are not getting paid. Depending on the jobs that you get and how skilled you are at those jobs, you could spend 40 hours at work in a week and get paid for 100 hours or 25 hours. It all depends on the jobs.

At one of the dealerships I worked for while I was still in school, I started noticing that I was standing around a lot. All the other guys were getting plenty of work, but I was being told again and again to go clean my bay or find something else to do until there was another job. For a long time I thought it was just because I was new. Or because I wasn't very good. After a few months they hired another young man. This guy was terrible. He was slow and sloppy and did poor work. And they were keeping him busy, while I stood around doing nothing. I finally realized that it wasn't because I was still new. I wasn't the new guy anymore. It wasn't because I was a bad tech. I was a far better technician than this new guy. And it wasn't because they didn't have enough work. There was plenty of work for everyone else. It was because I was a girl. I was devastated.

I spoke to the owner of the dealership and told him what I had observed going on. We spoke for a long time and he said that something would be done about it. The solution that he came up with was not to talk to the dispatcher and ensure that I was being given my fair share of jobs. It was not to set up a meeting with the people in the service department and me to work it out. His solution was that from then on, rather than going to the dispatcher to get jobs, like all the other techs, I would go directly to the service manager and ask him for work. The service manager would then choose what jobs to give me from the dis-

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patcher's pile. Rather than helping the situation, this new system ensured that I was at odds against not only the dispatcher, whose head I had to go above every time I wanted work and who had part of his job taken away from him, but all the other techs as well because the service manager was now hand picking my jobs and taking those jobs away from them. It was a [crappy] solution.

But at least I was actually starting to get some work. And I was tired of fighting all the time. I was tired of dreading work everyday and having to steel myself for the nastiness that was inevitable.

Then they hired another woman. She was well educated in automotive technology and she had several years of experience in the field. And they did the exact same thing to her. They wouldn't give her work. I had to watch her standing around doing nothing while incompetent men were buried under piles of jobs. We talked about it a lot and I encouraged her to talk to the owner of the dealership as I had, to fight for her job the way I had, and she did, but nothing really changed.

It was devastating to see that sexism really was still alive and well. We spoke a lot about trying to bring a discrimination suit against the dealership. We didn't really know what else to do and we knew that what was happening was unacceptable. However, when I spoke to my auto tech teacher about it she actually discouraged me. She told me that we had every reason to do what we were thinking and we may be successful in it, but she warned us that the automotive industry is a very close knit industry. Everyone knows everyone else in it. And everyone talks to everyone else. Even if we won, we would never be able to find a job in Vermont again. No one would want to hire us. As a brand new technician just starting out, I had to choose between my career and my identity as a human being. I chose my career. I dealt with that job until I could find another one, and I left as soon as possible.

The other challenge I experienced, and continue to experience to this day, is one of personality and outlook. As I said before, I came from a white liberal lower middle class world. I worked in child care and social services and health food stores. I surrounded myself with environments that required kindness and patience and gentleness. At 25 I jumped out of that world and into one filled with 18- and 19-year-old boys, and everything that goes along with that. Then I moved into a world of strong men. And I learned that men and women truly do process things differently and react to things differently. And when men spend their lives in an industry filled almost solely by other men, those processes and reactions are clarified and amplified and multiplied, and an incredibly hostile world is created. And it's a fine environment for the men who are drawn to it. They understand it and thrive in it. But to any outsider it is a difficult and hurtful environment to work in. And I am one of the most outside of all outsiders. I don't think that anything could have prepared me for the work environment I was entering. And this environment is something I still struggle with. Even within my own shop. My shop is definitely better than any other shop I have been at, but it is nowhere near what I imagined it could be. And until the industry as a whole starts changing (think many more women in the field), I think it will remain pretty far from what I want.

Finally, the most recent, and possibly the most problematic, challenge has been a surprising one for me. In opening my shop I wanted to create

a place that was good not only for customers, but also for technicians. I wanted to try and avoid that hostile environment I had seen almost everywhere else I worked. I thought that by paying my techs very well, offering good benefits, and understanding what it is like to do their job I would be able to make them happy and I would attract the best techs to me. But it has not worked out that way. My biggest challenge nowadays turns out to be actually finding technicians.

Like I said, I offer my technicians excellent pay and benefits as well as a bright clean new work area. All of my current techs are generally happy with their jobs. But I can not find anyone new to work for me. When we advertise using the shop phone number we don't get ANY responses. Recently we started using my business partner's personal phone number in order to at least get people to call in and do phone interviews. When we list jobs using her phone, we get lots of applicants, but when it comes down to actually getting them in, they mostly all fail to show up. The last person we asked to come in and interview with us actually hung up on us as soon as they learned that we were Girlington Garage. This is a major problem. And if it persists in the future it may be our downfall. We have great techs now, but if they move on, or if we need to expand and we can't find anyone to work for us, we will fail.

Q. What advice would you give to young women who are interested in the field?

- A.** Make the investment to get at least your associate's degree in automotive technology. Also try to take as many National Institute for Automotive Service Excellence (ASE) certifications as you can. To take on someone who is just learning is an enormous cost for a shop. Everyone makes big mistakes while they are learning and the shop has to cover those mistakes. The shop also loses a lot of business because the bay you work in is not turning over as many cars as it would with an experienced technician. Not to mention the cost of insurance they have to have on each person to cover them being in such a dangerous work space.

Being a mechanic is a tough, unforgiving job that only pays well once you have become proficient at it. This takes several years. It is also an enormous investment for the tech, as every technician must have all of her own tools. Just building up the necessary basic set and a tool box generally costs around \$10,000. Just for the basics.

Because of these reasons, it is a rare person not enrolled in an automotive program that actually sticks with the job long enough for a shop to recoup the expense of training them. Holding an associate's degree and ASEs shows that you are serious about this career.

Being a tech is incredibly rewarding work that is always interesting. I love being a mechanic, and I think that it is definitely a viable career choice for anyone who is self motivated and independent and tough. But it's no longer a career that anyone can just pick up and start. Like most other high-paying jobs nowadays, you have to go to school to get any kind of position besides lube tech.

Q. What's the employment outlook for automotive technicians?

- A.** As long as there are cars, there will be a great need for technicians.

CARPENTERS

OVERVIEW

Carpenters are skilled tradesworkers who cut, form, fit, install, and repair items typically made from wood, but also made of metal, glass, tile, or other materials. They work in the manufacturing and construction industries. About a third of carpenters are self-employed and work as subcontractors employed by home or business owners or construction managers. Carpenters train for the field by attending vocational schools or technical colleges or formal apprenticeship programs, and receive on-the-job training. Others learn the trade through on-the-job training. There are approximately 669,000 carpenters employed in the United States. About 1.4 percent of this total are women. Employment opportunities for carpenters should be good during the next decade.

FAST FACTS

High School Subjects

Mathematics
Technical/shop

Personal Skills

Communication
Critical thinking
Technical

Minimum Education Level

Apprenticeship

Salary Range

\$24,650 to \$39,530 to
\$71,660+

Employment Outlook

About as fast as the average

O*NET-SOC

47-2031.00, 47-2031.01,
47-2031.02

GOE

06.02.02

DOT

860

NOC

7271

THE JOB

The majority of carpenters work in construction. Their duties vary based on the project and where they are employed. They may help construct buildings, roads, bridges, docks, industrial plants, boats, and many other structures. In general, their job consists of cutting, sizing, and constructing wood or other building materials. A growing number of building managers are hiring carpenters who specialize in building structures such as scaffolds, constructing and installing staircases, building forms for concrete pours, installing wood trim, fitting windows, and making and installing custom cabinetry, among other skills. Some carpenters are multitasked, which makes them very marketable.

Some carpenters have to be familiar with building regulations because they often determine the materials that are used in construction. The materials used in the construction process are determined by the architect's specifications in a formal document. Sometimes an engineer must be consulted for the materials that must be used. Although every job carpenters perform is different, most jobs have the same basic steps. The initial steps are typically handled in a workshop or manufacturing facility off-site. First, carpenters review blueprints and mea-

sure, mark, and organize materials. Next, they size, form, and cut the items, whether made of wood, fiberglass, or another building material. To accomplish this, they use a variety of hand tools, such as chisels, saws, and hammers, as well as power tools such as drills, sanders, and electric saws. Once they build the items, they travel to the job site to fit and install the materials. They use adhesives, screws, or nails, depending on the material, to fit pieces together. Some jobs do not require pieces to be made but simply require installation. Staircases and cabinets are often premade and can be installed more quickly on-site than custom jobs. Carpenters make sure everything is straight and smooth using levels and sanders. The last step in every project is reviewing the work. Imperfections are recorded on a “punch list,” which the carpenter corrects.

Some carpenters remain workshop-based and are responsible solely for manufacturing items such as furniture or wooden molds for pouring concrete. Some make doors, staircases, or scaffolds. Other carpenters travel to job sites and fit and install such items or do finishing jobs such as laying hardwood floors or installing wood trim.

Some carpenters specialize in remodeling jobs rather than new construction. These workers may need to work around occupants and owners of the house or commercial building, so they must be careful, clean, and conscientious in their work.

Not all carpenters work in construction. Some repair materials such as glass, furniture, or hardwood floors. Others install locks, doors, or windows. Manufacturing firms hire carpenters to install or move machinery or structures.

The work of a carpenter is physically demanding, and the risk of injury in this career is fairly high. Inhalation of wood or fiberglass dust is a side effect of working in enclosed spaces with machinery, so carpenters typically wear face masks to protect themselves. They also wear protective gear such as hard hats, goggles, work gloves, and steel-toed boots to avoid injury. The work is strenuous, and carpenters spend a lot of time standing, kneeling, bending, climbing ladders and scaffolds, and crouching. They also carry tools and materials.

At construction sites, the number of daylight hours affects the length of the working day (if the project is outside). As a result, early starts are common for carpenters. Some carpenters that specialize in manufacturing remain in their workshops, but most carpenters perform their work on-site, so travel is a must. Most carpenters work a standard 40-hour week; however, some work additional hours depending on their workload and deadlines.

REQUIREMENTS

HIGH SCHOOL

In high school, take classes in algebra, geometry, physics, English, mechanical drawing, blueprint reading, and general shop.

POSTSECONDARY TRAINING

Carpenters train for the field by attending vocational schools or technical colleges or formal apprenticeship programs, which often last three to four years. The United Brotherhood of Carpenters and Joiners of America offers a search-

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able database of training programs at its website, www.carpenters.org. Information on training can also be obtained from the Home Builders Institute (www.hbi.org).

CERTIFICATION AND LICENSING

The United Brotherhood of Carpenters and Joiners of America offers voluntary certification to carpenters in several specialty areas, including scaffold building, high-torque bolting, and pump work. Contact the union for more information.

OTHER REQUIREMENTS

Successful carpenters have good eye-hand coordination, manual dexterity, and a good sense of balance. They are physically fit and have good endurance. Other important traits include mathematical acumen, problem-solving skills, the ability to follow instructions, strong communication skills, and the ability to work as a member of a team, but also independently, as needed. Carpenters in some parts of the country who wish to become forewomen or construction managers should be proficient in Spanish, since many construction workers today speak Spanish as a first language.

EXPLORING

One of the best ways to learn more about a career as a carpenter is to actually do carpentry work. Ask your shop teacher or parents to provide some age-appropriate activities that will help you hone your carpentry skills. You can also read books and magazines about carpentry and construction (such as *Building Women* from the National Association of Home Builders Professional Women in Building Council), visit carpentry-related websites, and talk to carpenters about their careers. Finally, consider volunteering with Habitat for Humanity. This nonprofit organization offers volunteer opportunities for young people between the ages of five and 25. Visit www.habitat.org/youthprograms for more information.

EMPLOYERS

There are approximately 669,000 carpenters employed in the United States. About 1.4 percent of this total are women. Thirty-two percent of all carpenters work in the construction industry, and another 22 percent are employed by specialty trade contractors. Others are employed by government agencies, manufacturing firms (such as shipbuilding or aircraft production), retail establishments, theater companies, movie and television production companies (as set builders), convention halls, and a variety of other industries. Approximately 32 percent of all carpenters are self-employed—a percentage that is much higher than the average for all occupations.

GETTING A JOB

Contact the local office of your state's employment service to learn more about available apprenticeships. Job leads can also be obtained from contractors, newspaper classified ads, and the local offices of the United

Brotherhood of Carpenters, and by contacting potential employers directly. Those interested in positions with the federal government should visit the U.S. Office of Personnel Management's website, www.usajobs.gov.

New carpenters should also consider joining the National Association of Home Builders Professional Women in Building Council. Members receive a subscription to *Building Women*, opportunities to network, and exclusive access to the Professional Women in Building Channel, an online resource that offers information on career development and profiles of successful women in the field. Visit www.nahb.org for more information.

EARNINGS

The U.S. Department of Labor (USDOL) does not provide salary information for female carpenters. It does report that women employed in construction and extraction occupations earned annual salaries of \$34,112 in 2010. Median annual salaries for all carpenters were \$39,530 in May 2010, according to the USDOL. Salaries ranged from less than \$24,650 to \$71,660 or more. The USDOL reports the following mean annual earnings for carpenters by employer: nonresidential building construction, \$48,230; building finishing contractors, \$45,850; foundation, structure, and building exterior contractors, \$41,280; and residential building construction, \$41,010.

Apprentices earn starting salaries that are about 50 percent of a journeyman carpenter's earnings. This wage increases gradually as an apprentice gains experience. By the fourth year of work, apprentices earn 90 to 95 percent of the journeyman carpenter's salary.

Employers offer a variety of benefits, including the following: medical, dental, and life insurance; paid holidays, vacations, and sick days; personal days; 401(k) plans; profit-sharing plans; and pension plans. Fringe benefits are typically guaranteed by union contracts. Approximately 19 percent of all carpenters are members of unions. Union members often receive health insurance, a pension, and other benefits from their union. Non-union workers typically receive fewer or no benefits. Additionally, self-employed workers must provide their own benefits.

"Women who are interested in pursuing a career in carpentry need to be determined and focused. The work is hard, but rewarding."

—Rocky Hwasta, Carpenter

EMPLOYMENT OUTLOOK

Employment for carpenters is expected to increase about as fast as the average for all occupations during the next decade, according to the U.S. Department of Labor. Population growth, an increasing emphasis on energy conservation (especially in the industrial sector), and an increase in projects that improve our nation's infrastructure (bridges, highways, and public

FOR MORE INFORMATION

For information on accredited educational programs, contact

**American Council for
Construction Education**

1717 North Loop 1604 E, Suite 320
San Antonio, TX 78232-1570
210-495-6161
acce@acce-hq.org
www.acce-hq.org

For info on K-12 programs, contact
Associated General

Contractors of America

2300 Wilson Boulevard, Suite 400
Arlington, VA 22201-5426
703-548-3118
info@agc.org
www.agc.org

For information on state apprenticeship programs, visit

**Employment &
Training Administration**

U.S. Department of Labor
www.doleta.gov/oa/stateoffices.cfm

For information on apprenticeships and training programs, contact

Home Builders Institute

1201 15th Street, NW, Sixth Floor
Washington, DC 20005-2842
800-795-7955
postmaster@hbi.org
www.hbi.org

For information about careers in the construction trades and its Professional Women in Building group, contact

**National Association
of Home Builders**

1201 15th Street, NW
Washington, DC 20005-2842
800-368-5242
www.nahb.com

For information on career opportunities for women in construction, contact

**National Association of
Home Builders Professional
Women in Building Council**

www.nahb.org/page.aspx/category/
sectionID=467

For information on apprenticeships, union membership, Sisters in the Brotherhood, and its Women's Committee, contact

**United Brotherhood of
Carpenters and Joiners of America**

Carpenters Training Fund
6801 Placid Street
Las Vegas, NV 89119-4205
www.carpenters.org

Contact the following organizations for information on youth training programs in the construction trades

Job Corps

U.S. Department of Labor
200 Constitution Avenue, NW,
Suite N4463
Washington, DC 20210-0001
202-693-3000
national_office@jobcorps.gov
www.jobcorps.gov

Project CRAFT

Home Builders Institute
http://hbi.org/page.cfm?pageID=129

Youthbuild

Home Builders Institute
http://hbi.org/page.cfm?pageID=176

There are many other organizations at the national, regional, state, and local levels for women interested in construction careers. See Appendix I: Women's Construction Associations on page 270 for an extensive list of organizations.

buildings) will increase demand for carpenters. Opportunities will also emerge as a result of turnover in this large career field—which is the second-largest building trades occupation—as workers retire or leave the field for other reasons.

Employment for carpenters—especially those who work in the construction industry—is tied to the health of the U.S. economy. When the economy is strong, more funding for construction projects is available, and opportunities are good. When the economy is poor, fewer jobs are available as the private and public sectors reduce funding.

Interview: Rocky Hwasta

Rocky Hwasta worked as a union carpenter (Local #373) in Cleveland, Ohio, for more than 25 years. She is now retired and works as a consultant to Hard Hatted Women. Rocky discussed her career and the field of carpentry with the editors of *Nontraditional Careers for Women & Men*.

Q. Why did you decide to enter this career?

- A. In 1985 I was at a point in my life where I was working in a low-paying job with no benefits. I wanted to make a career change to a job that gave me more personal satisfaction, a higher wage, and benefits. Also, I believed I had a responsibility to provide my children with a better life.

I always enjoyed working with my hands and was always a sort of “tomboy,” climbing trees, not afraid to get dirty, enjoying camping and the outdoors. As a carpenter, I made and built things with my own hands; these accomplishments

“As a carpenter, I made and built things with my own hands; these accomplishments gave me a great sense of pride in my job. I gained skills that I continually improved and that no one can ever take away from me.”—Rocky Hwasta, Carpenter

gave me a great sense of pride in my job. I gained skills that I continually improved and that no one can ever take away from me.

Q. How did you train for this career? What was your educational path?

- A. To enter the carpentry apprenticeship, I had to make a commitment to the union-funded and -operated program. The apprenticeship is a four-year program where you learn and you earn. An apprentice attends the training center for classroom and hands-on skills building four weeks a year. The rest of the time is spent on a construction project, employed by a contractor, where an apprentice is paired with a journey-level worker who teaches him or her the trade.

Q. How do you enter an apprenticeship?

- A. There are different ways in different parts of the country, but in this area one must contact the union hall or training center for a list of contractors. Then he or she has to get hired by one of these contractors. The contractor signs an “Intent to Hire” letter. The person must work for this

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employer for 90 days before he or she is indentured (accepted) into the apprenticeship program. Back when I got in, I took a written test and was placed in a five-week pre-apprenticeship (40 hours/week) with classroom and shop training with about 20 guys. I placed first in my class and was sent to a bridge job. The rest is “her” story!

Q. What are the most important qualities for carpenters?

- A. Math and reading comprehension, plus any type of drafting or shop classes, are helpful for a firm foundation to the apprenticeship. At the training center an apprentice follows a structured program of classes, including knowledge of hand and power tools, roof framing, interior systems (building walls, hanging drywall, installing ceilings and doors), blueprint reading, stair building, and many others.

Carpenters should be able to motivate themselves, work well by themselves and with others in a crew, and work with pride. They should learn as many carpentry skills as they can and be proficient in blueprint reading and basic math calculations. All construction workers need common sense to perform their work productively and safely. A good attitude and attendance are important aspects of a high-quality work ethic and are noticed by an employer.

Q. What are some of the pros and cons of work in this field?

- A. Over the course of my 25+ years of carpentry, I performed a variety of tasks and worked on many different types of job sites: schools, shopping malls, hospitals, bridges, colleges, sports arenas, residential housing, and office buildings. I set wooden forms for concrete; built walls, roofs, and stairs; hung drywall; installed doors with their hardware; and installed cabinets, countertops, and fine trim and woodwork, such as crown mold, chair rail, and casing around windows and doors. I had the opportunity to work as a *residential carpenter* (one who builds houses) and as a *commercial carpenter* (one who builds infrastructure and multipurpose structures, like office buildings, schools, and shopping centers).

This type of work keeps you fit and strong. There are all sizes of carpenters, and you can only do what your body allows you. As a woman, I tried to do my best without injuring myself. That is all that can be expected of anyone on the job, so men who were stronger than me did not intimidate me. They come in all shapes and sizes, too.

Carpenters take pride in completing a job. They can identify buildings and projects on which they have worked. There is a great pride in possessing the skills of a carpenter. Once learned and acquired, you have them for life. I also enjoy teaching others my skills and “tricks of the trade.”

The cons of the job were working in the heat and blistering sun in the summer or the cold, frigid air of the winter, or the muddy, rainy weather of the spring. Working indoors didn’t always solve that problem if the building wasn’t to the point of being heated or air-conditioned. I worked in pleasant conditions, too, like in the outdoors on a fall day, or indoors with air-conditioning.

At some sites the use of portable bathrooms was the only option, and they could be disgusting. Some sites had separate facilities for men and women. That was an ideal situation, but not always the case.

Carpentry work is always physical and sometimes difficult. For instance, on some jobs a carpenter may work on a scaffold all day, climbing up and down a ladder for access. Bridgework puts a carpenter far off

the ground with the use of safety harnesses that are sometimes uncomfortable and restricting, but necessary in case of an accidental fall. Some jobs require greater risks than others. Working on a ladder or in a hole provides bigger risks than working on the ground or standing on a floor.

Carpentry is sometimes seasonal where layoffs are common. All construction workers work themselves out of a job as a project is completed. A contractor has the option of sending its workers to another project or laying them off. Saving your money when you are working, and not living paycheck to paycheck, are important to being financially successful.

Construction work is not for everyone; weighing the pros and cons are important to job satisfaction. Also, remember that all carpenters do not perform all tasks. Some are highly skilled in some areas and perform only those parts of the job. For instance, some carpenters work only with finished wood products and cabinets, either preparing and building them or installing them, while still others work only on bridges, assembling “forms” for concrete pours. However, it is always most beneficial to steady and full employment to be as skilled as possible in all carpentry tasks.

Q. Did you face any challenges as a woman working in a male-dominated field?

- A.** As a woman, I had to learn to work with mostly men. Sometimes I would be the only woman on a job of more than 100 construction workers. I learned to focus on my work and not the derogatory comments of some of the men. As I built my skills, my personal confidence increased. I developed a “thick skin” against the mean remarks and learned all I could, often taking on personal projects in my home and volunteer projects to practice my skills. I learned what I could from the carpenters who were willing to teach and steered clear of those who didn’t want me there. My independent spirit and positive outlook guided me to continue and not be intimidated. That paid off in a decision I do not regret, as I cherished my career, maintained my multiple skills, and now enjoy a financially secure retirement.

Q. What advice would you give to high school students—especially young women—who are interested in this career?

- A.** Women who are interested in pursuing a career in carpentry need to be determined and focused. The work is hard, but rewarding. Research the training, job tasks, and financial rewards/benefits that are offered by a career in carpentry to help make a decision. More women are entering the field, so a network of mentors and support systems now exists to help them be successful. My suggestion is to find a mentor. Young women today are more Internet savvy; there are tradeswomen organizations across the country that offer emotional, and sometimes financial, support to female apprentices. (For instance, I am board president of Allied Cleveland Tradeswomen; we offer scholarships to female apprentices and mentor support to all tradeswomen. Additionally, Hard Hatted Women (www.hardhattedwomen.org) offers multiple tools for entry and success in building trades careers.)

The carpenters’ union is designed to train its members, help them find work, and offer a network of support. Attending meetings and staying current with your dues are your responsibility as a conscientious member. I have found my union to be more supportive of women over the years because I became active in advocating for us: tradeswomen

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specifically and union carpenters in general. Our local and regional training centers now both have a mentor committee for all apprentices.

Q. What is the future employment outlook for carpenters?

- A.** The future employment outlook for carpenters is very good, as many are retiring with a secure pension at an early age. The requirements for retirement vary regionally. In most cases, membership in the union allows for higher wages and more benefits than a non-union carpenter. A highly skilled, motivated carpenter will always be in demand. There are also numerous career paths a carpenter may take: foreman, superintendent, instructor, apprentice coordinator, union official, estimator, project manager, safety enforcement official, or self-employed contractor, to name a few.

Interview: Brooke Eimers

Brooke Eimers started her career as a carpenter, and she is now a job superintendent at JE Dunn Construction in Kansas City, Missouri. She discussed her career with the editors of *Nontraditional Careers for Women & Men*.

Q. How long have you worked in the field? What made you want to enter this career?

- A.** I officially started my career as a carpenter in May 2004 upon graduating from Pittsburg State University with a degree in construction management. I was hired on with JE Dunn Construction as a superintendent trainee and part of that trainee process was completing the apprenticeship program in Kansas City. I took this job because of the apprenticeship. I knew that with this kind of training I would be a superior superintendent someday. I took a building trades class in high school where I got out of school half a day to go work on building a house. In 2000 when I graduated high school Turner Construction was building a new school for our school district and was looking to hire someone out of my class to work on the jobsite as an intern. I got the job and learned about the different aspects of construction. I had always planned to go to college but after the first semester I quickly switched my major to construction management. JE Dunn recruited me right out of college.

Q. What is one thing that young people may not know about a career as a carpenter?

- A.** There is a wide range of carpentry. Many people probably think of the carpenter that framed your house or built your cabinets. I could be hanging off the side of a seven-story building attached to a large gang form by nothing but a harness and wall chains one day, and the next I might be hanging a door or coat hook on the wall. Tool bags are heavy; they keep a woman's hips in shape. You make great salary, you can move up into management, and it is a valid career choice. With a college degree, a carpenter can move up into supervisor roles and run entire projects like I am today.

Q. What do you like least and most about your job?

- A.** Cons: I don't like using Johnny on the spots and sometimes you have to work in very extreme temperatures. I love the heat, but the cold really gets to me. That is why I am convinced I need to move to Arizona. The

job can be high stress, especially at the management level because a lot of people rely on you to do their job. It is also physically demanding, which over a lot of years can wear on your body, which is why I recommend moving up into management. Trades people often have to worry about being laid off at the end of a project. Safety hazards are also an issue. You have to be aware of your surroundings and your tools. By the age of 27, I had already had one job-related surgery.

Pros: I get paid really well for what I do and have great benefits. Carpenters in Kansas City top out around \$60,000-\$70,000, and as you move up in management so does the pay. The physical labor helps keep my body in good shape. I do something new and different every day and each project I work with new people. I also get to walk away with a sense of accomplishment. You can step back at the end of every day and say, "Wow, look at what we built!" The work schedule is nice—Monday-Friday 7-3:30. There are also opportunities for overtime when a project is on a tight schedule.

Q. What advice would you give to young women who are interested in the field?

- A.** You can do anything you put your mind to. If I want something bad enough I always find a way to get it. The construction industry is a lot more open to women than it was only 10 years ago. Companies are required to have a percentage of minorities working for them and have to prove to the government that

they are actively trying to reach those goals. I currently work side by side on a jobsite with 35 other men and I am the only female. Like anything you adapt to your surroundings and it is not hard. Be patient and persistent, and confidence can go a long way. I am always applauded for my attitude, and people like to work with people who have a good attitude.

"With a college degree, a carpenter can move up into supervisor roles and run entire projects like I am today."—
Brooke Eimers, Carpenter

Q. Have you faced any special challenges as a female working in such a male-dominated field?

- A.** I used to believe that my age was more of a challenge than my gender. I started in this business when I was 22, and the majority of the people I worked with were 40 plus. It is hard earning respect from someone with a lot of experience when you are a young professional. You have to walk the walk and talk the talk. Even if I am not sure of myself or what I am talking about, I act like I do. CONFIDENCE goes a long way. The first few days on a new project are always the hardest. Everybody watches, and I can just see the look in their eyes. I anticipate they are thinking "Is she really capable?" I stand my ground, do my thing, and eventually the respect prevails. I have worked with some real jerks but at the end of the day we are all here to get a job done, make a decent wage, and go home to our families and friends. And, of course, I could tell you some stories, that might not be appropriate for the article. I actually had a guy try to give me 20 bucks for helping him figure something out. I think he must have been intimidated by a female that knew something he did not.

CHIROPRACTORS

OVERVIEW

Chiropractors treat patients for disorders of the musculoskeletal or nervous systems. They use many traditional medical diagnostic tests, including x-rays, MRIs, and laboratory tests in addition to techniques specific to the specialty of chiropractic care. Such treatments include spinal manipulation (known as adjustments), pressure and massage, and traction. Chiropractors are also known as *chiropractic physicians* and *doctors of chiropractic*. A four-year degree in chiropractic is required to practice in the field. There are approximately 70,000 chiropractors employed in the United States. About 20 percent of this total are women. Employment for chiropractors is expected to be good during the next decade.

THE JOB

People experience pain or other discomfort due to accidents, injury, medical conditions, stress, repetitive motions, poor posture, or even inadequate sleep. Some people seek help from medical doctors, but those who prefer to relieve their pain or discomfort without medication or invasive surgery seek the services of doctors of chiropractic.

Chiropractors are specially trained and licensed medical professionals who provide relief from chronic pain resulting from injury, disease, or other reasons. They specialize in treating the total body, but they pay special consideration to the spinal column and central nervous system.

When treating a new patient, chiropractors assess the patient's physical condition and complaints. They begin with a thorough physical and consultation, with special emphasis given to the patient's spine. Patients undergo a battery of laboratory tests to locate the source of pain or discomfort. They may also be given neurological or orthopedic tests. X rays and MRIs may be taken to rule out fractures or disease. Once the patient's medical history and test results are gathered, chiropractors advise him or her on the course of treatment.

If the patient complains of lower back pain, for example, chiropractors may begin a series of spinal adjustments using hand and finger manipulation

FAST FACTS

High School Subjects

Biology
Chemistry

Personal Skills

Active listening
Complex problem solving
Critical thinking

Minimum Education Level

Four-year degree in chiropractic

Salary Range

\$32,270 to \$94,454 to
\$143,670+

Employment Outlook

Much faster than the average

O*NET-SOC

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3122

or an instrument. These adjustments may be done on a manipulation table or on a mat while the patient is positioned on the floor. Other methods include heat and ice therapy, electrical stimulation, massage, water therapy, and light therapy. Chiropractors may also administer muscle tests or balance tests using weights, straps, tapes, or braces.

Many times, patients have a subluxation (also known as a vertebral subluxation), which causes extreme pain. Vertical subluxation is a condition resulting from a change in the position of two or more adjacent spinal bones, or vertebrae. This misalignment can cause negative effects on the nervous system as well as on the rest of the body. Many people refer to this pain as a “pinched nerve.” Chiropractors can relieve subluxation through adjustments, which correct vertebrae positioning.

Back pain and neck spasms can also be corrected through the use of certain equipment. Chiropractors often use inversion tables to position patients to lessen pressure on back muscles. Patients on inversion tables are held feet up and head down, which reduces back pain and improves ligament strength, body posture, and flexibility.

The length and frequency of treatments vary according to the patient and his or her degree of pain. Multiple sessions within a week’s time, or weekly sessions until pain subsides, is average, though those may be dictated by a patient’s insurance coverage. Some people seek chiropractic adjustments on a fairly regular basis.

Chiropractors believe in a holistic approach to health care. They often counsel patients regarding proper nutrition and exercise and advocate for a stress-free lifestyle.

Chiropractors see patients of all ages with many different conditions that are caused by accidents, chronic disease, or even repetitive movements. Some chiropractors specialize in sports medicine, wellness care and nutrition, rehabilitation, pediatrics, worker’s compensation and personal injury, geriatric care, pregnancy care, and other areas. They often work in a team of health care professionals, consulting with medical physicians, nutritionists, and nurses regarding the overall health and treatment of a patient. If needed, chiropractors may refer patients for additional medical treatment.

Some chiropractors choose to enter private practice. In such situations, chiropractors may have additional administrative duties related to their business. They are responsible for marketing, billing, scheduling, and outreach services. Depending on the size of their practice, chiropractors may also supervise chiropractic assistants, medical assistants, and clerical staff.

Chiropractors also seek continuing-education credits, as mandated by their state, by attending or participating in seminars, conferences, and lectures.

“When I learned about chiropractic, I knew it was exactly what I was looking for—a blend of rigorous academic study and hands-on healing skills that together provided a powerful and effective form of health care.”

—Karen Erickson, Chiropractor

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Chiropractors work a normal 40-hour week, with some evening and weekend hours reserved to accommodate patients' schedules. Their work areas, whether located within a hospital, clinic, or private office, are clean, comfortable, and well lit. The number of examining rooms will vary depending on the size of the practice, but each room will have either an exam table, or a manipulation or massage table, and perhaps some ultrasound therapy equipment or other diagnostic tools.

REQUIREMENTS

HIGH SCHOOL

Since you must go to college to become a chiropractor, you should take a college-preparatory curriculum in high school. Take classes in anatomy, physiology, biology, health, chemistry, and psychology. English and speech classes will help you develop your communication skills, which you will use frequently in your practice. Business, mathematics, advertising, marketing, and computer science classes will help you prepare to run a private practice.

POSTSECONDARY TRAINING

Entrants to chiropractic programs typically complete nearly four years of pre-medical undergraduate college education. Courses in inorganic and organic chemistry, biology, physics, psychology, and related lab work are recommended for aspiring chiropractic students.

Chiropractic programs last four to five academic years. Students complete an average of 4,820 hours of classroom and clinical study prior to graduation (as compared to 4,670 hours for traditional medical students). According to the American Chiropractic Association, "doctors of chiropractic are educated in orthopedics, neurology, physiology, human anatomy, clinical diagnosis including laboratory procedures, diagnostic imaging, exercise, nutrition, rehabilitation and more. Because chiropractic care includes highly skilled manipulation/adjusting techniques, a significant portion of time is spent in clinical technique training to master these important manipulative procedures." Students who complete the program are awarded the degree of doctor of chiropractic.

Nearly 20 postsecondary chiropractic training programs are accredited by the Council on Chiropractic Education. Visit the American Chiropractic Association's website, www.acatoday.org, for a list of programs.

Many chiropractic graduates complete postgraduate continuing education programs in specialty fields such as sports injuries, occupational health, and orthopedics.

CERTIFICATION AND LICENSING

All states and the District of Columbia require chiropractors to be licensed. Most states require applicants for licensing to have at least two years of undergraduate education (but increasingly a bachelor's degree) and the completion of a four-year program at an accredited chiropractic college leading to the doctor of chiropractic degree. Most state licensing boards recognize either all or part of the four-part test administered by the National Board of

Chiropractic Examiners. Some states may also have their own licensing examinations. The Federation of Chiropractic Licensing Boards offers a list of state licensing boards at its website, www.fclb.org.

OTHER REQUIREMENTS

Do you want to help others live more healthy and productive lives? Are you good at science and solving problems? Are you empathetic, patient, and a good listener? Do you have good manual dexterity? If you answered yes to these questions, then you might make a good chiropractor. Other important traits for chiropractors include excellent observational skills, the ability to work independently, good judgment, strong communication skills, and business acumen (if you own your own practice).

EXPLORING

The professional associations listed at the end of this article are an excellent place to start if you're interested in learning more about a career in chiropractic. They offer information on education, careers, and financial aid, and answers to FAQs about chiropractic procedures. Read books about chiropractic. Here is one suggestion: *Chiropractic Technique: Principles and Procedures*, 3rd edition (Mosby, 2010), by Thomas F. Bergmann and David H. Peterson. You should also talk to chiropractors about their careers. Visit the websites of chiropractic colleges to browse course requirements and other information. Join health clubs at school, and try to land a part-time job at a chiropractic clinic.

EMPLOYERS

There are approximately 70,000 chiropractors employed in the United States. About 20 percent of this total are women. Most chiropractors work in private practice. About 44 percent of chiropractors are self-employed. Others work at hospitals or government health facilities, or for other chiropractors.

GETTING A JOB

The career services office of your chiropractic college is a great place to start for job leads. You can also explore job opportunities via contacts made during your clinical experiences in college. Professional associations such as the American Chiropractic Association (<http://careers.acatoday.org>) and the International Chiropractors Association (www.chiropractic.org) offer job listings at their websites.

EARNINGS

The U.S. Department of Labor (USDOL) does not provide salary information for female chiropractors. All chiropractors earned mean annual salaries of \$94,454 in 2009, according to a survey conducted by *Chiropractic Economics*. Salaries for chiropractors ranged from less than \$32,270 to \$143,670 or more, according to the USDOL. The USDOL reports the following

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mean annual earnings for chiropractors by employer: offices of physicians, \$99,570; offices of dentists, \$98,680; offices of other health practitioners, \$79,150; outpatient care centers, \$75,800; and general medical and surgical hospitals, \$69,730.

Employers offer a variety of benefits, including the following: medical, dental, and life insurance; paid holidays, vacations, and sick and personal days; 401(k) plans; profit-sharing plans; retirement and pension plans; and educational assistance programs. Self-employed chiropractors must provide their own benefits.

EMPLOYMENT OUTLOOK

Employment for chiropractors is expected to increase much faster than the average for all occupations during the next decade, according to the U.S. Department of Labor (USDOL). More people are becoming interested in alternative and complementary medicine, which, coupled with a growing—and aging—U.S. population, is increasing demand for chiropractors. The USDOL reports that “chiropractors who specialize in pediatric care will be in demand as chiropractic spinal treatment is very gentle and children enjoy subsequent visits.”

FOR MORE INFORMATION

For information on education and careers, contact

American Chiropractic Association

1701 Clarendon Boulevard
Arlington, VA 22209-2799
703-276-8800
www.acatoday.org

For information on educational requirements and a list of accredited colleges, contact

Council on Chiropractic Education

8049 North 85th Way
Scottsdale, AZ 85258-4321
cce@cce-usa.org
www.cce-usa.org

For a list of state chiropractic associations, visit the association's website.

International Chiropractors Association

6400 Arlington Boulevard, Suite 800
Falls Church, VA 22042
800-423-4690
www.chiropractic.org

For information on licensure, contact

National Board of Chiropractic Examiners

901 54th Avenue
Greeley, CO 80634-4405
970-356-9100
nbce@nbce.org
www.nbce.org

For information about complementary and alternative medicine, contact

National Center for Complementary and Alternative Medicine

National Institutes of Health
9000 Rockville Pike
Bethesda, MD 20892
info@nccam.nih.gov
<http://nccam.nih.gov/health/chiropractic>

For a list of chiropractic colleges in Canada, contact

Canadian Chiropractic Association

600-30 St. Patrick Street
Toronto, ON M5T 3A3 Canada
877-222-9303
www.ccachiro.org

Interview: Karen Erickson

Karen Erickson, D.C., FACC is a chiropractor and a member of the Board of Trustees of the New York Chiropractic College. She discussed her career with the editors of *Nontraditional Careers for Women & Men*.

Q. How long have you worked in the field? What made you want to enter this career?

A. I have been a chiropractor for the past 22 years. I love being a chiropractor each and every day. I wanted to go into the healing arts since high school. Although I considered going to medical school after college, I was interested particularly in holistic health care, which at that time was not part of standard medical education. I had a B.S. in biology and chemistry, and wanted to do something more clinically rigorous than massage. When I learned about chiropractic, I knew it was exactly what I was looking for—a blend of rigorous academic study and hands-on healing skills that together provided a powerful and effective form of health care.

Chiropractic continues to grow in acceptance and use. There is a growing body of research showing chiropractic is safe and effective for a wide variety of conditions. Chiropractic is part of most insurance plans including Medicare. Chiropractic is slowly being incorporated into the Veterans Administration system of health care, which serves veterans and their families. Chiropractors like me often speak out in the media and other venues on a wide variety of health issues. I was the first chiropractor to be credentialed by a major teaching hospital when I joined the staff at Beth Israel's Continuum Center for Health and Healing in 2001. Since then, chiropractors have continued to practice in a multitude of clinical settings from private practices, to group practices with other chiropractors or multi-disciplinary practices, to practicing in major medical institutions.

Q. What is one thing that young people may not know about a career as a chiropractor?

A. A chiropractic career can take so many forms, depending on your interests. Many chiropractors have general practices. However, chiropractors can specialize just like medical doctors do. Some example of specialties are sports medicine, rehabilitation, pediatrics, wellness care and nutrition, worker's compensation and personal injury, geriatric care, and pregnancy care. Chiropractors can also pursue other graduate degrees like acupuncture, nutrition, research, law, business administration, public health, higher education, and radiology. Chiropractic careers can evolve into unique niches, which are rewarding and exciting.

Q. What are the pros and cons of your job?

A. Pros:

✓ Chiropractors help people every day and have privileged relationships with patients that are rewarding beyond words.

✓ You can be self employed and create the kind of practice you want using techniques that you find most effective. It is a great profession to have when you want to raise a family, because of the flexibility. You can create your own hours and easily work part-time or 80 hours a week. Chiropractic practice is easily modified to meet the needs at different

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times in your life: being single, married, children, empty nest, semi-retirement, and retirement. Many chiropractors practice long after they are of retirement age, because it is emotionally and intellectually rewarding. A chiropractic practice becomes a beautiful and meaningful community, and many chiropractors are reluctant to give that up.

✓ You can specialize. You are not stuck behind a desk.

✓ Finally, chiropractic has a vitalistic philosophy of life. Chiropractors understand that the body is capable of healing itself if you can remove any interference with the body's innate healing mechanisms. Medical doctors and other health care providers accept and refer patients for chiropractic care.

Cons: Many chiropractors don't participate in health care plans and have thriving practices, but for those who do accept insurance reimbursement as payment, the record keeping requirements are onerous and the reimbursement fees can be low (it is similar for medical doctors and physical therapists as well).

"The chiropractic profession welcomes women. The opportunities for contributing to the profession and having a successful career are endless and can be completely guided by your own interests and needs."
—Karen Erickson,
Chiropractor

Q. What are the most important personal and professional qualities for people in your career?

A. Chiropractors as a group are intelligent, caring, hardworking, entrepreneurial, and principled professionals. I can walk into a fellow chiropractor's office any place in the country and be certain to meet a warm, passionate health care provider. In New York, a large group of women chiropractors meet every few months and socialize and discuss specific practice topics. I am amazed at the openness and generosity women chiropractors show each other. Everyone wants everyone else's practice to thrive and are willing to share information and brainstorm together.

Q. Have you faced any special challenges as a female working in such a male-dominated field? If so, how did you deal with these challenges?

- A. There are many chiropractic techniques which allow women of any stature or strength to effectively practice.
Women increasingly play an important role in the profession, and the field is wide open. I am on the Board of Trustees of a major chiropractic college. There have been two women presidents of chiropractic colleges.
- Q. What advice would you give to young women who are interested in the field?**
- A. Join us! The chiropractic profession welcomes women. The opportunities for contributing to the profession and having a successful career are endless and can be completely guided by your own interests and needs.

CIVIL ENGINEERS

OVERVIEW

Civil engineers design and supervise the construction of a variety of structures, including buildings, bridges, dams, canals, tunnels, roads, and highways. They improve people's quality of life and ease of transportation. Civil engineers work on large government projects such as a new highway extension, or on smaller private projects. Major subspecialties in the field include *environmental*, *geotechnical*, *structural*, *water resources*, and *transportation engineering*. Civil engineers typically have at least a bachelor's degree in civil engineering or a related field. Approximately 276,000 civil engineers are employed in the United States; only 9.7 percent are women. Employment in the field is expected to be very good during the next decade.

FAST FACTS

High School Subjects

Mathematics
Physics

Personal Skills

Complex problem solving
Judgment and decision making
Technical
Time management

Minimum Education Level

Bachelor's degree

Salary Range

\$50,560 to \$77,560 to
\$120,000+

Outlook

Much faster than the average

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THE JOB

How do people living in Marin County cross the bay into downtown San Francisco? How do people bypass rush-hour traffic and still travel from Detroit into Windsor, Canada? How do Arizona, Nevada, and many of their neighboring states get hydroelectric power, irrigation flow, and protection from floods? How do commuters from outlying suburbs get to their downtown Chicago offices? The answers: the Golden Gate Bridge, the Detroit-Windsor Tunnel, the Hoover Dam, and the many Chicago expressways. All these structures, while different in size, scope, and purpose, share one thing in common. They were all created in part by civil engineers. Civil engineers design and supervise the construction of structures to optimize the quality of life for people—whether to provide them with easy navigational means of transportation, a safe place to live and work, or an alternative energy source.

When beginning a project, civil engineers meet with a team of builders, architects, engineers, and members of the community to discuss the purpose of the project. For example, they may meet with government officials or

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community leaders to address the need for a bridge to connect surrounding towns located across a body of water. Civil engineers then visit the proposed site to study the area that is involved and determine if the project is achievable. They take into account the topography of the area, including the type of soil and rock found there and the depth of the water, before designing construction plans. Using mathematical and scientific principles, and with the help of computer-aided design programs, civil engineers make a preliminary drawing of the structure, taking into consideration the type of bridge that is being constructed and the construction materials that will be used. Many times, civil engineers build miniature models to prove their design will withstand meteorological and geological stresses and everyday wear and tear while staying within the proposed budget. Their analysis is tested, reviewed, and revised before construction plans are finalized.

You May Not Know...

The editors of *Nontraditional Careers for Women & Men* asked Melissa Wu, a civil engineer at CH2M HILL in Bellevue, Washington, to name one thing that young people may not know about a career in civil engineering:

"You can do so much with a career in civil engineering. I don't think people realize how diverse of a field it really is. This field can have you looking at roads and transportation or investigating traffic models to find out why certain roads are congested. You can also plan natural habitats without destroying wetlands. It's not just about buildings and beams. Civil engineering covers so many different things that affect us in everyday life."

Major subspecialties in the field include environmental, geotechnical, structural, construction, transportation, and water resources (or hydraulic) engineering. They are detailed in the following paragraphs.

Environmental engineers are concerned with improving the environment, including providing access to clean water, controlling pollution, developing recycling programs, and creating waste disposal and management systems. They conduct tests to gauge the levels of hazardous waste at a chemical processing plant and suggest designs to better contain or avoid dangerous situations. For example, engineers may design a filter bed used to treat and convert wastewater into clean and safe drinking water.

Geotechnical engineers study the types of soil and rock that are present at a proposed building site. For example, in the planning stages of a harbor-front building, geotechnical engineers are consulted to conduct a soil mechanics analysis. They test the condition or any variables of the soil or bedrock found in the area and suggest the types of materials that should be used in the building's foundation. Their work is important in identifying the proper combination of steel and concrete needed to ensure a strong and reliable foundation; they may suggest the use of other stress-resistant materials or designs to withstand volume change, or to reduce problems caused by erosion or weather. They also take into account any existing variables such as the possibility of landslides, sinkholes, or earthquakes.

Structural engineers design and supervise the construction of buildings, bridges, and tunnels, as well as offshore structures such as oil and gas fields. When working on a new project, structural engineers first assess the structure and identify the type of load the structure must carry, as well as the stress and forces (weather, temperature, or potential stress from other natural phenomena such as hurricanes and earthquakes) that will affect the structure. Structural engineers closely study the type and magnitude of load, meaning the structure's material weight and the weight it must hold, including motor vehicles and their passengers and cargo. Live loads include moving weight and dynamic loads from wind or changes in temperature. Structural engineers create construction



A civil engineer reviews building plans with an associate. (Photo courtesy of Photos.com)

plans to make sure structures are functional, yet safe, considering factors such as a structure's overall construction costs, its aesthetics, and its durability. Specializations in this field include *wind engineering* and *earthquake engineering*.

Construction engineers are involved in many different building projects, from multistory dwellings to a suspension bridge to a waterway. They conduct experiments and studies, interpret data, and make predictions on whether an apartment's design, for example, is strong enough to withstand environmental stresses, or whether the design of a suspension bridge is strong enough to handle the weight of its load. They draft and evaluate building contracts and estimate the cost of building supplies and equipment. Construction engineers may also interpret area zoning laws and other legal processes.

Transportation engineers design and supervise the construction of streets, roads, highways, airports, transportation systems, and ports and harbors. When designing a traffic management plan, for example, they conduct research to identify the needs of the community, then they gather data on past accidents, the volume of traffic flow in the area, and any other relevant information. With this information, they work with a team of engineers to target certain intersections or certain areas, to time traffic

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signals or railway crossing signals, and to upgrade or widen lanes on frequently used roadways. They may also seek to improve pedestrian-heavy areas by introducing walking paths or extra pedestrian crossing signals or pavement markings.

Hydraulic engineers design and oversee the construction of any structure that deals with the flow and transportation of water, including dams, pipelines, bridges, levees, and canals. They use their knowledge of geology, hydrology, conservation science, resource management, meteorology, and the environment to predict the type and quantity of water in lakes, rivers, streams, and underground sources. They are concerned with the pressure and ease of water flow from these sources. After Hurricane Katrina struck the Gulf Coast, for example, hydraulic engineers in New Orleans were instrumental in overseeing the design and construction of a new levee system and floodwalls. This new system was designed to better withstand the high-power storm surges and the possible erosion of soil. Many hydraulic engineers are employed by the U.S. Army Corps of Engineers.

Full-time engineers work 40 hours a week, though often they clock in closer to 50 or even 60 hours a week. This is especially true when working to meet an important deadline or if complications arise on a project. Civil engineers work in clean, well-lit, and comfortable offices. Much of their work is done on computers, whether writing proposals, conducting research, or using the latest design program. However, engineers spend time in the field as well. For example, a transportation engineer may visit extremely busy roads to identify the reasons for congestion and traffic. An engineer specializing in water and sewage may visit existing water treatment plants or water reclamation centers. A structural engineer may travel to potential sites to identify the best location for a new bridge or tunnel. If a project is located in another state, or perhaps even another country, civil engineers may have to temporarily relocate there until the project is well underway.

Civil engineers work with a variety of professionals including architects, designers, construction managers, engineering technicians, and other engineers. They may also be responsible for making presentations to business executives or government officials in order to win a bid or to receive funding for a project. Civil engineers often meet with private citizens, especially if the structure in question is close to a residential area, or if the structure will be used by the public.

REQUIREMENTS

HIGH SCHOOL

In high school, take the following classes: physics, algebra, geometry, trigonometry, calculus, computer science, foreign language (especially if you want to work abroad), and science (chemistry, biology, physics, earth science), as well as classes such as English and speech that will help you develop your communication skills.

POSTSECONDARY TRAINING

Most people enter the field by earning a bachelor of science in civil engineering and taking and passing the Fundamentals of Engineering examination and obtaining professional licensing. Most employers require an advanced degree for top positions. ABET accredits civil engineering programs. Visit its Web site, www.abet.org, to access a searchable database of accredited programs in the United States and other countries. Students who plan to pursue study in environmental engineering can learn more about the field and access a list of accredited environmental engineering programs by reading the *Environmental Engineering Selection & Career Guide* (www.aaee.net/Website/SelectionGuide.htm), which is offered by the American Academy of Environmental Engineers.

“There’s a need for people with this degree. Everyone is always going to need clean water and safe roads, so civil engineering is always going to be in demand.”

—Jennifer Jacka-Taylor, Civil Engineer

CERTIFICATION AND LICENSING

The American Society of Civil Engineers (ASCE) offers voluntary certification via its sister organization, Civil Engineering Certification. This organization has partnered with the Environmental & Water Resources Institute, the Geo-Institute, and the Coastal Ocean Ports & Rivers Institute to create specialized certification programs. Visit the ASCE website for more information. Voluntary certification for environmental engineers is offered by the American Academy of Environmental Engineers, the Institute of Professional Environmental Practice (www.ipep.org), and the Academy of Board Certified Environmental Professionals (www.abcep.org). Voluntary certification for transportation engineers is offered by the Institute of Transportation Engineers.

Civil engineers whose work affects property, health, or life must be licensed as professional engineers. According to the U.S. Department of Labor, “this licensure generally requires a degree from an ABET-accredited engineering program, four years of relevant work experience, and completion of a state examination. Recent graduates can start the licensing process by taking the examination in two stages. The initial Fundamentals of Engineering examination can be taken upon graduation. Engineers who pass this examination commonly are called engineers in training (EITs) or engineer interns. After acquiring suitable work experience, EITs can take the second examination, called the Principles and Practice of Engineering exam.” Visit the National Council of Examiners for Engineering and Surveying website, www.ncees.org, for more information on licensure.

OTHER REQUIREMENTS

To be a successful civil engineer, you should be good at solving problems, have excellent communication skills, excel at mathematics, be able to work well with others, and have an inquisitive personality.

Did You Know?

MentorNet is a nonprofit organization that offers web-based e-mentoring between female and other underrepresented engineering and science students and industry professionals. There is no charge for the service, and males may also participate. Visit www.mentornet.net for more information.

EXPLORING

There are many ways to learn more about a career in civil engineering. You can read books and magazines about civil engineering, talk to an engineer about his or her career, attend an after-school or summer engineering program (see www.careercornerstone.org/pcsumcamps.htm for more information), and join local science and engineering clubs and organizations and participate in their competitions and other programs. Additionally, the American Society of Civil Engineers has

created a website to educate people about the rewards of a career in civil engineering. It can be accessed by visiting ASCEville.org.

EMPLOYERS

Approximately 276,000 civil engineers are employed in the United States; only 9.7 percent are women. According to the American Society of Civil Engineers, there are five main employment areas for civil engineers: government, education, consulting, industry, and construction. Civil engineers work for large international engineering companies, government agencies, and small regional construction companies. Others are employed as teachers at colleges and universities.

GETTING A JOB

Many civil engineers obtain their first jobs as a result of contacts made through college internships or networking events. Others seek assistance in obtaining job leads from college career services offices, newspaper want ads, and employment websites. Professional engineering associations—such as the American Society of Civil Engineers and the Institute of Transportation Engineers—provide job listings at their websites. See For More Information for a list of organizations. Additionally, the Women's Transportation Seminar (www.wtsinternational.org/Career.aspx) and the American Society for Engineering Education's Women in Engineering Division (<http://wied.asee.org/jobs.html>) offer job listings at their websites. Those interested in working for the federal government should visit the U.S. Office of Personnel Management's website, www.usajobs.gov.

EARNINGS

Salaries for civil engineers vary by type of employer, geographic region, and the worker's experience level and skills. The median income for civil engineers was \$85,000 in 2009, according to *The Engineering Income & Salary Survey*, ASCE/ASME. The median income for civil engineers with less than

one year of experience was \$55,160, while those more than 25 years of experience earned \$120,050. Earnings also varied by educational attainment. Civil engineers with a bachelor's degree had median annual earnings of \$85,000, while those with a doctoral degree in engineering earned \$110,700.

The U.S. Department of Labor (USDOL) does not provide salary information for women civil engineers. It does report that women employed in architecture and engineering occupations earned annual salaries of \$54,080 in 2010. Median annual salaries for all civil engineers were \$77,560 in May 2010. Salaries ranged from less than \$50,560 to \$119,320 or more. The USDOL reports the following mean annual earnings for civil engineers by employer: pipeline transportation of natural gas, \$96,390; federal government, \$87,020; nonresidential building construction, \$83,590; architectural, engineering, and related services, \$83,320; local government, \$81,430; and state government, \$76,530.

Civil engineers usually receive benefits such as health and life insurance, vacation days, sick leave, and a savings and pension plan. Self-employed workers must provide their own benefits.

EMPLOYMENT OUTLOOK

Our nation's infrastructure (bridges, roads, buildings, airports, tunnels, dams, harbors, and water supply and sewage systems) is deteriorating, but the population is increasing (which will require the construction of even more infrastructure). This is good news for civil engineers. Opportunities will be best for those with advanced education and certifications. Employment for civil engineers is expected to grow much faster than the average for all careers during the next decade, according to the U.S. Department of Labor.

FOR MORE INFORMATION

For information on careers, certification, and the *Environmental Engineering Selection & Career Guide*, contact

**American Academy
of Environmental Engineers**
130 Holiday Court, Suite 100
Annapolis, MD 21401-7003
410-266-3311
info@aaee.net
www.aaee.net

For information about education careers in engineering and its Women in Engineering Division, contact

**American Society
for Engineering Education**
1818 N Street, NW, Suite 600

Washington, DC 20036-2479
www.asee.org
http://wied.asee.org

For information on education and careers, contact

American Society of Civil Engineers
1801 Alexander Bell Drive
Reston, VA 20191-5467
800-548-2723
www.asce.org

For information on highway engineering, contact

**American Society
of Highway Engineers**
65 Beacon Hill
Henderson, NC 27537-9448
www.highwayengineers.org

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For More Info, continued from page 45

For information on water resources engineering, contact the following organizations

American Water Resources Association

PO Box 1626
Middleburg, VA 20118-1626
<http://awra.org>

American Water Works Association

6666 West Quincy Avenue
Denver, CO 80235-3098
www.awwa.org

For industry information, contact

Institute of Transportation Engineers

1627 Eye Street, NW, Suite 600
Washington, DC 20006-4087
www.ite.org

For information on licensure, contact

National Society of Professional Engineers

1420 King Street

Alexandria, VA 22314-2794
www.nspe.org

For career guidance and scholarship information, contact

Society of Women Engineers

203 North LaSalle Street, Suite 1675
Chicago, IL 60601
<http://societyofwomenengineers.swe.org>
<http://aspire.swe.org>

For information on structural engineering, contact

Structural Engineers Association-International

seaint-ad@seaint.org
www.seaint.org

For information on career opportunities for women, contact

Women's Transportation Seminar

1701 K Street, NW, Suite 800
Washington, DC 20006
www.wtsinternational.org

Interview: Jennifer Jacka-Taylor

Jennifer Jacka-Taylor is the stormwater management coordinator for the city of Hutchinson, Kansas. She discussed her career with the editors of *Nontraditional Careers for Women & Men*.

Q. What made you want to enter this career?

A. I had a friend who was an engineer. He was always so proud of every bridge that he drove over that so happened to be his design. I was impressed by the pride he had and having a tangible outcome for his work, so I decided to also become an engineer.

Q. What is one thing that young people may not know about a career as a civil engineer?

A. It's a very broad field. You can do a lot with civil engineering. It's a much honored profession because many engineering projects make people's lives better—with cleaner water or safer roads, for example. These are things that are unseen, but expected.

Q. Can you tell us about some of the project you've worked on?

A. I worked on several highways for KDOT. One of my favorite projects was one built in Columbia, Missouri. We got a federal grant to connect all the

trail systems to create an alternate means of transportation for people so they don't have to drive their cars everywhere they go. These trails were both for walking and biking, and went all over the town of Columbia, Missouri, where the Missouri University campus is located.

Q. What are the most important personal and professional qualities for people in this career?

- A.** It's important for people to want to do things right, and be a perfectionist. Being good in math and science helps. It's not a hard profession to break into—there's a need for people with this degree. Everyone is always going to need clean water and safe roads, so civil engineering is always going to be in demand.

Q. What are some of the pros and cons of your job?

- A.** I get to spend a lot of time outside of the office, visiting projects in the field. For example, with the trail project, I was able to hike the trails and really get to know them and their design. I also like knowing I am helping people.

A con of the job

is sometimes people only see the negative aspect of the project. For example, when sewers don't work right, people only see the flood. They never seem to notice a project when it is working properly. When bridges collapse people only wonder why, without knowing the difficulties we've had with the federal government to obtain funds in order to fix the structure.

Q. What happens when your funding does not come through for a project? Or if the amount is not enough?

- A.** You work through it. You have to find ways to cut costs without sacrificing in the safety and design of the project. Prioritize! Sometimes you are forced to repair and patch, rather than replace.

Q. What advice would you give to young people—especially young women—who are interested in becoming civil engineers?

- A.** The most important thing I learned in college is to stick with it and really follow what you want to do, or be. Some important classes to take would be lots of math and science. Writing and communication classes are also very helpful. For example, I use my communication skills every time I speak with the public, or working with others if there is a problem with a project. I also do a lot of presentations for the public. In engineering, it really pays to be well-rounded.

Q. Is this a male-dominated field?

- A.** It's male-dominated, but the field is getting better in terms of opportunities for women.

Learn More About It

Brockman, Reed. *From Sundaes to Space Stations: Careers in Civil Engineering*. Ruston, La.: Bonamy Publishing, 2011.

Layne, Margaret E. *Women in Engineering: Pioneers and Trailblazers*. Reston, Va.: American Society of Civil Engineers, 2009.

Layne, Margaret E. *Women in Engineering: Professional Life*. Reston, Va.: American Society of Civil Engineers, 2009.

Interview: Melissa Wu

Melissa Wu is a civil engineer at CH2M HILL in Bellevue, Washington. She discussed her career with the editors of *Nontraditional Careers*.

Q. How long have you worked in the field? What make you want to become a civil engineer?

A. I've been working as an associate engineer at CH2M Hill for the past seven years. I was always interested in the sciences and the environment while growing up. I also enjoy problem solving, and saw engineering as a great way to apply my problem solving skills while doing something good for my community and the world.

Q. Can you tell us about some of your current projects?

A. I'm working on a few projects right now; most of them are wastewater related. I'm working on a study for a new composting facility at a wastewater treatment plant in Western Washington. What we want to do is take the solids that result from the treatment process and convert them into a compost product that the public can use. These solids would be mixed with tree trimmings and would be used just like any compost for gardening or farming. Without this project, these waste solids, as well as the tree trimmings, would normally just go to a landfill.

Q. What are some of the pros and cons of your job?

A. I love working with other people. Sometimes I can figure out solutions by myself, but most often I find the best solutions are made in a team environment. I really do enjoy the interaction. I also think it's great to finally see your project come to life. It's fulfilling and personally gratifying.

However, sometimes as engineers, we can get a bit of tunnel vision. For example, we may come up with the best technical solution to a problem, but really there are so many factors to consider. What does the public want? What are your client's goals? Of course there's always politics and funding to consider. It's important to keep the bigger picture in mind. The best technical conclusion is not always the best solution.

Q. What are the key qualities for civil engineers?

A. You should like to solve problems. There are a lot of problems and issues that we, as engineers, can try to make better. I also think a big part of the job is being a team player. The stereotype of an engineer sitting in front of a computer all day isn't really how it works. You are constantly working with other people from other disciplines to work on problems; you are working with your clients and with the public to come up with the best solutions.

Q. What advice would you give to young people—especially young women—who are interested in becoming civil engineers?

A. Go for it! This career may take some work, but it is so worth it. I feel that there is this message out there that you have to be really good in math and science, and work really hard in order to be an engineer. I don't think this is particularly true. I feel that if you are interested in this field, if you want to make a difference, help solve some problems we have in our community, then you can become an engineer.

I would advise students to be involved in clubs and activities that stress teamwork—a sports team, a service club, or any activity that can put you in a leadership role.

CONSTRUCTION AND BUILDING INSPECTORS

OVERVIEW

Construction and building inspectors examine the construction, renovation, and maintenance of new and existing buildings, as well as structures such as highways, streets, dams, bridges, and water systems. They ensure that these projects comply with local building codes, safety ordinances, zoning regulations, and other specifications. Most construction and building inspectors specialize in a type of structure, particular construction phase, or system. The minimum educational requirement for construction and building inspectors is a high school diploma and on-the-job training, but an increasing number of employers are seeking inspectors with degrees in building inspection technology, engineering, architecture, construction management, or related fields. There are approximately 85,000 construction and building inspectors employed in the United States. Nearly 9 percent are women. Employment for construction and building inspectors is expected to grow faster than the average for all careers during the next decade.

FAST FACTS

High School Subjects

Mathematics
Shop

Personal Skills

Complex problem solving
Critical thinking
Judgment and decision making
Writing

Minimum Education Level

High school diploma, plus on-the-job training

Salary Range

\$31,970 to \$52,360 to
\$81,050+

Employment Outlook

Faster than the average

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THE JOB

In order to assure the health and safety of the public, building codes and standards are established by government bodies to regulate the construction, renovation, repair, and maintenance of all building and construction projects. Though they may vary slightly from state to state, these codes and standards are used as a guide to determine if construction projects comply with local ordinances, zoning regulations, and specific contract specifications. Construction and building inspectors are tasked with making sure all build-

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ing and construction projects meet the national code established by the International Code Council, as well as additional ordinances and codes required by each local jurisdiction.

Construction and building inspectors examine the construction of every type of structure, including new houses and buildings, highways, streets, canals, bridges, and water or sewer systems. They are also responsible for the examination of an existing structure's repair, renovation, or upkeep.

When working on a construction project, inspectors make an initial visit with the client to review and interpret building plans and blueprints. They take into account all specifications and construction methods to make sure they comply with government regulations. They are also concerned with zoning laws, grading issues, and other safety regulations. When encountering potential problems, such as, poor soil type at a site, inspectors suggest an alternate fill to improve drainage. Once all concerns are met and building plans are approved, inspectors give the green light for construction to begin or continue.



A building inspector conducts an inspection. (Photo courtesy of Photos.com)

Building inspections are conducted throughout the duration of the project. Inspectors make routine visits to monitor the progress of construction and verify that all safety regulations are continually being met. If they see a violation, inspectors issue violation notices or stop-work orders until the problems are rectified. Each phase of construction must be approved before the project can proceed further.

Most construction and building inspectors specialize in a particular structure, or construction phase. Here are some of the most common specialties:

Specification inspectors make sure the construction project is done according to a specific design. Usually, specification inspectors are hired by the

owner of the project, though insurance companies and banks also use their services.

Electrical inspectors review the installation of electrical systems and equipment, including the wiring, lighting, and motors for generating equipment, heating and cooling systems, appliances, and sound and security systems. For example, they test circuit loads to prevent overloading. Their inspection assures that all electrical work is in compliance with electrical codes and standards.

Mechanical inspectors examine the installation of various systems, including heating and cooling systems, refrigeration systems and equipment, boilers, and gas-fired appliances.

Plumbing inspectors review the installation of piping systems during these critical stages—layout of pipes, venting, backflow, and installation of fixtures. Their work assures the safety and health of water systems and sanitary waste disposal.

Elevator inspectors inspect the construction, maintenance, and repair of elevators, escalators, ski lifts, amusement park rides, and moving sidewalks.

Home inspectors inspect houses, apartments, condominiums, townhomes, and commercial buildings—both existing and new construction. Typically, home inspectors are hired to assist in the sale of a home or building. They review the overall condition of the building, examining the roof, exterior, the interior, including plumbing, electrical, heating and cooling systems. While they may report on possible code violations or potential structural problems, most home inspectors provide only an educated evaluation regarding the home. They do not have the power to enforce building compliance.

Public-works inspectors examine the construction, renovation, and maintenance of roads, highways, bridges, dams, and sewer systems. Their work includes the examination of concrete and steel work, asphalt paving, grading, or dredging concerns.

Construction and building inspectors use many different types of tools in their work including cameras, measuring instruments, survey equipment, levels, blueprints, and reference books. They also use computers to record and store data such as inspection logs, records, and photographs or videos of projects during various stages of development.

Most construction and building inspectors work 40 hours a week, though some overtime hours may be required to help meet deadlines pertaining to especially large projects. If an accident occurs at the workplace, inspectors are required to respond immediately in order to investigate and report on the situation.

Most work is done at the construction site. However, inspectors also spend a good deal of time in field offices reviewing construction or building

"Nothing is typical about this job; that is what makes me stay interested in the field."

**—Monique McClure-Hegge,
Home Inspector**

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plans, as well as handling administrative work such as answering phone calls, meeting with planners or clients, scheduling inspection visits, and writing inspection reports. Some travel is required to reach construction and building sites.

The work is hazardous at times, especially at construction sites. Inspectors often climb ladders, tour unfinished buildings, and move within tight spaces. Since many construction sites are dirty and littered with tools, nails, or debris, inspectors wear protective clothing such as heavy clothing, steel-toed boots, and hard hats to prevent injuries.

Most inspectors work alone, but must communicate their findings and suggestions to construction foremen, building managers, and clients.

REQUIREMENTS

HIGH SCHOOL

In high school, take classes in mathematics (especially algebra and geometry), shop, drafting, and computer science. English and speech classes will also be useful, since you will need to write detailed reports about your findings and communicate with business and home owners.

POSTSECONDARY TRAINING

The minimum educational requirement for construction and building inspectors is a high school diploma and on-the-job training, but an increasing number of employers are seeking inspectors with degrees in building inspection technology, engineering, architecture, construction management, or related fields. Recommended college classes include building inspection, home inspection, drafting, construction technology, blueprint reading, English, and mathematics.

Many inspectors learn their skills on the job. They work closely with an experienced inspector to learn the ins and outs of the field. They may be asked to participate in supervised onsite inspections to demonstrate their mastery of inspection techniques and building codes and standards.

Many construction inspectors have several years' experience as a trades worker (carpenter, plumber, electrician, pipefitter, etc.) or as a construction contractor or supervisor. This allows them to smoothly transition into an inspection career.

CERTIFICATION AND LICENSING

Licensing or certification is required by certain states. Contact your state's department of professional regulation for information on requirements in your state. You can learn about licensing requirements by state for home inspectors by visiting the National Association of Home Inspectors' website, www.nahi.org/public/48.cfm.

Inspectors can earn a certificate from the International Code Council by passing examinations on construction materials, techniques, and building codes. Other organizations that offer certification include the Association of Construction Inspectors, the International Association of Electrical Inspectors, the International Association of Plumbing and Mechanical

Officials, NAESA International, the National Association of Home Inspectors, and the National Fire Protection Association. Contact these organizations for more information.

OTHER REQUIREMENTS

Are you attentive to detail? In good physical condition? Good at writing reports? Effective at communicating well with others? Responsible and ethical? Do you have a strong interest in building construction? Are you willing to travel frequently for your job? If you answered yes to these questions, you are a good candidate for a career as a construction or building inspector. You also need a strong personality in order to firmly deliver bad news to people who are in violation of building codes and regulations. Sometimes people will get mad at you when you deliver the bad news. Some may even call you a liar or threaten to sue you. Although this job can sometimes be stressful, you can take solace in the fact that you are helping protect people from accidents and shoddy workmanship.

Approximately 25 percent of all construction and building inspectors belong to a union or are covered by a union contract.

"Just remember that women do really well in this position and if you really are interested in the area, you will do well. So hang on and buck the system!"

**—Monique McClure-Hegge,
Home Inspector**

EXPLORING

Read books about the construction industry and construction inspection careers. Visit the websites of the professional associations listed in the For More Information section to learn about the field. Talk to construction or building inspectors about their careers. Ask your school counselor or shop teacher for help arranging an information interview.

EMPLOYERS

There are approximately 85,000 construction and building inspectors employed in the United States. Nearly 9 percent are women. Local governments, primarily municipal or county building departments, employ about 44 percent of inspectors. About 27 percent of inspectors work for architectural and engineering services firms, including those that conduct home inspections.

GETTING A JOB

Job leads can be obtained from newspaper classified ads, college career services offices, employment websites, and by contacting potential employers directly. Those interested in positions with the federal government should visit the U.S. Office of Personnel Management's website, www.usajobs.gov. Additionally, pro-

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Professional associations—such as the International Code Council, International Association of Electrical Inspectors, and the International Association of Plumbing and Mechanical Officials—provide job listings at their websites.

The National Association of Home Inspectors offers a list of potential mentors for new inspectors at its website, www.nahi.org.

EARNINGS

The U.S. Department of Labor (USDOL) does not provide salary information for female construction and building inspectors. Median annual salaries for all construction and building inspectors were \$52,360 in May 2010. Salaries ranged from less than \$31,970 to \$81,050 or more. The USDOL reports the following mean annual earnings for construction and building inspectors by employer: federal government agencies, \$65,780; local government agencies, \$54,730; architectural, engineering, and related services firms, \$52,770; and state government agencies, \$49,050.

Employers offer a variety of benefits, including the following: medical, dental, and life insurance; paid holidays, vacations, and sick and personal days; 401(k) plans; profit-sharing plans; retirement and pension plans; and educational assistance programs. Self-employed workers must provide their own benefits.

EMPLOYMENT OUTLOOK

Employment for construction and building inspectors is projected to grow faster than the average for all careers during the next decade, according to the U.S. Department of Labor (USDOL). Greater focus on public safety, a growing U.S. population, the increasing popularity of green and sustainable design, and the trend toward more home inspections before home sales are creating many job opportunities for inspectors. The USDOL reports that “opportunities should be best for those with construction-related work experience; training in engineering, architecture, construction technology, or related fields; or certification as a construction inspector.”

FOR MORE INFORMATION

For industry information, contact
**American Construction
Inspectors Association**
530 South Lake Avenue, #431
Pasadena, CA 91101-3515
626-797-2242
www.acia.com

For industry information, contact
**American Society
of Home Inspectors**

932 Lee Street, Suite 101
Des Plaines, IL 60016-6546
847-759-2820
www.ashi.com

For information on certification,
contact
**Association of
Construction Inspectors**
PO Box 879
Palm Springs, CA 92263
support@assoc-hdqts.org
www.aci-assoc.org

continued on page 55

For More Info, continued from page 54

For information on certification, contact

International Association of Electrical Inspectors

PO Box 830848
Richardson, TX 75083-0848
800-786-4234
www.iaei.org

For information on certification, contact

International Association of Plumbing and Mechanical Officials

4755 East Philadelphia Street
Ontario, CA 91761
iapmo@iapmo.org
www.iapmo.org

For information on certification and the International Codes, or I-Codes, which have been adopted by all 50 states and the District of Columbia, contact

International Code Council

500 New Jersey Avenue, NW, 6th Floor
Washington, DC 20001-2070
www.iccsafe.org

For information on certification for elevator inspectors, contact

NAESA International

6957 Littlerock Road, SW, Suite A
Tumwater, WA 98512-7246
info@naesai.org
www.naesai.org

For info on certification, contact

National Association of Home Inspectors

4248 Park Glen Road
Minneapolis, MN 55416-4758
www.nahi.org

For information about opportunities for women in the construction industry, contact

National Association of Women in Construction

327 South Adams Street
Fort Worth, TX 76104
nawic@nawic.org
www.nawic.org

For information on fire prevention careers and certification, contact

National Fire Protection Association

One Batterymarch Park
Quincy, MA 02169-7471
publicaffairs@nfpa.org
www.nfpa.org

For information on career opportunities for women in construction and building inspection, visit

Women in Code Enforcement and Development

www.wicedicc.org

For information on opportunities in Canada, contact the following organizations

Canadian Association of Women in Construction

365 Brunel Road, Unit #1
Mississauga, ON L4Z 1Z5 Canada
info@cawic.ca
www.cawic.ca

Canadian Construction Women

142 – 757 West Hastings Street,
Suite 290
Vancouver, BC V6C 1A1 Canada
www.constructionwomen.org

There are many other organizations at the national, regional, state, and local levels for women interested in construction careers. See Appendix I: Women's Construction Associations on page 270 for an extensive list of organizations.

Interview: Monique McClure-Hegge

Monique McClure-Hegge is a home inspector and the president of the Minnesota chapter of the National Association of Home Inspectors (NAHI). She discussed her career with the editors of *Nontraditional Careers for Women & Men*.

Q. Can you tell us a little about yourself and your professional background?

A. I have been in this field since 2006. I bought the existing business from another woman who lives in my neighborhood. Since this industry has no regulations in the state of Minnesota I could travel the whole state if I wanted for work. I try to keep it within an hour of home. I have lived in Minnesota my whole life and went to college here also. I attended the University of Minnesota. After I graduated in the early 90's I had a lot of odd jobs, until I landed into something permanent in corporate America. I was in that job for 11 years—quality management. I am a HUGE W. Edwards Deming fan and one of my areas of study was organizational development, long before it became popular. Before I even got laid off from that job, my neighbor was bugging me to get into the home inspection world. So after I got laid off I tagged along with her on the job. I bought the franchise territory she owned after awhile. The franchise sent me to vigorous training and off I went.

Q. What's a typical day like on the job?

A. Nothing is typical about this job; that is what makes me stay interested in the field. The day could start early and end late. It could start late and end early. If you are not on an inspection that day then you need to be out marketing in some form. For me it might start or end with taking my mom or mother-in-law to an appointment between inspections or paid networking events or speaking engagements or NAHI meetings. Inspectors tend to work all the time. We may not have a job on Monday so we make ourselves available on Saturday or Sundays or late evenings in the summer. If the week is packed, I find myself packing a lunch and snacks so I can eat between jobs while driving. My next job might be 15 to 30 minutes away or I might have to drive two hours from where I am to where I need to go next. When getting to a house, one should see something new every time. You might think from the listing pictures that it looks pretty decent and estimate time but then it could be totally different. So, there is really nothing typical and really nothing you can plan normally for in this job.

Q. What are the pros and cons of work in your career?

A. That is a tough question. The pros I would have to say is that not every day is the same. The clients themselves are all different and interesting and have their own story. I actually enjoy most of the people in my industry that I am a member of, NAHI MN. I enjoy learning something new ALL the time. The cons for me would be when the weather is too hot, working really late at night, and eating late at night. Also, working with realtors who really think that home inspectors are out to ruin every deal—realtors who actually do not understand the value of a good home inspector and the role we play.

Q. What are the most important personal and professional qualities for home inspectors?

- A.** As a professional home inspector one needs to be credible in this profession. To accomplish this you need to belong to a national [professional] group and then join the local group. Keep up on all things home and house. One can't think they know it all. If you don't have the answer, you need to be a resource to get the professional answer. Carry insurance—errors and omissions.

As for personal, that is tough. I think inspectors get or lose connections because of their personality, so maybe touching on basics. You have to be able to converse about anything. One has to be approachable and not standoffish. By all means have a lot of confidence in what you are doing. This occupation is not for the meek or mild.

Q. Have you faced any special challenges as a female working in a male-dominated field? If so, how did you deal with these challenges?

- A.** Yes, I have. I have to network harder and a lot more than my male counterparts. Hardly anyone will take my call if I call on a broker or cold call a realtor. I have to be face to face with people so they can meet me and then have a conversation with me. If I can do that, I usually win them over. I get stared at a lot in conferences or building seminars and the such. Still it is hard even with some clients. I sometimes get a very non-communicative individual who is not used to females in the role of home inspector—giving this advice out, coming from me to a male client not from the Midwest is difficult. This is especially true of older Asian males. I have actually lost jobs within that population. They thought I was just the “front person” taking the calls. Then when I showed up at the job, it didn't work out. I can't change cultural issues. I have always been polite and tried to refer them to a male inspector. Even though I didn't get the job, I still hold myself up to a high standard of conduct and act as such. As a result of my involvement I was, and again, elected president of NAHI MN at the time of this interview. As such, in a leadership role I have overcome a lot of the stereotypes.

Q. What advice would you give to young women who are interested in the field?

- A.** I would say that as long as it takes to normally break into this field, as a female you can expect it to be twice as long. It is going to take a lot of face time with people and heavy networking. Stay true to yourself as a female and soon people will seek you out for the excellent job we tend to do in this field. It also will take more investment dollars than you think and realize. Just remember that women do really well in this position and if you really are interested in the area, you will do well. So hang on and buck the system!

CONSTRUCTION MANAGERS

OVERVIEW

Construction managers, also known as *project managers*, *construction superintendents*, and *general contractors*, oversee all aspects of a building project, from inception to completion. They keep the project on schedule, coordinate various tasks with sub-contractors, and hire and fire workers. Besides time management, construction managers are mindful of the cost and quality of the project, which could range from a single-family home or a new high school to a skyscraper or a monument. A growing number of companies require construction managers to have a bachelor's degree; some construction managers still enter the field after gaining years of experience in the industry. Approximately 477,000 construction managers are employed in the United States; 6.8 percent of this total are women. Employment for workers in the field is expected to grow faster than the average for all careers during the next decade.

FAST FACTS

High School Subjects

Business
Mathematics
Shop

Personal Skills

Leadership
Organizational
Problem solving
Technical
Time management

Minimum Education Level

Some postsecondary training

Salary Range

\$50,240 to \$83,860 to
\$150,250+

Employment Outlook

Faster than the average

O*NET-SOC

11-9021.00

GOE

06.01.01

DOT

N/A

NOC

0711

THE JOB

Whether building a single-family home, a strip mall, or a 100-story skyscraper, someone must manage all the construction activities in order to complete the project in a timely and cost-effective manner. This is the role of the construction manager.

A construction manager's duties, regardless of the scope of the project, can be divided into different operational areas. Before the project can get off the ground, the construction manager is involved in the preconstruction planning and administrative support. Meeting with architects, engineers, and the owners of the project, the construction manager assists in preparing a financial estimate of the project and a preliminary construction schedule. He or she may also be asked to voice any issues or questions regarding the project, including owners' expectations, materials used, or architectural or

engineering designs. Any conflicts are resolved as a team at this point. Preconstruction goals include developing a project's working budget, finalizing a realistic construction schedule, and creating a pre-purchase log.

Once plans have been refined and finalized, the construction manager can seek necessary permits, solicit bids for sub-contractors, and begin ordering building materials. He or she can also start to interview and hire construction crews. Major construction companies may have the humanpower and equipment to see a project from beginning to end, but many smaller companies contract aspects of the project to specialized subcontractors. For example, a cement company may be

hired to pour the foundation, a plumbing company to install water pipes or a sprinkler system, a roofing company to construct the roof, an elevator company to install elevators, or even a crane company to lift steel beams or large pieces of material to the upper floors of a skyscraper. Depending on the project's size, the construction manager may hire a *foreman*, *assistant manager*, or other necessary personnel to help manage the project. The construction manager also has to identify any materials that may be hard to acquire or that may require delivery

times that will impact the construction schedule. It is the construction manager's responsibility to ensure that building materials arrive in a timely manner and that subcontractors finish their portions of the project on schedule, otherwise further construction cannot proceed. For example, the frame of a house cannot be put up until the foundation is laid; drywall cannot be put into place until the electrical wiring and gas lines are finished; cabinets cannot be installed if flooring materials have not been delivered. The construction manager also needs to acquire or rent heavy construction equipment such as cranes, mechanical lifts, or other machinery.

Once the materials have been purchased, and the work crew hired, the construction manager supervises the project through each step. He or she continually monitors the crew's productivity and the quality of its work. During various phases of construction, building inspectors inspect certain aspects of the project to make sure its construction complies with government code. Passing inspection is an important responsibility of the construction manager, since it allows the project to continue. For example, if the project's electrical wiring is found to be faulty and not up to code, then the construction manager would have to make sure changes are made before the project would pass inspection. Sometimes, it takes many changes before the project passes inspection. Since delays can cause havoc on the construction schedule, it's important for the project to pass inspection on the first try. When such problems arise, however, construction managers must be able to work around them, perhaps by rescheduling the arrival of materials or work done by subcontractors. Planning changes

"This career is not for someone who wants to start work late in the day or work less than eight-hour days. Often this job requires many hours above and beyond the 9-5 lifestyle."—Christine J. Flaherty, Construction Manager

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often come with additional costs. Any scheduling or budgetary modifications must be reported to the project's owners or financial managers. Also, construction managers must be in constant communication with project officials, engineers, architects, and accountants regarding the progress of the project.

Construction managers are also responsible for the safety of their crew and contractors. They often meet with officials from the Occupational Safety



A construction manager reviews blueprints at a job site.

(Photo courtesy of Photos.com)

and Health Administration, a federal government agency, to make sure the work environment and materials used are free from dangerous chemicals or other hazards, all equipment is properly maintained and in working order, and crew members are wearing adequate protective clothing such as hard hats, work boots, and gloves.

Construction managers also establish wage rates for their crew and may assist the accounting department in working with union rules and rates. When necessary, the construction manager may need to impose disciplinary action or even terminate problem workers.

Full-time construction managers are employed 40 hours a week, but they often work extra hours or on weekends to meet construction deadlines or to finish special projects.

Also, construction managers are on call to respond to any emergencies that occur during a building project—be they with the materials, inspections, or crew.

Construction managers often maintain an office from which the overall construction project is supervised. These offices are usually well lit and comfortable and serve as a place to meet with vendors and contractors. Construction managers also make field visits, traveling to the job site in order to oversee the building's progression. They wear protective clothing such as hard hats, steel-toed boots, and heavy leather gloves when visiting a job site.

Access to a reliable car is important, especially when a construction site is located far from the main office, or when a supervisor is responsible for multiple building projects. When the building project is located out of state, or in some instances, out of the country, construction managers may need to live close to the site.

Construction managers interact with many different vendors, independent contractors, building inspectors, and crew members, often addressing small mishaps or delays. They must stay calm and focused, even when dealing with delays in the delivery of materials, labor issues, or changing deadlines.

REQUIREMENTS

HIGH SCHOOL

In high school, take courses in business, mathematics, accounting, finance, and shop. English and speech classes will help you develop your communication skills. Computer science classes will help you to learn how to use databases, software programs, and other technology.

POSTSECONDARY TRAINING

A growing number of companies require construction managers to have a bachelor's degree in construction management, construction science, building science, architecture, or civil engineering. Some construction managers also earn a master's degree in business administration or finance to improve their business and financial acumen. Some construction managers are able to enter the field with an associate's degree or after gaining years of experience in the industry. Degrees in construction management are available at all academic levels. More than 75 construction management programs are accredited by the American Council for Construction Education. Visit the council's website, <http://acce-hq.org/accreditedprograms.htm>, for a list of accredited two- and four-year programs in construction management. College degree programs in construction management typically include many industry-specific courses (such as site planning, construction methods, construction materials, building codes and standards, inspection procedures, value analysis, and cost estimating), combined with business courses in operations, finance, and marketing. Some colleges offer master's degrees in construction management or construction science. Recipients of these degrees typically work at very large construction firms that oversee multimillion-dollar projects.

"As a woman, you may have to work harder to earn the respect of your peers or supervisors, but that hard work and tenacity will pay off in the long run."—Christine J. Flaherty, Construction Manager

CERTIFICATION AND LICENSING

Certification is available from the American Institute of Constructors and the Construction Management Association of America. While not required, becoming certified is an excellent way to show employers that you are a competent worker who has met the high standards of your industry. Contact these organizations for more information on certification.

OTHER REQUIREMENTS

Key traits of successful construction managers include good time-management skills, the ability to multitask and work under deadline pressure, the ability to solve problems, decisiveness, and leadership skills. Construction managers need excellent communication skills because they frequently interact with a wide range of people—from business executives and managers, to architects

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and engineers, to building inspectors, to tradespeople. Construction managers who are fluent in Spanish will have an extra advantage in the industry because many construction workers speak Spanish as a first language. Finally, good computer skills are necessary to create schedules and cost analyses, as well as to stay in touch with colleagues, suppliers, and contractors.

You May Not Know...

The editors of *Nontraditional Careers for Women & Men* asked civil engineer Christine J. Flaherty to name one thing that young people may not know about a career as a civil engineer:

"Young people don't realize the exciting and dynamic nature of what it's like to work on a project. From working with people from all walks of life with diverse, unique, and important skill sets to contributing to the construction of complex structures and infrastructure that all of us use every day, it is a very rewarding job. There is always something new to learn on each construction project—they are each unique, as are the project team members."

mechanical, plumbing, and electrical; architectural firms; engineering firms; and government agencies. Many construction managers have their own consulting businesses. In fact, 61 percent of construction managers are self-employed.

EXPLORING

The Construction Management Association of America offers a wealth of career resources, including *A Career in Construction Management: Build America's Future as You Build Your Own*. It can be accessed at the association's website, www.cmaanet.org. Other ways to learn more about a career in construction management include reading books and magazines about the field, visiting the websites of college construction management departments, talking with a construction manager about his or her career, landing a part-time or summer job at a construction firm, or managing your friends and resources on a building project (such as a treehouse).

EMPLOYERS

Approximately 477,000 construction managers are employed in the United States; 6.8 percent of this total are women. They work for general contractors; specialty contractors such as

GETTING A JOB

Construction management graduates break into the industry by working as assistants to project managers, field engineers, cost estimators, or schedulers. It is important to gain experience in the field while in school to demonstrate your knowledge of the field to employers. Some ways to gain practical experience include participating in internships and cooperative education programs, or landing an entry-level job in the construction industry.

Many construction managers obtain their first jobs as a result of contacts made through college internships or networking events. Others seek assis-

tance in obtaining job leads from college career services offices, newspaper want ads, and employment websites. Additionally, the Construction Management Association of America offers job listings at its website, www.cmaanet.org/career-headquarters. Those interested in positions with the federal government should visit the U.S. Office of Personnel Management's website, www.usajobs.gov.

EARNINGS

Salaries for construction managers vary by type of employer, geographic region, and the worker's experience level and skills. New graduates with a bachelor's degree in construction science or construction management received average starting salary offers of \$53,199 in July 2009, according to the National Association of Colleges and Employers.

The U.S. Department of Labor (USDOL) does not provide salary information for women construction managers. Median annual salaries for all construction managers were \$83,860 in May 2010, according to the USDOL. Salaries ranged from less than \$50,240 to \$150,250 or more. The USDOL reports the following mean annual earnings for construction managers by employer: building equipment contractors, \$98,040; nonresidential building construction, \$94,170; foundation, structure, and building exterior contractors, \$92,000; and residential building construction, \$91,420.

Construction managers usually receive benefits such as health and life insurance, vacation days, sick leave, and a savings and pension plan. Self-employed workers must provide their own benefits.

EMPLOYMENT OUTLOOK

Employment in the construction industry is expected to be good over the next decade. In fact, according to the U.S. Department of Labor, employment in the construction industry is projected to increase by 19 percent from 2008 to 2018, as compared to an average of 11 percent for all industries. Opportunities will be best in nonresidential construction. Developments that will increase the need for managers include the construction of residential and commercial structures; the renovation of existing structures; the repair and construction of infrastructure, such as bridges, roads, water and sewer pipes, and energy supply lines; and the trend toward retrofitting existing buildings to make them more energy efficient.

Opportunities will be best for those with at least a bachelor's degree in construction management, construction science, or civil engineering who also have practical experience in the industry. The best jobs will also go to those who stay up to date with constantly changing construction technology, building techniques, and construction materials.

Employment for construction managers is tied to the health of the U.S. economy. When the economy is strong, more funding for construction projects is available, and opportunities are good. When the economy is poor, fewer jobs are available as the private and public sectors reduce funding.

FOR MORE INFORMATION

For information on accredited educational programs, contact

American Council

for Construction Education

1717 North Loop 1604 E, Suite 320
San Antonio, TX 78232-1570

210-495-6161

acce@acce-hq.org

www.acce-hq.org

For information on certification, contact

American Institute of Constructors

700 North Fairfax Street, Suite 510

Alexandria, VA 22314-2090

703-683-4999

www.professionalconstructor.org

For information on K-12 programs, contact

Associated General

Contractors of America

2300 Wilson Boulevard, Suite 400

Arlington, VA 22201-5426

800-242-1767

info@agc.org

www.agc.org

For information on careers and certification, as well as a glossary of construction management-related terms, contact

Construction Management

Association of America

7926 Jones Branch Drive, Suite 800

McLean, VA 22102-3303

703-356-2622

info@cmaanet.org

www.cmaanet.org

For additional information on careers and *Building Women* magazine, contact

National Association

of Home Builders

1201 15th Street, NW

Washington, DC 20005-2842

800-368-5242

www.nahb.com

For information about opportunities for women in the construction industry, contact

National Association

of Women in Construction

327 South Adams Street

Fort Worth, TX 76104

800-552-3506

nawic@nawic.org

www.nawic.org

For information about construction careers, education, and its Women's Leadership Academy, contact

National Center for Construction

Education and Research

13614 Progress Boulevard

Alachua, FL 32615

888-622-3720

www.nccer.org

For information on opportunities in Canada, contact the following organizations

Canadian Association of

Women in Construction

365 Brunel Road, Unit #1

Mississauga, ON L4Z 1Z5 Canada

info@cawic.ca

www.cawic.ca

Canadian Construction Women

142 – 757 West Hastings Street,

Suite 290

Vancouver, BC V6C 1A1 Canada

www.constructionwomen.org

There are many other organizations at the national, regional, state, and local levels for women interested in construction careers. See Appendix I: Women's Construction Associations on page 270 for an extensive list of organizations.

Interview: Christine J. Flaherty

Christine J. Flaherty, CCM, LEED AP is the director of business development at STV, Inc., a full-service planning, architecture, engineering, and construction management firm that provides services nationwide. She discussed her career with the editors of *Nontraditional Careers for Women & Men*.

Q. What made you want to enter this career?

A. I have always worked in the field of construction and project management. From college, I was always intrigued with learning how to build projects and being out in the field. I found a firm that gave me those opportunities. My father is an engineer and I earned my engineering degree. He was definitely my most influential mentor in looking at engineering, aside from my Advanced Placement physics teacher in high school.

Q. What are the most important qualities for construction managers?

A. Interpersonal skills are important. Being able to work collaboratively on teams and communicate effectively and efficiently all contribute to an individual's success. In addition, it is important to realize that hard work and a curious and tenacious attitude all remain important characteristics to achieve success. From a professional qualifications standpoint, young professionals need to have a bachelor's degree in architecture/engineering or construction management at a minimum, and in the long term, they should plan on pursuing a master's, either in engineering, architecture, construction engineering, or business, depending on the area of focus. Finally, wait a few years before investing time and money on a master's degree. You want to make sure you are investing in the career that you are best suited for and most interested in. Also, if you wait to determine what master's program you would like to pursue, you may have the opportunity for the firm you work for to sponsor your master's education, if it supports the long-term career plans you have established with the firm where you work. A master's degree is expensive, so you need to consider it as an investment that is well thought out. I would recommend going for your master's at least after three years' experience and before you hit 10 years.

Q. What are some of the pros and cons of your job?

A. Pros: Having a variety of tasks to work on every day. Working with highly knowledgeable people from all walks of life. I have enjoyed learning from the foreman and women in the field as well as the senior project managers, executives, owners, and lawyers who I have worked with and for. All of them have specific tasks on a project to successfully and safely complete a project, and you are in a team environment every day.

Cons: This career is not for someone who wants to start work late in the day or work less than eight-hour days. Often this job requires many hours above and beyond the 9-5 lifestyle. When you are part of a project, the mission is complete the project first and foremost. Fast-tracking projects and pushing jobs requires the hard work of many often times long hours, but for the many people who love their jobs, this is a minor aspect about being a construction manager.

Q. Have you faced any special challenges as a female working in a male-dominated field? If so, how did you deal with these challenges?

A. I've actually found that ageism is a harder stereotype to deal with than sexism. The older generations feel that without experience, a young person doesn't have much to offer, yet the younger generation, when given mentorship and good training, can make a great contribution to firms.

As a female working in the industry, there have been times when you get the sense that you are being treated or observed "differently," but you have to ignore that and perform your job, and eventually you earn the respect from those you work with because they see how you are contributing. One word of advice for young women entering this industry—always remember that you are representing yourself and your company in a professional environment, even if a casual business environment in the field. As such, it is always sound advice to dress in a manner that is appropriate to going to work, not school. Short skirts, tight-fitting shirts, and clothes that distract people will not help you earn respect in the work environment. I know this first hand because I learned this early on in my career. If you are uncertain if that outfit will be OK at work, than the answer probably is no.

Q. What advice would you give to young people—especially young women—who are interested in becoming construction managers?

A. This is an excellent industry to work in. Always ask questions and look for mentors to learn from any and all areas of the business where you are interested. As a woman, you may have to work harder to earn the respect of your peers or supervisors, but that hard work and tenacity will pay off in the long run. Also, do not think that you are alone in your endeavor in this career. There are many women in this industry, many, many talented, bright, and aggressive women who are successful in their own right. Seek them out to mentor you when you may have difficulties. Also, please remember that this is a team-oriented industry; your success does not have to be at the expense of others. Honesty and integrity are critical and important values to hold onto in this business. You are only as good as your word, and honesty is THE most important value to hold onto. As an offshoot of honesty, be true to yourself in your career—use your own style of work and do not think that you have to behave the same way as others do to get results (i.e., don't feel like you have to yell at contractors to get results, there are other ways to accomplish the goals you are trying to achieve).

COST ESTIMATORS

OVERVIEW

Cost estimators are employed by the construction and manufacturing industries to forecast the cost of a proposed product, construction project, manufacturing process, or other endeavor. By carefully analyzing all components that make up a project or proposed process, they deliver a total cost for the company so managers can decide if the project is a good idea economically. At least some postsecondary training is required to land a job in the field; increasingly employers are seeking cost estimators with bachelor's degrees. Approximately 102,000 cost estimators are employed in the United States; 11.6 percent are women. Good job opportunities are expected for workers in the field during the next decade.

FAST FACTS

High School Subjects

Business
Economics
Mathematics

Personal Skills

Communication
Critical thinking
Technical

Minimum Education Level

Some postsecondary training

Salary Range

\$34,100 to \$57,860 to
\$95,620+

Employment Outlook

Much faster than the average

O*NET-SOC

13-1051.00

GOE

13.02.04

DOT

160

NOC

2233, 2234

THE JOB

The majority of cost estimators work in the construction industry. Construction estimators study blueprints and specifications to create cost estimates for projects. They also visit proposed project sites to study the building conditions and determine if there are any special issues that might affect the estimate. For example, they must account for the nearest utility lines or sewers and add these factors into their cost projections. If the land is dense with trees, bushes, or other vegetation, cost estimators need to factor the cost of clearing the land into their estimates. Cost estimators also take into account the proposed building materials (analyzing quality, quantity, type, and cost of the materials that will be used), the type of equipment proposed to be used to construct the building, the size of and rates paid to labor crews, and the computer hardware and software required. They also calculate taxes and insurance costs. After these and other details have been added together, estimators add a certain percentage to the estimate to cover unforeseen or emergency expenses and to ensure that the construction company will make a profit.

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Estimators may specialize in residential or commercial project estimation. Construction companies often employ more than one cost estimator, with each worker specializing in a particular area of construction. For example, they may hire an *electrical cost estimator*, a *concrete or flooring cost estimator*, and a *drywall estimator*.

Cost estimators also work in the manufacturing industry. They are hired to estimate the cost of producing a new product or changing a manufacturing process, and to analyze its profitability. They must consider the quality of material to be used, tools and equipment needed to produce the products, labor costs, and other associated costs.

You May Not Know...

The editors of *Nontraditional Careers for Women & Men* asked Marcene Taylor, a cost estimator and the owner of MARCENE TAYLOR INC. in Boise, Idaho, to name one thing that young people may not know about a career as a cost estimator:

"Estimators play a critical role in the design and construction of any project. They are usually the one person on the team who has touched every part of the project during the planning stage, and they have thought about all the nuances of the construction. Estimators are go-to players for architects, engineers, project managers, and owners."

Some cost estimators with specialized knowledge are known as *cost engineers*. These estimators specialize in minimizing costs of a project using what is called Total Cost Management (TCM). TCM is a process by which the estimator uses his or her professional and technical expertise to plan and control resources, costs, profitability, and risk. Cost engineers typically specialize based on industry (such as construction, manufacturing, or information technology) or production type (such as buildings or software).

Cost estimators just starting out often work on smaller components of a project and then report their findings to a lead estimator who reviews them and adds them to the final pricing of the overall project. Estimators in a *lead* or *head estimator* role must have management skills to be able to lead cost estimation teams and juggle other administrative tasks such as payroll, vacation scheduling, and performance reviews. Some lead estimators may be expected to coach or mentor estimating personnel just starting out in the field.

Cost estimators use a variety of techniques to determine their projections, including statistical modeling, time-phase charts, learning-curve analysis, and cost-estimating relationships. Time-phase charts show the time required for tool design and fabrication, troubleshooting and correcting all problems, manufacturing parts, assembly, and testing. Learning curves graphically represent the rate at which the labor force employed on a project becomes more efficient. As the project moves on, the performance of workers improves with practice. These statistical graphs are also commonly called "cost reduction" curves, because many issues that can creep up during the life cycle of

a project, such as staffing changes, redesigns, shortages of parts, and lack of operator skills, generally diminish over time. Much of this analysis of charts and curves is done with the help of high-tech computer software, so estimators must be adept at and comfortable using computers.

Once an estimate has been delivered and if a project does go through, some estimators are maintained on the project to monitor completion and prepare cost summaries.

Cost estimators typically work in offices with standard hours of operation. Those who are employed in the construction industry often keep earlier hours—getting to the office or construction sites as early as 5:00 or 6:00 A.M. Some travel is necessary to review proposed building sites or processes.

A career as a cost estimator can sometimes be stressful. In many cases, the success or failure of the contractor depends on the estimator. If he or she underestimates costs, the contractor will lose money. On the other hand, if the estimator presents an inflated cost, the proposed bid for the project will most likely be rejected.

REQUIREMENTS

HIGH SCHOOL

In high school, take courses in accounting, mathematics, business, economics, and computer science. English and speech courses will help you to develop your communication skills, which you will use frequently as a cost estimator to write reports and interact with coworkers. Take shop and drafting courses to learn how to read blueprints and other technical documents.

POSTSECONDARY TRAINING

At least some postsecondary training is required to land a job in the field. Employers in the construction and manufacturing industries are increasingly seeking cost estimators with bachelor's degrees.

Cost estimators in the construction industry have degrees in construction management, building science, or construction science. Courses in cost estimating are included in these degree programs. In addition to formal education, cost estimators should gain experience through participation in internships or cooperative education programs, or entry-level work in the industry.

Cost estimators in the manufacturing industry typically have degrees in engineering, mathematics, statistics, physical science, operations research, accounting, finance, business, economics, or a related subject.

According to the U.S. Department of Labor, “many colleges and universities include cost estimating as part of bachelor's and associate's degree curriculums in civil engineering, industrial engineering, information systems development, and construction management or construction engineering technology. In addition, cost estimating is often part of master's degree programs in construction science or construction management.”

Cost estimators also receive long-term, on-the-job training because each company has its own protocol regarding cost estimation techniques. Professional cost-estimating associations—such as the American Society of Professional Estimators, the Association for the Advancement of Cost

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Engineering, and the Society of Cost Estimating and Analysis—also offer continuing education programs.

CERTIFICATION AND LICENSING

The American Society of Professional Estimators, the Association for the Advancement of Cost Engineering, and the Society of Cost Estimating and Analysis offer voluntary certification to cost estimators. Contact these organizations for more information.

OTHER REQUIREMENTS

Cost estimators should have excellent mathematical ability, an analytical nature, the ability to multitask, confidence, and strong interpersonal skills to work well with management and colleagues. They should also be computer-savvy and be familiar with cost estimation software, including commercial and building information modeling software (which is used frequently in the construction industry). Estimators must have excellent communication skills to effectively negotiate prices with subcontractors, vendors, and their clients. Often the people they work with have widely differing goals, interests, and points of view, so estimators must be able to take into account these issues while still doing their jobs. They also might be asked to report their findings to management during project meetings in a presentation-style format. They need to be able to translate highly technical findings into straight talk regarding pricing and recommended courses of action.

EXPLORING

Read books and magazines about cost estimating. Visit the websites of professional cost estimating associations and college programs that offer degrees or classes in the field. Talk with a cost estimator about his or her career. Try to land a part-time or summer job at a construction firm or a factory to get a taste of what a career in these industries is like. Join business clubs at school.

EMPLOYERS

Approximately 102,000 cost estimators are employed in the United States; 11.6 percent are women. The construction industry employs nearly 60 percent of all cost estimators, and approximately 15 percent work for manufacturers. The remaining percentage are employed in a variety of industries.

GETTING A JOB

Many cost estimators obtain their first jobs as a result of contacts made through college internships, career fairs, and networking events. Others seek assistance in obtaining job leads from college career services offices, newspaper want ads, and employment websites. Additionally, professional associations, such as the American Society of Professional Estimators, provide job listings at their websites. See For More Information for a list of organizations. Those interested in positions with the federal government should visit the U.S. Office of Personnel Management's website, www.usajobs.gov.

EARNINGS

Salaries for cost estimators vary by type of employer, geographic region, and the worker's experience level and skills. The U.S. Department of Labor (USDOL) does not provide salary information for female cost estimators. It does report that women employed in business and financial operations occupations earned annual salaries of \$47,528 in 2010. Median annual salaries for cost estimators were \$57,860 in May 2010, according to the USDOL. Salaries ranged from less than \$34,100 to \$95,620 or more. The USDOL reports the following mean annual earnings for cost estimators by employer: nonresidential building construction, \$69,410; building equipment contractors, \$64,970; foundation, structure, and building exterior contractors, \$61,010; building finishing contractors, \$60,450; and residential building construction, \$59,540.

Cost estimators usually receive benefits such as health and life insurance, vacation days, sick leave, and a savings and pension plan. Self-employed workers must provide their own benefits.

EMPLOYMENT OUTLOOK

Employment for cost estimators is projected to grow much faster than the average for all careers through 2018, according to the U.S. Department of Labor. The construction industry, which is expected to grow by 19 percent during this time span, will provide the most job openings for cost estimators. Factors that are fueling demand for cost estimators in the construction industry include increasing population (which is creating demand for construction projects of all types, including infrastructure such as highways, bridges, and subway systems) and the growing complexity of construction projects (which is prompting demand for estimators with specialized skills). Opportunities will be best for those with at least a bachelor's degree, certification, and industry experience.

Employment for cost estimators in the construction industry is tied to the health of the U.S. economy. When the economy is strong, more funding for construction projects is available, and opportunities are good. When the economy is poor, fewer jobs are available as the private and public sectors reduce funding.

FOR MORE INFORMATION

For information on society-sponsored educational programs and certification, contact

**American Society
of Professional Estimators**
2525 Perimeter Place Drive, Suite 103
Nashville, TN 37214-3674
888-EST-MATE
SBO@aspenational.org
www.aspenational.org

For information on career paths in cost estimation, certification, and its Women in Project Controls Committee, contact

**Association for the Advancement of
Cost Engineering International**
1265 Suncrest Towne Centre Drive
Morgantown, WV 26505-1876
304-296-8444
info@aacei.org
www.aacei.org

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For More Info, continued from page 71

To learn about opportunities for women in construction, contact

National Association of Women in Construction

327 South Adams Street
Fort Worth, TX 76104
800-552-3506
nawic@nawic.org
www.nawic.org

For information on certification and a glossary of cost estimating terms, visit the society's Web site.

Society of Cost Estimating and Analysis

527 Maple Avenue East, Suite 301
Vienna, VA 22180-4753
scea@sceaonline.net
www.sceaonline.net

Contact the following organizations to learn more about opportunities in Canada

Canadian Association of Women in Construction

365 Brunel Road, Unit #1
Mississauga, ON L4Z 1Z5 Canada
www.cawic.ca

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Interview: Marcene N. Taylor

Marcene N. Taylor, CPE, LEED AP is a cost estimator and the owner of MARCENE TAYLOR INC. in Boise, Idaho. She has worked in the field since 1996. Marcene discussed her career with the editors of *Nontraditional Careers for Women & Men*.

Q. What made you want to enter this career?

A. I just started my own firm, consulting to owners and design professionals during the planning stages of construction. Prior to opening my company, I have worked for both cost consulting firms and an architecture firm.

I did not have any idea that this career existed while I was going to college. I worked doing administrative and accounting work and happened to get a job for Davis Langdon answering their phones and typing their estimates. After I was there about six months, I was offered an apprenticeship to learn how to estimate. I think it is fascinating and quite creative to estimate costs of buildings without a lot of detail to measure.

Q. What is one thing that young people may not know about a career as a cost estimator?

A. Estimators play a critical role in the design and construction of any project. They are usually the one person on the team who has touched every part of the project during the planning stage, and they have thought about all the nuances of the construction. Estimators are go-to players for architects, engineers, project managers, and owners.

Q. What are the most important qualities for people in your career?

- A.** Estimators need to be detail-oriented as well as willing to see the big picture—it is a job that requires a mixture of creativity and science. They need to be adept at using numbers/math and have good computer skills. Estimators also need to be diplomatic, good leaders, and team players.

Q. What are some of the pros and cons of your job?

- A.** Pros include great opportunities for career advancement, opportunities to continue to learn and work on a variety of job types, and opportunities to live and work anywhere in the country. In addition, you have the opportunity to work in construction, but work in an office as opposed to being in the field—so it may be easier on your body long term.

Cons include times of high stress and long hours when estimates and bids are due. Also, if working for a contractor, job opportunities may be dependent on the construction climate in your area.

“As a woman in the construction field, you have to maintain a positive and confident attitude and make sure that you know your stuff. Acknowledge that you may have to work harder to prove yourself.”

—Marcene N. Taylor,
Cost Estimator

Q. Any advice for aspiring estimators? What's the best way to land a job?

- A.** Learn all that you can about a variety of aspects of design and construction and building types. There isn't a degree course in estimating, so you will have to learn on the job. Ask questions and pay attention to what is going on around you—be willing to be mentored. The people who are the best teachers are the ones who have been estimating for a long time.

The best way to find a job is to express interest in estimating. Many people don't think that estimating is an exciting career choice and only choose it as a pathway to get out onto construction sites as a project manager or supervisor. In addition, join a professional organization such as the American Society of Professional Estimators and network with others in the field.

Q. Have you faced any special challenges as a female working in such a male-dominated field? If so, how did you deal with these challenges?

- A.** There are some challenges. Construction is not only male-dominated, but also traditional. As a woman in the construction field, you have to maintain a positive and confident attitude and make sure that you know your stuff. Acknowledge that you may have to work harder to prove yourself. I have found though that once you earn respect in the field it is strongly defended by the male workers around you.

Q. What advice would you give to young women who are interested in the field?

- A.** You need to maintain a positive and professional demeanor and have a thick skin. Learn everything you can and be confident!

ELECTRICAL AND ELECTRONICS ENGINEERS

OVERVIEW

Electrical engineers focus on the high-power generation of electricity, such as electricity needed to power homes or a car's transmission. *Electronics engineers* focus on the application of electricity to smaller-scale applications such as electrical circuits, computers, smartphones, and electronic devices such as iPads. A minimum of a bachelor's degree in electrical engineering or a related major is required to enter these careers. There are approximately 298,000 electrical and electronics engineers employed in the United States. Slightly more than 7 percent are women. Little or no employment change is expected for electrical and electronics engineers during the next decade, but since the field is so large, there will be many employment opportunities for aspiring electrical and electronics engineers.

THE JOB

Ever wonder how the video games of the 1970s developed into the multi-player, graphically powerful video games we enjoy today? Or marvel at how the lights work when you turn them on? We can thank electrical and electronics engineers for these and countless other improvements. But electrical and electronics engineers do more than just work on video games and the delivery of electricity to homes. For example, they develop technology that helps doctors identify diseases more quickly, animation technology that helps the entertainment industry deliver cutting-edge movies and television shows to consumers, robotics technology that is used by NASA to explore Mars, GPS devices in vehicles that help people get to

FAST FACTS

High School Subjects

Computer science
Mathematics
Physics
Shop

Personal Skills

Critical thinking
Complex problem solving
Judgment and decision making
Technical/scientific

Minimum Education Level

Bachelor's degree

Salary Range

\$54,030 to \$84,540 to
\$128,610+ (electrical engineers)
\$57,860 to \$90,170 to \$135,080+
(electronics engineers)

Employment Outlook

Little or no change

O*NET-SOC

17-2071.00, 17-2072.00

GOE

02.07.04

DOT

099

NOC

2133

their destinations, security equipment that scans luggage for potential terrorist threats at airports, and the list goes on.

Electrical engineers design, develop, and test electrical equipment, components, systems, or devices. This equipment includes electric power generators, wireless phone transmitters, high-density batteries, navigation systems, electrical systems of aircraft and automobiles, electric motors, radar and navigation systems, communication systems, and power systems used by utilities and other industries.

When electrical engineers start a project, such as redesigning the electrical distribution system of a luxury automobile, they often meet with engineers, designers, and vendors to discuss future goals and identify existing problems with the current systems. They analyze system requirements, cost, and time-frame, as well as the feasibility of the project. Engineers create blueprints using tools such as computer-assisted engineering and design software and computer testing systems to build and test a prototype of the new system. Once the new system is created, engineers and technicians evaluate, retest, inspect, and make any needed modifications before the new system is broadly implemented.

Electronics engineers design, develop, and test electronics equipment such as broadcast and communications systems, aerospace guidance and propulsion control systems, MP3 players, computer systems, GPS devices, and smartphones. Electronics engineers who work solely on computer hardware are often considered *computer hardware engineers*.

Electronics engineers, such as those responsible for designing new electronic circuit boards or the electronic components of a smartphone, also begin their project with a team meeting. Conferring with other engineers, technicians, industrial designers, and corporate managers, electronics engineers work to identify the goals of the product, needs of the customer, and technical requirements to meet these requirements. They use computer-aided engineering and design software and equipment in preliminary stages, detailing all parts of the systems, including wiring and installation. They take into account budgeting and production concerns as well as safety standards and industry regulations. Electronics engineers often provide technical support and training to staff members to help them learn proper use and maintenance of new systems. They may also write technical guides and user manuals for products.

Electrical and electronics engineers, especially those who work in research and development, help prepare bid documents, drawings, and specifications for new products, parts, or systems for the military, government agencies, and manufacturers. Many engineers file patents, either individually or on behalf of a group, to protect their designs or innovations. Other

"Electrical engineering is multidimensional, interdisciplinary, and strives to innovate technology for the benefit of humanity. It provides an incredible foundation for an unimaginable variety of careers."

—Karen Panetta, Electrical Engineer

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duties of electrical and electronics engineers include supervision of technicians and other workers assigned to a project.

Some electrical and electronics engineers write reports and articles for professional publications, present their findings at industry conventions and seminars, and teach college-level classes.

Most electrical and electronics engineers work 40 to 50 hours a week. Depending on the project at hand, this time includes occasional work on the weekends or during evenings.

Electrical and electronics engineers work in a variety of settings. Some have comfortable, well-lighted offices and laboratories, while others work in factories, in power plants, or even outdoors. Engineers who work outdoors, such as those overseeing the installation of equipment, often work in less-than-favorable conditions, especially when the weather is inclement. Engineers take precautions when working with heavy machinery or complicated tools by wearing sturdy shoes, insulated work gloves, or other protective clothing.

Some travel is expected, since engineers are often assigned to projects outside of office headquarters. Depending on the length of the project—some larger projects last several years—engineers often consider relocating closer to the project's center.

Dollars for College

The Society of Women Engineers offers scholarships and fellowships to women who have been “admitted to accredited baccalaureate or graduate programs, in preparation for careers in engineering, engineering technology and computer science.” Scholarships and fellowships range from \$1,000 to \$20,000 each. Visit <http://societyofwomenengineers.swe.org> for more information.

REQUIREMENTS

HIGH SCHOOL

There are many high school classes that will prepare you for college and a career as an engineer. Take classes in algebra, geometry, trigonometry, calculus, physics, electronics, computer science, English, speech, business, and social studies. Taking a foreign language will also be useful, since there are many opportunities for engineers in foreign countries.

POSTSECONDARY TRAINING

A minimum of a bachelor's degree in electrical engineering or a related major (such as electronics or computer engineering) is required to enter these careers. Many electrical and electronics engineers—especially those interested in pursuing managerial or research positions—receive a master of science degree in a specialization of their choice. Some earn a master's in business administration. College electrical and electronics professors need at least a master's degree, with most earning a Ph.D. ABET accredits electrical and

electronics engineering programs. Visit its Web site, www.abet.org, to access a searchable database of accredited programs in the United States.

CERTIFICATION AND LICENSING

Electrical and electronics engineers whose work affects property, health, or life must be licensed as professional engineers. According to the U.S. Department of Labor, “this licensure generally requires a degree from an ABET-accredited engineering program, four years of relevant work experience, and completion of a state examination. Recent graduates can start the licensing process by taking the examination in two stages. The initial Fundamentals of Engineering examination can be taken upon graduation. Engineers who pass this examination commonly are called engineers in training (EITs) or engineer interns. After acquiring suitable work experience, EITs can take the second examination, called the Principles and Practice of Engineering exam.” Visit the National Council of Examiners for Engineering and Surveying’s website, www.ncees.org, for more information on licensure.

OTHER REQUIREMENTS

Are you an excellent problem solver? Good at math and science? Creative? If so, you might be a good electrical or electronics engineer. Other important traits for engineers include a logical mind, curiosity, strong communication skills (including the ability to interact as a member of a team and write technical reports), and a willingness to continue to learn throughout your career.

EXPLORING

There are many ways to learn about a career as an electrical and electronics engineer. You can read books about the field, join engineering and science clubs, conduct information interviews with engineers about their careers, and participate in engineering summer camps sponsored by colleges and universities.

There are also many specialized resources available for women interested in engineering. You can read a sample issue of *IEEE Women in Engineering Magazine* by visiting www.ieee.org/membership_services/membership/women. The magazine seeks to encourage young women to enter the field. Attaining student membership in IEEE Women in Engineering will also help you learn more about the field. Finally, IEEE Women in Engineering offers the STAR Program to mentor young women in junior and high schools and to encourage them to pursue careers in the field. Visit www.ieee.org/membership_services/membership/women/star.html for more information.

EMPLOYERS

There are approximately 298,000 electrical and electronics engineers employed in the United States. Slightly more than 7 percent are women. Electrical and electronics engineers are employed by private businesses, large corporations, government agencies, and the military. According to the Institute of Electrical and Electronics Engineers, there are 10 key

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industry sectors in which engineers are employed: telecommunications, energy and electric power, computers, semiconductors, aerospace, bio-engineering, manufacturing, education and research, transportation and automotive, and the service industry.

GETTING A JOB

Many electrical and electronics engineers obtain their first jobs as a result of contacts made through college internships or networking events. Others seek assistance in obtaining job leads from college career services offices, newspaper want ads, and employment websites. Additionally, professional engineering associations—such as the Institute of Electrical and Electronics Engineers (<http://careers.ieee.org>)—provide job listings at their websites. The Institute also offers career articles, career enhancement webinars, and other employment resources at www.ieee.org/education_careers. Those interested in working for the federal government should visit the U.S. Office of Personnel Management's website, www.usajobs.gov.

EARNINGS

The U.S. Department of Labor (USDOL) does not provide salary information for female electrical and electronics engineers. It does report that women employed in architecture and engineering occupations earned average annual salaries of \$54,080 in 2010.

Median annual salaries for all electrical engineers were \$84,540 in May 2010. Salaries ranged from less than \$54,030 to \$128,610 or more. Electronics engineers earned median annual salaries of \$90,170. Ten percent earned less than \$57,860, and 10 percent earned \$135,080 or more.

Employers offer a variety of benefits, including the following: medical, dental, and life insurance; paid holidays, vacations, and sick and personal days; 401(k) plans; profit-sharing plans; retirement and pension plans; and educational-assistance programs. Self-employed engineers must provide their own benefits.

EMPLOYMENT OUTLOOK

Little or no employment change is expected for electrical and electronics engineers during the next decade, according to the U.S. Department of Labor (USDOL). Foreign competition and the use of engineering services performed in other countries will limit job growth. Despite this prediction, there will continue to be employment opportunities for aspiring electrical and electronics engineers because the field is so large, and current engineers will leave the field to retire or for other reasons. The USDOL predicts that “electrical engineers working in firms providing engineering expertise and design services to manufacturers should have better job prospects.” It also predicts that electronics engineers will find the most opportunities in service-providing industries—especially in firms that provide engineering and design services.

FOR MORE INFORMATION

For a list of ABET-accredited industrial engineering programs, visit the ABET website.

ABET

111 Market Place, Suite 1050
Baltimore, MD 21202-7116
410-347-7700
www.abet.org

For information about education and careers in engineering and its Women in Engineering Division, contact

American Society for Engineering Education

1818 N Street, NW, Suite 600
Washington, DC 20036-2479
202-331-3500
www.asee.org
<http://wied.asee.org>

The Institute has a goal of increasing the number of women who pursue careers in technology. Visit its website for Q&As with high-achieving women in computer science and engineering, statistics about women in these fields, and a wealth of other resources.

Anita Borg Institute for Women and Technology

1501 Page Mill Road, MS 1105
Palo Alto, CA 94304
650-236-4756
<http://anitaborg.org>

For information on education and careers, contact

Institute of Electrical and Electronics Engineers

2001 L Street, NW, Suite 700
Washington, DC 20036-4910
202-785-0835
ieeusa@ieee.org
www.ieee.org

For information on career opportunities for women in engineering, visit **IEEE Women in Engineering**
women@ieee.org
http://www.ieee.org/membership_services/membership/women

MentorNet offers free web-based e-mentoring between female and other underrepresented engineering and science students and industry professionals. There is no charge for the service, and males may also participate.

MentorNet

www.mentornet.net

For information on licensure, contact **National Society of Professional Engineers**

1420 King Street
Alexandria, VA 22314-2794
www.nspe.org

For career guidance and scholarship information, contact

Society of Women Engineers

203 North LaSalle Street, Suite 1675
Chicago, IL 60601
www.swe.org

This website features more than 30 videos and essays from women working in a variety of careers at NASA. It also features a blog and a link to a site for middle-school girls who are interested in learning more about careers in science, technology, engineering, and mathematics.

Women @ NASA

<http://women.nasa.gov>

This website offers special radio programming on women in science, technology, engineering, and mathematics.

Women in Science, Technology, Engineering, and Mathematics ON THE AIR!

www.womeninscience.org

Interview: Karen Panetta

Dr. Karen Panetta is a professor of electrical and computer engineering and director of the Simulation Research Laboratory at Tufts University. She is also the founder of Nerd Girls (<http://nerdgirls.com>), whose mission is to “encourage other girls to change their world through science, technology, engineering, and math, while embracing their feminine power.” Karen discussed her career and the field with the editors of *Nontraditional Careers for Women & Men*.

Q. How long have you worked in the field?

A. I have worked in technology since I was an engineering undergraduate, then in industry for over a decade, and now as a professor for 15 years.

Q. What made you want to become an electrical engineer?

A. Honestly, I didn't know what electrical engineers did. My father recognized that I was good at math and science and also that I had expensive shopping habits. He decided that I should be an engineer. I loved writing computer programs and wanted to know more about what went on inside the “box”; that's when I decided to go into computer engineering. Computer engineering is the best of both worlds. I write and know software as much as a computer science person and can design hardware for pretty much anything! I received my master's and Ph.D. in electrical engineering.

Q. What is one thing that young people may not know about a career in electrical engineering?

A. Electrical engineering is multidimensional, interdisciplinary, and strives to innovate technology for the benefit of humanity. It provides an incredible foundation for an unimaginable variety of careers. For instance, I work on biomedical applications to help disabled people using my research in image processing to help medical doctors better detect cancer and see things in medical scans that humans might miss. I also develop security applications to help detect threat objects in passenger luggage. I use robotics to survey areas that could be hazardous for humans or to catch criminals. I develop software information systems to help track disabilities in children to help researchers determine the causes of afflictions such as autism and blindness. I create devices to help disabled people regain some of their lost independence, and I use renewable energy to provide clean energy to remote islands that are the homes of endangered birds. I use animation and special effects to communicate and convey scientific approaches so that anyone can understand technical topics dominating our world. I even got to work for NASA. Every one of these opportunities was made possible by my electrical engineering education.

Q. What are the pros and cons of work in your career?

A. You must keep learning! Some people look at this as both a pro and a con! Technology changes so rapidly, and we are always looking ahead to anticipate our world's technology needs to keep people safe, healthy, and productive. Always having to be ahead of technology and dreaming of new innovations keeps us from getting bored or becoming obsolete. It also opens new avenues for us because we can move into other fields such as medicine, law, education, and public policy. Who is better suit-

ed to bring awareness and evaluate new technology policies than those of us who understand every facet of it?

The cons are that people can get too comfortable and won't sacrifice the security of working as a highly paid engineer for a company or take the time to go back to school to keep their skills current. They may not take risks to venture out on their own to start their own companies. I always encourage my students to continue their formal education and try to be entrepreneurs while they are still young and used to living on student wages. It gets tougher to give up a secure income once you have a family.

Professional organizations like the IEEE (Institute of Electrical and Electronic Engineers) also offer lots of training in the hottest fields to help keep people current who may not want or can't afford to go back for a graduate degree. So, there's no excuse for us not to keep learning!

Q. Have you faced any special challenges as a female working in a male-dominated field? If so, how did you deal with these challenges?

- A.** The most difficult hardships I faced were the many social stigmas associated with smart women, including what we are supposed to look and dress like, to our personality traits, or lack of personality traits! If a woman appeared like she stepped out of a fashion magazine, then it was considered impossible for her to have a brain. The other big myth is that competent female engineers and scientists can't possibly have interests in athletics, dance, music, the arts, or any other social activity. This defies the stereotype that smart women must also be anti-social!

Q. What advice would you give to young women who are interested in becoming electrical engineers?

- A.** Stop worrying about grades and just run through the finish line to get your degree. You don't need to cross the finish line first; you just need to complete the race to win. Engineering is all about learning how to do things right from experiments that have gone wrong. Get comfortable being uncomfortable when learning new things and don't let it paralyze your motivation. Ignore people who try to put limitations on you. Since when does anyone know you better than you know yourself? There are lots of people out there who will tell you what you cannot do. Only you can let them hold you back so don't let them! Finally, you're not alone. There are support groups out there like Nerd Girls and IEEE Women in Engineering that are helping thousands of young girls reach their full potential. If you ask us for help, we're here for you.

Q. Can you tell us a little about the Nerd Girls program that you created?

- A.** Nerd Girls arose from my frustration that smart girls had so many negative stereotypes associated with them, which the entertainment industry was also perpetuating. While the scholars were busy spending thousands of tax dollars trying to investigate "why girls' brains work differently than boys'," I took a common sense, low-cost approach to look at what girls were seeing every day in their lives. What I saw was that the media promoted that success for a woman meant she had to be thin, look like a super model, and have some sort of talent, whether it be singing or cheerleading. Now, we have brilliant women who do these things, too, but no one was promoting this. No one made the connection that the peer pressure of being perceived as a smart girl made her socially unacceptable. Furthermore, if she was smart and not afraid to show it, the stereotype cast her as someone who had to be ugly and

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have no other social interests or talents. What was missing is that engineers are innovators and all those interdisciplinary talents we have outside of engineering is what makes us better innovators who aren't afraid to imagine new things that don't exist.

The nail in the coffin for me was seeing the negative perception that young women could not be financially independent; therefore a successful woman would make it a goal to latch on to someone well off to support her.

The other major observation I made was that smart girls still suffer from an overwhelming lack of confidence, despite getting good grades. Finally, girls want to see the "big" picture. There is a persistent lack of understanding of what engineers do and their value to society. This also holds girls back.

Biomedical engineering is now one of the most popular disciplines for women in engineering. Why? Because, they learn that biomedical engineers help find cures for diseases, develop assistive technology for the disabled, and save the environment. Guess what? Electrical engineers do this, too, but because what we do is sometimes transparent to society, they don't attribute the great innovations we come up with to electrical engineering. For instance, pacemakers and cell phones would not be possible without electrical engineers.

I put the pieces together and created Nerd Girls. The approach is to: 1) Find projects that require teamwork that serve humanity, whether it be a person, a community, or the environment. 2) Teach students to use the skills they have and not be afraid to learn new research skills to tackle problems they have never seen before, which builds their confidence. 3) Finally, show younger students that these girls are successful and make them role models for younger students by showcasing not only their engineering accomplishments, but their interdisciplinary interests, in dance, cheerleading, music, drama, writing, sports, and art that make them "normal" everyday girls just like the girls they reach out to.

What is different about Nerd Girls from other mentorship programs is that the participants just don't learn to "teach" younger students. They are researchers and inventors first. Thus, they stretch their own career development skills and learn that while they can be good teachers and role models, they can be independent successful career women with no limits on their potential.

Q. What has been one of the most rewarding experiences in your career, and why?

- A.** When I first proposed Nerd Girls, I was attacked for trying to redefine the word "nerd" into something positive and cool. I was told this was impossible. If you look in an old dictionary, the word "nerd" said "someone stupid and socially inept." If you look at the definition today, it says a nerd is someone who is smart. Young girls are now proclaiming themselves proudly as Nerd Girls. They are smart talented young women who don't fit any negative stereotype. I watch generations of my Nerd Girls accomplish things I never dreamed of and know that I truly have changed the word "nerd" into something positive and cool.

I have essentially accomplished what I set out to do, namely, change the way a nation views women in engineering and science.

ELECTRICIANS

OVERVIEW

Electricians install, repair, and maintain electrical and power systems for homes, corporations, and industrial businesses. Some electricians specialize in intercommunications systems, air conditioning, electrical equipment, or renewable energy infrastructure. Most electricians prepare for the field by completing an apprenticeship. There are approximately 560,000 electricians employed in the United States. About 1.5 percent are women. Employment for electricians is expected to be good during the next decade.

THE JOB

By the time you move into a new house, the air conditioning is already working, appliances are operating, and with a flip of a switch, the lights can be turned off and on. At businesses, offices and boardrooms are well lighted, and all communication systems are operational every working day. Industrial operations can maintain their functions because assembly lines, transformers, and machine tool controllers are up and running. Electricians make all this possible, since they are in charge of installing, maintaining, and repairing electrical and power systems for homes and businesses, and in a variety of industries throughout the country.

Electricians take care of the backbone of all power supplies when working in construction. With new homes, they first follow construction blueprints showing the desired location of wiring equipment. At times, electricians may provide sketches or assist in the preliminary blueprint design. They rate the information presented, and, if needed, provide the construction manager or foreman with necessary suggestions or changes.

When installing new wiring, electricians measure and cut, bend, and thread electrical conduit. They use a variety of tools and instruments for this task such as wire and cable cutters, pipe threaders, conduit benders, or screwdrivers and wrenches. They install various control and distribution apparatus—switches, dimmers, relays, and circuit breaker panels.

FAST FACTS

High School Subjects

Mathematics
Shop

Personal Skills

Complex problem solving
Critical thinking
Mechanical/technical

Minimum Education Level

Apprenticeship

Salary Range

\$29,400 to \$48,250 to
\$80,890+

Employment Outlook

About as fast as the average

O*NET-SOC

47-2111.00

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2244, 5226, 7212, 7241,
7242, 7243, 7245, 7246

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They also connect power cables to equipment and install the ground leads. Electricians are also in charge of installing light fixtures, appliances, wiring for heat and air conditioning, audio and video systems, air conditioning, and alarm systems. Once all wiring is complete, electricians install and test all electrical fixtures, apparatus, and control equipment.

Electricians also install wiring for businesses and industrial companies. They prepare logic diagrams for all computerized equipment, robotics, or assembly systems, as well as programmable controllers and other electronic systems. Communications systems are another responsibility of electricians, specifically coaxial cable or fiber-optic cable for computers and telephones.

When maintaining or repairing existing wiring systems, electricians test circuits to make sure they comply with safety codes. If equipment or systems through testing appear hazardous, electricians will advise management. They suggest necessary adjustments or replacements of parts or an entire system upgrade.

For large projects, electricians may work with or supervise a team of less-experienced electricians and apprentices.

With further training, electricians can specialize and work as the following:

Powerhouse electricians are in charge of the repair and maintenance of generating stations and powerhouses.

Substation electricians inspect, test, and maintain substation electrical equipment, including circuit breakers, transformers, and surge arresters.

Locomotive electricians oversee the installation and maintenance of electrical wiring and equipment of railroad cars, streetcars, and subway trains. They work on motors, generators, air conditioners, electrical outlets, and lighting fixtures.

Electricians typically work a 40-hour week, though some overtime may be required when working on large projects or emergency repairs. Some companies that operate 24 hours a day may employ three shifts of electricians for overall coverage. Maintenance work may be scheduled during evening hours or weekends, especially in emergency situations. Electricians must wear protective clothing, including heavy boots, gloves, and sometimes eye goggles, and safety equipment that includes hardhats, hearing protection, face shields, and body harnesses.

Electricians work indoors and outdoors, depending on their employer. Electricians working on construction sites primarily work outdoors, even in inclement weather, or in unheated homes under construction. Travel to these job sites is required.

REQUIREMENTS

HIGH SCHOOL

Classes in mathematics, electronics, and shop are good preparation for a career as an electrician. You should also take speech classes to improve your communication skills, and Spanish classes in order to communicate with the large number of Spanish-speaking workers in the construction industry. Knowledge

of Spanish will especially come in handy if you plan to work as a job foreman or construction manager.

POSTSECONDARY TRAINING

Most electricians prepare for the field by completing an apprenticeship program, which usually lasts three to five years. Each year of an apprenticeship program typically features 2,000 hours of on-the-job training and 144 hours of related classroom instruction. Apprenticeship programs are offered by the International Brotherhood of Electrical Workers, National Electrical Contractors Association, Associated Builders and Contractors, and Independent Electrical Contractors. Visit www.doleta.gov/OA/sainformation.cfm for information on apprenticeship training programs in your state. To enter an apprenticeship program, you must typically be at least 18 years old and have earned a high school diploma or GED and successfully completed algebra class with a grade of C or better.

According to Independent Electrical Contractors, general electrical apprentices receive instruction in safety, first aid, and CPR; mechanical skills; electrical skills; electrical theory; codes and standards; residential, commercial, and industrial wiring; fire alarm, signaling, and life safety systems; lighting systems; transformers; motors and control; and electrical troubleshooting. Those seeking to specialize in residential electrical service also learn about topics such as residential wiring; residential fire alarm, signaling, and life safety systems; and residential lighting systems. Those specializing in data-telecommunications learn about specialized topics such as data and telecommunications cabling; copper and fiber-optic connections and splices; life safety systems; security; audio and video systems; wireless communications; and building automation.

Some electricians train for the field or prepare for apprenticeships by completing training at public and private vocational-technical schools and training academies, or by working as helpers to experienced electricians.

CERTIFICATION AND LICENSING

The National Joint Apprenticeship and Training Committee and the International Society of Certified Electronic Technicians offer voluntary certification. Contact these organizations for more information.

Most states and municipalities require electricians to be licensed. To become licensed, electricians must demonstrate mastery of the National Electrical Code, local and state electric and building codes, and electrical theory. Electricians who are employed on public works projects may need a special license. The U.S. Department of Labor reports that “in some states, electrical contractors need certification as master electricians. Most

The Top 5 Apprenticeships

The U.S. Department of Labor's Office of Apprenticeship reports that there are more than 1,000 registered apprenticeship programs in the United States. Here are the top five:

1. Electrician
2. Heavy-Truck Driver
3. Carpenter
4. Plumber
5. Pipefitter (construction)

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states require master electricians to have at least seven years of experience as an electrician or a bachelor's degree in electrical engineering or a related field."

OTHER REQUIREMENTS

Electricians should be in good physical condition, since the work is often strenuous. They are required to lift heavy tools and materials, cut conduit, and connect cables, and they spend a great deal of time climbing ladders or scaffolds, standing, stooping, kneeling, or bending. Since there is always the risk for injury, burns, or even electrocution, electricians must be vigilant about following safety precautions and procedures during a job. Other important traits for electricians include good color vision (to differentiate between different-colored wiring), manual dexterity, eye-hand coordination, a good sense of balance, the ability to follow instructions, and the ability to work both independently and with others, when necessary.

About a third of all electricians belong to a union; the main union for electricians is the International Brotherhood of Electrical Workers. Other unions for electricians include the International Union of Electronic, Electrical, Salaried, Machine, and Furniture Workers; the International Association of Machinists and Aerospace Workers; the International Union, United Automobile, Aircraft and Agricultural Implement Workers of America; and the United Steelworkers of America.

EXPLORING

Explore hobbies such as repairing radios or computers or building electrical kits. Perhaps your high school has an electronics club. If not, ask your shop teacher for help in forming one. Talk to a female electrician about her career. Ask your shop teacher to help arrange an information interview. Additionally, the National Electrical Contractors Association offers a Women's Peer Group and an annual summit (www.necanet.org/education/womens-peer-group). You might consider contacting a female electrician who is affiliated with this group for advice on entering the field. The Group also has a Facebook page (www.facebook.com/NECAWPG).

EMPLOYERS

There are approximately 560,000 electricians employed in the United States. About 1.5 percent are women. Most electricians work for electrical contracting firms. Many are employed in the construction industry, while the rest work in various industries, including automotive and manufacturing.

GETTING A JOB

Electrician apprentices gain the chance to obtain a journeyman electrician position by performing well as an apprentice. Once you complete your apprenticeship or other type of training, you can also apply directly to electrical contractors, visit employment websites, or contact local unions. The International Brotherhood of Electrical Workers and National Electrical

Contractors Association offer job listings at their websites (see the For More Information section).

EARNINGS

The U.S. Department of Labor (USDL) does not provide salary information for female electricians. Median annual salaries for all electricians were \$48,250 in May 2010, according to the USDL. Salaries ranged from less than \$29,400 to \$80,890 or more. The USDL reports the following mean annual earnings for electricians by employer: electric power generation, transmission and distribution, \$57,990; local government, \$55,480; building equipment contractors, \$51,550; nonresidential building construction, \$50,070; and ship and boat building, \$42,940.

Apprentices receive earnings that range from 30 to 50 percent of the salary paid to experienced electricians. Their pay increases during their training.

Employers offer a variety of benefits, including the following: medical, dental, and life insurance; paid holidays, vacations, and sick and personal days; 401(k) plans; retirement and pension plans; and educational-assistance programs. Union members often receive health insurance, a pension, and other benefits from their union. Self-employed workers must provide their own benefits.

"There is great opportunity for women in the construction fields, and many career pathways once you have finished your apprenticeship. You may go into various management levels or even become a contractor."

—Jane Templin, Electrician

EMPLOYMENT OUTLOOK

Employment for electricians is expected to be good during the next decade, according to the U.S. Department of Labor. Electricians who have multiple skills and experience with voice, data, and video wiring will have the best job prospects.

Employment is increasing for electricians because the U.S. population is growing, prompting a need for new home, business, and infrastructure wiring. The growing popularity of renewable energy and energy efficiency is also creating demand for electricians to help connect solar panels and wind turbines to electrical infrastructure and install motion sensors for energy-saving lights. Additionally, the trades, unlike other blue-collar jobs (such as those in manufacturing), have a good future because these positions cannot be shipped overseas, and they are protected by unions or politicians who are afraid to offend a key segment of their political base. Employment for maintenance electricians is steadier than that of construction electricians because existing electrical infrastructure must always be maintained and repaired.

FOR MORE INFORMATION

For information on representation for women and minorities in the electrical trades, contact

Electrical Workers Minority Caucus

PO Box 642
El Cerrito, CA 94530-0642
510-848-6714
www.ibew-ewmc.com

For information on state apprenticeship programs, visit

Employment & Training Administration

U.S. Department of Labor
www.doleta.gov/oa/stateoffices.cfm

For information on apprenticeships and careers, contact

Independent Electrical Contractors

4401 Ford Avenue, Suite 1100
Alexandria, VA 22302-1464
703-549-7351
info@ieci.org
www.ieci.org

For information about joining a labor union and apprenticeships, contact

International Brotherhood of Electrical Workers

900 Seventh Street, NW
Washington, DC 20001-3886
202-833-7000
www.ibew.org

For information on certification, contact

International Society of Certified Electronic Technicians

3608 Pershing Avenue
Fort Worth, TX 76107-4527
800-946-0201
info@iscet.org
www.iscet.org

For information about opportunities for women in the construction industry, contact

National Association of Women in Construction

327 South Adams Street
Fort Worth, TX 76104
nawic@nawic.org
www.nawic.org

For information on its Women's Peer Group and annual summit, contact

National Electrical Contractors Association

3 Bethesda Metro Center, Suite 1100
Bethesda, MD 20814-6302
www.necanet.org

For information on apprenticeship and training programs, contact

National Joint Apprenticeship and Training Committee

301 Prince George's Boulevard, Suite D
Upper Marlboro, MD 20774-7401
office@njatc.org
www.njatc.org

For information on opportunities in Canada, contact the following organizations

Canadian Association of Women in Construction

365 Brunel Road, Unit #1
Mississauga, ON L4Z 1Z5 Canada
www.cawic.ca

Canadian Construction Women

142 – 757 West Hastings Street, # 290
Vancouver, BC V6C 1A1 Canada
www.constructionwomen.org

There are many other organizations at the national, regional, state, and local levels for women interested in construction careers. See Appendix I: Women's Construction Associations on page 270 for an extensive list of organizations.

Interview: Jane Templin

Jane Templin is an electrician and the outreach director for the Electrical Training Institute (www.laett.com) and vice-president of IBEW Local 11. She discussed her career with the editors of *Nontraditional Careers for Women & Men*.

Q. What made you want to enter this career?

A. I suppose I will have to give you a bit of background to how I found my amazing career. My husband and I, with our one-year-old son, came to California in 1967. We were young but scraped by with various jobs. In 1969 I started working at Aetna insurance as a payroll audit clerk. By 1971 I had risen to a clerk supervisor level and was training two young men that were new hires. In the course of getting to know one another the rate of pay came up and I was startled to find out they were making more than me. I asked for a review and was told to my face that I made good money for a woman. A few months later I was asked if I was pregnant and when I responded yes I was asked when my six-month term was. I asked what that meant since babies go nine months to term and was told I would be terminated at my sixth month along with termination of any benefits and so I was, and there was no unemployment then either. The unemployment office told me I was not eligible since pregnancy was a choice.

I started looking for employment after my daughter was born, but it was another recession time with the oil embargo and the aerospace industry down in our area. I tried various jobs, looking for equal pay and respect when a friend's husband told me about the apprenticeship program in his electrical union. While I have always liked working with my hands, I didn't know the opportunities that came with a construction career and training. I decided to give it a shot and applied, was put on a list, and finally called in to start my apprenticeship in 1976. I was 29 years old, married with two children and finally found the career I fell in love with. I built things: schools, refineries, hospitals, homes, hi-rise buildings, convention centers, malls, and more. I was building my community and had a real sense of ownership with it. The more I learned the better it got—apprentice, journeyman, foreman, and general foreman, more opportunities and better pay and benefits, it was icing on the cake.

Q. What is one thing that young people may not know about a career as an electrician?

A. What most don't know is that there are college credits attached to apprenticeship programs that can be applied to getting an A.A. or A.S. or a bachelor's degree if you want to continue your education.

Q. What are the most important skills/personal qualities for electricians?

A. It does take good math skills and dedication. You can't be absent or tardy in this field of work and schooling. It is a physical job and you must be healthy and physically fit to do it. In construction you have to be a team player. A good sense of humor helps too.

Q. Can you tell us about the Electrical Training Institute?

A. I now work as outreach director at the Electrical Training Institute, which is operated jointly by the International Brotherhood of Electrical

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Workers Local 11 and the National Electrical Contractors Association. While the priority is the apprenticeship training programs, there are also journey-level skill improvement courses. An electrician's success in the industry is tied to the ability achieved through training, both on the job and in the classroom. It is a progressive development. When I completed my inside wireman electrician's apprenticeship in 1980 I was so honored to be asked to come back and be one of the instructors. The union helped me get my state of California teaching credential, and I would teach when I could after work and sometimes on a Saturday. It was great to feel I was helping others to get what I had, a wonderful career. I came on staff fulltime in 1996 as senior instructor and then became outreach director in 2006.

Q. What advice would you give to young women who are interested in the field?

- A.** Look around at some of the construction jobs in your area and see if there is one trade that interests you. Talk to some of the workers and ask how they feel about their career. There is great opportunity for women in the construction fields, and many career pathways once you have finished your apprenticeship. You may go into various management levels or even become a contractor. If a young woman is interested she should not be put off by the term "nontraditional." That only means there are less than 25 percent of a gender in that profession—and that can always change. There were very few women in the trades when I started in 1976, maybe one out of 3,000. Now it is more like 20 out of 1,000. Still low, but growing better every year as women find out about the possibilities in construction.

Q. Have you faced any special challenges as a female working in such a male-dominated field? If so, how did you deal with these challenges?

- A.** There are always challenges in any career, but hard work and a good attitude will take you far. Be receptive to mentoring and don't be afraid to build a group of allies—men and women—who will share ideas with you to make it better in your workplace. Everyone has a story and most are willing to share it to your benefit. In time you will become the mentor instead of the mentee. A tradeswoman these days has many networks to help support her. On Facebook or other social networks you can find hundreds of labor and tradeswomen groups available. You are not alone.

ENGINEERING TECHNICIANS

OVERVIEW

Engineering technicians use their knowledge of science, engineering, and mathematics to help engineers and scientists solve technical problems relating to manufacturing, sales, construction, inspection, and maintenance. Some engineering technicians are focused on the research and development of equipment and machinery used in many different industries. Other technicians develop specialized skills to work in industries such as aerospace, computer and information technology, environmental engineering, and electromechanical. Employers prefer to hire engineering technicians with associate's degrees or at least some postsecondary training in engineering technology or related fields. There are approximately 348,000 engineering technicians employed in the United

States. Slightly more than 13 percent are women. The employment outlook for engineering technicians varies, with opportunities the best for civil and environmental engineering technicians.

FAST FACTS

High School Subjects

Mathematics
Science
Shop

Personal Skills

Ability to follow instructions
Complex problem solving
Critical thinking

Minimum Education Level

Some postsecondary training

Salary Range

\$28,000 to \$54,080 to
\$87,860+

Employment Outlook

Varies by specialty

O*NET-SOC

17-3021.00, 17-3022.00,
17-3023.00, 17-3023.01,
17-3023.03, 17-3025.00,
17-3026.00, 17-3027.00,
17-3029.00

GOE

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003, 005, 007, 008, 012, 013

NOC

2212, 2231, 2232, 2233, 2241

THE JOB

Engineering technicians assist engineers and scientists in the research and development of new products, machinery, or services. They help design products, often using computer-aided design software. They may also be in charge of preparing, conducting, and monitoring experiments; collecting test data; and recording results. Engineering technicians working in quality-control testing gather data and inspect processes and products. Some engineering technicians work in manufacturing. They may be tasked with the design of a product, its development, and all production concerns. There are many engineering technician specialties. Some of the more common specializations include:

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Aerospace and operations engineering technicians are responsible for aircraft and spacecraft safety and performance. They test different components or systems within the aircraft or spacecraft, test computer programs, or handle other tasks that aim to prevent equipment malfunctions.

Civil engineering technicians assist in the planning and construction of our nation's highways, dams, bridges, water treatment systems, and buildings. They help create building plans, survey potential construction sites, and estimate construction and material costs.

Electrical and electronics engineering technicians design, develop, test, and manufacture communication equipment, medical devices, navigational equipment, and computer equipment. Their tasks include testing, repairing, and adjusting the equipment for optimum performance.

Environmental engineering technicians help environmental engineers and scientists prevent, control, and correct, or remediate, environmental hazards. Their work might include designing better filters at waste treatment plants, maintaining and rebuilding manufacturing equipment to generate less pollution or toxic waste, or developing strategies to clean up or reduce the environmental effects of a disaster such as an oil spill.

Industrial engineering technicians are concerned with the efficient use of personnel, materials, and machines in business and other settings. They record and analyze work flow using charts, diagrams, and written reports. They study time and methods used by a company to identify the best standard of quality and reliability. Industrial engineering technicians evaluate data and help in planning work details according to the capacity of machinery, systems, employee pool, and production schedules.

Mechanical engineering technicians help engineers and scientists design, develop, test, and manufacture industrial machinery and equipment. They analyze the cost or practicality of these designs in terms of labor, longevity, or space allotment, and set up tests to check the equipment's performance. If modifications or adjustments are needed, mechanical engineering technicians make the changes. They use computer-aided design and computer-aided manufacturing systems, automatic control systems, and hand and power tools to do their work.

Engineering technicians usually work a 40-hour week, with hours scheduled in the evenings or weekends, as needed. The work setting of engineering technicians is dependent on their specialty. Some, such as industrial engineering technicians conducting research, work indoors in clean, well-lit facilities. Others, such as mechanical engineering technicians inspecting manufacturing equipment, may do so in crowded, noisy factories. Technicians often wear protective clothing, work boots, gloves, masks, and earplugs to avoid exposure to fumes, dust, and extreme noise.

REQUIREMENTS

HIGH SCHOOL

In high school, take as many classes in science (chemistry, physics) and mathematics (algebra, geometry, trigonometry, calculus) as possible. Mechanical drawing, shop, computer science, and computer-aided design

classes will help you develop your technical and computer skills. Since it is important to be a good communicator in this field, take English and speech courses to help you develop these skills.

POSTSECONDARY TRAINING

Employers prefer to hire engineering technicians with associate's degrees or at least some postsecondary training in engineering technology or related fields. Approximately 700 engineering technology specialty programs are accredited by ABET. Visit www.abet.org for a list of programs.

Dollars for College

Girls Incorporated is a nonprofit organization "that inspires all girls to be strong, smart, and bold through a network of local organizations in the United States and Canada." It offers the Lucile Miller Wright Scholars Program, which provides multiple scholarships (\$2,500 and \$15,000) to young women who are in the 11th or 12th grade and who are members of a Girls Incorporated affiliate. The scholarships can be used to attend an accredited two- or four-year college or university. Visit www.girlsinc.org/about/national-scholars.html for more information.

CERTIFICATION AND LICENSING

Certification and licensing requirements vary by engineering technician specialty. Contact your state's department of professional regulation for information on requirements in your state.

Many engineering technicians receive voluntary certification from the National Institute for Certification in Engineering Technologies. Electronics engineering technicians may obtain voluntary certification from the Electronics Technicians Association International and the International Society of Certified Electronics Technicians. Those employed in manufacturing can become certified by the Society of Manufacturing Engineers.

OTHER REQUIREMENTS

Engineering technicians often work as part of a team of engineers, scientists, managers, and skilled trade workers. They need good verbal and listening skills to be able to convey ideas and observations, or to follow directions from others. Engineering technicians need to be good at solving problems. The ability to work as a member of a team is also important. Other important traits for engineering technicians include mathematical and mechanical aptitude, creativity, organizational skills, patience, a detail-oriented personality, and a willingness to continue to learn throughout one's career.

EXPLORING

There are many ways to learn more about education and careers in engineering technology. Websites such as www.egfi-k12.org will help you learn more about engineering. The Society of Women Engineers (SWE) offers

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<http://aspire.swe.org>, which provides an overview of engineering education and careers. Engineer Your Life: A Guide to Engineering For High School Girls (www.engineeryourlife.org) is also useful. Engineer Girl (www.engineergirl.org) is a similar site for middle-school girls.

You should read books and magazines about engineering and attend an after-school or summer engineering program (visit www.careercornerstone.org/pcsumcamps.htm for more information).

Talk to engineering technicians about their careers. Professional organizations that you might consider contacting for help in setting up interviews include the American Society for Engineering Education's Women in Engineering Division (<http://wied.asee.org>), the SWE, and the other organizations that are listed in the For More Information section at the end of this article.

EMPLOYERS

There are approximately 348,000 engineering technicians employed in the United States. Slightly more than 13 percent are women. Thirty-three percent of all engineering technicians specialize in electrical and electronics engineering; 18 percent in civil engineering; 15 percent in industrial engineering; 9 percent in mechanical engineering; 4 percent in environmental engineering; and 2 percent in aerospace engineering and operations.

Major employers of engineering technicians include the manufacturing industry; professional, scientific, and technical service industries; and government agencies.

GETTING A JOB

Many engineering technicians obtain their first jobs as a result of contacts made through college internships, career fairs, or networking events. Others seek assistance in obtaining job leads from college career services offices, newspaper want ads, and employment websites. Additionally, some professional associations provide job listings at their websites. See For More Information for contact information. Those interested in positions with the federal government should visit the U.S. Office of Personnel Management's website, www.usajobs.gov.

EARNINGS

The U.S. Department of Labor (USDOL) does not provide salary information for female engineering technicians. It does report that women employed in architecture and engineering occupations (which includes the higher-paid careers of engineer and architect) earned annual salaries of \$54,080 in 2010. The USDOL reports the following salary ranges for engineering technicians by specialty: aerospace, \$34,590 to \$87,860+; civil, \$29,060 to \$70,450+; electrical and electronics, \$34,070 to \$81,290+; environmental, \$28,000 to \$72,020+; industrial, \$31,560 to \$73,440+; and mechanical, \$31,940 to \$73,980+.

Employers offer a variety of benefits, including the following: medical, dental, and life insurance; paid holidays, vacations, and sick and personal days; 401(k) plans; profit-sharing plans; retirement and pension plans; and educational-assistance programs. Self-employed workers must provide their own benefits.

Did You Know

The U.S. Department of Labor reports that some technician careers—particularly in electronics and computer science—are more apt to be offshored to foreign countries. Technician specialties that require some on-site presence—such as environmental, civil, and industrial engineering—are more likely to be based in the U.S. and will have better job prospects.

EMPLOYMENT OUTLOOK

The employment outlook for engineering technicians varies, but opportunities will be best for those with some postsecondary training or associate's degrees in engineering technology. The following paragraphs provide more information about employment outlooks for each engineering subspecialty during the next decade.

Little or no change in employment is expected for aerospace engineering and operations engineering technicians, according to the U.S. Department of Labor. Demand for aerospace technology is increasing, but the growing use of computer simulations for designing and testing new products will reduce the need for technicians.

Employment for civil engineering technicians is expected to grow faster than the average. Our nation's transportation, water supply, and pollution control systems are aging, and technicians will be needed to help replace them, as well as to work on new construction projects.

Little or no employment change is predicted for electrical and electronics engineering technicians. Products are being designed and manufactured more efficiently, which is reducing demand for technicians. Additionally, growing competition from foreign design and manufacturing firms (which often pay lower salaries to workers than those in the United States) will limit new opportunities for technicians.

Employment for environmental engineering technicians will grow much faster than the average. Growing public concern about the environment will create a need for technicians to clean up existing polluted sites and prevent future hazards from occurring. As more government regulations are implemented that protect the environment, demand will increase for technicians.

Job opportunities for industrial engineering technicians are expected to increase about as fast as the average for all careers. Companies are constantly seeking ways to reduce costs by streamlining manufacturing processes and improving worker productivity, which will create demand for technicians in this specialty.

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Little or no employment change is expected for mechanical engineering technicians. Manufacturing companies are becoming more efficient in the design and manufacturing of products, which will reduce the number of new positions that are available. The offshoring of many manufacturing jobs will also limit job growth.

FOR MORE INFORMATION

For a list of ABET-accredited engineering technology programs, visit the ABET website.

ABET

111 Market Place, Suite 1050
Baltimore, MD 21202-7116
410-347-7700
www.abet.org

For information on careers and the *Environmental Engineering Selection & Career Guide*, contact

American Academy of Environmental Engineers

130 Holiday Court, Suite 100
Annapolis, MD 21401-7003
info@aaee.net
www.aaee.net

For information on careers and membership for high school and college students, contact

American Institute of Aeronautics and Astronautics

1801 Alexander Bell Drive, Suite 500
Reston, VA 20191-4344
800-639-2422
www.aiaa.org

For information about education, careers in engineering, and its Women in Engineering Division, contact

American Society for Engineering Education

1818 N Street, NW, Suite 600
Washington, DC 20036-2479
202-331-3500
www.asee.org
<http://wied.asee.org>

For info on certification, contact

American Society of Certified Engineering Technicians

601-824-8991
www.ascet.org

For information on education and careers, contact

American Society of Civil Engineers

1801 Alexander Bell Drive
Reston, VA 20191-5467
800-548-2723
www.asce.org

For information on education and careers in mechanical engineering, contact

ASME International

Three Park Avenue
New York, NY 10016-5990
800-843-2763
infocentral@asme.org
www.asme.org
www.facebook.com/groups/124025924300706 (ASME's Facebook Women in Engineering page)

For information on certification, contact

Electronics Technicians Association International

5 Depot Street
Greencastle, IN 46135-8024
800-288-3824
eta@eta-i.org
www.eta-i.org

continued on page 97

For More Info, continued from page 96

**International Society of
Certified Electronics Technicians**

3608 Pershing Avenue
Fort Worth, TX 76107-4527
800-946-0201
info@iscet.org
www.iscet.org

For information on education and
careers, contact

**Institute of Electrical
and Electronics Engineers**

2001 L Street, NW, Suite 700
Washington, DC 20036-4910
202-785 0835
ieeeusa@ieee.org
www.ieee.org

For information on opportunities for
women in engineering, contact

IEEE Women in Engineering

women@ieee.org
www.ieee.org/membership_services/membership/women

For information on careers, contact

Institute of Industrial Engineers

3577 Parkway Lane, Suite 200
Norcross, GA 30092-2833
800-494-0460
www.iienet.org

For information on certification,
contact

**National Institute for Certification
in Engineering Technologies**

1420 King Street, Suite 405
Alexandria, VA 22314-2794
888-IS-NICET
www.nicet.org

For information on certification,
contact

Society of Manufacturing Engineers

One SME Drive
Dearborn, MI 48128
800-733-4763
www.sme.org

For career guidance and scholarship
information, contact

Society of Women Engineers

203 North LaSalle Street, Suite 1675
Chicago, IL 60601
877-793-4636
hq@swe.org
www.swe.org

This website features more than 30
videos and essays from women work-
ing in a variety of careers at NASA. It
also features a blog and a link to a
site for middle-school girls who are
interested in learning more about
careers in science, technology, engi-
neering, and mathematics.

Women @ NASA

http://women.nasa.gov

For information on opportunities for
women in aerospace, contact

Women in Aerospace

204 E Street, NE
Washington, DC 20002
202-547-0229
info@womeninaerospace.org
www.womeninaerospace.org

For information on career opportuni-
ties for women, contact

Women's Transportation Seminar

1701 K Street, NW, Suite 800
Washington, DC 20006
202-955-5085
www.wtsinternational.org

FIREFIGHTERS

OVERVIEW

Firefighters put out fires, rescue people, and protect property. They respond to emergency situations and are often the first emergency professionals at the scene of an accident or situation. When not responding to emergencies, firefighters maintain fire trucks and equipment, as well as fire hydrants and their fire station. Firefighters are either paid employees or serve their community as volunteers. A minimum of a high school diploma, plus on-the-job training, is required to become a firefighter; some fire departments require applicants to have an associate's or bachelor's degree in fire science or a related field. There are approximately 280,000 full-time firefighters employed in the United States; 3.6 percent are women. Employment for firefighters is expected to grow faster than the average for all careers in the next decade.

FAST FACTS

High School Subjects

Biology
Chemistry
Physical Education

Personal Skills

Critical thinking
Judgment and decision making

Minimum Education Level

High school diploma; an increasing number of employers are requiring workers to have some postsecondary training

Salary Range

\$23,050 to \$45,250 to
\$75,390+

Employment Outlook

Faster than the average

O*NET-SOC

33-1021.01, 33-1021.02,
33-2011.00, 33-2011.01,
33-2011.02

GOE

04.04.01

DOT

250

NOC

0642, 6262, 8422

THE JOB

Every year, many lives are lost and billions of dollars worth of property is destroyed due to fire and other emergencies. Firefighters and the work they do alleviate some of these disasters by helping to prevent or put out fires and assisting in emergency situations.

When fire stations receive a call, firefighters immediately don their protective gear—fireproof pants, jacket, helmet, and heavy boots and gloves—and board fire trucks and engines to travel to the scene as quickly as possible. The firefighter assigned to cover watch duties makes a preliminary evaluation based on the call—the type and magnitude of the fire, its location, and injuries. The firefighter notifies other firefighters by activating signals or through a public-address system. The firefighter will then send the appropriate response for the call, whether one truck or engine or the entire battalion. Once firefighters arrive at the scene, they communicate back to the

fire station for needed equipment or backup via telephone or two-way radios.

When firefighters arrive at the scene, supervisors or battalion chiefs first “read” the fire—by making a quick observation regarding the color of the smoke, the direction of fire, or the heat of the fire. They may also request a floor plan to learn more about a building. Once properly informed, supervisors can devise a systematic and safe approach for extinguishing the fire. Each firefighter has a specific duty at the scene—one may connect hoses to hydrants, others may operate pumps for high-pressure hoses, another may be in charge of nozzles. Still others may be in charge of search and rescue and the safe evacuation of people who may be trapped in the building. Firefighters use special fireproof masks, clothing, oxygen tanks, and other protective equipment in such situations.

Firefighters use special tools to do their work. They use hoses, high-pressure nozzles, and pumps to extinguish fires. Depending on the fire and its origin, firefighters may use foam, gels, or other flame retardants, instead of water. If fighting a fire in a multistory building, firefighters use high ladders equipped with ladder pumps to help fight the fire. They also use battering rams, saws, axes, and power tools to gain access to a building, ventilate smoke-filled areas, or tear down weak and dangerous structures. Depending on the size and type of fire, firefighters may use other methods to keep fires at bay, including creating fire lines or trenches.

After the fire is under control, firefighters then begin to protect and salvage private belongings. They may move furniture or other large objects to minimize water damage, or use salvage covers. Deodorizers may be used to help alleviate smoke damage to furniture, clothing, and other personal property. Firefighters also assist fire inspectors and police in determining the cause of each fire.

All firefighters provide medical assistance. Most firefighters are trained as emergency medical technicians, or EMTs, and can administer CPR and first aid to the injured.

Firefighters also respond to non-fire emergency situations. They may arrive at the scene of a car accident to help pry victims out of vehicles, investigate a possible gas leak, assist in a water rescue, or help police in other capacities.

Firefighters constantly train to stay ready to respond effectively to emergency calls. Activities include climbing stairs while wearing full equipment, practicing using hoses and ladders, or participating in mock fire calls. Some fire departments even have enclosed spaces or junk cars that are used specif-

“Working in the fire-EMS service is a way of life. It is a commitment to a life of service to the community. It is very rewarding in that every day you make an impact on someone’s life and the safety and well being of many in a community.”

—Mary Beth Michos, Firefighter

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ically to help firefighters hone their fire and rescue techniques. Firefighters must keep up to date on new technological developments of equipment, fire retardants, or changing administrative practices and policies. They also provide



Employment of firefighters is expected to grow by 19 percent from 2008–18, according to the U.S. Department of Labor.
(Photo courtesy of Thinkstock)

community outreach by conducting fire education and awareness classes and fire drills, and by promoting fire prevention.

Firefighters do not work a typical 40-hour week, as shifts are dependent on the station, the number of firefighters assigned, and the work load. Some firefighters are on duty for a full 24 hours, then off for 48 hours. This schedule is repeated with an extra off day at regular intervals. Other firefighters work a 10-hour day shift for three or four consecutive days, then a 14-hour night shift, and they may have three to four days off. This cycle then repeats. However, firefighters are required to work overtime, as needed, as well as holidays. During their shift, firefighters live at the fire station.

Fires can occur at all hours of the day and night and in all types of weather, so firefighters must always be on alert and ready to respond at a moment's notice. The job can be quite dangerous, even life threatening. In addition to the

dangers of fire and smoke inhalation, firefighters risk potential injury when buildings collapse, gases and chemicals explode, or they are overcome by the extreme heat.

Some firefighters fight fires that are located in forests, rangelands, or other natural areas. These positions are very demanding. *Wildland firefighters* must create fire lines by cutting down trees and removing grass and other combustible vegetation in the path of the fire in order to deprive it of fuel. They may have to hike for miles wearing heavy gear just to reach a remote forest fire. Some firefighters called *smoke jumpers* actually parachute from airplanes to reach fires in remote areas.

REQUIREMENTS

HIGH SCHOOL

High school classes that will be useful to firefighters include biology, chemistry, and other science courses; mathematics; and physical education.

POSTSECONDARY TRAINING

Although some firefighters can land a job with just a high school diploma, an increasing number of fire departments are requiring people with some postsecondary training in fire science or related fields. New hires complete extensive training at fire academies. Recruits learn about a variety of topics, such as fire prevention, firefighting techniques, dealing with hazardous materials, emergency medical procedures (including CPR and first aid), and local building codes. They also learn how to use fire tools and equipment such as axes, chain saws, and ladders. After they complete their training, they are assigned to a fire company and work under a period of probation. Many fire departments have accredited apprenticeship programs that last up to four years.

An increasing number of colleges and universities offer associate and bachelor's degrees in fire engineering or fire science. The International Fire Service Accreditation Congress offers a list of accredited degree programs at its website, www.ifsac.org/Handbook/Accredited_Programs.pdf.

CERTIFICATION AND LICENSING

Nearly every fire department requires firefighters to be certified as emergency medical technicians. Most fire departments require the lowest level of certification, emergency medical technician-basic, but some larger departments may require their firefighters to receive paramedic certification. The National Registry of Emergency Medical Technicians offers certification to emergency services providers. Additionally, some states have their own certification programs.

"Every woman who enters a nontraditional field brings new skills, insight, and talents that better the profession."

—Mary Beth Michos, Firefighter

OTHER REQUIREMENTS

It is important that firefighters stay in top physical condition, and part of their training is devoted to improving their fitness. Many times their practice drills include strenuous workouts, often while wearing heavy protective gear and equipment. Firefighters must also work well with others, since many times the lives of people trapped by fire are dependent on firefighters' organization and teamwork. Other important traits for firefighters include courage, endurance, self-discipline, emotional stability, good judgment, the ability to remain calm under pressure, dependability, and leadership abilities (for those in management positions).

Approximately 66 percent of all firefighters are union members or are covered by a union contract.

EXPLORING

There are many ways to explore the career of firefighter while you are still in school. You can bone up on the terms of the firefighting trade by reading a

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glossary of firefighting terms at the National Fire Protection Association website, www.nfpa.org. You can read books about firefighting. Here is one suggestion: *Firefighters: Their Lives in Their Own Words*, by Dennis Smith (Broadway, 2002). This book features interviews with female and male firefighters. You can read back issues of *International Fire Fighter* magazine at www.iaff.org/mag. The International Association of Women in Fire & Emergency Services (IAWFES) offers a variety of useful articles and resources of special interest to women at its website, www.i-women.org. Resources include *Many Women Strong: A Handbook For Women Firefighters*; “Physical Abilities Testing: No Easy Answer”; and “What is Sexual Harassment?”

Learn first aid and CPR. Classes are offered by the American Red Cross, community agencies, and the Boy Scouts of America and the Girl Scouts of the United States of America.

Talk to firefighters about their careers. Contact the IAWFES and other professional associations listed in the For More Information section for help in arranging an information interview, or ask your school counselor for assistance.

EMPLOYERS

There are approximately 280,000 paid firefighters employed in the United States; 3.6 percent are women. There are about 43,000 supervisors of firefighters; less than 1 percent of this group are women.

Approximately 90 percent of firefighters work for local governments. Others are employed by federal (USDA Forest Service, the National Park Service), local, and regional fire departments. Private firefighting companies employ a small number of fire fighters.

GETTING A JOB

Firefighter applicants must pass written and physical tests (tests of coordination, strength, physical stamina, and agility) and a medical examination that includes a drug test. They also must be at least 18 years of age and have a high school diploma or a GED.

Firefighting students who attend postsecondary programs can obtain job leads from their college's career services office. All aspiring firefighters should contact municipalities in their area to learn about job openings. Professional associations and unions also often provide job listings at their websites. For example, the International Association of Women in Fire & Emergency Services lists firefighter positions at <http://i-women.org>, and the International Association of Fire Chiefs lists fire chief positions at <http://careers.iafc.org>.

EARNINGS

The U.S. Department of Labor (USDOL) does not provide salary information for female firefighters. It does report that women employed in protective-service professions earned annual salaries of \$31,512 in 2010. Salaries for all firefighters ranged from less than \$23,050 to \$75,390 or more. Median annu-

al earnings were \$45,250. The USDL also reports the following mean annual earnings for firefighters by government employer: federal government, \$48,990; local government, \$48,370; and state government, \$42,880.

Supervisors of firefighters earned salaries that ranged from less than \$41,450 to \$111,120 in 2010, according to the USDL.

Employers offer a variety of benefits, including the following: medical, dental, and life insurance; paid holidays, vacations, and sick and personal days; 401(k) plans; retirement and pension plans; and educational-assistance programs. Nearly all fire departments provide protective clothing and breathing apparatus to firefighters.

EMPLOYMENT OUTLOOK

Employment for firefighters is expected to grow faster than the average for all careers through the next decade, according to the U.S. Department of Labor, although competition for these jobs will be very strong, since many people want to enter this career. The growing U.S. population is causing increased demand for firefighters, especially as more people move to densely populated cities. Applicants who score the highest on physical-conditioning and mechanical-aptitude exams, have EMT or paramedic certification, and have completed at least some postsecondary firefighter education will have the best job prospects.

Interview: Mary Beth Michos

Mary Beth Michos served as the fire chief of the Prince William County (VA) Fire & Rescue Department for nearly 13 years after spending 21 years in the Montgomery County (MD) Department of Fire & Rescue Services. She is currently the chief administrative and operations officer of the International Association of Fire Chiefs. Mary Beth discussed her career and the field of firefighting with the editors of *Nontraditional Careers for Women & Men*.

Q. What made you want to pursue a career in the fire service?

A. I didn't grow up wanting to be a firefighter. Matter of fact I selected a very "feminine occupation" and went to nursing school and became an RN. I had an opportunity to be the head nurse of a Heartmobile—one of the first mobile coronary care units (precursors to paramedic units) in the country. In that capacity I taught fire service personnel advanced life support. We learned much from the Heartmobile experiment—that advanced life support services were life saving to more than just cardiac patients and that the life-saving measures could be provided by paramedical personnel.

The Montgomery County Department of Fire & Rescue Services hired me for one year to develop and implement its paramedic program. My intention was to do that for the year and then return to critical care nursing. It was during that year that I fell in love with the fire service and decided that is where I wanted to spend my career.

Initially the director of the department said I could just perform EMS but after two years in the department I was told I had to get my fire service certifications, which I did. This was a significant turning point

FOR MORE INFORMATION

For industry information, contact

International

Association of Fire Chiefs

4025 Fair Ridge Drive, Suite 300
Fairfax, VA 22033-2868
703-273-0911
www.iafc.org

For information on careers, contact

International

Association of Fire Fighters

1750 New York Avenue, NW
Washington, DC 20006-5301
202-737-8484
www.iaff.org

For a wealth of resources about women in firefighting, visit the association's website.

International Association of Women in Fire & Emergency Services

4025 Fair Ridge Drive
Fairfax, VA 22033
703-896-4858
<http://i-women.org>

For information on accredited postsecondary fire science programs, contact

International Fire Service Accreditation Congress

1700 West Tyler
Oklahoma State University
Stillwater, OK 74078-8075

405-744-8303
www.ifsac.org

For information on careers in fire protection, contact

National Fire Protection Association

1 Batterymarch Park
PO Box 9101
Quincy, MA 02169-7471
617-770-3000
www.nfpa.org

For information on working as a volunteer firefighter, contact

National Volunteer Fire Council

7852 Walker Drive, Suite 450
Greenbelt, MD 20770
888-ASK-NVFC
nvfcoffice@nvfc.org
www.nvfc.org

For information on wildland firefighting careers, contact

U.S. Department of the Interior

Bureau of Land Management
Fire and Aviation Directorate
www.blm.gov/fna/recruit.htm

For fire-related statistics and information on training opportunities, contact

U.S. Fire Administration

16825 South Seton Avenue
Emmitsburg, MD 21727
301-447-1000
www.usfa.fema.gov/fireservice

because then I was able to be involved in all aspects of the fire service and not only EMS. Having achieved fire and rescue certifications allowed me to progress up the ranks and eventually become a fire chief. I have never regretted making the decision to change my career path. I have had a great life as a member of the fire-EMS service.

Q. What are the pros and cons of working in the fire service?

A. The pros are many.

✓ First of all it is more than just a job. Working in the fire-EMS service is a way of life. It is a commitment to a life of service to the community. It

is very rewarding in that every day you make an impact on someone's life and the safety and well being of many in a community.

✓ The fire service also has diverse areas of interest. In the fire service an individual can work in fire suppression, emergency medical services, administration, fire prevention and code enforcement, hazardous materials, or be an instructor. There are opportunities for advancement from an entry-level position through various ranks up to becoming the executive fire chief.

✓ When in the fire service you are part of a family—a family in your department and an even larger national family. When you need help and support that family is there for you.

✓ While you don't get rich working in the fire service the compensation, benefits, and retirement programs provide a comfortable life for fire personnel and their families.

The cons are few.

✓ It is a stressful and dangerous profession but then again most of the people attracted to the profession thrive on the adrenaline. Over the years there has been an intense focus on firefighter health and safety. We are starting to see the results with a decline in the annual death toll and number of injuries [to firefighters].

✓ It is also a 24/7 profession. Firefighters have to work long hours (anywhere from 40 to 56 hours a week), weekends, and holidays. Again, the format for the shifts is sometimes more convenient to family life and may compensate for working weekends and holidays.

✓ Fire service personnel are held to a higher standard of conduct and behavior because of the public trust. Some may consider that a con but it really isn't a hardship to fire personnel.

Q. Have you faced any special challenges as a female working in a male-dominated field? If so, how did you deal with these challenges?

A. There are challenges anytime you are the different one in a group. I was a first woman in my department and one of very few women in the national fire service when I was hired. Many people didn't know how to act around me and I didn't know what was expected of me. It took awhile until we all learned what the expectations were. Open communications were very helpful.

Every time I was promoted there were new challenges because I was a woman. Some men had to adjust for the first time in their careers to following directions from a woman (other than their wives). When I became fire chief I went to my first state chiefs' conference. I sat there and looked around and once again I was the only woman in the room. Even at that number of years into the fire service it did feel a little lonely.

I have to admit there were times I was harassed. I learned early on that it was important to handle the situation immediately. I let the individual know when I didn't like their behavior and I have to admit that in most cases that was the end of it. If it didn't end then I took it to my supervisor.

I guess the hardest situation was when I was actually harassed and discriminated by my supervisor, the department head. I explored my

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options to handle the situation and decided to change departments. It was the best career decision I could have made since it resulted in me becoming chief of a great organization where I was very happy for almost 13 years until I retired. While not everyone has this option everyone needs to weigh what options they do have carefully since some actions can impact their future significantly.

I learned two important things along my journey as a woman in the fire service.

1) You have to realize that sometimes people don't get along with you and it isn't because you are a woman. It may be that they just don't like you as an individual. So don't blame every decision and situation that doesn't go your way on being a woman—it may be you!

2) There are times when you don't achieve something or get something you have your heart set on. I have had numerous occasions like this in my life and each time my disappointment has lead to something even better for me. One example is that when I was graduating from high school I wanted to go to college and become an engineer. My dad told me he didn't have enough money to send two kids to college and he felt it was more important that my brother go to college. He suggested nursing school, which was not costly at all. I followed that pathway and was very happy as a nurse and it led to my career in the fire service. I can't imagine being as happy and fulfilled had I become an engineer.

Q. What advice would you give to young women who are interested in the field?

A. Go for it! I have had a wonderful career in the fire service and there is no reason that they wouldn't. Every day you go to work and you don't quite know what you will face that day, but you come home each day knowing you helped someone on one of the worst days of their lives.

I do a program for women called "Embracing Being a Woman in a Man's World." I talk about the "Keys for Success" on the job. Below is a very condensed version of the presentation.

Know you value system and live by it. You don't have to become one of the guys to be successful. Practice the behaviors and ways of doing things that have made you successful and happy before you started your career in the fire service.

Engage in relationships. Learn to relate to your male colleagues on a professional basis while reaching out to other women and being supportive of them. Find a mentor and be willing to mentor others. Develop a large network beyond your immediate work environment.

Your skills and abilities add to the success of your team at work. Use them instead of just blending in. Leverage your differences for the advancement of the group. As women we bring new insights and skills, which the fire service needs.

Seek to accept and understand differences. You will find that there are more differences than just gender differences among the members of your team. You will even find differences among the other women in the service. Focus on your mutual goals and embrace and value the differences everyone brings—it all makes the work unit stronger.

Every woman who enters a nontraditional field brings new skills, insight, and talents that better the profession. They also serve as role models and pave the way for removing the "non" from the "traditional" in describing the fire service as a career for women.

HEATING AND COOLING TECHNICIANS

OVERVIEW

Heating and cooling technicians install, maintain, and repair heating and air-conditioning units and all components for commercial and residential buildings. They also work on refrigeration units such as those used in restaurants, warehouses, and businesses. Heating and cooling technicians are well versed in diagnosing and solving a variety of problems with different types of heating and cooling units. While many technicians install and repair heating and cooling units, others also find employment as trade educators, product designers, and industry sales personnel. An apprenticeship or training at a technical school are the minimum educational requirements to enter the field. Some technicians learn their skills on the job. There are approximately 311,000 heating and cooling technicians employed in the United States; 0.6 percent are women. Excellent employment opportunities are expected for heating and cooling technicians during the next decade.

FAST FACTS

High School Subjects

Mathematics
Shop

Personal Skills

Judgment and decision making
Mechanical/manipulative
Troubleshooting

Minimum Education Level

Apprenticeship or postsecondary vocational training;
some technicians learn their skills on the job

Salary Range

\$26,490 to \$42,530 to
\$66,930+

Employment Outlook

Much faster than the average

O*NET-SOC

49-9021.00, 49-9021.01

GOE

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THE JOB

During the summer, we crank up air conditioners to keep our homes cool; in winter, we can easily adjust the thermostat to ward off the chill in the air. Such comforts are so easily attainable that we often take for granted the people who make them possible: heating and cooling technicians.

Heating and cooling technicians are responsible for keeping temperature, humidity, and air quality constant in residential, commercial, and industrial settings. They design, install, maintain, and repair air-conditioning units and heating systems used to keep our homes and businesses climate controlled; air quality systems to keep our schools and public buildings comfortable; and refrigeration systems used to store and transport food, medicine, and other perishable items.

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Since these systems—heating, ventilation, air conditioning, and refrigeration—are commonly referred to as HVACR systems; many times the technicians responsible for them are referred to as *HVACR technicians*.

Air-conditioning and heating systems are complicated, with many different electrical, mechanical, and electronic parts. For example, with a central air-conditioning system, freon, a refrigerant, is circulated within the unit to cool the air. Most systems are “split,” meaning parts are located outside and inside the house.

When working on a project, such as the installation of a central air-conditioning system in a home under new construction, HVACR technicians follow a series of steps. First they check the blueprints supplied by the contractor or construction manager. It’s important for HVACR technicians to be able to closely follow design specifications to install and position the unit correctly.

“This career is good for women who are mechanically inclined due to lack of a lot of heavy lifting, the ability to get our hands in the tight spaces that are prevalent in the modern furnaces, and the ease of working around air conditioners.”

—Amy Myers, HVACR Technician

Compressors, pumps, and fans are also installed to draw warmer air from the outside to be cooled and distributed throughout the house. Using special tools such as drills, power saws, and soldering guns, HVACR technicians install and link pipes—either metal or fiberglass—to connect the unit to different parts of the house. Ducts, vents, thermostats, and switches are also installed. Air filters are installed to capture dust and pollen as the air moves through the air-conditioning system. HVACR technicians also install drainage systems to collect water that normally condenses through the cooling process. They use special test equipment such as voltage or current meters and pressure indicators

to make sure the air-conditioning system is functioning properly and efficiently, and air is being cooled at the desired temperature.

HVACR technicians not only install air-conditioning, heating, and refrigeration systems, they also maintain and repair these systems. Forced-air heating systems, for example, run more efficiently when properly cleaned and maintained on an annual basis. HVACR technicians are often busiest just before cold weather sets in, when many households and businesses gear up their furnaces and heating systems for the winter season. They check on different parts of the heating systems to look for any leaks in the ducts or pipes, evidence of condensation, coil damage, or other irregularities. They also make sure thermostats and switches are functioning properly, as well as change all air filters. Routine maintenance not only keeps systems operating smoothly, it also helps them run more efficiently, using less energy.

While HVACR technicians are trained to do both installation and repair, they often specialize in one or the other. Some HVACR technicians specialize in a type of equipment, such as commercial refrigeration.

Most HVACR technicians work at least 40 hours a week, with some need for weekend or evening hours. While installation and repair jobs take place throughout the year, maintenance-type jobs are most plentiful during specific times—spring and early summer months for air-conditioning system maintenance, and fall and early winter months for heating system maintenance.

Heating and cooling technicians work in a variety of settings, depending on their specialty or type of project. The installation of air-conditioning and heating systems takes place in private residential homes, apartment buildings, office complexes, or large industrial buildings. Refrigeration systems are installed in restaurants, commercial buildings, or different modes of transportation, such as trains and trucks.

Work conditions are often uncomfortable. Repairing a broken air-conditioning system or heating system, for example, means the work setting is either a very warm and stuffy building, or one that is extremely cold. HVACR technicians must often stoop, kneel, or crawl to get to hard-to-reach furnaces, or work in very cramped positions. There is also the threat of injury from electrical shock, burns from chemicals, or muscle strain from lifting heavy equipment. They often protect themselves from potential injury by wearing protective clothing, including sturdy shoes and work gloves.

REQUIREMENTS

HIGH SCHOOL

Recommended classes include algebra, geometry, physics, chemistry, computer science, computer-aided design, mechanical drawing and blueprint reading, and shop. English and speech classes will help you to develop your communication skills. If you plan to run your own heating and cooling contracting business, you should take classes in business, advertising, and marketing.

POSTSECONDARY TRAINING

Heating and cooling technicians prepare for the field by completing apprenticeships or training programs at career or technical schools or community colleges. Some technicians learn their skills on the job.

Programs at career or technical schools or community colleges can take between six months and two years to complete. Topics of study include electronics; mathematics; equipment design and construction; installation, maintenance, and repair of heating and cooling components; blueprint reading; and basic plumbing. HVAC Excellence; the National Center for Construction Education and Research; and the Partnership for Air-Conditioning, Heating, and Refrigeration Accreditation accredit postsecondary heating and cooling education programs. Visit the websites of HVAC Excellence (www.hvacexcellence.org/AccreditedPrograms.aspx) or the Partnership for Air-Conditioning, Heating, Refrigeration Accreditation (www.pahrahvacr.org) for lists of accredited programs.

Apprenticeships typically last three to five years. Each year of an apprenticeship program typically features 2,000 hours of on-the-job training and 144 hours of related classroom instruction. To enter an apprenticeship pro-

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gram, you must typically be at least 18 years old and have earned a high school diploma or GED.

The following unions and associations sponsor apprenticeships: Air Conditioning Contractors of America; the Mechanical Contractors Association of America; Plumbing-Heating-Cooling Contractors Association; locals of the Sheet Metal Workers' International Association; the United Association of Journeymen and Apprentices of the Plumbing and Pipe Fitting Industry of the United States and Canada; and local chapters of the Associated Builders and Contractors and the National Association of Home Builders. Visit www.doleta.gov/OA/sainformation.cfm for information on apprenticeship training programs in your state.

CERTIFICATION AND LICENSING

Voluntary certification is available from North American Technician Excellence, the Refrigeration Service Engineers Society, the Refrigerating Engineers & Technicians Association, and HVAC Excellence. Contact these organizations for more information. Technicians who buy or work with refrigerants must be certified in their proper handling. To become certified, they must pass a written examination that is administered by organizations approved by the U.S. Environmental Protection Agency, such as unions, contractor associations, trade schools, or building groups.

Heating and cooling technicians must be licensed by some states and localities. Contact your state's department of professional regulation for details on licensing requirements in your state.

OTHER REQUIREMENTS

Are you good working with your hands? Don't mind getting dirty? Are you in good physical shape? Are you a good communicator? If so, you have the skills that it takes to become a successful heating and cooling technician. Other important traits for technicians include an aptitude for working with tools, the ability to solve problems, strong troubleshooting skills, patience, attention to detail, organizational skills, and a willingness to continue to learn throughout your career.

Approximately 15 percent of heating and cooling technicians belong to a union. Popular unions for technicians include the Sheet Metal Workers International Association and the United Association of Journeymen and Apprentices of the Plumbing and Pipefitting Industry of the United States and Canada.

EXPLORING

The best way to learn more about this field is to talk to heating and cooling technicians about their careers. Ask your shop teacher or school counselor to help arrange an information interview, or perhaps you can briefly speak to a technician during a service call at your house. Read books about heating and cooling systems, and visit the websites of the professional associations listed at the end of this article for more information.

EMPLOYERS

There are approximately 311,000 heating and cooling technicians employed in the United States; 0.6 percent are women. Approximately 54 percent of heating and cooling technicians work for plumbing, heating, and air-conditioning contractors. Others work for refrigeration and air-conditioning service and repair shops, stores that sell heating and air-conditioning systems, local government agencies, schools, hospitals, and large office buildings. Approximately 16 percent of heating and cooling technicians are self-employed.

GETTING A JOB

Many heating and cooling technicians obtain their first jobs through apprenticeships or by contacting potential employers directly. Others seek assistance in obtaining job leads from college career services offices, newspaper want ads, and employment websites. Air Conditioning Contractors of America and the American Society of Heating, Refrigerating and Air-Conditioning Engineers offer job listings at their websites (see the For More Information section). Those interested in positions with the federal government should visit the U.S. Office of Personnel Management's website, www.usajobs.gov.

EARNINGS

The U.S. Department of Labor (USDOL) does not provide salary information for female heating and cooling technicians. It does report that women employed in installation, maintenance, and repair occupations earned annual salaries of \$35,516 in 2010. Median annual salaries for all heating and cooling technicians were \$42,530 in May 2010. Salaries ranged from less than \$26,490 to \$66,930 or more. The USDOL reports the following mean annual earnings for heating and cooling technicians by employer: hardware, and plumbing and heating equipment and supplies merchant wholesalers, \$48,840; direct selling establishments, \$46,170; and building equipment contractors, \$43,600.

Apprentices begin at about 50 percent of the salary paid to experienced heating and cooling technicians. Their pay increases during their training.

Employers offer a variety of benefits, including the following: medical, dental, and life insurance; paid holidays, vacations, and sick and personal days; 401(k) plans; retirement and pension plans; and educational-assistance programs. Union members often receive health insurance, a pension, and other benefits from their union. Some companies provide workers with uniforms, company vans, and tools.

EMPLOYMENT OUTLOOK

Employment for heating and cooling technicians is expected to grow much faster than the average for all careers during the next decade, according to the U.S. Department of Labor. Some factors fueling this growth include the growing U.S. population, which is creating demand for commercial, residential, and industrial climate-control systems; the need to replace existing

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residential HVACR systems; a trend toward improving indoor air quality and the development of new energy-saving heating and air-conditioning systems; and a large number of expected retirements of current technicians.

FOR MORE INFORMATION

For industry information, contact

**Air-Conditioning, Heating,
and Refrigeration Institute**

2111 Wilson Boulevard, Suite 500
Arlington, VA 22201-3001
ahri@ahrinet.org
www.ahrinet.org

For information on education and careers, contact

**Air Conditioning
Contractors of America**

2800 Shirlington Road, Suite 300
Arlington, VA 22206-3607
info@acca.org
www.acca.org

For information on careers, contact

**American Society of
Heating, Refrigerating and
Air-Conditioning Engineers**

1791 Tullie Circle, NE
Atlanta, GA 30329-2305
ashrae@ashrae.org
www.ashrae.org

For information on state apprenticeship programs, visit

**Employment &
Training Administration**

U.S. Department of Labor
www.doleta.gov/oa/stateoffices.cfm

For information on green heating and cooling techniques, contact

Green Mechanical Council

1701 Pennsylvania Avenue, NW,
Suite 300
Washington, DC 20006-5813
877-347-3360
www.greenmech.org

For information on certification and accredited postsecondary education programs, contact

HVAC Excellence

1701 Pennsylvania Avenue, NW
Washington, DC 20006-5805
www.hvacexcellence.org

For information about opportunities for women in the construction industry, contact

**National Association
of Women in Construction**

327 South Adams Street
Fort Worth, TX 76104
nawic@nawic.org
www.nawic.org

For info on certification, contact

**North American
Technician Excellence**

2111 Wilson Boulevard, #510
Arlington, VA 22201-3051
www.natex.org

For information on accredited training programs, contact

**Partnership for Air-
Conditioning, Heating,
Refrigeration Accreditation**

2111 Wilson Boulevard, Suite 500
Arlington, VA 22201-3001
www.pahrahvacr.org

For information on union membership, and to read profiles of women in the plumbing industry, visit the association's website.

**Plumbing-Heating-Cooling
Contractors Association**

180 South Washington Street
PO Box 6808
Falls Church, VA 22046-2900
www.phccweb.org

For information on industrial plant refrigeration certification, contact

Refrigerating Engineers & Technicians Association

PO Box 1819
Salinas, CA 93902-1819
831-455-8783
info@reta.com
www.reta.com

For information on certification, contact

Refrigeration Service Engineers Society

1666 Rand Road
Des Plaines, IL 60016-3552
800-297-5660
www.rses.org

For info on heating and cooling and the sheet metal industry, contact

Sheet Metal and Air Conditioning Contractors' National Association

4201 Lafayette Center Drive
Chantilly, VA 20151-1219
703-803-2980
info@smacna.org
www.smacna.org

For information on union membership, contact

United Association of Journeymen and Apprentices of the Plumbing and Pipe Fitting Industry of the United States and Canada

United Association Building

Three Park Place
Annapolis, MD 21401-3687
410-269-2000
www.ua.org

For information on opportunities in Canada, contact the following organizations

Canadian Association of Women in Construction

365 Brunel Road, Unit #1
Mississauga, ON L4Z 1Z5 Canada
info@cawic.ca
www.cawic.ca

Canadian Construction Women

142 – 757 West Hastings Street,
Suite 290
Vancouver, BC V6C 1A1 Canada
www.constructionwomen.org

There are many other organizations at the national, regional, state, and local levels for women interested in construction careers. See Appendix I: Women's Construction Associations on page 270 for an extensive list of organizations.

Interview: Amy Myers

Amy Myers is currently a student of HVAC/R in Ft. Wayne, Indiana, and works as an apprentice in a local shop. She discussed her career with the editors of *Nontraditional Careers for Women & Men*.

Q. What made you want to enter this career?

A. What has drawn me to this career in the HVAC/R industry you ask? As a young girl, I was always beside my father, working with him, helping him on everything from siding a house, to building a storage shed, to working

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on cars. I knew I was more of a “tomboy” and wanted to do something that allowed me to work with my hands and repair mechanical systems, as well as gain an education/skill that I could take anywhere I decided to live. This career is good for women who are mechanically inclined due to lack of a lot of heavy lifting, the ability to get our hands in the tight spaces that are prevalent in the modern furnaces, and the ease of working around air conditioners.

Q. What is one thing that young people may not know about a career in HVAC/R?

- A.** One thing that young people might not know about the HVAC/R industry is there is a need to continue your education even after graduating from a technical college. The field is changing rapidly and requires the technician to keep up on the changing technology. The government is changing regulations (which requires you to obtain certifications), there are changes in efficiency, and changes in freon, which is used in air conditioning systems.

Q. What has your apprenticeship education been like?

- A.** The apprenticeship education that I am enrolled in has been a good learning experience, consistent with the education I have learned in classes. It has been challenging, to put what I learn to work in the field, but the men I work with have been very helpful and patient. There are times when they teach me as well as times I teach them—a trade-off of knowledge. It is always a learning experience.

Q. What advice would you give to young women who are interested in the field?

- A.** The advice that I would give to women interested in the field is to not get discouraged when you feel like there are times when you aren’t “getting it.” It takes time, patience, and experience to get to the point of being able to diagnose a malfunction with a furnace or refrigeration system in a few steps. It is good to take on jobs with a positive attitude and learn from someone who has many years of experience to get the best education you can obtain.

Q. Have you faced any special challenges as a female working in such a male-dominated field? If so, how did you deal with these challenges?

- A.** There are always challenges when working in a male-dominated field but as a woman determined to be successful in this field, I have tackled them head on. I have come across a few customers who have asked me why I thought this was “women’s work?” I have grinned and explained to them that I enjoy this field and meeting new people. Sometimes there have been heavy loads to carry; such as when I have installed a furnace or air conditioning unit, but I have learned to find different methods to carry those loads. As a woman, if you’re determined enough to go into this field, there are ways to defeat the challenges that lay in wait.

INDUSTRIAL ENGINEERS

OVERVIEW

Industrial engineers use their knowledge of mathematics, science, and engineering to find solutions to technical, production, and management issues in business, health care, computer technology, and nearly every other industry. They design, develop, test, and evaluate various systems and work processes within a business. Their work helps increase productivity and ensures the health and safety of all employees. Industrial engineers typically have at least a bachelor's degree in industrial engineering or a related field. There are approximately 157,000 industrial engineers employed in the United States. Twenty percent are women. Employment in the field is expected to grow faster than the average for all careers during the next decade.

FAST FACTS

High School Subjects

Mathematics
Physics

Personal Skills

Complex problem solving
Critical thinking
Judgment and decision making

Minimum Education Level

Bachelor's degree

Salary Range

\$49,700 to \$76,100 to
\$112,830+

Employment Outlook

Faster than the average

O*NET-SOC

17-2112.00

GOE

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012

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THE JOB

"Time is money" goes the old adage; these words are very familiar to industrial engineers. It is no wonder then that many businesses and manufacturing companies seek the expertise of industrial engineers to streamline their manufacturing processes and systems, as well as to study the work habits and methods of employees. Their suggestions help companies save money by improving worker productivity, reducing the amount of resources used during manufacturing, cutting shipping and delivery times, and otherwise improving a company's or organization's performance. Examples of their tasks include streamlining the work of printing facilities to better meet deadlines, eliminating unnecessary business costs in paperwork or company travel, and helping to increase worker productivity by suggesting the rearrangement of factory floors or office areas.

The duties of industrial engineers vary depending on the type of business or project at hand. When working with companies that manufacture products or systems, industrial engineers may choose to design or tweak facilities or operational procedures. This may entail changing the methods of creating

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the product, such as better equipment or assembly lines. They may investigate the production line itself, by way of factory inspection, in order to identify unnecessary or redundant steps. They may order a cost analysis of the manufacturing system to find ways to streamline or reduce costs. Industrial engineers may even investigate labor utilization standards to make sure all employees are working at optimum levels.

Industrial engineers may develop or oversee quality control, inventory control, or even cost control to help companies reduce waste in production or labor power, without sacrificing quality. They may also study procurement and distribution procedures to find ways to reduce the cost of acquiring raw materials or reduce the cost of delivering the final product to vendors or customers. They also review production schedules, engineering specifications, and related information to obtain a better picture of manufacturing methods, procedures, and activities.

Industrial engineers also work with businesses to improve employee productivity. In this capacity, they may research every department in their company, its staff, and its role in the business. They may use measuring devices, stopwatches, or software programs to gauge time spent on a particular step in production or the process as a whole. They may also interview workers and managers to collect information. Armed with this information, industrial engineers design and make suggestions to increase productivity. This may include simplifying work flow, reducing workers' motions, and changing the layout of equipment, office systems, or other units used to conduct business.

Dollars for College

The National Society of Professional Engineers offers The Maureen L. & Howard N. Blitman, P.E., Scholarship to Promote Diversity in Engineering to a high school senior from an ethnic minority who has been accepted into an ABET-accredited engineering program at a four-year college or university. The scholarship is for \$5,000. The Society also offers scholarships to female college students who are studying engineering. Visit www.nspe.org/Students/Scholarships/index.html for more information.

Aside from the benefits to the business, many improved processes also result in improved working conditions for employees by creating more well-defined and meaningful work and increased safety.

Industrial engineers design or develop new automated processing, management information, or other systems. Industrial engineers may use tools such as computer-aided design (CAD), microcontrollers, or computer-aided manufacturing (CAM) systems. Finally, they may research new products or product applications that can help improve worker productivity.

Industrial engineers often meet with staff and management personnel regarding purchasing procedures, product specifications, and manufacturing capabilities to help meet project deadlines. They may review specification

manuals, production manuals, or even employee handbooks to help them in their research.

Since business can change due to the economy, consumer demands, or the availability of labor, industrial engineers regularly meet with businesses to conduct long-range organization studies, system effectiveness studies, or plant location surveys.

Businesses may also consult with industrial engineers to study potential markets, sources of raw materials, labor supplies, alternate sources of energy, or new financing of operations. They conduct research related to the business and present their information in the form of reports, charts, illustrated plans, or PowerPoint presentations.

Many industrial engineers specialize in a particular area of industrial systems or processes. Industrial engineers who design, improve, or install systems of machines, equipment, information, materials, or employees within an organization may be called *operations engineers* or *management engineers*.

Those specializing in the planning or development, application, or maintenance of quality standards concerning finished or partially finished materials or products are called *quality control engineers*.

Time study engineers are concerned with developing work measurement procedures, or conducting time and motion studies to better monitor levels of efficiency of employees and facilities.

Specialists working with production specifications, drawings, schedules, or contract modifications are called *documentation engineers*.

Most industrial engineers work a typical 40-hour week, though longer hours may be required due to pending deadlines or a challenging project.

Work conditions vary depending on the employer or the project at hand. Industrial engineers evaluating computer systems for a client may work indoors in well-lit and comfortable offices. Those tasked with designing and testing a particular manufacturing process will more than likely end up spending a lot of time inside the factory. Such situations may expose industrial engineers to noise, chemicals, fumes, or other hazards. Industrial engineers who work for shipping companies such as UPS might actually travel delivery routes to observe workers in action and provide solutions to improve efficiency. Industrial engineers who work as freelance consultants often travel to meet clients, evaluate their needs, and make presentations.

REQUIREMENTS

HIGH SCHOOL

Engineer Your Life, a website for high school girls interested in engineering, suggests that high school students take the following classes to prepare for college and a career in engineering: “math (four years): algebra I and II, geometry, trigonometry, calculus; science (four years): biology, physics, chemistry (other science options for the fourth-year requirement and electives include advanced levels of biology, chemistry, physics, or ecology, astronomy, and earth sciences); language arts (four years): English (elective courses in this area

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include speech/debate, communications/media, and journalism); and foreign language (three years).” Other useful classes include geography, social studies, computer science, psychology, art, and sociology.

POSTSECONDARY TRAINING

Industrial engineers typically have at least a bachelor’s degree in industrial engineering or a related field. ABET accredits industrial engineering programs. Visit its Web site, www.abet.org, to access a database of accredited programs in the United States.

Many industrial engineers continue their education and earn a graduate degree. This qualifies them to work as management analysts, business executives, and college professors.

“In my opinion, it can never be a poor choice to have an engineering degree. Engineers go on to do many other things, become doctors, lawyers, or CEO’s of companies large and small. I think this degree really just teaches you how to think on your feet and solve problems fast and effectively—which isn’t bad in any career!”

—Sara Falkiewicz,
Industrial Engineer

CERTIFICATION AND LICENSING

Industrial engineers whose work affects property, health, or life must be licensed as professional engineers. According to the U.S. Department of Labor, “this licensure generally requires a degree from an ABET-accredited engineering program, four years of relevant work experience, and completion of a state examination. Recent graduates can start the licensing process by taking the examination in two stages. The initial Fundamentals of Engineering examination can be taken upon graduation. Engineers who pass this examination commonly are called engineers in training (EITs) or engineer interns. After acquiring suitable work

experience, EITs can take the second examination, called the Principles and Practice of Engineering exam.” Visit the National Council of Examiners for Engineering and Surveying website, www.ncees.org, for more information on licensure.

OTHER REQUIREMENTS

Are you a good problem-solver? Attentive to detail? Able to work as a member of a team and independently, when necessary? If so, you might make a good industrial engineer. Other important traits for industrial engineers include good organizational and time-management skills, creativity, and an inventive and flexible personality.

EXPLORING

There are many ways to learn more about a career in industrial engineering and engineering in general. You can read books and magazines about industrial engineering. You can attend an after-school or summer engineering program (visit www.careercornerstone.org/pcsumcamps.htm for more information). Websites such as www.egfi-k12.org will help you learn more about

engineering. The Institute of Industrial Engineers offers a variety of industrial engineering blogs at <http://iieblogs.org>. The Society of Women Engineers (SWE) offers <http://aspire.swe.org>, which provides an overview of engineering education and careers. Engineer Your Life: A Guide to Engineering For High School Girls (www.engineeryourlife.org) is also useful. Engineer Girl (www.engineergirl.org) is a similar site for middle-school girls.

You should talk to industrial engineers about their careers. Professional organizations that you might consider contacting for potential interviews include the American Society for Engineering Education's Women in Engineering Division (<http://wied.asee.org>) and the Society of Women Engineers (www.swe.org). You can also read articles about engineering in association publications such as the *SWE Magazine*.

EMPLOYERS

There are approximately 157,000 industrial engineers employed in the United States; 20 percent are women. Many industrial engineers work in manufacturing. Others work in aerospace, agriculture, aviation, computers, construction, real estate, transportation, telecommunications, utilities, and any other industry that seeks to improve worker and system productivity and reduce costs.

GETTING A JOB

Many industrial engineers obtain their first jobs as a result of contacts made through college networking events or internships. Others seek assistance in finding job leads from college career services offices, newspaper want ads, and employment websites. Additionally, professional engineering associations—such as the Institute of Industrial Engineers and the American Society for Engineering Education's Women in Engineering Division—provide job listings at their websites. See the For More Information section for a list of organizations. Those interested in working for the federal government should visit the U.S. Office of Personnel Management's website, www.usajobs.gov.

EARNINGS

The U.S. Department of Labor (USDOL) does not provide salary information for female industrial engineers. Salaries for all industrial engineers ranged from less than \$49,700 to \$112,830 or more in May 2010. Median annual earnings were \$76,100. The USDOL also reports the following mean annual earnings for industrial engineers by employer: oil and gas extraction, \$102,240; petroleum and coal products manufacturing, \$99,740; semiconductor and other electronic component manufacturing, \$85,410; navigational, measuring, electromedical, and control instruments manufacturing, \$83,780; architectural, engineering, and related services, \$83,410; aerospace product and parts manufacturing, \$83,050; and motor vehicle parts manufacturing, \$73,770.

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Employers offer a variety of benefits, including the following: medical, dental, and life insurance; paid holidays, vacations, and sick and personal days; 401(k) plans; profit-sharing plans; retirement and pension plans; and educational-assistance programs. Self-employed workers must provide their own benefits.

EMPLOYMENT OUTLOOK

Employment for industrial engineers is expected to grow faster than the average for all careers during the next decade, according to the U.S. Department of Labor. Companies are constantly seeking ways to improve production, cut costs, and otherwise improve employee productivity—which translates into strong opportunities for industrial engineers. Job prospects will be best for engineers with advanced education and a proven track record of helping companies and other organizations improve their “bottom lines.”

FOR MORE INFORMATION

For a list of ABET-accredited industrial engineering programs, visit the ABET website.

ABET

111 Market Place, Suite 1050
Baltimore, MD 21202-7116
410-347-7700
www.abet.org

For information about careers in engineering and its Women in Engineering Division, contact

American Society

for Engineering Education

1818 N Street, NW, Suite 600
Washington, DC 20036-2479
202-331-3500
www.asee.org
<http://wied.asee.org>

For information on careers in industrial engineering, contact

Institute of Industrial Engineers

3577 Parkway Lane, Suite 200
Norcross, GA 30092-2833
800-494-0460
www.iienet.org

MentorNet is a nonprofit organization that offers web-based e-mentoring between female and other underrepresented engineering and science students and industry professionals.

There is no charge for the service, and males may also participate. Visit the MentorNet website for more information.

MentorNet

Info@mentornet.net
www.mentornet.net

For information on licensure, contact

National Society

of Professional Engineers

1420 King Street
Alexandria, VA 22314-2794
703-684-2800
www.nspe.org

For career guidance and scholarship information, contact

Society of Women Engineers

203 North LaSalle Street, Suite 1675
Chicago, IL 60601
877-793-4636
hq@swe.org
www.swe.org

Interview: Sara Falkiewicz

Sara Falkiewicz is the director of performance excellence at ProHealth Care in Waukesha, Wisconsin. She also works as an adjunct professor at the Milwaukee School of Engineering and was chosen as one of the New Faces of Engineering in 2011 by the National Engineers Week Foundation. Sara discussed her career with the editors of *Nontraditional Careers for Women & Men*.

Q. How long have you worked in the field? What made you want to become an industrial engineer?

A. I have worked in this field in some capacity (from internships to full-time employment) for almost 10 years.

My exposure to industrial engineering was actually an accident. Many students (including me) don't know this type of engineering even exists and is an option in school. I actually started my secondary education in a computer engineering program. This was during the Silicon Valley boom, and I thought working for Intel, Apple, or a similar company was my ideal job.

I found a summer internship in a manufacturing facility implementing a computer system to track their products. Though the project was implementing a computer system, actually doing that involved a lot of work with the employees of the facility to learn how they actually would use the system, and organizing their work in a different way to allow them to use the system.

I had a lot of face-to-face interaction and was out on the floor learning about the way the facility worked. I realized then that I didn't want to have to spend the rest of my life sitting in front of a computer, coding. I wanted to be actively working with groups of people and help make their everyday work easier and less stressful. I then worked with my advisors at school to change programs and pursue industrial engineering.

Q. What is one thing that young people may not know about a career in industrial engineering?

A. I think the appeal of this specialty, which is in essence designing processes to work better, is that processes exist everywhere. A "process"—steps to reach an intended outcome (to get from "A" to "B" effectively)—is how all work in all industries is done. You have the opportunity to use this skill set almost anywhere—from manufacturing salad dressings to planning how much of what products go into stores. You can take whatever your interest is and find an organization to work for that does something in that field. I think it would be hard to find a place that an industrial engineer wouldn't be an asset.

Q. What are your typical duties? What types of projects are you currently working on?

A. Typical duties for an industrial engineer are learning about processes as they work now and making recommendations to make them work more effectively. We learn about processes by gathering data on how they work, observing and interviewing, or even doing the processes ourselves firsthand to understand how they work. We then use a whole "toolkit" of tools to determine the best way to move forward among multiple options.

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I think this assessment and recommendation process could be compared in a simple way to figuring out which restaurant to recommend to a friend. You would first determine an ideal location or area. You might then determine what restaurants are in that area, and for each option you might gather additional data to help you make a decision. For example, you check the prices and what is on the menu, you ask others who may have eaten at that restaurant, you check online reviews, and perhaps even eat there yourself to test it out. You put together all of those data sources and come up with your best option from many, and make a recommendation to your friend!

In my current role, my projects are centered around the same theme—what is the best way to get something done? If a patient enters our facility having a heart attack, what steps need to happen to get that patient treatment as quickly as possible? If our nurses are giving blood to a patient, what steps need to be taken to make sure it is the right kind of blood?

Q. Have you faced any special challenges as a female working in such a male-dominated field? If so, how did you deal with these challenges?

- A.** I feel fortunate to say that I haven't faced any challenges specific to being a female in this field. This particular specialty of engineering from my observation actually has more females than others.

In school, at the time it was 12 male students to every female student. There were many times where I might be one of the only female students eating in the dormitory lunch room, or one of the only female students in a class. Looking back though I felt more proud to be there, representing an underrepresented type of student, than threatened or uncomfortable. On a funny note, it also results in great dating odds; I ended up marrying a classmate.

In the field, I think what really matters is whether you are competent and have a good skill set, and that you have the ability to work effectively as a member of a diverse team. If you are good at what you do and make a positive contribution, the differences between you and your other team members—gender, race, ethnicity, faith—no longer are an issue.

Q. What advice would you give to young women who are interested in the field?

- A.** Go for it! In my opinion, it can never be a poor choice to have an engineering degree. Engineers go on to do many other things, become doctors, lawyers, or CEO's of companies large and small. I think this degree really just teaches you how to think on your feet and solve problems fast and effectively—which isn't bad in any career!

I hope high school students understand that the pathway to success is not a straight line. It might be quite curvy; you might even be traveling in circles or backwards at times, but what matters is that you are moving towards something, a destination. Eventually with hard work and focus you'll get where you want. It's not quick though, and certainly not easy! The first step is choosing a college and a focus for your future studies, but if you change your mind and start to study something else, you learned something from that initial experience. I didn't start out in industrial engineering, but made my way there and now love what I do—and I still use many of the skills I got from my first major, when I was figuring out what I "really wanted to be when I grow up!"

PAINTERS

OVERVIEW

Painters apply paint, varnish, glazes, washes, and other similar finishes to walls, buildings, bridges, and other structures for decorative or protective purposes. They use brushes, rollers, and sprayers to apply straight color, though sponges, cloths, and plastic are also used to create textures or faux finishes. Many painters learn their skills on the job. Others learn via an apprenticeship or training at a technical school. There are approximately 299,000 painters employed in the United States. Slightly more than 7 percent are women. Employment for painters is expected to be excellent during the next decade.

THE JOB

Painting is one of the easiest and most cost-effective ways to redecorate a room, give new life to a piece of furniture, or protect structures from the elements. While some painting projects can be done by an untrained individual, many people choose to hire trained professionals to get the job done.

When taking on a new project, painters often meet with the client or builder to find out the scope of the project, the look desired, and the available budget. Painters assess the project—size of the room or structure—to determine the best paint to use as well as the number of hours to devote to the job. They suggest the proper type of paint for the project, such as flat or semi-gloss paint for interiors, and durable waterproof or weatherproof paint for exteriors. Painters use color swatches or faux-finish samples to help clients find the perfect shade of color or combination of colors.

Painters first prepare the surfaces to be painted. They remove wall hangings or fixtures. They patch existing cracks or holes in walls. They repair larger holes or damage by installing new drywall and applying spackle. When the spackling is dry, painters use sandpaper to smooth out any rough edges. Old layers of paint are removed by sanding, wire brushing, or water or abrasive blasting. At times, it is necessary to give walls or surfaces a quick wash to remove excess dust from sanding. Such precaution is needed to help the new paint adhere properly to the wall's surface. Furniture or other structures are

FAST FACTS

High School Subjects

Mathematics
Shop

Personal Skills

Following instructions
Manual dexterity

Minimum Education Level

Apprenticeship, technical school, or on-the-job training

Salary Range

\$22,450 to \$34,280 to
\$58,480+

Employment Outlook

About as fast as the average

O*NET-SOC

47-2141.00, 51-9122.00

GOE

06.02.02

DOT

840

NOC

7294

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given the same preparation before painting. In new construction, a special primer or sealer is applied to the walls before the actual color is painted.

Some larger fixtures that are harder to remove may be simply covered with a tarp. Special painter's tape is also used to cover glass windows, ceilings, and corners. Large tarps or drop cloths are used to cover furniture and protect floors from paint spills and splatters.

You May Not Know...

The editors of *Nontraditional Careers for Women & Men* asked painter Angela Jankowski to name one thing that young people may not know about a career as a painter:

"Young people may not know how diverse a career as a painter really is. You can work in a variety of specialties such as faux finish, paper hanging, lead abatement, bridge work, tank work, residential, commercial, sand-blasting, water blasting, containment work, and the list continues. The more areas you are trained in the more valuable you are—which can translate into a very prosperous career as a painter."

Painters purchase their paint from paint stores or the paint departments of home improvement stores, where the desired color is matched and mixed automatically. For larger projects, painters can order their paint and have the shipment delivered to the site. Some painters mix their own colors.

Different tools are used for painting. The brush is the most common, though there are different types used depending on the surface and type of paint. An angular brush, for example, is often used to paint tight corners or when a fine line is needed; a brush with straight bristles is used to paint fences or other large surfaces. Painters also use rollers to quickly cover large surfaces, as well as rollers with a long-handled attachment to reach high walls or ceilings. Automatic paint sprayers are used to cover large surfaces such as decks, the exterior of a building, or other struc-

tures. Painters also use ladders or scaffolding when painting high walls and ceilings or hard-to-reach surfaces.

Some painters specialize in decorative finishes, using different tools, materials, or techniques to achieve this look. For example, painters use metal tools, sponges or rags, or even sheets of plastic to create textures, such as stippling, marbling, or other faux finishes. They also use layers of paint, glazes, or washes to create a speckled or distressed finish. Plaster is often stamped on a surface, then painted or glazed over to achieve a distinctive pattern.

Painters are also hired to paint industrial surfaces such as bridges, ships, fences, buildings, or machinery. Acrylic-solvent type paints are used that add protection against weather, rust, or normal wear and tear, yet are environmentally friendly. Sprayers are used when working with large surfaces, as well as steeples, fixed scaffolding, or operating scaffolding to reach tall structures or hard-to-reach areas.

The final step, regardless of the type of project, is cleanup. Any splashes of paint on windows, floors, ceilings or fixtures are removed. Trays, brushes, and rollers are carefully washed, dried, and stored; tarps and painting cloths are folded for future use. Once the paint is dry, electrical plates and fixtures are replaced.

Painters employed by builders or painting companies often train and supervise apprentices, taking care to inspect their work. Self-employed painters are responsible for other duties such as billing clients, ordering supplies, and marketing their services.

Painters wear overalls and hats or other such work clothing to protect their regular clothing from paint splatters. Comfortable shoes are a must, since painters are on their feet for long hours at a time.

Painters often wear dust masks and safety goggles during the sanding process. Painters also risk injury when climbing ladders or suspended on a movable scaffold. They take many safety precautions to avoid injuries.

REQUIREMENTS

HIGH SCHOOL

Useful classes include shop, art, chemistry, mathematics, and English and speech. Painters who plan to operate their own contracting businesses should take business, advertising, marketing, and computer science classes.

POSTSECONDARY TRAINING

Many painters learn their skills on the job by working as a helper to an experienced painter. Others learn via an apprenticeship or a one-year training program at a technical school.

Apprenticeships typically last two to four years. Each year of an apprenticeship program typically features 2,000 hours of on-the-job training and 144 hours of related classroom instruction. The Finishing Trades Institute (FTI, www.finishingtradesinstitute.org) is the training and education department for the International Union of Painters and Allied Trades (IUPAT). The FTI operates the painters' apprenticeship training program, which lasts four years. Visit www.iupat.org/pages/start-a-career for more information on IUPAT apprenticeship training.

To enter an apprenticeship program, you typically must be at least 18 years old and have earned a high school diploma or GED. Visit www.doleta.gov/OA/sainformation.cfm for information on apprenticeship training programs in your state.

CERTIFICATION AND LICENSING

Industrial painters can obtain voluntary certification from the National Association of Corrosion Engineers. Contact the association for information on certification requirements.

OTHER REQUIREMENTS

Do you have good manual dexterity? Good color sense and vision? Can you perform repetitive tasks without getting bored or reducing the quality of your work? Are you detail oriented and focused when given a task? If so, you are a good candidate for a career as a painter. You will also need to be in good physical condition to withstand hours of stooping, kneeling, stretching, or reaching high overhead. Painters should also have the stamina to work in the hot sun and wind, and they should not be afraid of working at heights.

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Many painters belong to the International Union of Painters and Allied Trades or other unions.

EXPLORING

Read books and other publications about painting. Sample issues of *Painters and Allied Trades Journal* are available at www.iupat.org/pages/about/publications. View how-to painting videos on YouTube and at home remodeling sites. Talk to painters about their careers, or observe them as they go about their work. The best way to learn if a career as a painter is a good fit for your interests and abilities is to actually work on a painting project. Perhaps your religious organization or school needs some volunteer painters. Or maybe your parents need some help painting a bathroom or closet. Be sure to ask your parents for permission first before starting a home project.

EMPLOYERS

There are approximately 299,000 painters employed in the United States. Slightly more than 7 percent are women. About 36 percent of painters work for painting contractors. Other employers of painters include real estate management firms, hospitals, schools, factories, and government agencies. Forty-five percent of painters are self-employed.

GETTING A JOB

Many painters obtain their first jobs through apprenticeships or by contacting potential employers directly. Others seek assistance in obtaining job leads from newspaper want ads, employment websites, and college career services offices. Those interested in positions with the federal government should visit the U.S. Office of Personnel Management's website, www.usajobs.gov.

EARNINGS

The U.S. Department of Labor (USDOL) does not provide salary information for female painters. It does report that women employed in construction occupations earned annual salaries of \$33,592 in 2010. Median annual salaries for all painters were \$34,280 in May 2010. Salaries ranged from less than \$22,450 to \$58,480 or more. The USDOL reports the following mean annual earnings for painters by employer: local government, \$47,230; non-residential building construction, \$38,610; building finishing contractors, \$36,650; and residential building construction, \$33,270.

Apprentices receive earnings that range from 40 to 50 percent of the salary paid to experienced painters. Their pay increases during their training.

Employers offer a variety of benefits, including the following: medical, dental, and life insurance; paid holidays, vacations, and sick and personal days; 401(k) plans; retirement and pension plans; and educational-assistance programs. Union members often receive health insurance, a pension, and other benefits from their union. Self-employed workers must provide their own benefits.

EMPLOYMENT OUTLOOK

The U.S. Department of Labor (USDOL) predicts that employment for painters will be excellent during the next decade. A large number of positions will open for painters each year as current painters leave the field for retirement or other reasons. The need for painting is like death and taxes—it will never go away. New homes and buildings need to be painted, and old ones must be repainted. Bridges, fences, and other structures must be constantly maintained and repainted in order to stop potential corrosion and deterioration and simply so that they look good for the public.

The USDOL reports that employment for industrial painters should be especially strong, “with the best employment opportunities...in the Gulf Coast region, where strong demand and the largest concentration of workers exists.”

FOR MORE INFORMATION

For information on state apprenticeship programs, visit

Employment & Training Administration

U.S. Department of Labor
www.doleta.gov/oa/stateoffices.cfm

For information on union membership, contact

International Union of Painters and Allied Trades

7234 Parkway Drive
 Hanover, MD 21076
mail@iupat.org
www.iupat.org

For information about certification for industrial painters, contact

NACE International

1440 South Creek Drive
 Houston, TX 77084-4906
 800-797-6223
firstservice@nace.org
www.nace.org

For information about opportunities for women in the construction industry, contact

National Association of Women in Construction

327 South Adams Street
 Fort Worth, TX 76104

nawic@nawic.org
www.nawic.org

For additional information on careers and *Building Women* magazine, contact
National Association

of Home Builders

1201 15th Street, NW
 Washington, DC 20005-2842
www.nahb.com

For information on education and careers, contact

Painting and Decorating Contractors of America

1801 Park 270 Drive, Suite 220
 St. Louis, MO 63146-4020
www.pdca.org

For information on opportunities in Canada, contact

Canadian Association of Women in Construction

365 Brunel Road, Unit #1
 Mississauga, ON L4Z 1Z5 Canada
www.cawic.ca

There are many other organizations at the national, regional, state, and local levels for women interested in construction careers. See Appendix I: Women's Construction Associations on page 270 for an extensive list of organizations.

Interview: Angela Jankowski

Angela Jankowski has worked as a painter for 10 years. She discussed her career with the editors of *Nontraditional Careers for Women & Men*.

Q. Where do you work?

A. I work at D.C Cook Nuclear Plant in Bridgman, Michigan. I am an industrial painter, and in 2008 I was offered the opportunity to become a safety observer.

Q. What does a safety observer do?

A. I observe all workers (craft and non-craft). I observe work practices, housekeeping, barriers, and signage, and ensure the proper personal protective equipment is used. I fill out observation cards; these cards are used to collect data for trending purposes and determine areas for safety improvement. When I am not a safety observer I work with the painters in the blast shop, turbine, auxiliary, and containment buildings.

Q. What made me what to become a painter?

A. I moved to Bridgman, Michigan, home of D.C Cook Nuclear Plant. I wanted to work at the plant, but I didn't know exactly what I could do considering I didn't have a college background. Then three years later, I was managing a deli when Barb, a wonderful lady I worked with, said one day "We need to get you a better paying job, have you ever thought of being a pipefitter? An iron worker? A painter?" That was the conversation that changed my life, I didn't know anything about the International Union of Painters and Allied Trades (IUPAT), but with the help of Barb and her husband (Charlie aka Scotty), who was a contracted quality control inspector at the Cook Plant, I was able to join the IUPAT as an apprentice. My first job was at D.C Cook Nuclear Plant.

Q. What are the pros and cons of work in your career?

A. Pros:

- ✓ Good wage and benefits
- ✓ The excellent training you are offered
- ✓ The diversity of paths you can take; for example, I am a painter and a safety observer, and just recently an Occupational Safety and Health Administration instructor

Cons:

- ✓ You may have to travel out of state for work. Some people really enjoy this, but it can be difficult when you have small children.
- ✓ This is dirty and sometimes physically demanding work; plan on working in a hot environment

Q. Have you faced any special challenges as a female working in a male-dominated field?

A. When I think back to the early years, yes, guys did test me. I was also an apprentice, but I think it was more to see what I was made of, to see if I was a worker or not. I have been fortunate to have had many great peers.

Q. What advice would you give to young women who are interested in becoming painters?

- A.** My advice to young women painters is, KEEP IT PROFESSIONAL, work hard, and learn as much as you can. And never pass up the opportunity for additional training. Stick with it. As an apprentice the wage may be difficult to manage the first couple of years, but the effort is worth it.

Q. What is the future employment outlook for painters?

- A.** Personally from the nuclear industry outlook, we are in need of young people. I think the average age of painters in this field is about 45. We also have many painters who will be retiring soon. There is a lot of opportunity here for the right person.

Interview: Julia Porter

Julia Porter was employed as a painter and drywall worker for 22 years. She is currently the technical assistance coordinator for the International Union of Painters and Allied Trades (IUPAT) Job Corps Program. Julia discussed her career with the editors of *Nontraditional Careers for Women & Men*.

Q. Can you tell us about your career?

- A.** I worked in the field with my tools for 22 years. I began my career as a painter's apprentice then changed to a drywall finisher. I worked for the same company, Pacific Construction Systems, for 13 years. I was trained to run work as a foreman, and I did quite well. I was fortunate to have a great mentor who taught me the value of staying involved with my union. In the late 1990's I started my own union drywall finishing and painting company. I had a good run in Seattle during the dot.com boom but I eventually had to close up shop and return to work for a contractor as a superintendent. I was an IUPAT Job Corps painting instructor for two years, and was promoted to IUPAT Job Corps field coordinator for one year in the Pacific Northwest Region. For the past four years I've worked as the technical assistance coordinator for the IUPAT Job Corps Program.

Q. What made you want to become a painter?

- A.** I was a single mother with only a high school diploma on state assistance and needed a living wage career and medical benefits for my baby. I was always athletic and enjoyed working with my hands and tools, so a union apprenticeship was perfect for me.

Q. What is one thing that young people may not know about a career as a painter?

- A.** That painting is a varied craft with many different avenues to choose from. The union painting contractors usually pay higher wages with the best benefits.

Q. What are the pros and cons of work in your career?

- A.** Pros:

✓ The satisfaction and pride you feel when you look back at the work you've accomplished at the end of the day

What is Green Construction?

The U.S. Environmental Protection Agency defines green construction as “the practice of creating structures and using processes that are environmentally responsible and resource-efficient throughout a building’s life-cycle from siting to design, construction, operation, maintenance, renovation and deconstruction.” Green construction is also known as *green building* or *sustainable* or *high-performance building*. Construction workers from all the trades work in this industry, but they have special training and experience in green construction techniques. They use sustainable building materials during construction or renovation, ensure that products used in indoor environments are ecologically friendly and have fewer toxic emissions than traditional building materials, and plant native trees, plants, and shrubs that require less water and fertilizers—which reduces water usage and protects the local soil and water supply from pollution. For information on green construction, visit the U.S. Green Building Council’s website, www.usgbc.org.

- ✓ The training you receive as a union craftsman, which allows you to be the best at your trade
- ✓ The camaraderie you develop with fellow tradespersons
- ✓ The wages and benefits you receive as a union tradesperson

Cons:

- ✓ The physical toll on your body
- ✓ Working in extreme conditions

Q. Have you faced any special challenges as a female working in a male-dominated field? If so, how did you deal with these challenges?

- A. In the early 1980s working on high rises I used to get a lot of comments from the guys like “you should be home barefoot and pregnant,” “just another woman taking a man’s job,” and much worse. I was pretty feisty, and I knew what I was doing so I’d either come back with something snappy or just ignore them because I knew some saw me as a threat. I had to be tough in those days, but I have many great memories and I was fortunate to work on many high-profile projects throughout the Greater Puget Sound region.

Q. What is the future employment outlook for painters?

- A. I believe with the number of baby boomers preparing to or already retiring from the painting trade and with the U.S. Bureau of Labor Statistics projection of 20 percent growth in the construction industry in the next nine years the future employment outlook is pretty bright!

Q. What advice would you give to young women who are interested in becoming painters?

- A. Become a well-trained union painter, do your best every day, and take good care of your body; you only get one. If you can, partner up with a more experienced woman who is willing to mentor you. Oh, and be sure to toughen up a bit—there’s no crying in construction!

PILOTS

OVERVIEW

Pilots transport passengers and cargo to destinations throughout the United States and the world. They find employment as airline pilots, commercial pilots, crop dusters, medical operations pilots, law enforcement pilots, helicopter traffic monitors, military pilots, and flight instructors, as well as work in other careers. In addition to the operation of the aircraft, some pilots are in charge of minor maintenance and repairs of their planes, as well as other nonflying duties. The completion of some postsecondary aviation training and a license is required to work as a pilot. There are approximately 82,000 pilots employed in the United States; 5.2 percent are women. Employment for pilots is expected to grow about as fast as the average for all careers during the next decade.

FAST FACTS

High School Subjects

Mathematics

Physics

Personal Skills

Complex problem solving

Critical thinking

Judgment and decision making

Minimum Education Level

Some postsecondary training

Salary Range

\$34,860 to \$75,000 to

\$139,330+

Employment Outlook

About as fast as the average

O*NET-SOC

53-2011.00, 53-2012.00

GOE

07.03.01

DOT

196

NOC

2271

THE JOB

On most flights, airline crew members work as a team, with the most experienced pilot serving as the *captain* and supervisor. Before the plane's departure, the captain visually inspects the engines, control panels, and all instruments and gauges to ensure they are in proper working order. She also makes sure all luggage and cargo are loaded. The captain works with flight dispatchers and airline forecasters to create a flight plan, taking account of possible severe weather in the area and adjusting route, altitude, and speed accordingly.

The *co-pilot*, also known as the *first officer*, helps the captain prepare for the flight. She is responsible for monitoring instrument panels and communicating with air traffic controllers. During the plane's takeoff, it is necessary for the captain and the co-pilot to work together closely. The captain considers the size of the plane, as well as the combined weight of passengers and cargo, to calculate the proper speed needed to become airborne. While the captain is in charge of concentrating on the runway, the co-pilot is responsi-

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ble for monitoring the instrument panels, making adjustments as needed. The co-pilot is responsible for informing the captain that the necessary take-off speed is reached, after which the captain raises the nose of the plane by pulling back on instrument controls. During long flights, co-pilots share shifts with the captain in navigating the plane.

Once a desired altitude is reached, the plane continues to its destination on autopilot, with constant monitoring by the captain and co-pilot. Co-pilots routinely check fuel gauges, engine controls, and other systems. They communicate with air traffic controllers during the flight. In the event of sudden changes in weather or heavy turbulence, the captain often decides to change navigation course or cruising altitude, although approval is needed from air traffic controllers.

Some flights have a third person as part of their aircrew—the *flight engineer*. The flight engineer assists the pilots with flying duties, especially on long transatlantic flights. She also makes minor in-flight repairs when needed and acts as communication liaison with the cabin crew.

“My job is always changing—the weather, my routes, the passengers. Every day is different.”

—Annmarie Savitski, Pilot

Throughout the flight, the crew makes several announcements to passengers. They give details of the flight, notify of potential changes in weather or approaching pockets of turbulence, or simply give news about the destination city.

The captain and co-pilot prepare for landing by slowly decreasing speed and altitude as they approach their destination. Air traffic controllers inform the captain of the plane’s assigned runway. Monitoring the instrument panels, the co-pilot notifies the captain to lower the plane’s wheels and apply the brakes. At the end of each flight, the crew gives a complete record of the flight and the plane’s maintenance records to its airline and the Federal Aviation Administration.

When we think of pilots flying the friendly skies, we usually refer to airline pilots. However, did you know that 34 percent of all pilots fly aircrafts for commercial purposes? *Commercial pilots* work in many different industries—from agriculture to cargo transport.

Commercial pilots are highly trained aviation professionals, capable of operating airplanes of various sizes. Depending on the employer, commercial pilots fly large corporate jets, small fixed or rotary winged crafts, and even helicopters. Many commercial pilots enter the industry after serving as pilots in the military.

Their work begins while still on the ground. They must check the condition of the aircraft each day, prior to every takeoff. Commercial pilots check engines, panel controls, navigation instruments, and other systems. Fuel levels are checked and refilled if needed. Commercial pilots working as crop dusters must make certain all fertilizers or insecticides are properly loaded on the airplane. Those working as *corporate pilots* must check in passengers

and any baggage. Commercial pilots working for cargo carriers must make sure all pieces of mail or cargo are loaded properly and securely on board.

Commercial pilots also must complete paperwork and flight calculations prior to takeoff. They must calculate the proper navigation route using the correct speed and altitude levels needed to reach their destination. Navigation plans should be filed detailing the final destination and the intended route. The weather should be checked, not just for the surrounding area, but for the area around the final destination. Commercial pilots must also coordinate with crew members and those responsible for ground activities. During winter, pilots must be sure the plane is well equipped for the weather; for example, wings, engine, and landing gear must be de-iced and operational. If fog or clouds cause poor visibility, pilots are forced to renavigate their route, or ask for assistance or visual reference when preparing to land.

During the flight, commercial pilots monitor the plane's activities, such as engine power, fuel consumption, and other air systems. Sometimes, wind shear or changing weather makes it necessary to alter flight plans. Commercial pilots constantly monitor such conditions using on-board instruments and make adjustments as needed. They also keep in contact with air traffic controllers in control towers via radio.

After landing, commercial pilots have other duties. Those employed by agricultural businesses that perform crop dusting, fertilizing, or perhaps seeding are often responsible for loading these chemicals or seeds on board. They also make sure sprayers or other devices used to deploy chemicals or seeds are functioning properly. Agricultural pilots fly their aircrafts, or sometimes helicopters, at low altitudes to dust and spray fields and crops.

Some commercial pilots work for health care companies that provide emergency medical services. When a patient needs further medical assistance, or perhaps a lifesaving procedure, hospitals use helicopters or medical aircraft for transportation. Pilots working in this capacity must be able to get their aircraft ready at a moment's notice, and they often maneuver their helicopter to land on hospital helipads or roofs. Flying a helicopter is different than a plane, the most obvious reason being the size. However, helicopters can go only short distances, and they must also be flown at lower altitudes. This lower altitude forces helicopter pilots to be on the lookout for obstacles such as power lines, bridges, towers, or even tall trees, which can cause a potential crash.

"It is a great career for the independent, driven woman. It requires patience, drive, and determination. If you enjoy challenges, traveling, and working with many different people in an always fluid and changing environment, then you would probably enjoy this line of work."

—Nathalie Hacken, Pilot

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Other commercial pilots transport cargo or mail. Many times they are responsible for loading or unloading bundles or pallets. They make sure their load is within proper weight limits of the craft and are balanced evenly, as well as secured for the flight.

Many large corporations employ commercial pilots to fly corporate jets. Other pilots can find employment flying planes or helicopters for tour companies, entertainment companies, or shuttle services.

Some commercial pilots also serve as flight instructors. Additional duties such as student lectures or simulator lessons are part of this job.

Depending on the employer, commercial pilots have irregular work schedules, flying 30 hours one month, and sometimes double that amount the next. They may also be required to remain in a city overnight before continuing home or to their next destination. Commercial pilots employed at larger companies, such as those flying corporate jets, may have more regular scheduled hours, with overnight stays.

Commercial pilots also have many duties aside from flying. Crop dusters, for example, may be responsible for stocking insecticides or other applications. Flight instructors have classroom instruction duties as well as test-grading and flight simulator work.

The work can be dangerous at times, especially when flying during inclement weather. Commercial pilots also face potential hearing loss due to prolonged exposure to noisy engines. Working with powerful fertilizers and toxic insecticides can also present possible exposure or negative health hazards for agricultural pilots.

REQUIREMENTS

HIGH SCHOOL

Take a college-preparatory curriculum in high school because many pilots have completed at least some college education. Recommended classes include English, mathematics, physics, science, computer science, speech, and foreign languages. Additionally, start pursuing your pilot's license while in high school.

POSTSECONDARY TRAINING

Most major airlines require applicants to have a college degree; pilots must also be licensed. See the Certification and Licensing section for information on licensing requirements.

Many pilots receive their training for the field via military service, but a growing number of people are training to become pilots by attending flight schools or by taking lessons from Federal Aviation Administration (FAA)-certified flight instructors. Approximately 600 civilian flying schools (including some colleges that offer degree credit for pilot training) are certified by the Federal Aviation Administration. The Aviation Accreditation Board International (www.aabi.aero/programs.html) and the University Aviation Association (www.uaa.aero) also accredit college aviation programs. *WomanPilot* magazine offers a list of postsecondary training programs at <http://womanpilot.com/pilot/docs/Education.pdf>.

Types of Pilot Licenses

A **student pilot license** is designed for the initial training period of flying. The student pilot must have a flight instructor present. He or she can solo after appropriate instructor endorsements.

A **recreational pilot license** limits the holder to: specific categories and classes of aircraft, the number of passengers which may be carried, the distance that may be flown from the departure point, flight into controlled airports, and other limitations.

A **private pilot license** lets the pilot carry passengers and provides for limited business use of an airplane. You must be at least 17 years of age to obtain this license.

A **commercial pilot license** lets the pilot conduct some operations for compensation and hire. You must be at least 18 years of age to obtain this license.

An **airline transport pilot license** is required to fly as captain by some air transport operations. You must be at least 23 years of age to obtain this license.

Source: Federal Aviation Administration

CERTIFICATION AND LICENSING

Since pilots have so much responsibility, they must meet stringent licensing requirements. To receive a commercial pilot certificate (license), you must be at least 18 years of age, have at least 250 hours of flight experience, pass a physical examination, pass a written examination, and demonstrate your flying ability to FAA or designated examiners. You must also receive a rating for the kind (single-engine, multi-engine, or seaplane) and type of plane (such as Boeing 707 or 747) that you fly.

Airline captains must have an air transport pilot's license. To obtain this license, you must be at least 23 years old, have a minimum of 1,500 hours of flying experience (including cross-country, night, and instrument flying), pass FAA written and flight examinations, and have one or more advanced equipment ratings.

Pilots also receive ratings from the FAA to fly during periods of low visibility. According to the USDL, pilots "may qualify for this rating by having the required hours of flight experience, including 40 hours of experience in flying by instruments; they also must pass a written examination on procedures and FAA regulations covering instrument flying and demonstrate to an examiner their ability to fly by instruments. Requirements for the instrument rating vary depending on the certification level of flight school."

The National Association of Flight Instructors offers the master flight instructor and the associate master flight instructor accreditation to flight

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instructors who “have reached the highest level of instructional activity, educational experience, and professional service to the flight-training community.” Contact the Association for more information.

OTHER REQUIREMENTS

To be a successful pilot, you should be decisive and calm under pressure. You should have good problem-solving skills. Pilots should be team players with excellent communication skills, as they often fly with a co-pilot or depend upon the instructions of other aviation professionals such as air traffic controllers, flight dispatchers, and aviation weather forecasters. Pilots must also meet strict physical fitness requirements. Other important traits include self-motivation, reliability, a willingness to continue to learn throughout one’s career, and leadership ability.

“This is a job where there is no direct boss necessarily looking over your shoulder, so there is a great sense of personal accountability. It is your responsibility to ensure your technical knowledge is maintained at a professional level. You are directly in charge and responsible for all aspects of your flight—balancing safety, efficiency, and customer service.”

—Nathalie Hacken, Pilot

EXPLORING

There are many ways to explore the career of pilot. While in high school, you can start pursuing your student pilot license. You can read publications about the field such as *Air Line Pilot* magazine (www.alpa.org), *Aviation for Women* (www.wai.org/magazine), and *WomanPilot* magazine (<http://womanpilot.com>). There are also many helpful websites, such as Cleared to Dream

(www.clearedtodream.org), from the Air Line Pilots Association, International (ALPA).

Talk to pilots about their careers. The ALPA offers a program that sends pilots to schools. Visit www.clearedtodream.org for more information. Students can also join the ALPA ACE Club, which offers access to networking opportunities and exclusive career and salary information from the organization. Women in Aviation, International holds an Annual International Women in Aviation Conference (www.wai.org). Perhaps you can attend the conference and talk with women pilots about their careers or simply learn about aviation through conference seminars.

Each summer, the Experimental Aircraft Association holds the Women Soar You Soar program for high school girls interested in the field of aviation. According to its website, “the unique program introduces more than 100 girls and 35 women, from engineers to fighter pilots, working in a variety of aviation and aerospace fields. Activities include flight simulation, workshops, wing rib assembly, mentor sessions, career exploration, and more.” Visit www.airventure.org/attractions/women_soar.html for additional information.

Those who hold a student pilot certificate or equivalent pilot certificate can become associate members of The Ninety-Nines, an organization for

women pilots. The Ninety-Nines also offers speakers on aviation. Visit www.ninety-nines.org to learn more.

During summer break, ask your parents to take you to the International Women's Air and Space Museum (<http://iwasm.org/wp-blog>) in Cleveland, Ohio. Or take a trip to the Smithsonian National Air & Space Museum (www.nasm.si.edu) in Washington, D.C. A special Women in Aviation and Space History section is available at the Museum's website, www.nasm.si.edu/research/aero/women_aviators/womenavsp.htm.

EMPLOYERS

There are approximately 82,000 pilots employed in the United States; 5.2 percent are women. Airline pilots work for regional and national airlines. They are typically based near major metropolitan airports or airports that operate as hubs for the major airlines. Commercial pilots work for large companies that fly cargo, air-taxi companies, airports and colleges (as flight instructors), utilities (to inspect energy infrastructure), crop-dusting companies, medical services companies, government agencies, and travel companies (sightseeing tours). Pilots are also employed in the U.S. military.

GETTING A JOB

Many new pilots begin their careers by working as co-pilots or pilots for smaller regional or commuter airlines. Although the pay is often low, this arrangement allows them to gain experience and flight hours that will prepare them to work at larger, national airlines. This experience is important because newly hired pilots at major airlines typically must have 4,000 hours of flight experience.

Job leads can be found via professional associations, the career services offices of flight schools, and by contacting airlines and other employers directly.

The Ninety-Nines, Inc. International Organization of Women Pilots offers a variety of career resources for aspiring and current pilots at its website, www.ninety-nines.org/index.cfm/pilot_careers_center.htm. Some of its resources include the Pro 99s Network, an email-based networking forum in which aspiring and current women pilots discuss issues in the field; the 99s Professional Pilot Leadership Initiative, a three-phase, 18- to 24-month structured mentoring program that helps women pilots develop their careers and leadership skills; and career scholarships that "cover the entire cost of completing advanced flight training or coursework, such as for multi-engine ratings, jet type ratings, flight instructor and airline transport pilot certificates, and college degree."

Did You Know?

Blanche Scott was the first American woman pilot to fly solo, according to the Experimental Aircraft Association. On September 2, 1910, she flew a Curtiss airplane to an altitude of about 40 feet.

EARNINGS

The U.S. Department of Labor (USDOL) does not provide salary information for female pilots. Median annual salaries for all airline pilots were \$80,130 in May 2010. Salaries ranged from less than \$54,980 to \$139,330 or more.

Commercial pilots earned median annual salaries of \$67,500 in May 2010. Ten percent earned less than \$34,860, and 10 percent earned \$119,650 or more. The USDOL reports the following mean annual earnings for commercial pilots by employer: scenic and sightseeing transportation, \$74,840; other ambulatory health care services, \$67,850; support activities for crop production, \$62,600; and technical and trade schools, \$62,280.

Employers offer a variety of benefits, including the following: medical, dental, and life insurance; paid holidays, vacations, and sick and personal days; 401(k) plans; profit-sharing plans; retirement and pension plans; and educational-assistance programs. Airline pilots and their immediate families also receive free or reduced-fare transportation on their own and other airlines. Self-employed workers must provide their own benefits.

EMPLOYMENT OUTLOOK

Employment for airline pilots is expected to grow about as fast as the average for all careers during the next decade, according to the U.S. Department of Labor. Opportunities will be best at regional airlines and low-cost carriers. There will be strong competition for jobs at the major airlines.

Despite this prediction, the international airline industry is on the rebound. Airbus, a top manufacturer of commercial jets, predicts that world passenger traffic will increase by 4.7 percent annually from 2009 to 2028. This is good news for airline pilots. In fact, the International Civil Aviation Organization reports that between 2010 and 2030, airlines will need 3,000 more pilots per year than are typically hired. The Herman Group, a firm of strategic business futurists, reports that this shortfall has created a bidding war for pilots, "with some airlines offering tax-free salaries and four-bedroom villas and other carriers offering free training." During the next 12 years, U.S. airlines will hire more than 40,000 new pilots. Foreign airlines are also competing for U.S.-based pilots by holding recruiting drives in the United States and touting higher pay and free housing. Air carriers from the following countries are expected to offer the most new jobs to U.S.-based carriers: China, India, Brazil, and Turkey.

Employment for commercial pilots is expected to be stronger than for airline pilots. Commercial pilots have a wider range of employment options in a variety of industries such as agriculture, utilities, health care, and shipping.

Pilots attracted to a less stressful flight routine are beginning to seek employment as air taxi operators. These carriers are flying "very light jets" that transport three to five passengers to destinations within the United States—allowing pilots to return to their home city each night after work.

FOR MORE INFORMATION

For information on careers, union membership, and women in aviation, contact

Air Line Pilots

Association, International

1625 Massachusetts Avenue, NW
Washington, DC 20036-2212
703-689-2270
www.alpa.org

To read *The Airline Handbook*, visit the ATAA website.

Air Transport

Association of America (ATAA)

1301 Pennsylvania Avenue, NW,
Suite 1100
Washington, DC 20004-1738
ata@airlines.org
www.airlines.org

For information on experimental aircraft, contact

Experimental Aircraft Association

EAA Aviation Center
3000 Poberezny Road
Oshkosh, WI 54902-8939
920-426-4800
www.eaa.org

For information on pilot schools and licensing, contact

Federal Aviation Administration

800 Independence Avenue, SW,
Room 810
Washington, DC 20591-0001
866-835-5322
www.faa.gov

For information on careers, contact

Helicopter

Association International

1635 Prince Street
Alexandria, VA 22314-2818
703-683-4646
www.rotor.com

For information on career opportunities, including Tips on Becoming an Airline Pilot, visit

International Society of Women Airline Pilots

723 South Casino Center Boulevard,
2nd Floor
Las Vegas, NV 89101-6716
www.iswap.org

For information on a career as a flight instructor and professional certifications, contact

National Association of Flight Instructors

730 Grand Street
Allegan, MI 49010-8014
866-806-6156
nafi@nafinet.org
www.nafinet.org

For information on aviation education and camps, visit the Coalition's website.

National Coalition for Aviation Education

www.aviationeducation.org

The Ninety-Nines, Inc. is an international organization of women pilots. Visit its website for more information.

The Ninety-Nines, Inc.

4300 Amelia Earhart Road
Oklahoma City, OK 73159
www.ninety-nines.org

For information on test pilots, contact

Society of Experimental Test Pilots

PO Box 986
Lancaster, CA 93584-0986
661-942-9574
Setp@setp.org
www.setp.org

continued on page 140

For More Info, continued from page 139

For information on accredited post-secondary aviation programs, contact
University Aviation Association
3410 Skyway Drive
Auburn, AL 36830-6444
334-844-2434
www.uaa.aero

For career information, contact
Whirly-Girls, International
Women Helicopter Pilots
www.whirlygirls.org

For information on careers in aviation for women, contact
Women in Aviation International
Morningstar Airport
3647 State Route 503 South
West Alexandria, OH 45381-9354
937-839-4647
wai@wai.org
www.wai.org

For information on careers in corporate and business aviation, contact
Women in Corporate Aviation
www.wca-intl.org

Interview: Annmarie Savitski

Annmarie Savitski is an Airbus 320 first officer for Delta Air Lines. She discussed her career with the editors of *Nontraditional Careers for Women & Men*.

Q. How long have you worked in the field?

A. I have been a commercial airline pilot for 13 years. I was hired by the regional carrier Mesaba Airlines in March 1998. I spent nine years with Mesaba, two years as a first officer (co-pilot) and seven years as a captain. Currently, I work for a major airline. I was hired in 2007 by Northwest Airlines, which is now Delta Air Lines, following the merger in 2009.

Prior to flying for a commercial airline, I worked as a flight instructor at Paine Field Airport in Everett, Washington, and in Savoy, Illinois, for the University of Illinois' Institute of Aviation. By flight instructing students on single- and multi-engine aircraft, I was able to log the flight time and experience I needed to be hired by an airline.

Q. What made you want to become a pilot?

A. I'm the oldest of five children. One evening at the dinner table my father asked us what we'd like to do when we grew up. I replied, "A stewardess or a psychiatrist." My brothers and sisters laughed and said I couldn't be a stewardess because I was afraid of heights. I disagreed; I thought flying would be different and I wouldn't be afraid. My father joked that I'd have enough problems as an adult and that I wouldn't want to be a psychiatrist. He then went on and said if I was going to be in the plane, why not fly it? He always said I should take the extra step. If I wanted to be a nurse, for example, I could be a doctor, or if I wanted to be a waitress, I could own the restaurant. So very casually I told everyone at the table, I was going to be a pilot.

My first flight that I can recall was the summer before high school; I spent a week in San Francisco with relatives. As we started rolling down

the runway, I felt the acceleration push me back a little in my seat. I was excited and that's when I really thought I wanted to learn how to fly!

Even to this day when the flight attendant closes the flight deck door, I think of my Dad and thank him for the suggestion. I have the best "office view" around!

Q. What is one thing that young people may not know about a career as a pilot?

- A.** I think some people believe you have to be very strong in math and science, but a major in engineering isn't required to be a pilot. Having a strong understanding of meteorology and some physics and math will be required to fully understand your aircraft and your environment.

I believe people might think of being an airline pilot as glamorous. I love my job and I love to travel, but like any occupation, things can become monotonous. Not all of the cities you fly to are categorized as tourist "hot spots." And the ones that are might not be as interesting after you've flown to them numerous times.

Q. What are the pros and cons of work in your career?

- A.** Pros:

✓ I like that my career isn't a 9-5 job. I know at times it's hard on my family when I'm away, but when I'm home, I'm home. I don't bring my work home with me.

✓ My job is always changing: the weather, my routes, the passengers. Every day is different.

✓ Travel: I really do enjoy traveling. When I'm in a city that I haven't been to before I try to do some research and see things that the city has to offer. Airlines also have employee travel benefits; these benefits allow my family to fly for a very nominal fee. This has allowed my husband and I to travel throughout the United States, Europe, and Asia.

Cons:

✓ Travel—it's fun, but it can also be draining. Trying to eat healthy meals on the road isn't always easy. Also, trying to maintain a regular exercise regimen can be difficult at times.

✓ Time away from family: if you are a family person and like to be home every night to sleep in your own bed, this might not be the career for you.

✓ Away for holidays: this can be hard on the family and it is inevitable that you will be away for a birthday or special occasion.

Q. Have you faced any special challenges as a female working in a male-dominated field?

- A.** Overall, I would have to say no. One of the things I appreciate about the airline industry is that everything is based on seniority. When my seniority number is sufficient for a promotion (upgrading from first officer to captain), I decide whether I'm ready and I submit for the promotion. I'm then trained and tested according to specified standards. If I pass, I'm promoted to the new position.

This field is male-dominated; only 5 percent are women and less than that are female captains. I think my attitude and my ability to listen and learn have been extremely important in my career progression. I've never

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had the attitude that I deserve something because I'm a woman or a minority. I feel I'm an airline pilot who happens to be a woman. I'm always learning and gaining experience from my crew members and when I have the opportunity, I'm sharing my knowledge with them.

I think my desire to be a strong pilot, but also a crew member who people want to be around, has made my career a very enjoyable one.

Q. Are there any other special challenges that you face as a pilot?

- A.** The flight deck is a very small space and two or three people can be sharing that space for several hours a day over a few days time. It's imperative that good communication is practiced. The flight deck is not a place to have personality issues or misunderstandings. We're taught to identify and address issues like this immediately. Not necessarily because everyone has to like each other, but for safety reasons. I've found over the years if something is addressed immediately, you'll usually find a miscommunication or someone just not realizing he or she was doing something that made the other person uncomfortable.

Q. What advice would you give to young women who are interested in becoming pilots?

- A.** My advice would be the same for young women or men. First off, this is a career that has a very volatile history. You might find yourself spending more time building flight time as a flight instructor than you planned, or furloughed from your job due to economic downturns. Go out and take some lessons; if you're not crazy about flying, perhaps you should look at a different career. This career can be an expensive investment, and the rewards of the career can take several years to reap.

I'd also suggest having a plan B career. I was given some opportunities in computer programming while starting my career and this has been a very valuable asset for me as my career has progressed. For example, while I was teaching in Seattle, the majority of my flight students were Microsoft employees. One saw that things were slow with flight instructing and asked if I'd be interested in a job at Microsoft. Having had only one programming class at the University of Illinois, I was reluctant, but with some tutoring and study, I was hired as a programmer on Microsoft Flight Simulator. It was an incredible opportunity and extremely challenging. That opportunity has led to me continuing my education with web design and other graphic-based computer programs.

Ask yourself what you might want to do if for some reason you couldn't fly any more.

Q. What is the future employment outlook for pilots?

- A.** Due to [the events of] September 11, airline bankruptcies, and skyrocketing oil prices, the amount of hiring that has occurred in the last 10 years has been very small. However, due to the mandatory retirement age of 65, and the forecasted growth of global aviation in the next 10 years, the need for pilots is very great. Many of the airlines are already preparing for the demand and are partnering with aviation universities with hopes of being able to recruit soon after a pilot graduates and has accumulated the required flight time.

Interview: Nathalie Hacken

Nathalie Hacken is a pilot for Atlantic Southeast Airlines. She discussed her career with the editors of *Nontraditional Careers for Women & Men*.

Q. How long have you worked in the field? What made you want to become a pilot?

A. I started flying 10 years ago in the spring of 2001. I had many friends at college who were enrolled in the flight program and it was through them that I had received exposure to the idea of a career as a pilot. After graduation I decided to attend flight school in Florida. Upon completing the required ratings, I built hours flights instructing and interned with Atlantic Southeast Airlines, for whom I've been flying the last seven years.

Q. What is one thing that young people may not know about a career as a pilot?

A. Your actions while you were younger may be questioned throughout your career, so it is important even in high school and college to demonstrate personal accountability and to be responsible for your decisions and actions because these “mistakes” will follow you for years to come. Your character and professionalism will be reviewed when the time comes to interview for that coveted “dream job,” and that includes any undesirable actions you made in your youthful years.

Q. What are the pros and cons of work in your career?

A. Pros:

- ✓ You get to experience new places and meet lots of different people. There are opportunities to layover at some great destinations and every week you may be paired with a different crew.
- ✓ There is potential for a significant amount of time off per month and good compensation. At a minimum most pilots will have 11 days off per month, but as you gain seniority you could get as much as 18 days off per month. Schedules can vary from one day trips to over 17 day trips depending on the company and the type of flying they do (cargo, commercial, domestic, or international). Salaries vary greatly depending on company, aircraft, and longevity with the company. This information can readily be found online.
- ✓ Not having to take your work home with you.
- ✓ Travel; most companies provide travel benefits to their employees. Pilots also have jumpseating privileges.
- ✓ You can live wherever you want, but the con to this choice is commuting to work, which can be challenging especially during busy travel months.

Cons:

- ✓ Being away from home
- ✓ Sometimes working long hours and flying during night hours. Beginning pay is poor, and you have to pay your dues for a while before you see any pay increases
- ✓ Balancing work with family life can be a challenge. It is not impossible but it is also not ideal. I have seen some of my friends quit their jobs entirely when they had children. The ones who stayed either have a

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nanny help out several days a week or family close by to help raise their children. If both parents are in the industry they sometimes bid for opposite schedules so one parent can be home with the children at all times.

✓ Job stability is tied to the economy; it is therefore a very cyclical industry. This industry is constantly going through transformations to adapt to global and financial challenges.

Q. What are the most important personal and professional qualities for pilots?

- A.** Self motivated, responsible, reliable, always learning, humble, team player, solid leadership and decision-making skills.

It is important to be able to communicate well with others and to get along with many different personality types. You are stuck with one person in a cramped space during the flight for possibly many hours. Outside of the flight deck you are interacting with operations personnel, ramp agents, dispatchers, gate agents, passengers, flight attendants etc., so it is very important to be able to work efficiently and effectively with all of those individuals. This is a job where there is no direct boss necessarily looking over your shoulder, so there is a great sense of personal accountability. It is your responsibility to ensure your technical knowledge is maintained at a professional level. You are directly in charge and responsible for all aspects of your flight; balancing safety, efficiency, and customer service.

Q. Have you faced any special challenges as a female working in a male-dominated field?

- A.** I personally have experienced hardly any discrimination for being female. I can recall maybe two small incidences over the last 10 years where someone judged me or made comments purely because of my gender. Nor have I received any special treatment for being female. Nowadays, it is very accepted for women to be pilots even though we are still the minority. Many more women are pursuing this line of work and a lot of the barriers have long been broken down.

Q. What advice would you give to young women who are interested in becoming pilots?

- A.** It is a great career for the independent, driven woman. It requires patience, drive, and determination. If you enjoy challenges, traveling, and working with many different people in an always fluid and changing environment, then you would probably enjoy this line of work. If you are interested in becoming a pilot, I would seek out a mentor to give you advice and guidance. There are several organizations for female pilots that can be found online. Some of the top ones are Women in Aviation International, The 99's, and www.clearedtodream.org. There are many scholarships and resources available on these websites. Another option would be to receive your flight training through the military.

Q. What is the future employment outlook for pilots?

- A.** The future job market is currently looking very promising for job growth. Federal law requires commercial pilots to retire at age 65. The major airlines have a large number of baby boomer pilots who are all coming to retirement age, causing the airlines to lose mass amounts of pilots due to attrition over the next 10 to 15 years. For the unforeseeable future that will create a high demand for new pilots.

PLUMBERS, PIPEFITTERS, PIPELAYERS, STEAMFITTERS, AND SPRINKLERFITTERS

OVERVIEW

Plumbers design, create, install, maintain, and repair piping systems in residential, commercial, and industrial buildings. They also work on pipe systems needed to bring potable water to the public by way of reservoirs and water treatment plants and waste disposal and gas supply systems. *Pipefitters* install and repair high- and low-pressure pipe systems. *Pipelayers* are responsible for laying pipes used in sewer and drainage systems. *Steamfitters* install pipe systems that are used to move gases and liquids under high pressure. *Sprinklerfitters* install pipes used for indoor fire prevention systems or outdoor water systems used to maintain landscaping. Plumbers and related workers train for the field by completing apprenticeships or programs at career or technical schools or community colleges. There are approximately 396,000 plumbers, pipelayers, pipefitters, and steamfitters employed in the United States. About 1.5 percent are women. Very good employment opportunities are expected for plumbers, pipefitters, pipelayers, steamfitters, and sprinklerfitters during the next decade.

FAST FACTS

High School Subjects

Mathematics
Shop

Personal Skills

Complex problem solving
Judgment and decision making
Mechanical/manipulative

Minimum Education Level

Apprenticeship

Salary Range

\$27,580 to \$46,660 to
\$79,920+

Employment Outlook

Faster than the average

O*NET-SOC

47-2152.00, 47-2152.01,
47-2152.02

GOE

06.02.02

DOT

862

NOC

7251, 7252

THE JOB

Less than a century ago, it was common for washrooms to be located outside, far away from a family's main residence. Outdoor wells or pumps provided water for drinking, cooking, and bathing; and when done, dirty water was hauled away manually. Thanks to modern indoor plumbing, we are not burdened with these tasks today.

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Plumbers are often called on to maintain, upgrade, or repair existing plumbing or water systems in residential, commercial, or industrial buildings. They routinely check plumbing systems to identify potential clogs or drainage problems. For example, plumbers are called to clear outdoor drainage systems, unclog toilets, or clear blockage from waste disposal systems.

Plumbers install, repair, and maintain pipes, fixtures, and systems used for water distribution and disposal in residential, commercial, and industrial buildings. When they work on new residential construction projects, for example, plumbers work closely with contractors to help plan the best location of pipes, plumbing fixtures, and appliances. They read blueprints and designs, using their knowledge of building codes and the intricacies of plumbing systems, and give their input on needed design revisions or alterations. Plumbers are also instrumental in creating a budget for new plumbing systems.

When installing a new plumbing or water system, plumbers use a toothed hole saw to cut openings into floors, walls, ceilings, and cabinets to accommodate pipes. Steel rods and joists are used to help support pipes. Plumbers use pipecutters, tube cutters, and jigsaws to size and cut steel and copper

pipes. Recently, polyvinyl chloride pipes (PVC)—made from vinyl and plastic—have become popular materials to use in plumbing systems. PVC pipes are lightweight, durable, and rust- and rot-free. Several pieces of piping are often used to maneuver around the structure of the house, as well as to connect to larger pieces of a water or plumbing system. Plumbers use soldering torches to weld metal pieces together, or liquid sealants for PVC pipes.

Once the pipes are connected, plumbers install appliances and fixtures such as shower stalls, tubs, faucets, and kitchen garbage disposals. They also check the water system for proper gauge pressure and temperature, and they make adjustments as needed. Finally, they check to make sure the entire system is in working order.

Green plumbers are plumbing professionals who have been trained on the latest water-efficiency technologies. They work on plumbing projects that are designed to cause less harm to the environment.

The following paragraphs provide an overview of other plumbing-related careers:

You May Not Know...

The editors of *Nontraditional Careers for Women & Men* asked Marie Anderson, a pipefitter foreman in Chicago, Illinois, to name a few things that young people may not know about a career as a pipefitter:

"The one thing that most young people may not know about the pipefitting trade, or any building trade, is that it isn't all about manual labor. The trades involve using your brain as well as using your muscles. I only weighed about 100 pounds when I got my apprenticeship, so I was very nervous about making it through the day without hurting myself or someone else. I wanted to carry my share of the job, so I listened to my teachers in the field, and paid attention to everything they did. Young people need to know that they have something to learn every day if they are working in the trades."

Pipefitters attach high-pressure and low-pressure pipe systems to walls and structures such as radiators and tanks. They install automatic controls that often regulate these systems. Pipefitters also inspect and repair worn components of existing pipe systems, including those used to generate electricity and those used in cooling and heating systems.

Pipelayers install and maintain clay, concrete, plastic, or iron pipes for sewer and drainage systems as well as oil and gas lines.

Steamfitters assemble, maintain, and repair pipes and systems used to move liquids and gases, especially under high pressure.

Sprinklerfitters install, maintain, and repair automatic fire sprinkler systems in residential and commercial buildings.

Plumbers and related workers often work 40 hours or more a week. Many plumbers are routinely on call, responding to emergencies at all hours of the day and night, even weekends, to fix clogs, leaks, or other plumbing problems. Much of their work is done inside, such as for indoor plumbing or water systems; though some projects, such as repairing a broken or clogged septic system, are located outdoors.

Pipelayers work mostly outdoors. Some projects, such as laying pipes for industrial or commercial power plants, call for work in remote areas. Pipefitters and steamfitters mostly work in industrial settings. Sprinklerfitters work mostly indoors, though some work is scheduled outdoors, such as when installing lawn sprinkler systems for residential or commercial buildings. Some travel to and from work sites should be expected.

REQUIREMENTS

HIGH SCHOOL

In high school, take courses in shop (especially plumbing, if offered), drafting, speech, computer science, mathematics, and physics.

POSTSECONDARY TRAINING

Plumbers and most other related workers prepare for the field by completing apprenticeships or training programs at career or technical schools or community colleges. Pipelayers typically receive on-the-job training.

Apprenticeships typically last four to five years. Each year of an apprenticeship program typically features 2,000 hours of on-the-job training and 144 hours of related classroom instruction. To enter an apprenticeship program, you must typically be at least 18 years old and have earned a high school diploma or GED.

The following unions and associations sponsor apprenticeships: United Association of Journeymen and Apprentices of the Plumbing and Pipefitting Industry of the United States and Canada; the National Association of Plumbing-Heating-Cooling Contractors; the American Fire Sprinkler Association; local employers of either the Mechanical Contractors Association of America or the National Association of Plumbing-Heating-Cooling Contractors; a union associated with a member of the National Fire

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Sprinkler Association; the Associated Builders and Contractors; and the Home Builders Institute of the National Association of Home Builders. Visit www.doleta.gov/OA/sainformation.cfm for information on apprenticeship training programs in your state.

CERTIFICATION AND LICENSING

Voluntary certification as an accredited green plumber is available from GreenPlumbers USA. According to the organization, “training consists of a five-course, 32-hour accreditation in environmental and technical issues including Climate Care, Caring For Our Water, Solar Hot Water, Water Efficient Technology, and an Inspection Report Service.” Contact GreenPlumbers USA for more information.

Most states and localities require plumbers to be licensed. To become licensed, plumbers must have two to five years’ experience in the field and pass an examination. Plumbers and related workers who work on gas lines must have a special license in certain states. A few states require pipefitters to be licensed. Contact your state’s department of professional regulation for information on licensing requirements in your state.

OTHER REQUIREMENTS

Plumbers, pipefitters, pipelayers, steamfitters, and sprinklerfitters should be in good physical shape. Much of the work involves lifting heavy materials or tools, standing for long periods of time, or working in tight, cramped spaces. There is also risk of injury when working with sharp tools and heavy or hot pipes. Some plumbers and related workers are injured when handling heavy materials or machinery. They take a variety of safety precautions to avoid injury. Other important traits for plumbers and related workers include good communication skills; the ability to work independently, as well as a member of a team, when necessary; good problem-solving and troubleshooting skills; patience; and self motivation.

Approximately 31 percent of plumbers and related workers belong to a union, most commonly the United Association of Journeymen and Apprentices of the Plumbing and Pipefitting Industry of the United States and Canada.

EXPLORING

Read books and magazines about plumbing. Try to do basic plumbing repairs at home with the help of your parents. Try to land a part-time or summer job at a plumbing firm to get a taste of what a career in the field is like. Visit the websites of professional plumbing associations, unions, and technical programs that offer degrees or classes in the field. Talk with plumbers, pipefitters, pipelayers, steamfitters, and sprinklerfitters about their careers.

EMPLOYERS

There are approximately 396,000 plumbers, pipefitters, pipelayers, steamfitters, and sprinklerfitters employed in the United States. About 1.5 percent are women.

Fifty-six percent of plumbers and related workers are employed by plumbing, heating, and air-conditioning contractors that are involved in new construction, modernization, repair, or maintenance work. Others work for a variety of industrial, commercial, and government employers. Twelve percent of plumbers, pipefitters, pipelayers, steamfitters, and sprinklerfitters are self-employed.

GETTING A JOB

Many plumbers and related workers obtain their first jobs through apprenticeships or by contacting potential employers directly. Others seek assistance in obtaining job leads from college career services offices, newspaper want ads, and employment websites. Those interested in positions with the federal government should visit the U.S. Office of Personnel Management's website, www.usajobs.gov.

"It is hard when you first start out, but if you stick with it, earn your peer's respect by doing a good job and working hard and learning, you will come up through the ranks and feel comfortable. It just takes a while to get there."

—Marie Anderson, Pipefitter Foreman

EARNINGS

The U.S. Department of Labor (USDOL) does not provide salary information for female plumbers, pipefitters, pipelayers, steamfitters, and sprinklerfitters.

Median annual salaries for all plumbers and related workers were \$46,660 in May 2010. Salaries ranged from less than \$27,580 to \$79,920 or more. The USDOL reports the following mean annual earnings for plumbers and related workers by employer: natural gas distribution, \$53,870; nonresidential building construction, \$52,880; building finishing contractors, \$50,690; utility system construction, \$48,460; and local government, \$47,630. Apprentices begin at about 50 percent of the salary paid to experienced plumbers, pipefitters, and related workers. Their pay increases during their training.

Employers offer a variety of benefits, including the following: medical, dental, and life insurance; paid holidays, vacations, and sick and personal days; 401(k) plans; retirement and pension plans; and educational-assistance programs. Union members often receive health insurance, a pension, and other benefits from their union. Self-employed workers must provide their own benefits.

EMPLOYMENT OUTLOOK

Very good employment opportunities are expected for plumbers, pipefitters, pipelayers, steamfitters, and sprinklerfitters during the next decade, according to the U.S. Department of Labor. Employment in the field is increasing for several reasons. Construction of power plants, water and wastewater treatment plants, office buildings, and factories—which have extensive piping systems—is expected to increase. There will also be a need for existing maintenance on the plumbing and piping systems of these buildings. The

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increasing U.S. population will create demand for plumbers to repair and maintain plumbing on existing residential buildings, as well as work on new construction projects. Water shortages and efforts to conserve water in certain areas of the country will create demand for workers to retrofit existing plumbing infrastructure. Green construction techniques that help save water and energy will create a need for specially trained green plumbers.

FOR MORE INFORMATION

For information on a career as a sprinklerfitter, contact the following organizations

American Fire

Sprinkler Association

12750 Merit Drive, Suite 350

Dallas, TX 75251-1273

214-349-5965

www.firesprinkler.org

National Fire Sprinkler Association

40 Jon Barrett Road

Patterson, NY 12563-2164

www.nfsa.org

For information on state apprenticeship programs, visit

Employment &

Training Administration

U.S. Department of Labor

www.doleta.gov/oa/stateoffices.cfm

For information on certification, contact

GreenPlumbers USA

928 2nd Street, Suite 300B

Sacramento, CA 95814

www.greenplumbersusa.com

For information about opportunities for women in the construction industry, contact

National Association

of Women in Construction

327 South Adams Street

Fort Worth, TX 76104

nawic@nawic.org

www.nawic.org

For information on union membership and to read profiles of women in the plumbing industry, visit the association's website.

Plumbing-Heating-Cooling

Contractors Association

180 South Washington Street

PO Box 6808

Falls Church, VA 22046-2900

www.phccweb.org

For information on union membership, contact

United Association of Journeymen

and Apprentices of the Plumbing

and Pipe Fitting Industry of the

United States and Canada

United Association Building

Three Park Place

Annapolis, MD 21401-3687

www.ua.org

For information on opportunities in Canada, contact the following organizations

Canadian Association of

Women in Construction

365 Brunel Road, Unit #1

Mississauga, ON L4Z 1Z5 Canada

info@cawic.ca

www.cawic.ca

There are many other organizations at the national, regional, state, and local levels for women interested in construction careers. See Appendix I: Women's Construction Associations on page 270 for an extensive list of organizations.

Interview: Doreen Cannon

Doreen Cannon is a plumber and the president of Plumbers Local 55 in Cleveland, Ohio. She has worked as a union plumber for 13 years. Doreen discussed her career with the editors of *Nontraditional Careers for Women & Men*.

Q. Where do you work? What made you want to become a plumber?

A. I currently work for Northern Ohio Plumbing, but I am a member and find my employment through Plumbers Local 55 in Cleveland, Ohio.

When our son was born I was lucky enough to have a husband who took on a part-time job, which gave me the option of staying home. So I left my job in retail management, and five years later when my son started kindergarten I was ready to get back to work.

I always enjoyed helping my father. He was a pipefitter by trade, and very handy. He had three daughters, I was the youngest and I guess the son he never had because I was the one who helped him as he did work around the house including plumbing. I always was the kind of person who enjoyed working with my hands, so when it was time for me to get back into the workforce I decided to make a career change.

My father gave me a lot of advice and with his help I decided on plumbing. I knew how important training would be so I looked into Plumbers Local 55 and was impressed with their five-year apprenticeship program. I applied and was accepted.

Q. What do you like most and least about your career?

A. One of the pros of this career is the pay, a benefit of being in a trade union is all members are paid the same wages. From a female perspective this is very important. We all know that in this age of equal rights, equal pay is still a problem. There are also opportunities to make more as a foreman, supervisor, or a union officer. Variety of work is also a plus. Unlike many other jobs, you are not on the same job or at the same location for your entire career or working with the same people every day. Each job site is different—usually with different people. The variety of work is also great. Plumbers work on underground piping and medical gas lines in hospitals. They install bathroom and kitchen fixtures and water lines. With such a range, work is never boring.

Training received during the five-year union apprenticeship program is also a plus to this career. Through the program you receive the knowledge and licenses needed to become a respected plumber. This is accomplished in the classroom, at the training center, and working in the field at no cost to the apprentice. Once you have completed the apprenticeship and are a licensed plumber no one can take that knowledge away. You will always have a career as a plumber. Through the union contract the apprentice knows actually the wages they will be making each of their five years. There are very few jobs where you know what your wages will be in five years or if you're getting an increase.

The first negative that comes to mind are the cold, freezing, and hot temperatures along with the rain, mud, and snow. We often work on new construction projects where there is no heat or air conditioning. It is difficult to work in freezing temperatures for eight hours where you do not get completely thawed out and warm until you get home and

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into a hot shower. From a female perspective the restroom facilities are difficult to handle. There is usually no running water on the jobs (that's what we are there to install), so the restrooms are portable johns, which are not always the cleanest and are difficult to use in the cold weather—especially for a female. The work can be physically demanding and challenging for women.

Q. What are the key qualities for plumbers?

- A.** You have to be self motivated. On the job there is always something to do and you have to take the initiative. This carries over in the classroom. There is a lot of studying that needs to be done on your own time to pass the tests to get the licenses to become a journeyman plumber. You have to be hard working, not be afraid to get dirty, and as a female worry about your appearance (hard hats are a hairstyle killer). This type of job involves heavy lifting, working in a ditch, and working off a ladder or high in the air off a lift. You need to know yourself and your limitations. Are you afraid of heights? Working in small spaces? Are you willing to put in the work to keep yourself physically strong so you can lift the pipe in the air and get the job done?

Q. Have you faced any special challenges as a female working in a male-dominated field? If so, how did you deal with these challenges?

- A.** This is a complicated question for me because this is not a career choice for all women, for all the reasons already mentioned. The main challenge is “being a woman in the field” and finding the balance between fitting in and being treated equal, yet respected as a women. So I guess the best way to answer this is to talk about how I think I have had success.

I have found that if you are willing to listen and learn, most men in this field are more than willing to teach and help you. You will be treated in the way you act. If you are yourself, a woman, they will treat you as one but if you start out trying to be one of the guys, talking like them and getting involved in their male conversations, you will be treated as one of them. For some women that is the way they want it. Just remember the way you are treated in the first few weeks, if not days, on the work site sets the tone for the rest of your career. Personally, I was never one to use foul language or talk about personal business, tell dirty jokes, etc. There is a lot of that on the jobs; it's a construction site. But again most of the guys keep those kind of conversations between each other when I am not around, which I appreciate, but I also never judge or complain about conversations I overhear as long as they are not directed at me.

I have not had any problems being a women working in a male-dominated field, I think it has to do with my personality. I am a no-nonsense, professional woman who treats all fellow plumbers with respect.

Physical strength may at times be a challenge. A woman may not have the same strength as a man so you have to find what works for you. Don't look at this as an obstacle. It is not just a women's challenge. Younger men are stronger than the older men on the job as are the bigger men than the smaller; everyone is different.

Q. What advice would you give to young women who are interested in the field?

- A.** I would advise any women considering plumbing as a career choice to do their research. There is much more to the job than the general public

understands. Yes, plumbers install faucets and toilets and snake drain, but we also install medical gas and oxygen lines in hospital operating rooms and make sure buildings have the gas needed to supply heat and hot water. Understand that you have to work outside in the cold and heat and get dirty in the mud. Once the decision is made, apply to a union apprenticeship program where you will get all the training needed and equal pay for equal work. Realize that not all men want women on the job, so listen and learn, and be willing to try and you will earn their respect. Remember you are a plumber and equal to other workers on the job, speak up for yourself if needed.

Interview: Marie Anderson

Marie Anderson is a pipefitter foreman in Chicago, Illinois. She has been a pipefitter since she began her apprenticeship in 1980. Marie discussed her career with the editors of *Nontraditional Careers for Women & Men*.

Q. Where do you work?

A. I work at the University of Illinois at Chicago. I have a crew of 10 men on two separate campuses—the east side campus, and the west side campus, which includes more than 100 buildings.

Q. What made you want to enter this career?

A. My father and my two uncles were both pipefitters. My dad encouraged me to try the pipefitter trade, seeing that I always liked nontraditional jobs. It was a good opportunity to go to school and learn a trade while being paid to do both. I also liked a more challenging career, and there weren't that many women in the trades, so I thought I would give it a shot.

Q. What is one thing that young people may not know about a career as a pipefitter?

A. The one thing that most young people may not know about the pipefitting trade, or any building trade, is that it isn't all about manual labor. The trades involve using your brain as well as using your muscles. I only weighed about 100 pounds when I got my apprenticeship, so I was very nervous about making it through the day without hurting myself or someone else. I wanted to carry my share of the job, so I listened to my teachers in the field, and paid attention to everything they did. Young people need to know that they have something to learn every day if they are working in the trades.

Q. What are the most important personal and professional qualities for pipefitters?

A. I think the most important personal qualities involved in becoming a pipefitter are willingness to learn, and know that everyone, including yourself, makes mistakes. You should learn through your mistakes and other people's mistakes. Also, take pride in doing a great job, and finish the job you have started.

I think, as a professional, you have to remember to respect the people you work with and for. That way, you will earn the respect of others you work with, and you will build a reputation that will precede

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you on all of your jobs. Your reputation in the trade will make a huge difference in what jobs you will get, and how long you may work for a company.

Q. What advice do you have for young women who are interested in the field?

- A.** If I were to give any advice to women who want to become pipefitters, I would tell them to always act in a professional manner. Don't expect to be treated differently just because you are a woman. You may be looked at differently by the men in the field, but you are perceived by how you carry yourself on the job. You will have to be tough enough to take criticism, and use it to your advantage: learn from it and come back tougher and ready to work the next day. Do the same job that the other guys are doing, and you will earn respect.

Q. Have you faced any special challenges as a female working in such a male-dominated field? If so, how did you deal with these challenges?

- A.** When I got my apprenticeship, it was 1980, and there were very few women in the trades. I was in the first apprenticeship that Local 597 took that had women. There were three of us, and we didn't know what to expect. I went to school at Washburne Trade School once a week, and went to work on the job site the other four days. There were about 20 apprentices that went to school on my day, and I know at first they didn't know what to make of a girl in the trades. They were wary at first, but in time, they accepted me. I was treated very well in school, and I felt much camaraderie when I went to school each week. The teachers treated me just like one of the boys, and I learned a lot in the four years I went to school.

On the job site, the men were either very helpful and taught me the trade each day that I went to work, or they were totally against women being on the job site. I had men tell me I had no business being there, even though I pulled my own weight. Back in 1980, the trades weren't ready for women in the field, and the bathroom accommodations were strictly for men. You had to be resourceful when it came to that matter, and as the years progressed, things changed, and attitudes either changed or were kept under cover.

There still aren't that many women in the trades, but it isn't the same as it was when I got in. I felt back in the 80's, when I walked on a job for the first time, everyone was talking about "the girl" on the job, and I felt very alone. It is hard when you first start out, but if you stick with it, earn your peer's respect by doing a good job and working hard and learning, you will come up through the ranks and feel comfortable. It just takes a while to get there. I know I didn't feel like I was comfortable in my job until I had been a pipefitter for 10 years. That may seem like a long time, but there is a lot to learn about the job and the people around you.

POLICE OFFICERS

OVERVIEW

Police officers protect people and property and preserve peace and order. Their duties include responding to and investigating crimes, apprehending criminals, patrolling a specific area as assigned, and responding to calls for help from the public. In addition, *detectives* have investigative duties such as collecting and analyzing evidence at crime scenes. A minimum of a high school diploma, plus on-the-job training, is required to enter the field. Some departments require applicants to have some postsecondary training or even a degree in criminal justice or a related field. There are approximately 859,000 police officers, detectives, criminal investigators, and sheriff's patrol officers employed in the United States. About 13 percent are women. Employment for police officers is expected to grow about as fast as the average for all careers during the next decade; job opportunities for detectives are expected to increase faster than the average.

FAST FACTS

High School Subjects

Physical education

Psychology

Personal Skills

Critical thinking

Service orientation

Minimum Education Level

High school diploma, plus on-the-job training

Salary Range

\$31,700 to \$40,144 to

\$83,510+

Employment Outlook

About as fast as the average

O*NET-SOC

33-3021.01, 33-3021.02,

33-3051.00, 33-3051.01

GOE

04.03.01

DOT

375

NOC

6261

THE JOB

Residents in all U.S. communities, large or small, count on police officers and detectives to preserve peace and assure safety. As specially trained government employees, they protect the people and property of the towns or areas in which they serve.

Police officers, depending on the area assigned, work singly, in pairs, or in groups. They patrol their "beat," watching for suspicious activity, make arrests, and keep public order. Most police officers make rounds in specially marked police cars, though some travel in unmarked cars; on foot; on bicycles, Segways, or motorcycles; or by riding horses.

Police officers arrive at the scene of automobile accidents, burglaries, crimes, or other incidents after being alerted by calls from fellow police officers or police dispatches. Police officers may be dispatched to the scene in

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order to give assistance or backup for other officers. They administer basic first aid, if necessary. They also investigate complaints such as disorderly conduct, trespassing, or missing persons. Once at the scene, police officers gather information and record facts or interview witnesses in order to prepare reports on the incident.

When dispatched to a crime scene, police officers round up and arrest suspects and perpetrators and bring them to the main precinct house or police station. Arrested suspects and perpetrators are transported via police car or police squadrol. Police officers use tools such as firearms, handcuffs, night sticks, tasers, pepper spray, and tear gas to help them in their work.

Police officers also help control and direct traffic. They issue traffic tickets and citations when people violate the law. Their job is made easier with the use of video systems in each patrol car, computer databases and software programs that allow them to check the criminal backgrounds of individuals, and special radar scanners, which can pinpoint the speed at which vehicles travel.

Police officers assist pedestrians and motorists in need. They respond to reports of blocked roads or other situations that may cause possible hazards.

Police officers also promote good community relations by getting to know the residents and business owners of their assigned area, or “beat.”

“I love being able to help people and give back to my community. To be able to make a difference in a life is the best feeling in the world.”
—Charlie Kane, Police Officer

They participate in community fairs, outreach programs, and drug and alcohol awareness programs at area schools, community centers, churches, mosques, and temples.

Detectives are experienced police officers who have more demanding investigative duties. Unlike police officers, they wear regular clothing, which help them blend in with the public while on stakeouts, working undercover, or simply gathering information in the community. Detectives are assigned a variety of cases including murders, orga-

nized crime, drug crimes, kidnappings, or burglaries. When assigned a case, police detectives arrive at the scene to interview witnesses, take photographs or video of the crime scene, search for clues or evidence, and mark off the crime scene.

If working on a murder, for example, police detectives may look for spent shell casings, mark where victims’ bodies were found, interview the families of victims or question eyewitnesses, and look for any evidence left behind by suspects (such as a piece of clothing). If needed, detectives dust for fingerprints or make casts of shoe prints to use for future identification. They study available video footage for clues to suspects’ identification, or work with police artists to create an artist’s rendering of the suspect based on the description of eyewitnesses. They may conduct searches of paper records or computer databases to assist in their investigation.

Some cases are complicated and may involve investigations that last days, months, or years. Detectives work with other law enforcement officials to

investigate and observe suspects or persons of interest for some time before making an actual arrest. They may ask suspects to submit to a polygraph test, or compare their information against a national criminal database in hopes of making an arrest. Police officers and detectives help prepare cases for court and provide testimony before a judge or jury.

Some police officers and detectives receive additional training in order to qualify for promotion or work on special cases. For example, with sufficient experience, training, and education, police officers and detectives may work as vice-squad police, investigating persons or businesses suspected of breaking anti-vice laws. Others may specialize in cases of drug dealing, missing persons, or serial killings. Others work with special units, such as special weapons and tactics (SWAT); horseback, harbor, bicycle, or motorcycle patrol; canine corps; or emergency-response teams.

Police officers and detectives usually work a 40-hour week, but they may work overtime hours as needed. They can be scheduled to work evenings, weekends, and holidays since police protection is needed around the clock. Police officers wear uniforms, special shoes or boots, and hats—all issued by their department. Police officers and detectives are issued badges or other pieces of identification, which bear a unique number.

Police detectives are often required to work long hours, especially when working on a complicated or high-profile case. However, their commitment to law enforcement endures even when off duty, as police officers remain armed and ready to exercise their authority when needed.

REQUIREMENTS

HIGH SCHOOL

There are many high school classes that will help prepare you for a career in law enforcement. English classes will help you to write reports—something that you will do frequently as a police officer. Speech classes will help you to develop your communication skills. You will be constantly interacting with the general

public, criminals, and your fellow police officers during your work shift, so it is a good idea to learn how to communicate effectively. Taking a foreign language (especially Spanish) will allow you to communicate with people who do not speak English. Police officers need to be in excellent physical shape to do their jobs well, so it is a good idea to take physical education classes and participate in as many sports as possible. Other important classes for police officers include psychology, sociology, social studies, mathematics, health, and computer science.

“Know that as a female you can really do this job well and effectively and make great change in the world.”

—Charlie Kane, Police Officer

POSTSECONDARY TRAINING

A minimum of a high school diploma, plus on-the-job training at a police training academy, are required to enter the field. Some departments require

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applicants to have some postsecondary training or even a degree in criminal justice or a related field. Many police officers enter the field after receiving law enforcement training and experience in the military. Most police departments require applicants to be U.S. citizens, be at least 21 years old, and meet rigorous physical and personal qualifications. Many police departments and law enforcement agencies pay all or partial tuition for officers to earn degrees in criminal justice, police science, and public administration. Police officers with college educations typically receive higher salaries than those who only have a high school diploma.

Police academy training typically lasts 12 to 14 weeks. The U.S. Department of Labor reports that recruits receive “classroom instruction in constitutional law and civil rights, state laws and local ordinances, and accident investigation...and also receive training and supervised experience in patrol, traffic control, use of firearms, self-defense, first aid, and emergency response.”

OTHER REQUIREMENTS

This work is stressful and can be dangerous, with police officers and detectives carrying one of the highest incidences of on-the-job injury and sickness, even death. Police officers must constantly be alert and ready to handle a variety of situations at a moment's notice. They must be in good physical condition to withstand the rigors of the job. Teamwork and good communication skills are important for the job. Police officers often work in pairs or work with other departmental professionals. Travel is expected, especially when working as a special federal agent, or when crime cases cross state borders. Other important traits for police officers include attention to detail, strong ethics, honesty, courage, decisiveness, and the ability to think quickly under pressure.

Many police officers are members of unions such as the Fraternal Order of Police.

EXPLORING

There are many ways to learn about the exciting career of police officer. You can read books about the field. Here are a few suggestions: *Women Police: Portraits of Success*, by Patricia Lunneborg (iUniverse, Inc., 2004); *A Different Shade of Blue: How Women Changed the Face of Police Work*, by Adam Eisenberg (Behler Publications, 2009); and *History in Blue: 160 Years of Women Police, Sheriffs, Detectives, and State Troopers*, by Allan T. Duffin (Kaplan Publishing, 2010). Professional police associations publish magazines for their members. *FOP Journal* (www.fop.net) is published by the National Fraternal Order of Police. *WomenPolice Magazine* (<http://iawp.org>) is the official publication of the International Association of Women Police.

Visit the National Law Enforcement Museum in Washington, DC, on vacation or a class trip. If you can't make it to the Museum, visit its website, www.nleomf.com/museum.

Some police departments hire police cadets, high school graduates who are still in their teens who are interested in careers in law enforcement.

Firsts in Women Policing

1905: Lola Baldwin became the first female police officer when she began serving on the Portland, Oregon, Police Department.

1915: The International Association of Policewomen was formed.

1968: Betty Blankenship and Elizabeth Coffal became the first women patrol officers. They worked for the Indianapolis Police Department.

1985: Penny Harrington became the first police chief of a major city (Portland, Oregon).

Source: National Center for Women and Policing

Cadets perform clerical duties and attend law enforcement classes until they reach the age at which they can apply to the police department. Contact local police departments to see if such opportunities are available.

Watch police officers at work during street fests and community events, or during community policing meetings. You might even get a chance to say hello, but be sure not to interfere with their duties, since protecting the public is their main responsibility. Ask your school counselor to arrange an information interview with a police officer or a presentation on law enforcement at your school.

EMPLOYERS

There are approximately 859,000 police officers, detectives, criminal investigators, and sheriff's patrol officers employed in the United States. About 13 percent are women.

Most police officers work for law enforcement departments at the local (79 percent) and state levels (11 percent). Federal agencies also employ police officers.

GETTING A JOB

Contact the recruiting office or personnel division of the police department or agency where you would like to work. Aspiring police officers typically must pass civil-service exams and pass physical examinations. They also must participate in an oral interview in which they go before a board of three to five people who ask basic questions such as, Why do you want to become a police officer?, What have you done to prepare for this job?, and If you were in a situation where you had to shoot someone, could you do it? The board may also present scenarios to test the applicant's communication skills, reasoning ability, and ethics. Some departments may have psychologists or psychiatrists interview leading job candidates to assess their mental health. Most applicants must also take a lie detector examination and/or a drug test. A general background check may be conducted on applicants. The National Center for Women & Policing reports that heavy drug use, a felony conviction, or extremely poor credit can disqualify applicants.

"Some advice I would give to young women who are interested in becoming police officers is: police work is nothing like you see on reality TV shows or in the movies."

—Charlie Kane, Police Officer

After you are approved for potential hiring, you will be placed on an eligibility list. When openings occur, new hires are selected from this list.

Once hired, you will attend the department's police academy (see Postsecondary Training). After you graduate from the academy, you will be on probation for anywhere from nine to 18 months. This means that you can be fired, or terminated, without a right to appeal. Termination happens to only a few recruits in each recruiting class, so if you work diligently, you will become a full-fledged police officer.

As mentioned earlier, aspiring police officers should contact police departments and other law enforcement agencies regarding potential openings. If you attend college, your career services offices can also steer you to job leads. There are many websites that list job openings for police officers. One good site is LawEnforcementJobs.com. Professional associations also may list job openings. Women in Federal Law Enforcement, for example, offers job listings at its website, www.wifle.org/jobs_online.htm.

EARNINGS

The U.S. Department of Labor (USDOL) reports that female police officers earned average annual salaries of \$40,144 in 2010. Salaries for all police officers ranged from less than \$31,700 to \$83,510 or more. The USDOL reports the following mean annual earnings for police officers by employer: state government, \$58,200; local government, \$55,710; federal government, \$51,590; and colleges, universities, and professional schools, \$46,560.

Employers offer a variety of benefits, including the following: medical, dental, and life insurance; paid holidays, vacations, and sick and personal days; 401(k) plans; special allowances for uniforms; retirement and pension plans; and educational-assistance programs.

EMPLOYMENT OUTLOOK

Employment for police officers is expected to grow about as fast as the average for all careers during the next decade, according to the U.S. Department of Labor. Faster-than-average employment growth is expected for detectives and criminal investigators. Opportunities will be favorable for police officers and detectives at the local level, while there will be strong competition for positions at the state and federal levels. The growing U.S. population and public fear about crime are creating demand for more police officers—especially in large cities. Police officers with bilingual skills and advanced education or military police experience will have the best job prospects.

FOR MORE INFORMATION

For information on employment with the federal government, contact

Federal Law Enforcement Officers Association

1100 Connecticut Avenue, NW,
Suite 900
Washington, DC 20036
www.fleoa.org

For information on union membership, contact

Fraternal Order of Police, Grand Lodge

701 Marriott Drive
Nashville, TN 37214
615-399-0900
www.fop.net

For information on careers and a list of state and local women's police organizations in the United States, contact

International Association of Women Police
www.iawp.org

For information on careers in policing, contact

International Police Association
info@ipa-usa.org
www.ipa-usa.org

For information on careers in law enforcement and the American Police Hall of Fame and Museum, contact

National Association of Chiefs of Police
www.nacoponline.org

The NAPO is a "coalition of police unions and associations from across the United States that serves to advance the interests of America's law enforcement officers through legislative and legal advocacy, political action and education."

National Association of Police Organizations (NAPO)

317 South Patrick Street
Alexandria, VA 22314-3501
703-549-0775
info@napo.org
www.napo.org

For career information, contact

National Association of Women Law Enforcement Executives

160 Lawrenceville-Pennington Road,
Suite 16-115
Lawrenceville, NJ 08648
Info@NAWLEE.org
<http://nawlee.com>

The Center "promotes increasing the numbers of women at all ranks of law enforcement as a strategy to improve police response to violence against women, reduce police brutality and excessive force, and strengthen community policing reforms." Visit its website for more information, including the online article, "Becoming a Police Officer."

National Center for Women & Policing

www.womenandpolicing.org

For information on a career as a sheriff, contact

National Sheriffs' Association

1450 Duke Street
Alexandria, VA 22314-3490
800-424-7827
www.sheriffs.org

For information on federal law enforcement careers, contact

Women in Federal Law Enforcement

2200 Wilson Boulevard, Suite 102,
PMB-204
Arlington, VA 22201-3324
301-805-2180
www.wifle.org

Interview: Charlie Kane

Charlie Kane works in the Gang Investigations Unit of the Organized Crime Division of a major metropolitan police department. She discussed her career with the editors of *Nontraditional Careers for Women & Men*.

Q. How long have you worked in the field? What made you want to enter this career?

A. I have been a police officer for 11 years. Out of those 11, I have worked six in the Organized Crime Division. I entered this career because I loved the idea that I could make a difference in someone's life. For as long as I can remember I have dreamt about becoming a law enforcement officer. I always wanted a career that had to do with service, and I believe being a police officer is at the top of the list as far as serving people. I can remember being a child and seeing a police car on my block. I would smile and wave to them and feel a sense of security. It made me feel good to know that I had someone to call if I ever needed help. As I grew older I knew I wanted to be able to do that for someone someday. As a police officer today, I take pride in exactly that; I love being able to help people and give back to my community. To be able to make a difference in a life is the best feeling in the world.

Q. What is one thing that young people may not know about a career as a police officer?

A. One thing that young people may not know about a career in law enforcement is how stressful the job can be. We see things that people may never see in their lifetimes. We are faced with life and death decisions, and that can really take its toll on a person. Our schedules can be very stressful, too. We work many long nights and spend our mornings in court proceedings. At times we rarely see our families because we are usually walking out the door when they are walking in from school or work. We tend to miss birthdays, holidays, graduations, etc. We are willing to sacrifice our "normal lives" because police work never stops.

Q. What are the pros and cons of your job?

A. The pros of my job are: making a good living, great benefits, having a job that is never boring (no two days are ever the same), meeting many people from different backgrounds, a lot of advancement opportunities within the police department, and being a well-respected member of the community. I love the camaraderie within the police department. It is a great feeling to know your brothers and sisters in blue will forever be there in your time of need. Lastly, I enjoy building cases against some truly evil people. It is very gratifying to remove people from the community who really want to do harm to others.

The cons of my job are: the time spent away from family and friends, the failures of the justice system, the disrespect and the hatred for police by certain community members, and the physical, emotional, and mental toll the job can take on your mind, body, and spirit.

- Q. What are the most important personal and professional qualities for people in your career?**
- A.** In my opinion, the most important personal and professional qualities for people in law enforcement begin with people's ethics and morals. We as police officers are given a right to bear arms and a right to take people's freedom away. We have to be trusted with those rights and be able to show the community that we are fair and just. Another important quality of a police officer is the ability to be a "people person." We deal with so many diverse cultures, and we have to have excellent communication skills. We have to be very good at making people feel comfortable around us. Also, you have to have a good sense of humor. You have to be able to laugh at some of the things you see or they will eat you alive. Lastly, you have to learn to leave work at work. It is never a good idea for an officer to go home and bring the stressors of the job home to the family.
- Q. Have you faced any special challenges as a female working in such a male-dominated field? If so, how did you deal with these challenges?**
- A.** Over the years I have faced very minimal challenges as a female working in such a male-dominated field. I learned very early that male officers will either respect you or they won't. You are immediately sized up on your ability to perform and if you don't perform well, you are told about it. I have been in positions where the old school "boys club" feeling is there but I didn't take it personally. I have always proven myself that I could do the job just as well if not better. Over the years this has worked pretty well for me. I am currently one of only a handful of females working in a very male-dominated unit. I always try to keep things on a level playing field and it's been great. My guys and I enjoy working together and really get along well.
- Q. What advice would you give to young women who are interested in the field?**
- A.** Some advice I would give to young women who are interested in becoming police officers is: police work is nothing like you see on reality TV shows or in the movies. I would say to really be prepared for the emotional, mental, and physical challenges that are unique to female officers. I think the most important thing is to know your limits as a female. Remember that you may be a lot smaller and less physically fit than most criminals on the street. You can learn how to use your voice to really control a situation that otherwise may end up physical. I would take advantage of all the training you can find and keep yourself healthy and happy. Lastly, know that as a female you can really do this job well and effectively and make great change in the world.

SOFTWARE ENGINEERS

OVERVIEW

Software engineers design, develop, and test software that is used for businesses' operating systems, network management, or database management. Many times software engineers may adapt a software program to fit the specific needs of a client or its business. They also develop a wide variety of software that is used by consumers, including computer games, operating systems, business applications, network control systems, human-computer interfaces, and middleware. A minimum of a bachelor's degree in computer information systems, computer science, mathematics, or software engineering is required to work in the field; some employers prefer applicants to have a master's degree. Approximately 973,000 software engineers work in the United States; nearly 21 percent are women. Employment for these workers is expected to grow much faster than the average for all careers during the next decade.

FAST FACTS

High School Subjects

Computer science
Mathematics

Personal Skills

Communication
Complex problem solving
Critical thinking
Technical

Minimum Education Level

Bachelor's degree

Salary Range

\$54,360 to \$75,140 to
\$143,330+

Employment Outlook

Much faster than the average

O*NET-SOC

15-1132.00, 15-1133.00

GOE

02.07.01

DOT

030

NOC

2173

THE JOB

What would life be like without software? There would be no computers as we know them today. No Internet. No modern cars!—software is used in their electronic systems. No video games, cell phones, or countless other electronic gadgets that we have come to take for granted in our fast-paced, highly technological lives. Without software, it would be much harder to design and layout books like this one and create animated movies and television shows. In short, our lives have become easier—and more fun—as a result of software, and most people wouldn't want to return to the days when it did not exist.

Many businesses rely on software to store and manage data, sell products, track inventory, and perform a variety of other tasks. Software engineers create many of these applications. Using theories and principles of computer science and mathematics, they design, develop, and test software for many

different companies, businesses, and individual consumers. Their projects range from business applications, to operating systems, to computer games.

When working on a new project, software engineers identify the potential user. Are they designing accounting software to be used by an international company? Software for a handheld GPS unit? A video game? A cell phone? An app for an iPhone? Or a new feature for a website? They often travel to the company headquarters or client's office to consult on the design and maintenance of the software system.

Software engineers often consult with hardware engineers regarding certain aspects of the project. They work together to evaluate the interface between hardware and software and to determine if the company's main computer hardware has the performance capacity to handle the new software. Software engineers also analyze the time needed to develop the software and the final cost of the project. Some engineers focus on human-computer interfaces.

Human-computer interface designers help design interfaces for software that makes it easier to use. Examples of software design interfaces include pull-down menus, icons, and folders on software programs, as well as complete interfaces such as web browsers.

Software engineers create flowcharts, diagrams, and other documentation during the design process to help them get a handle on the project. Then they create algorithms, which act as instructions, telling the computer what actions to execute. These algorithms are converted into special coding or programming by *computer programmers*. However, some software engineers also play a role in the actual programming. Popular program languages include C, C++, Java, and Python.

There are two types of software engineers: *applications software engineers* and *systems software engineers*. Applications software engineers create customized applications as determined by the client's needs. After deployment, these applications or special utility programs are often tested and debugged until the applications run smoothly. Software engineers may use existing diagnostic computer programs or design a unique program to detect potential flaws in the system. Applications engineers may also create or develop databases.

Systems software engineers work with a company's existing computer system. They expand, construct, or maintain the system based to the company's needs. For example, they may coordinate computer software for different

"I think young people think of computer scientists as folks who sit around in cubicles writing code by themselves. That is not at all what computer science is about. It's about working together in teams, figuring out how computers can help solve problems in other fields, learning how to make the human/computer interactions work better, all kinds of things that involve working with people as much as working with computers."

—Dr. Donna Reese,
Computer Science Professor

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departments—such as customer service, inventory, or billing. They may develop a file transfer or a network protocol such as TCP/IP or IPX/SPX. Systems engineers also create computer networks that allow departments to access shared information or create easier departmental communication. Depending on the size and location of the company and any satellite offices, they may use WAN (wide area network) or LAN (local area network) connectivity and network management software. Engineers are also responsible for ensuring system and data security using passwords, firewalls, and other security measures.

Some software engineers create and maintain technical documentation for a project. Others coordinate the installation of a software system, often supervising the work of programmers, analysts, and technicians.

Full-time software engineers work about 40 hours a week. However, overtime is necessary, and often unavoidable, especially when an important deadline is looming. Approximately 15 percent of software engineers work more than 50 hours a week. Most software engineers work in comfortable offices. They spend a considerable amount of time in front of a computer but also attend meetings and travel to meet with clients. When assigned a new project, software engineers often meet with the client to identify the client's needs and goals. Once the project is underway, engineers can often telecommute from their homes via the Internet, accessing the computers of clients remotely via special software programs.

Overall duties will vary depending on the size of the company or organization and the nature of its business. For example, a large insurance company may employ many software engineers to manage a large-scale project, with one or two engineers assigned to perform a small role within the project. However, a smaller company, such as an independent clothing store, may employ one computer professional on staff. That one person may be responsible for duties ranging from all software programming needs to training coworkers on how to use new software and navigate the company's computer network.

REQUIREMENTS

HIGH SCHOOL

Take as many mathematics and computer science classes as possible in high school. Those that help you develop your problem-solving and critical-thinking skills will be most useful. Other key classes include English and speech.

POSTSECONDARY TRAINING

A minimum of a bachelor's degree is required to work in the field; some employers require applicants to have a master's degree. Applications software engineers usually have degrees in computer science, software engineering, or mathematics. Systems software engineers usually have majored in computer science or computer information systems. It also helps to have industry-specific knowledge. For example, a software engineer who works in the health information management industry should have an understanding of the health care field and the way in which computers are used to store, manage, and analyze patient information.

ABET accredits software engineering programs. Visit its website, www.abet.org, for a database of accredited programs.

Software engineering technology is constantly changing and evolving. Software engineers must keep abreast of these innovations through continuing-education classes, seminars, and conferences.

CERTIFICATION AND LICENSING

Product vendors and software firms offer voluntary certification to software engineers. Certification is also offered by professional computing associations such as the Institute for Certification of Computing Professionals (www.iccp.org) and the IEEE Computer Society. Contact these organizations for more information. Certification, while voluntary, is highly recommended. It is an excellent way to stand out from other job applicants and demonstrate your abilities to prospective employers.

OTHER REQUIREMENTS

To be a successful software engineer, you will need excellent analytical and technical skills. You must be able to solve problems and “think outside the box” to come up with solutions for difficult design challenges. Other important traits include strong communication skills, the ability to multitask, attention to detail, the ability to work well under pressure, and a willingness to continue to learn throughout your career.

EXPLORING

Does a career as a software engineer sound exciting? If so, there are many ways to explore the career while still in school. You can read books and magazines (such as *Computerworld*) to learn more about the computer industry. Another good resource is the Association for Computing Machinery’s *Women in Computing* newsletter and blog, which contain useful resources for women interested in education and careers in computing. Visit the websites of college computer science departments to learn about typical classes and possible career paths. Ask your teacher or school counselor to arrange an information interview with a software engineer.

To help young people explore opportunities in computer science, the Association for Computing Machinery and other organizations have created a useful website, Computing Degrees and Careers (<http://computingcareers.acm.org>), that provides a wealth of information about important skills, educational requirements, and career paths; interviews with computer science students and recent graduates; and answers to frequently asked questions about the field, such as Didn’t the opportunities in the field disappear when the dot-com bubble collapsed in 2000? and Aren’t computing jobs solitary and boring? DotDiva.org is an excellent resource that encourages young women to pursue careers in the computer industry. Here are two other useful sites for those interested in learning more about software engineering careers: Why Choose Computer Science & Engineering? (www.cs.washington.edu/WhyCSE) and the Sloan Career Cornerstone Center (<http://careercornerstone.org>).

Did You Know?

- ✓ Although women make up 56 percent of the U.S. workforce, they only comprise 25 percent of workers in Information Technology jobs.
- ✓ Women make up only 11 percent of executives at Fortune 500 technology companies.
- ✓ In 2009, only 18 percent of undergraduate computing and information sciences were awarded to women—a decrease of 19 percent from 1985.
- ✓ Tech companies with more women on their management teams “have a 34 percent higher return on investment; the presence of women on technical teams increases teams’ collective intelligence (problem-solving ability and creativity).”

Source: National Center for Women & Information Technology

EMPLOYERS

Approximately 973,000 software engineers work in the United States; nearly 21 percent are women. About 57 percent of software engineers specialize in applications software, while 43 percent focus on systems software. About 32 percent of software engineers work for computer systems design and related services firms. Other major employers of software engineers include government agencies, the computer security industry, software publishers, the computer manufacturing industry, financial institutions, insurance companies, telecommunications companies, and virtually any industry (medical, industrial, aerospace, scientific, etc.) that produces products or services that require software engineering.

GETTING A JOB

Many software engineers obtain their first jobs as a result of contacts made through college internships or networking events. Others seek assistance in finding job leads from college career services offices and newspaper want ads. Additionally, professional associations, such as the IEEE Computer Society, provide job listings and career articles at their websites. See For More Information for a list of organizations. Many computer professionals also seek out job opportunities at job-search websites such as Dice (www.dice.com), Robert Half Technology (www.roberthalftechnology.com), ComputerJobs.com (www.computerjobs.com), and Crunchboard (www.crunchboard.com). Those interested in positions with the federal government should visit the U.S. Office of Personnel Management’s website, www.usajobs.gov.

EARNINGS

Salaries for software engineers vary by type of employer, geographic region, and the worker’s education, experience, and skill level.

Did You Know?

Barbara Liskov was the first woman in the United States to earn a Ph.D. in computer science. She earned her doctorate from Stanford University in 1968. She is currently a professor at the Massachusetts Institute of Technology. In 2008, she received the A.M. Turing Award from the Association of Computing Machinery for her contributions to the computer programs that “form the infrastructure of our information-based society,” according to a statement from the Association.

Median annual earnings for female software engineers were \$75,140 in 2010, according to the U.S. Department of Labor (USDOL).

Median annual salaries for software developers-applications were \$87,790 in May 2010, according to the USDOL. Salaries ranged from less than \$54,360 to \$133,110 or more. Computer software developers-systems software earned median annual salaries of \$94,180. Ten percent earned less than \$61,040, and 10 percent earned \$143,330 or more.

According to *Computerworld's* 2010 Salary Survey, software engineers earned an average base salary of \$88,697 and an additional \$4,250 in bonuses.

Employers offer a variety of benefits, including the following: medical, dental, and life insurance; paid holidays, vacations, and sick and personal days; 401(k) plans; profit-sharing plans; retirement and pension plans; and educational assistance programs. Self-employed workers must provide their own benefits.

EMPLOYMENT OUTLOOK

Opportunities should be excellent for software engineers. Employment in software publishing is expected to increase by 32 percent from 2008 to 2018, according to the U.S. Department of Labor (USDOL)—or nearly three times as fast as the average for all industries. The USDOL projects that the career of software engineer is among the occupations that is expected to grow the fastest and add the most new jobs through 2018. Additionally, the career of software engineer was chosen by CareerCast.com as the second-best job in 2010 based on five criteria (income, work environment, stress level, employment outlook, and physical demands of the job).

Employment will grow as a result of the increasing use of computer networking, expanding Internet technologies, growing emphasis on computer security, and increasing demand for new mobile applications and software systems (including those that are used by businesses).

Advanced manufacturing, which requires the merger of manufacturing and information technology, is one of the key industries fueling demand for these workers. Other industries that will need software engineers include information security, Internet consulting, and telecommunications. Software engineers with “strong programming, systems analysis, interpersonal, and business skills” and at least a bachelor’s degree will have the best employment opportunities, according to the USDOL.

FOR MORE INFORMATION

For a list of ABET-accredited engineering programs, visit the ABET website.

ABET

111 Market Place, Suite 1050
Baltimore, MD 21202-7116
410-347-7700
www.abet.org

The Institute has a goal of increasing the number of women who pursue careers in technology. Visit its website for Q&As with high-achieving women in computer science and engineering, statistics about women in these fields, and a wealth of other resources.

Anita Borg Institute for Women and Technology

1501 Page Mill Road, MS 1105
Palo Alto, CA 94304
650-236-4756
<http://anitaborg.org>

For information about education, careers in engineering, and its Women in Engineering Division, contact

American Society for Engineering Education

1818 N Street, NW, Suite 600
Washington, DC 20036-2479
202-331-3500
www.asee.org
<http://wied.asee.org>

For information on education and careers, visit the association's websites.

Association for Computing Machinery

2 Penn Plaza, Suite 701
New York, NY 10121-0701
800-342-6626
<http://computingcareers.acm.org>

www.acm.org

For information on opportunities for women in the computer industry, contact

Association for Computing Machinery's Women in Computing (ACM-W)

<http://women.acm.org>

For info on membership, contact

Association for Women in Computing

PO Box 2768
Oakland, CA 94602
info@awc-hq.org
www.awc-hq.org

For industry news, contact

Association of Information Technology Professionals

401 North Michigan Avenue, Suite 2400
Chicago, IL 60611-4267
800-224-9371
aitp_hq@aitp.org
www.aitp.org

The CRA-W is "an action oriented organization dedicated to increasing the number of women participating in computer science and engineering research and education at all levels." Visit its website for more information.

Committee on the Status of Women in Computing Research (CRA-W)

c/o Computer Research Association
crawinfo@cra.org
www.cra-w.org

For information on careers and certification, contact

IEEE Computer Society

2001 L Street, NW, Suite 700
Washington, DC 20036-4928
202-371-0101
help@computer.org
www.computer.org

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For More Info, continued from page 170

For career information and to read *Women in Engineering* magazine, visit **IEEE Women in Engineering**
women@ieee.org
www.ieee.org/membership_services/
membership/women

MentorNet is a nonprofit organization that offers web-based e-mentoring between female and other underrepresented engineering and science students and industry professionals. There is no charge for the service, and males may also participate. Visit the MentorNet website for more information.

MentorNet
Info@mentornet.net
www.mentornet.net

For information on high school competitions and women in the computer industry, contact **National Center for Women and Information Technology**
University of Colorado
Campus Box 322 UCB
Boulder, CO 80309-0322
www.ncwit.org

For career guidance and scholarship information, contact **Society of Women Engineers**
203 North LaSalle Street, Suite 1675
Chicago, IL 60601
877-793-4636
hq@swe.org
www.swe.org

For news about software engineering, visit the SIIA website.

Software and Information Industry Association (SIIA)
1090 Vermont Avenue, NW, 6th Floor
Washington, DC 20005-4095
202-289-7442
www.siiia.net

This website features more than 30 videos and essays from women working in a variety of careers at NASA. It also features a blog and a link to a site for middle-school girls who are interested in learning more about careers in science, technology, engineering, and mathematics.

Women @ NASA
http://women.nasa.gov

This website offers special radio programming on women in science, technology, engineering, and mathematics. **Women in Science, Technology, Engineering, and Mathematics ON THE AIR!**
www.womeninscience.org

This organization is open to both women and men who are interested in learning more about education and careers in technology. Visit its website for more information.

Women in Technology International
www.witi.com

Interview: Donna Reese

Dr. Donna Reese is a professor and head of the Department of Computer Science and Engineering at Mississippi State University. In 2010, she received the McDonald Mentor Award from Tau Beta Pi, the world's largest engineering honor society. Dr. Reese discussed her career and the field of computer science with the editors of *Nontraditional Careers for Women & Men*.

Q. What made you want to enter this career?

A. I entered college as a chemical engineering major. I had a great chemistry teacher in high school and loved math and people told me I should be in engineering. My first semester at Louisiana Tech I had an introduction to engineering class where the professor thought all engineers should learn to program computers. This was before the PC so this was the first exposure to computing I had. I loved it! I changed majors to computer science and have loved every minute of it.

Q. What is one thing that young people may not know about a career in computer science?

A. It's really about people. I think young people think of computer scientists as folks who sit around in cubicles writing code by themselves. That is not at all what computer science is about. It's about working together in teams, figuring out how computers can help solve problems in other fields, learning how to make the human/computer interactions work better, all kinds of things that involve working with people as much as working with computers.

Q. What makes computer science an attractive field for women?

A. I have found this to be a very flexible field to be in for raising a family. I know there are people who would say differently, but I have found this field to be incredibly flexible. You can work from lots of places (even more so these days). So if I wanted to take off and go to my kids' soccer game, I could. I could always work from home to finish up things afterwards. Part of this was having supportive bosses, but I think new technologies have really opened this up even more. Also, there is so much need for diverse perspectives on software. It really does make a better software product when you have a lot of people from different backgrounds helping to design the product. We need folks from all genders, races, socioeconomic backgrounds, cultures, etc. so that all these different perspectives can help make products that are more attractive for everyone.

Q. What advice would you give to young women who are interested in careers in computer science?

A. Don't be intimidated by the guys! Male students tend to be over confident in their abilities whereas female students tend to be under confident. Sometimes male students will talk as if they know everything and are not struggling when they really are. Female students sometimes come to me saying they "don't get it" and they are making the high grade in the class. I always encourage young women to find mentors in the older students who have already made it through to the higher levels. This helps them to be able to talk to someone who may have felt the same lack of confi-

Engineering Students Really Hit the Books

Be prepared to study hard if you major in engineering in college. According to the National Survey of Student Engagement, engineering students study the most out of all academic disciplines. Forty-two percent of college seniors who were pursuing engineering degrees reported that they studied more than 20 hours a week. The average full-time undergraduate studies about 15 hours a week. In contrast, only 19 percent of business majors reported studying more than 20 hours a week.

dence in their earlier courses and they can help to combat that “imposter syndrome” that seems to always be around.

Q. What can be done to encourage more young women to pursue careers in computer science?

A. We are trying at Mississippi State to help all students, particularly the women, see more of the breadth of opportunities that there are in computing. We have added a new course at the freshman level that isn't about programming. It's about what all you need to be successful and what you can do with the degree in the end. We do lots of team projects in there so students get an opportunity to see that teams of diverse people can come up with much better solutions than one person can. I think it's making a difference.

Q. Have you faced any special challenges as a female working in such a male-dominated field?

A. I can't honestly say that I have ever experienced blatant gender discrimination in my career. My biggest challenge has been trying to have a good work/life balance and sometimes falling prey to the imposter syndrome myself. Having a good mentor or two that can help you keep things in perspective and tell you to make time for yourself and can help reaffirm your confidence when you are feeling overwhelmed can really help make a difference. This probably applies equally in all fields.

Q. What has been one of your most rewarding experiences during your career, and why?

A. I guess I have two answers to this. From the technical side, it has always been rewarding to me when I can use my computing skills to make someone's job easier. So if I can write a program to help automate something that someone was having to do by hand, I find this very rewarding. Particularly if it is a tedious, error-prone manual process and I can make it easy to do and free up that person to work on something else they would much rather work on, then I find that rewarding. From the academic side, the most rewarding experience is when you have students who struggle to figure out what they want to do with their lives and then you see the light bulb go on for them. It's very rewarding when they graduate and get jobs and are successful to think that you played a small part in helping them decide what was the right thing for them to do with their lives.

STONE WORKERS

OVERVIEW

Stone workers—such as brick masons, block masons, and stone and cement masons—are specially trained to create surfaces and structures that are durable, functional, and sometimes attractive. They use a variety of materials for their work, including bricks, tiles, cement, and natural or artificial stones. Depending on their employer and specialty, they may build walls, fences, small patios, sidewalks and walkways, highways, fireplaces and chimneys, dams, and airport runways. Stone workers prepare for the field via on-the-job training, postsecondary vocational educational programs, or apprenticeship programs. There are approximately 169,000 stone workers employed in the United States. Less than 1 percent are women. Job opportunities are expected to be good for stone workers during the next decade.

FAST FACTS

High School Subjects

Mathematics

Shop

Personal Skills

Complex problem solving

Mechanical/manipulative

Time management

Minimum Education Level

Extensive on-the-job training, an apprenticeship, or postsecondary vocational training

Salary Range

\$23,130 to \$40,000 to

\$78,630+

Employment Outlook

About as fast as the average

O*NET-SOC

47-2021.00, 47-2022.00,

47-2044.00, 47-2051.00

GOE

06.02.01

DOT

844, 861

NOC

7281, 7282, 7283

THE JOB

What do the Great Wall of China, the Taj Mahal, and your parents' fireplace have in common? They were built by the hands of stone masons. Masonry is one of the oldest trades in history, with origins tracing back about 6,000 years. Stone masons are just one of the many types of stone workers who use natural and artificial materials to create surfaces and structures that are functional, durable, and often attractive. They construct buildings, walls, fences, roads, sidewalks, fireplaces, chimneys and high-temperature furnaces, and other structures. The following paragraphs provide more information about specialties in the field.

Brick masons and *block masons*, also known as *bricklayers*, work with ceramic blocks, pre-made masonry panels, concrete blocks, and stone. When starting a project, such as a wall or fireplace they first consult the

blueprint or design to estimate the amount of materials needed. They then measure distances and mark guidelines on work surfaces before laying out material. Using a plumb bob—a weighted tool used to survey an area—and a level, brick masons and block masons can set the alignment of bricks. If needed, bricks are cut to size, or to accommodate a corner or particular design. Brick masons and block masons use trowels to spread mortar on the base of the project; this serves as a binder for the first level of bricks. Mortar, a mixture of cement, sand, lime, and water, acts as an adhesive. Mortar comes in a variety of shades to accent or match the brick color.

Mortar is also spread on bricks before they are placed in the mortar base. Brick masons align the bricks by tapping them firmly in place. Levels are used throughout the project to ensure that the brick layers are placed evenly. Tools such as a tuck pointer are used to finish mortar joints between layers. When working around doors or windows, brick masons and block masons may need to cut bricks and concrete blocks with a masonry saw. Angles and decorative designs are constructed using vertical and horizontal alignment of bricks and concrete blocks. Depending on the design, steel supports, lintels, anchor holes, or wire clamps are used to help support the bricks so the mortar can harden. When the project is complete, brick masons and block masons clean the structure with a cleaning solution, which also helps the mortar to set and cure.

Some brick masons specialize in a particular structure. *Refractory masons*, for example, build furnaces, boilers, and soaking pits used in steel mills, oil refineries, or other manufacturing companies. These special structures use industry-grade materials such as fire brick or refractory tiles that are able to withstand extreme temperatures.

Stone masons work primarily with natural stone such as marble and granite, or artificial stones created from a mix of concrete, marble chips, or other materials. When working on a project such as an outdoor patio or decorative wall, they first consider the blueprint or design. Stones may need shaping or cutting to fit the design. Stone masons use hammers and chisels or diamond-blade power saws to cut the stone. It is important to cut stone along its grain to avoid damage and to get a clean line. Similar to brickwork, a shallow layer of mortar is first set as a base. Mortar is spread on the stone before alignment in the base. Once stones are tapped into place, a second layer of mortar and stone is set, and so on, until the structure reaches the desired height. Stone masons finish joints between stone layers or corners using mortar and a variety of tools, such as chisels, shaping and pointing tools, or mallets. If working with large pieces of heavy stone, stone masons often use hoists to lift these pieces into place.

"I actually love the fact that masonry is a physically challenging job. I love that my job keeps me moving and grooving all day; it's a great way to stay in shape."

—Marie Caputo, Cement Mason

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Depending on the design, stones are often pre-numbered to make setting easier. Stone masons also use brackets to keep large stones in place until the mortar sets. Additional mortar is spread, filling joints. Final steps include washing the stones with a cleaning solution; this helps remove any dirt or stains as well as set the mortar.

Stone workers also repair and maintain existing structures. Loose mortar is chiseled away; loose or damaged bricks, blocks, or stone are removed using crowbars, chipping guns, or hammers. Stone workers must work carefully when removing damaged pieces so as not to compromise the integrity of the remaining structure. Brackets may be used to support replacement pieces of stone or brick, and several layers of mortar may be used to fill joints.

Cement masons and *concrete finishers* are specialized stone workers who place and finish concrete. There are many steps in the process. First, cement masons set up and align the forms that will hold the concrete. Then they direct the placement of the concrete and use special tools or shovels to spread the concrete in the form, or supervise laborers who do this work. Masons then use a straightedge back and forth across the tops of the forms to level the freshly poured concrete. Then masons have to “float” the concrete, or smooth its surface with a “bull float,” a long-handled tool of about 8 by 48 inches. This tool covers the rougher materials and creates a fine cement paste at the surface. The next steps involve using an edger to produce slightly rounded edges (this process also helps prevent chipping or cracking) and using a special tool called a “groover” to make joints or grooves at specific intervals that help control cracking. Cement masons then finish the surface, which could involve smoothing the surface using either a powered or hand trowel; creating a coarse, nonskid finish by using a stiff-bristled brush or broom; or creating a pebble finish by embedding small gravel chips into the surface.

Terrazzo workers and finishers create beautiful floors, walkways, patios, and panels by exposing marble chips and other fine aggregates on the surface of finished concrete.

Some stone workers move on to other jobs within the industry. Some become *estimators*, who estimate costs for a project. They create construction bids by taking into account the size of the project, type and amount of materials used, and degree of service needed. Other stone workers become *inspectors*, who determine the structural soundness of a project. They also take into account the structure’s compliance with building codes or other regulations.

Stone workers usually work 40 hours a week, though may work more hours if projects are plentiful, or less depending on weather conditions or the number of local construction jobs available. In the past, stone and brick work ceased during winter months. However, with the advent of new processes and materials, stone work can now be done year-round. Stone workers must travel to job sites, including out of state as the work demands.

The work is strenuous, as stone workers are required to lift heavy loads of bricks, stone, and mortar. Injuries may occur, especially with the use of hammers, chisels, or other tools. Common injuries include falls from scaffolding.

folds and ladders, cuts from sharp tools, and bruises from blunt tools such as hammers. Stone workers take a variety of safety precautions and wear protective clothing, including heavy gloves, kneepads, water-repellent boots, and hard hats, to reduce the risk of injury.

REQUIREMENTS

HIGH SCHOOL

Classes that will help you prepare for a career as a stone worker include mathematics, shop (especially mechanical drawing and blueprint reading), English, chemistry, physics, and general science.

POSTSECONDARY TRAINING

Stone workers prepare for the field via on-the-job training, postsecondary vocational educational programs, or apprenticeship programs.

Apprenticeships typically last three to four years and are sponsored by local contractors, trade associations, or local union-management committees. Each year of an apprenticeship program typically features 2,000 hours of on-the-job training and 144 hours of related classroom instruction. To enter an apprenticeship program, you must typically be at least 18 years old and have earned a high school diploma or GED. Visit www.doleta.gov/OA/sainformation.cfm for information on apprenticeship training programs in your state. Additionally, the Mason Contractors Association of America offers a database of training programs at www.masoncontractors.org/masonrycareers/findatrainingprogram.

"I would say to any woman interested in a career in cement masonry, to just go for it! Family and friends may think you are crazy, as they did in my case, but if you do not see yourself sitting in a cubicle for the next 30 years, construction may prove to be a fantastic option."
 —Marie Caputo, Cement Mason

CERTIFICATION AND LICENSING

The American Concrete Institute offers a variety of certifications to cement masons who are employed in the concrete construction industry. The Mason Contractors Association of America offers certification to masonry contractors. Contact these organizations for more information.

OTHER REQUIREMENTS

Stone workers should be in good physical condition to withstand long hours of bending, standing, and kneeling, as well as lifting heavy objects such as scaffold parts, forms, bags of concrete, and rows of brick. Other important traits for stone workers include good manual dexterity, a strong work ethic, the ability to work both as a member of a team and independently, good communication skills, and knowledge of basic math.

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Approximately 18 percent of brick masons, block masons, and stone masons are members of unions, mainly the International Union of Bricklayers and Allied Craftworkers. About 14 percent of cement masons, concrete finishers, and terrazzo workers belong to unions, the largest of which are the International Union of Bricklayers and Allied Craftworkers and the Operative Plasterers' and Cement Masons' International Association of the United States and Canada. A few terrazzo workers belong to the United Brotherhood of Carpenters and Joiners of the United States.

EXPLORING

This is one career that you can explore via hands-on experience. Work with your parents to build a wall or walkway using stone masonry or cement. Read how-to books and watch videos online to learn the basic techniques of these trades. The Mason Contractors Association of America offers a masonry glossary at www.masoncontractors.org/aboutmasonry/masonryglossary, and you can learn about cement and concrete basics by visiting www.cement.org/basics. Talk to stone workers about their careers. Perhaps you can visit a work site to observe stone workers on the job.

EMPLOYERS

There are approximately 169,000 stone workers employed in the United States. Less than 1 percent are women. Most work in building construction or for specialty trade contractors. Approximately 27 percent of brick masons, stone masons, and block masons are self-employed. Only 5 percent of cement masons, concrete finishers, segmental pavers, and terrazzo workers are self-employed—a percentage that is lower than the average for many workers in the construction industry.

GETTING A JOB

Stone worker apprentices gain the chance to obtain a full-time position by performing well as an apprentice. Once you complete your apprenticeship or other type of training, you can also find a job by applying directly to contractors, by visiting employment websites, or by contacting local unions. The Mason Contractors Association of America and the American Concrete Institute offer job listings at their websites (see the For More Information section).

EARNINGS

The U.S. Department of Labor (USDOL) does not provide salary information for female stone workers. It does report that all stone workers earned annual salaries of about \$40,000 in 2010. The USDOL reports the following salary ranges for stone workers by specialty: brick masons and block masons: \$28,790 to \$78,630+; cement masons and concrete finishers: \$23,130 to \$63,400+; stone masons: \$23,560 to \$61,370+; and terrazzo workers and finishers: \$24,190 to \$63,650+.

Apprentices begin at about 50 to 60 percent of the salary paid to experienced stone workers. Their pay increases during their training.

Employers offer a variety of benefits, including the following: medical, dental, and life insurance; paid holidays, vacations, and sick and personal days; 401(k) plans; retirement and pension plans; and educational-assistance programs. Union members often receive health insurance, a pension, and other benefits from their union. Self-employed workers must provide their own benefits.

EMPLOYMENT OUTLOOK

Employment for stone workers is expected to be good during the next decade, according to the U.S. Department of Labor. The growing U.S. population is leading to increased demand for new highways, factories, bridges, hospitals, industrial facilities and office buildings (some of which may be made from stone), and other residential and nonresidential structures, as well as a need for workers to repair existing structures. Stone workers who have expertise in green construction and energy efficiency will have especially strong job prospects.

FOR MORE INFORMATION

For info on certification, contact
American Concrete Institute
 38800 Country Club Drive
 Farmington Hills, MI 48331
 248-848-3700
www.concrete.org

For information on education and careers in construction, contact
Associated Builders and Contractors
 4250 North Fairfax Drive, 9th Floor
 Arlington, VA 22203-1607
gotquestions@abc.org
www.trytools.org

For information on K-12 programs, contact
Associated General Contractors of America
 2300 Wilson Boulevard, Suite 400
 Arlington, VA 22201-5426
 703-548-3118
info@agc.org
www.agc.org

For information on state apprenticeship programs, visit
Employment & Training Administration
 U.S. Department of Labor
www.doleta.gov/oa/stateoffices.cfm

For information on educational opportunities, contact
International Masonry Institute
 The James Brice House
 42 East Street
 Annapolis, MD 21401-1731
 410-280-1305
www.imiweb.org

For information on union membership and apprenticeships, contact
International Union of Bricklayers and Allied Craftworkers
 620 F Street, NW
 Washington, DC 20004-1618
 888-880-8222
askbac@bacweb.org
www.bacweb.org

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For More Info, continued from page 179

For information on masonry, contact

The Masonry Society

3970 Broadway, Suite 201-D
Boulder, CO 80304-1135
info@masonrysociety.org
www.masonrysociety.org

For information on apprenticeships and careers, contact

Mason Contractors Association of America

1481 Merchant Drive
Algonquin, IL 60102
800-536-2225
www.masoncontractors.org

For information about opportunities for women in the construction industry, contact

National Association of Women in Construction

327 South Adams Street
Fort Worth, TX 76104
nawic@nawic.org
www.nawic.org

For information on career opportunities for women, contact

National Association for Women in Masonry

www.nawmonline.net

For industry information, contact

National Concrete Masonry Association

13750 Sunrise Valley Drive
Herndon, VA 20171-4662
www.ncma.org

For information on terrazzo and mosaic tile workers, contact

National Terrazzo and Mosaic Association

PO Box 2605
Fredericksburg, TX 78624-1924
info@ntma.com
www.ntma.com

For information on the tile industry, contact

National Tile

Contractors Association
PO Box 13629
Jackson, MS 39236-3629
601-939-2071
www.tile-assn.com

For information on apprenticeships, other training programs, and scholarships, contact

Operative Plasterers' and Cement Masons' International Association

11720 Beltsville Drive, Suite 700
Beltsville, MD 20705-3104
301-623-1000
opcmaiintl@opcmia.org
www.opcmia.org

For industry information, contact

Portland Cement Association

5420 Old Orchard Road
Skokie, IL 60077-1083
info@cement.org
www.cement.org

For information on apprenticeships and union membership, contact

United Brotherhood of Carpenters and Joiners of America

6801 Placid Street
Las Vegas, NV 89119-4205
www.carpenters.org

For information on career opportunities for women, contact

Women in Concrete Alliance

womeninconcrete.org

There are many other organizations at the national, regional, state, and local levels for women interested in construction careers. See Appendix I: Women's Construction Associations on page 270 for an extensive list of organizations.

Interview: Marie Caputo

Marie Caputo is a cement mason in New York City. She discussed her career with the editors of *Nontraditional Careers for Women & Men*.

Q. How long have you worked in the field? What made you want to enter this career?

A. I have worked as a cement mason in Local Union #780 in New York City for four years. These past few years have proven to be extremely challenging, physically and mentally demanding, yet at the same time, incredibly fulfilling. And I would not change them for anything in the world.

It was definitely not a childhood dream to become a cement mason, let alone work in construction. This career move happened primarily by chance, when a friend offered to put in a good word for me at the union hall. From then on has undoubtedly made me feel like I was in the right place at the right time.

Q. What is one (or more) things that young people may not know about a career in cement masonry?

A. I never would have thought of how much skill and technique equally go into the art of finishing concrete. Considering I went to art school, I instantly became thrilled that I was a part of one of the last trades that actually was considered an art form. Every day in concrete proves to be a learning experience. Somedays you may work with a 20- or 30-year veteran who has a fabulous technique to share, and all of a sudden, certain things begin to click. Like in every job, it always helps to have an open mind. As human beings, most of the time ego gets in the way; however, it helps to be able to take constructive criticism from others you may work with because they definitely have much to share. Believe me, it is not an easy trade to learn. It's not like anyone can just walk onto the job site, pick up a trowel, and provide a smooth, beautiful finish.

There are more and more women entering the construction sector every year. However, there are currently less than 10 active women members in the Cement Masons Union. Essentially the reason being that it is an extremely tough job, not that women can't get the job done. We are a tight group that work very hard, and give the men a run for their money!

Q. Can you please briefly describe a day in your life on the job?

A. A day in concrete is a long, tough day indeed. Start time is at seven in the morning, when the concrete trucks arrive, and depending on the yardage and the quickness or not-so-quick service of the trucks, there will probably be 30+ trucks coming and going all day. The concrete laborers on the job will take control of the pump, of exactly how much concrete dispenses in an area at a given time. The masons will determine the grade and use straight edges to dispense the concrete evenly in a particular area. After the straight edge is used, the man or woman in charge of the bull float manually administers the float onto that particular piece of the slab, in which the stone is pushed down from the surface. As the day goes on, and more and more areas begin to harden, some masons will leave the pull up and embark on the finish. Some areas will require the mason to get down and dirty, using knee pads and boards on the slab, and will trowel the finish by hand until it

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hardens and is polished. Trowel machines are also used to ensure a spectacular finish. Finishing concrete is composed of many, many hours of diligent work. Depending on the size of the slab, a 12- to 20-hour day is extremely common.

Q. What are the pros and cons of your job?

- A.** Every job, no matter how much you like or dislike it, has pros and cons that differ greatly from one person to the next. I actually love the fact that masonry is a physically challenging job. I love that my job keeps me moving and grooving all day; it's a great way to stay in shape. Yet on the flip-slide, all day walking around in concrete definitely creates a soreness I have never experienced in the gym. It takes some getting used to. A big draw to construction by men and women alike is the high pay rate and amazing benefits. All of the trades vary slightly in pay rates. Cement masons generally make more money than most other trades, and that is essentially due to the fact that we do not work much in the winter. It costs a company much more money to pour concrete in the winter rather than in the warmer months, so work is sparse during colder climates. This is a learning experience as well. When work is booming, construction workers must learn to save that hard-earned money because the dry periods can prove to be extremely sluggish.

Q. Have you faced any special challenges as a female working in such a male-dominated field? If so, how did you deal with these challenges?

- A.** Any individual, men and women alike, in any career, must prove themselves in the beginning. Well, the same exists for a woman in construction, especially a woman who works in concrete. There are the stereotypes that women do not like to work and do not like to work hard, so proving yourself in the field is essential in creating a good reputation. Once you prove that you are there to pull your own weight, you become the rock star on the job. Every fellow construction worker on that job site will be your friend and help you through any tough times you may have. The best thing to do is to be yourself and do your best every day.

Q. What advice would you give to young women who are interested in the field?

- A.** I would say to any woman interested in a career in cement masonry, to just go for it! Family and friends may think you are crazy, as they did in my case, but if you do not see yourself sitting in a cubicle for the next 30 years, construction may prove to be a fantastic option. The winter months are extremely cold; however, you learn quite quickly how to dress and deal with the elements when working outside every day. Any new job can prove to be quite difficult at first, yet every day your confidence increases.

Interview: Marylou Errico

Marylou Errico works in sales for Little Falls Lumber and Concrete Forming in Rochester, New York. She discussed her career with the editors of *Nontraditional Careers for Women & Men*.

Q. How long have you worked in the field?

- A.** I have been in the construction business for well over 20 years, with 16 years in outside sales. I have acquired several training certificates from vendors as well from the State of New York in regard to products, their uses, and application. I would say a lot of the knowledge has come from working directly in the field with contractors; they are sometimes the best teachers since you see exactly how the products are used in all aspects.

Q. What are your primary duties?

- A.** My primary job duties include actively working closely with new and existing customers to establish their needs for projects and maintaining an up-to-date knowledge base of product lines. I also do project management and estimating, visit job sites to evaluate upcoming needs and progress, and continually look to establish new business opportunities.

Q. What do you like most and least about your career?

- A.** Pros include a sense of accomplishment in knowing you played an integral part of a project, meeting new people everyday, and travel.

Cons: The workday never seems to end. This is where the customer service really plays a part in this job. You have to remember that it is not personal, it is business. You have to be balanced with tough skin and be willing to let some things go in one ear and out the other.

Q. What are the most important personal and professional qualities for success in your career?

- A.** The ability to multi-task is a must. You also need organizational skills, product knowledge, and customer service skills; be able to learn to listen not just hear; and be willing to learn. I know that staying on top of projects for the customer is important. Most times the contractors expect us to know their schedule as well. Memory for me is key. I know when they are pouring concrete they are going to need certain items, and I then anticipate the next step—the sealing and such.

Q. Any advice for young women interested in the field?

- A.** Just do it. It is an interesting and challenging job that changes all the time. There are new products, new customers, new job sites, new people. I know a lot of women who are project engineers, managers, estimators, and foremen.

SURVEYORS

OVERVIEW

Surveyors measure and determine boundaries and locations of various points, lines, and contours of the Earth's surface. Their information is used to establish physical boundaries for parcels of land, airspace, or bodies of water. They gather their information using tools such as the Global Positioning System (GPS), computer programs, legal records and maps, photographs, and previous surveys, and they present their findings in the form of electronic or print maps, plans, or descriptive reports. A minimum of a bachelor's degree in surveying or a related field is required to enter the field. There are approximately 29,000 surveyors employed in the United States. Slightly more than 17 percent are women. Employment for surveyors is expected to grow faster than the average for all careers during the next decade.

FAST FACTS

High School Subjects

Computer science
Geography
Mathematics

Personal Skills

Complex problem solving
Critical thinking
Technical ability

Minimum Education Level

Bachelor's degree

Salary Range

\$30,800 to \$54,880 to
\$89,930+

Employment Outlook

Faster than the average

O*NET-SOC

17-1021.00, 17-1022.00,
17-1022.01

GOE

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DOT

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NOC

2154

THE JOB

Have you: Ever wondered how property lines are determined in your neighborhood? Looked on a paper or electronic map for the location of a lake or pond? Ever used a handheld Global Positioning System (GPS) to locate a particular road, town, or point of interest? If so, then you have benefited from the work and expertise of surveyors.

Surveyors measure and determine the boundaries of the Earth's surfaces, including parcels of land, bodies of water, and airspace. Their work is used by private companies and government agencies to determine land specifications for deeds, leases, or other legal documents, as well as road maps, atlases, and charts. Their measurements are also used by companies and agencies when starting construction projects and in mining, oil and natural gas exploration, farming, and many other enterprises.

When working on a project, for example, a deed description needed for a major construction project, surveyors travel to the location in question.

They study the physical evidence including notes, existing maps, and deeds, or other legal documents to research important information needed to conduct the survey. They walk through a portion or the entire length of the property, if possible. They use a variety of tools to help them in their work, including theodolites, transits, compasses and angle prisms, level rods, steel measuring tapes and reels, range rods, metal detectors, digital cameras, and powerful telescopes. Surveyors increasingly rely on computerized tools to measure and map the Earth's surface including the Global Positioning System, satellite signal receivers (small instruments that are mounted on tripods that are used in conjunction with GPS technology), large-format digital plotters, computer-aided design software, and optical and laser electronic equipment. Often times, it is necessary for surveyors to adjust, or recalibrate, their instruments to maintain accuracy. They also take notes and make sketches in field notebooks or on hand-held computers. Once they have collected the necessary data, surveyors return to their home office to prepare their findings.

The accuracy of their fieldwork is checked against computerized mathematical equations, information received by satellite signal receivers, and analytical and scientific software. Surveyors sometimes meet with engineers, architects, lawyers, and other professionals to discuss their findings. Once their research is checked and completed, they present their findings to the client.

Surveyors also measure and determine boundaries for airspace. This information is important to airlines when creating continental and international flight routes. This information is also used by governments for military purposes, especially during times of war. The military relies on the research and work of surveyors to help locate military targets and make vital maneuvers involving troops and equipment.

Surveyors may specialize in a particular area; these careers are detailed in the following paragraphs.

Construction surveyors conduct surveys for construction projects, such as highways, shopping centers, housing developments, skyscrapers, pipelines, refineries, offshore oil rigs, utility networks, airstrips, bridges, and renewable-energy sites (such as wind farms and geothermal power plants). They provide data to architects, engineers, contractors, and other construction professionals during every stage of a construction project.

Land surveyors establish or verify property, township, and other boundary lines. Their surveys are used to prepare legal documents such as leases, easements, and deeds. Land surveyors are also known as *boundary* or *cadastral surveyors*.

Geodetic surveyors, also known as *geodesists*, use extremely accurate technology such as satellite and Doppler positioning systems to measure large areas of land, space, and sea. These measurements take into consideration the curvature of the earth and its geophysical characteristics.

Companies involved in mining or tunneling operations hire *mining surveyors* to measure surface and underground land areas. This information is used when determining locations for mines, tunnels, or subways and assessing the location and volume of raw materials, such as coal, that are in mines.

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Photogrammetric engineers, also known as *photogrammetrists* and *remote sensing surveyors*, are specialized surveyors who conduct aerial surveys of areas that are inaccessible or to which travel is difficult. They create topographic maps using information from aerial or satellite images, as well as land photographs. Photogrammetry is used in construction projects, in the creation of topographic maps, and to track pollutants in a large body of water after a major environmental accident. Specialized laser scanners are also used to obtain a precise model of large three-dimensional structures.

Petroleum or other natural sources of energy are found using data gathered by *geophysical prospecting surveyors*, who help locate potential sites of oil, minerals, or other deposits underground.

Topographic surveyors measure and map the contour, shape, and location of land features such as mountains, valleys, and man-made objects.

Marine surveyors, also known as *hydrographic surveyors*, specialize in creating surveys of bodies of water such as rivers, harbors, and streams. They use sound waves to gather information regarding shore lines, depth of water, erosion, underwater hazards, or other hydrographic details. This information is used in the planning of piers, bridges, breakwalls, and dredging projects; when creating navigation routes; and when exploring for oil or working on utility projects. Demand for marine surveyors is high because storms and currents constantly change the makeup of the shoreline and the land under water.

Forensic surveyors testify under oath about surveying data in courtrooms and other legal proceedings. They serve as expert witnesses in legal cases that involve vehicular or industrial accidents. Forensic surveyors must have years of experience in the field and be able to easily convey technical information to juries, lawyers, judges, and others in legal proceedings.

Surveyors work 40 hours a week, though extended hours may be scheduled in the summer months when weather and sunlight are optimal. All surveying or research work is conducted outdoors in many different terrains. Calculating data, preparing reports, or meeting with clients is usually conducted indoors.

REQUIREMENTS

HIGH SCHOOL

Recommended classes include computer science, computer-aided design, algebra, geometry, trigonometry, mechanical drawing, and drafting. Since surveyors often have to write reports and other correspondence and work as a member of a team, you should take English and speech classes to develop your communication skills. Other useful classes include history, geology, botany, and forestry.

POSTSECONDARY TRAINING

A minimum of a bachelor's degree in surveying (sometimes called geomatics engineering) or a related field is required to enter the field as a professional licensed surveyor. People with backgrounds in geology, engineering, forestry, computer science, and astronomy may also be attracted to careers in surveying. Photogrammetrists typically have a bachelor's degree in cartography, surveying, geography, computer science, forestry, engineering, or a physical

science. Visit www.abet.org for a list of accredited surveying programs. There are apprenticeship courses available in some states.

CERTIFICATION AND LICENSING

The Federal Emergency Management Agency and the American Congress on Surveying and Mapping (ACSM) have partnered to create a certification program for floodplain surveyors. The ACSM has also partnered with the Bureau of Land Management to develop the certified federal surveyors program.

Surveyors who specialize in GIS and photogrammetry can obtain voluntary certification from the American Society for Photogrammetry and Remote Sensing. The GIS Certification Institute also provides certification.

Some surveyors must be licensed or registered. (Jobs also exist for field personnel that do not require licensing, especially in construction surveying.) Requirements vary by state but typically include having a bachelor's degree in surveying or a related field and passing a series of examinations, and sometimes passing an exam prepared by the state licensing board. The National Council of Examiners for Engineering and Surveying administers the national exams, which must be passed for licensure. The Fundamentals of Surveying exam is taken by new surveyors. The Principles and Practice of Surveying exam is taken after surveyors accrue four years of experience with an experienced surveyor. (Note: several states do not require a bachelor's degree for licensure; in such an instance, survey technicians who want to become surveyors must have considerable experience in the field—typically at least 10 years—before applying for licensure.) Many surveyors obtain licenses in more than one state so that they have more employment options. Contact your state's department of professional regulation for requirements in your state.

The National Society of Professional Surveyors has a certification program for surveyors who do not plan to become licensed surveyors. The progressive exams test for competency as a survey helper, instrumentman, chief of parties, or office technician. Preparation for these exams is through apprenticeship programs or by self-study and field experience. A high school diploma is required for entrance to the exams.

OTHER REQUIREMENTS

Surveyors must have mathematical and technical ability. They should be able to visualize objects, sizes, distances, and abstract forms. They should be in good physical condition and able to walk considerable distances, climb hills, and stand for a long period of time. Many times, they are forced to carry heavy loads of tools and other equipment to a work site. Heavy boots, hard hats, and other protective clothing are a must. Surveyors should be prepared to travel to work sites, and perhaps even temporarily relocate for a detailed survey project. Other important traits for surveyors include the ability to work with precision and concentration, strong communication and interpersonal skills, leadership abilities (if they work as crew or party chiefs), and a willingness to continue to learn throughout their careers.

EXPLORING

There are many ways to explore careers in surveying. One way is to read journals published by professional surveying associations. Here are some suggestions: *Point of Beginning Magazine* (www.pobonline.com), *Professional Surveyor Magazine* (www.profsurv.com), and *The American Surveyor* (www.amerisurv.com). Although some of the technical terminology may be over your head, these publications will provide you with a good overview of issues in the field. You can also read books about the field. Ask your school or local librarian for some suggestions.

Visit the websites of the professional associations listed in the For More Information section for information on education and careers. Another good website is Measuring the World Around Us: A High-Tech Career In Professional Surveying (www.surveyingcareer.com), which is sponsored by the National Society of Professional Surveyors.

"I have often been the only woman on the project or even in the company. You have to constantly prove yourself."

—Mickie Warwick, Surveyor

Visit the National Museum of Surveying (www.surveyingmuseum.org) in Springfield, Illinois, on a family vacation or class trip.

Talk to surveyors about their careers. Ask your school counselor or science teachers for help setting up an information interview.

EMPLOYERS

There are approximately 29,000 surveyors employed in the United States. Slightly more than 17 percent are women. Approximately seven out of 10 jobs in the field are with architectural, engineering, and related firms. Government agencies at all levels employ about 15 percent of surveyors. Major federal government employers of surveyors include the U.S. Geological Survey, the Bureau of Land Management, the U.S. Forest Service, the National Oceanic and Atmospheric Administration, and the Army Corps of Engineers. Surveyors at the state and local levels are typically employed by highway departments or urban planning and redevelopment agencies. Utility companies also employ surveyors.

GETTING A JOB

New graduates can obtain job leads from their career services offices, from contacts made through internships, by contacting companies directly, and by reading *The American Surveyor* (www.amerisurv.com).

The GIS Certification Institute offers a Mentoring Program that links students and young professionals with certified GIS professionals for a period of at least six months. Visit www.gisci.org/Mentoring_Program/mentoring_program.aspx for more information.

EARNINGS

The U.S. Department of Labor (USDOL) does not provide salary information for female surveyors. It does report that women employed in architecture and engineering occupations earned average annual salaries of \$54,080 in 2010. Median annual salaries for all surveyors were \$54,880 in May 2010. Salaries ranged from less than \$30,800 to \$89,930 or more. The USDOL reports the following mean annual earnings for surveyors by employer: state government, \$72,270; local government, \$62,370; non-residential building construction, \$59,640; architectural, engineering, and related services, \$56,700; and highway, street, and bridge construction, \$53,830.

Employers offer a variety of benefits to full-time workers, including the following: medical, dental, and life insurance; paid holidays, vacations, and sick and personal days; 401(k) plans; retirement and pension plans; and educational-assistance programs. Self-employed surveyors must provide their own benefits.

EMPLOYMENT OUTLOOK

Employment for surveyors is expected to grow faster than the average for all careers during the next decade, according to the U.S. Department of Labor (USDOL). Surveyors who have bachelor's degrees in surveying or related fields, knowledge of Global Positioning System and Geographic Information Systems technology, and considerable field experience will have the best job prospects. The USDOL reports that "increasing demand for geographic data, as opposed to traditional surveying services, will mean better opportunities for mapping technicians and professionals who are involved in the development and use of GIS and digital mapmaking."

FOR MORE INFORMATION

For a list of accredited surveying programs, visit the ABET website.

ABET

111 Market Place, Suite 1050
Baltimore, MD 21202-7116
410-347-7700
www.abet.org

For information on geodetic surveying, contact

American Association for Geodetic Surveying

www.aagsmo.org

For information on education, careers, and certification, contact

American Society for Photogrammetry and Remote Sensing

5410 Grosvenor Lane, Suite 210
Bethesda, MD 20814-2160
asprs@asprs.org
www.asprs.org

Visit the society's website to read *Cartography and GIS*.

Cartography and Geographic Information Society

6 Montgomery Village Avenue, #403
Gaithersburg, MD 20879-3557
www.cartogis.org

continued on page 190

For More Info, continued from page 189

For information on certification, contact

GIS Certification Institute

701 Lee Street, Suite 680
Des Plaines, IL 60016-4508
www.gisci.org

For information on certification, contact

National Society

of Professional Surveyors

6 Montgomery Village Avenue, #403
Gaithersburg, MD 20879-3557
www.nspsmo.org

For information on employment and volunteer opportunities with the federal government, contact the following agencies

Bureau of Land Management

www.blm.gov

National Oceanic and Atmospheric Administration

www.noaa.gov

U.S. Army Corps of Engineers

www.usace.army.mil

U.S. Forest Service

www.fs.fed.us

U.S. Geological Survey

www.usgs.gov

Interview: Mickie Warwick

Mickie Warwick is a licensed surveyor and also works in construction. She discussed her career with the editors of *Nontraditional Careers for Women & Men*.

Q. What type of construction jobs do you currently do?

A. I am currently working on starting my own business. In the last five years, I have worked on a natural gas power plant; a uranium-enrichment facility; a missile field (14 silos for anti-ballistic missiles); oil processing modules in South Korea; hydrographic surveying (driving a little skiff around) to determine volumes of material excavated from a float plane pond to build up the runway safety areas at the airport at Juneau, Alaska; revetment dikes on the north slope of Alaska (wearing chest waders in the Saginavirktok River); high point vents project on the Alyeska Pipeline; a GIS ownership layer for the Department of Transportation; ownership plats for a new railroad bridge across the Tanana River; Denali Gas Pipeline; above ground inspection of the Alyeska oil pipeline; a sewer line at Carlsbad Caverns in New Mexico; many stakeouts for construction of apartment buildings, curb, and gutter; and a bike path in Chitina, Alaska. The best thing about this job is the variety!

Q. What is one thing that young people may not know about a career in surveying?

A. The variety of jobs available. With all of the new technology, the field work has changed a lot. Most of the equipment is digital, computers and wireless communication are standard field gear. Measurements are easier in some ways, but a lot of new complications have come with the new technology. There are jobs both in the office and in the field. Get into an apprenticeship class or go to a community college or university if you want to move up.

There are opportunities in surveying in the office if you are interested in learning computer-aided design (CAD). Fieldwork isn't the only option. But, if you enjoy working in the outdoors, knowing CAD, can make that a real fight. There is a strong inclination to put you, as a woman, in the office if you have GIS or computer drafting skills or are willing to learn them.

Q. What advice would you give to young women who are interested in the field?

- A.** Be prepared to be outside in a lot of weather conditions. Have good weather gear. Be prepared to be the only woman on the construction project. You are likely to make the others uncomfortable until they get to know you. They are afraid of harassment charges and in general, frequently just aren't used to having a woman on the job site. Be professional. Keep work at work and your personal life at home. Try not to create drama.

Q. Have you faced any special challenges as a female working in such male-dominated fields? If so, how did you deal with these challenges?

- A.** I have often been the only woman on the project or even in the company. You have to constantly prove yourself. A man with the same credentials/experience will be assumed to know what he is doing. The best you can hope for is that your co-workers and management have an open mind and you just have to prove yourself. Often there are assumptions that are so deep rooted in their belief system that they don't even know they have them. Every mistake or hesitation will be noticed and magnified. Press through—just keep going.

Have a sense of humor. Don't fight the battles that aren't important. Have a few good jokes and be ready to laugh. It's a lot of fun. Try to find some other woman surveyors you can vent to and get advice from. However, be prepared to stand up for yourself if you have to.

TOP EXECUTIVES

OVERVIEW

Top executives direct overall operations for corporations, businesses, colleges and universities, K-12 school districts, and governmental or nonprofit groups. They plan and implement business strategies, manage staff, and create and oversee budgets. Depending on the nature and structure of a company, top executives have a variety of titles, such as president, vice president, chief executive officer, chief operating officer, or general manager. Large corporations employ several top executives who are responsible for various departments within the company, each handling a specific role or duty. Some top managers also own the businesses they manage. A minimum of a bachelor's degree is needed to enter the field; many top executives have master's degrees in business administration. There are approximately one million chief executives employed in the United States. About 25 percent are women. Women make up 25 percent of the 884,000 general and operations managers employed in the United States. Little or no employment change is expected for top executives.

FAST FACTS

High School Subjects

Business
Computer science
Economics

Personal Skills

Complex problem solving
Critical thinking
Judgment and decision making
Management of financial resources
Management of personnel resources

Minimum Education Level

Bachelor's degree

Salary Range

\$47,280 to \$83,096 to
\$1 million+

Employment Outlook

Little or no change

O*NET-SOC

11-1011.00, 11-1021.00

GOE

09.01.01, 10.01.01, 13.01.01

DOT

189

NOC

0013, 0014, 0015, 0016, 0611

THE JOB

All businesses, large or small, rely on good management to stay organized, profitable, and able to meet the demands of the future. Top executives, standing at the highest rung of the corporate ladder, are responsible for making sure these goals are met. Some top managers also own the businesses they manage.

Top executives hold many different titles depending on the size and structure of the company. They may be called general manager, chief executive officer, chief operating officer, or president. Regardless of the title, top executives

utives are responsible for creating and implementing a business strategy tailored to the company's or organization's purpose, mission, and goals. They are charged with managing the overall operations of the company, including creating and overseeing a budget, managing staff, securing new clients, overseeing the delivery of products and services, monitoring investments, and promoting economic development.

Top executives are responsible for their company's delivery of a program, product, or particular service. They study the design, marketing promotion, and delivery methods for these products. They are also involved in human resource management and make sure all personnel policies and procedures conform fully to the laws and regulations of their state or country.

A top executive for an international corporation, for example, may rely on her skilled managerial staff or fellow executives for assistance in the overall operation of the company. She may study weekly sales reports to gauge profit margins, monitor resources, and ascertain the status of various programs. Top executives may need to woo prospective clients, or work with vendors and distributors to negotiate the best prices for raw materials. They also keep close watch on the progress of their business competitors.

Top executives answer to the board of directors, a group of highly qualified individuals who support and promote the company's goals, activities, and philosophy. If a seat opens, top executives may suggest a replacement member or help in the search for a new member. Top executives also must pacify and impress shareholders and other investors. They often present sales figures, accounts, and profits at annual corporate meetings. At times, top executives conduct community and public-relations work to help their company maintain a positive public image.

Those working in the nonprofit sector have the additional responsibility of fund-raising. Here, top executives oversee fund-raising planning and make sure these campaigns are implemented. They may be in charge of identifying resource requirements and finding new sources of revenue, as well as submitting all administration records and documentation relating to fund-raising efforts to the board. Those holding positions at universities may have concerns such as promoting alumni support, moving their institution up in national school rankings, and student enrollment. They may also be tasked with finding additional funding or corporate endowments for academic improvements or building projects.

Top executives have an office at company headquarters, but they also travel regularly to different branches or satellite offices abroad. *Executive assistants* help executives with many administrative duties including arranging travel plans, meetings, daily scheduling, and paperwork, as well as handling phone calls, emails, and other correspondence.

"I may be at my desk all day
one day and in the field on
a job all day the next."
—Kitty Hoyle, Business
Executive and Owner

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As the head of their company and corporation, top executives many times have the final say on important policy changes or financial decisions. They also have the authority to greenlight or shelve new products or services. While their lofty status allows them to take credit for company success and profits, they are also accountable for any failures or perceived shortcomings in company performance.



Successful top executives are strong leaders, good problem-solvers, decisive, intelligent, creative, lifelong learners, and strong communicators.
(Photo courtesy of Photos.com)

Some companies and corporations rely on more than one top executive to set the overall direction of the business. *General managers* are responsible for purchasing, hiring and training staff, quality control of all products and services, and day-to-day supervisory duties of personnel.

Chief financial officers direct a company's financial goals and objectives, as well as monitor budgets. They ensure the accuracy of financial documents and prepare reports that detail the financial activities and general fiscal health of the company.

Chief information officers (CIOs), a growing managerial force in many corporations, are in charge of the technological direction of their organization. This includes staff training and budgeting for new equipment and programs. It's important for CIOs to be knowledgeable of the total company-departmental functions, administrative procedures, and policies, as well as the vision for the future direction of the business. With this knowledge, CIOs are able to properly hire and train computer specialists, information technology workers, and extra support personnel needed to meet these objectives. CIOs may also supervise the work of all technology staff.

Top executives normally enjoy spacious and luxurious offices. A normal work week consists of more than 40 hours, with work conducted late into the evenings or even on weekends.

Top executives spend a great deal of time traveling from headquarters to offices located in another city or country. They meet with the managerial staff of these offices to make sure the company's goals and strategies are being met. Top executives also travel to meet or entertain potential clients and attend conventions, association conferences, and board meetings.

Dollars for College

Executive Women International (EWI) offers the EWI Scholarship Program "an annual, competition-based program that awards more than \$200,000 in college scholarship money to qualifying high school juniors each year." Winners are selected based on their scholastic achievement, good citizenship and extra-curricular activities, and leadership qualities. Awards range between \$1,000 and \$5,000. Visit www.ewiconnect.com for more information.

REQUIREMENTS

HIGH SCHOOL

Since most top executives have college degrees, it is a good idea to take a college-preparatory curriculum in high school. Recommended courses include English, speech, business, psychology, mathematics, computer science, and science. Since many corporations operate on a global scale, it is a good idea to take at least one foreign language.

POSTSECONDARY TRAINING

A minimum of a bachelor's degree is needed to enter the field; many top executives have master's degrees in business administration. Others have degrees in the liberal arts or a specialized discipline. For example, a top executive at an engineering firm often has a degree in engineering. An executive at a pharmaceutical company may have a degree in pharmaceutical sciences or pharmacology. Those heading nonprofit organizations often have degrees in nonprofit or association management.

Some industries, such as retail trade or transportation, are more apt to promote from within. In these instances, experienced and hard-working employees without a bachelor's degree may advance to managerial positions.

CERTIFICATION AND LICENSING

Voluntary certification is available from the Institute of Certified Professional Managers. Those who want to earn the certified manager credential must complete a specified amount of training and pass an examination.

OTHER REQUIREMENTS

This job can be extremely stressful. Top executives are under pressure to deliver high profits and meet other goals. Failure to attain these bench-

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marks may cost top executives their jobs. Those interested in being on an executive career track should be prepared to relocate to other cities and countries, as needed. Other important traits for chief executives include leadership ability, decisiveness, the ability to solve problems, excellent communication and organizational skills, intelligence, creativity, flexibility, and a willingness to continue to learn throughout their careers.

EXPLORING

There are two excellent youth business organizations that you can join to gain experience in business. Junior Achievement is “the world’s largest organization dedicated to educating students about workforce readiness, entrepreneurship, and financial literacy through experiential, hands-on programs for young people worldwide.” It offers programs for students in kindergarten through high school. Visit www.ja.org for information on its programs and local chapters. Business Professionals of America is a “national co-curricular career and technical organization for high school, college, and middle school students preparing for careers in business and information technology.” Visit www.bpa.org for more information.

Other ways to learn more about the field include reading books about business management careers, visiting the websites of the professional associations in the For More Information section, talking with chief executives about their careers, and reading about respected executives and companies in business-oriented publications such as *Bloomberg Businessweek*, *The Wall Street Journal*, *Fortune*, and *Forbes*.

EMPLOYERS

There are approximately one million chief executives employed in the United States. About 25 percent are women. Women make up 25 percent of the 884,000 general and operations managers employed in the United States.

GETTING A JOB

The career of top executive is not an entry-level position. It takes many years of hard work and determination to reach the pinnacle of leadership at a company or organization. Most people work in line-level or lower-management positions before working their way up the management ladder.

Many people obtain their first jobs as a result of contacts made through college internships or networking events. Others seek assistance in obtaining job leads from college career services offices, job-search websites, and newspaper want ads. Additionally, professional associations in your field of specialty provide job listings at their websites. See the For More Information section for a list of organizations. Those interested in positions with the federal government should visit the U.S. Office of Personnel Management’s website, www.usajobs.gov. Additionally, the American Management Association offers job listings at <http://management-jobs.amanet.org>.

EARNINGS

The U.S. Department of Labor (USDOL) reports that female chief executives earned median annual salaries of \$83,096 in 2010, while general and operations managers earned \$50,544. Salaries for all chief executives ranged from less than \$75,160 to \$165,080 or more. General and operations managers earned from less \$47,280 to \$142,030 or more. Top executives at Fortune 500 companies often earn millions of dollars a year.

Employers offer a variety of benefits, including the following: medical, dental, and life insurance; paid holidays, vacations, and sick and personal days; 401(k) plans; profit-sharing plans; stock options and other performance bonuses; retirement and pension plans; and educational-assistance programs. Many top executives receive perks such as access to expense allowances, use of executive dining rooms and company-owned aircraft and cars, and company-paid club memberships.

Good Advice

Business owner and executive Kitty Hoyle offers the following advice to aspiring business professionals:

"Go for it! This is a wonderfully exciting field. Where else can you drive by your work for a lifetime and feel proud? Being your own boss allows you the freedom to advance yourself as much as you possibly can, make as much money as you possibly can, and make your own decisions as honorably as you choose."

EMPLOYMENT OUTLOOK

Little employment change is expected for top executives during the next decade. There is strong competition for these positions because they are prestigious and offer some of the highest average salaries among all careers. There will be opportunities, though, because the field is so large and many people leave the profession or transfer to other positions. There are also many opportunities for entrepreneurs who are interested in starting their own businesses.

Employment opportunities for top managers vary by industry. For example, the health care industry is growing and a large field, so there will be more opportunities than in the manufacturing industry, which is experiencing slow growth in many of its sectors. Other industries that are experiencing growth include scientific research and development, software publishing, and computer systems design and related services companies. Opportunities should also be good at advocacy, grantmaking, and civic organizations, although salaries paid to these employers are not as high.

FOR MORE INFORMATION

Visit the Association's website to read profiles of noteworthy members.

American Business Women's Association

11050 Roe Avenue, Suite 200
Overland Park, KS 66211
800-228-0007
www.abwa.org

For information on seminars for women in business, resources on careers and finding a job, and membership for college students, contact

American Management Association

1601 Broadway
New York, NY 10019-7434
877-566-9441
www.amanet.org

Catalyst is a nonprofit membership organization that seeks to expand opportunities for women and business.

Catalyst

120 Wall Street, 5th Floor
New York, NY 10005
212-514-7600
info@catalyst.org
www.catalyst.org

For information on professional support resources and scholarships for high school juniors, contact

Executive Women International

7414 South State Street
Midvale, UT 84047
877-4EWI-NOW
www.ewiconnect.com

NAFE is one of the country's largest associations for women professionals and business owners. Visit its website for profiles of NAFE Women of Excellence, articles for entrepreneurs, information on networking, and member profiles.

National Association for Female Executives (NAFE)

2 Park Avenue
New York, NY 10016
www.nafe.com

Contact the association for resources for female business owners and information on membership for college students.

National Association of Women Business Owners

601 Pennsylvania Avenue, NW, #900
Washington, DC 20004-2601
www.nawbo.org

Contact the association for information on management careers.

National Management Association

2210 Arbor Boulevard
Dayton, OH 45439-1506
nma@nma1.org
<http://nma1.org>

SIFE offers a variety of business-related programs for college students. Visit its website for details.

SIFE

1959 East Kerr Street
Springfield, MO 65803-4775
sifehq@sife.org
www.sife.org

Interview: Kitty Hoyle

Kitty Hoyle is the owner and president of Wellington Hamrick, Inc. and Wellington Hamrick Precast, Inc. (<http://wellingtonhamrick.com>), concrete manufacturing companies in Boiling Springs, North Carolina. She discussed her career with the editors of *Nontraditional Careers for Women & Men*.

Q. Can you tell us a little about yourself and your background?

A. I was an otherwise average high school student with an aptitude for math, and that made it a little challenging in the mid 1970's to easily find a "traditional" career to pursue. My father told me I would make a good engineer, but I had no idea what a woman engineer looked like because I had never heard of a woman engineer. Actually I found the suggestion sort of insulting at the time. As an adult, I understand how perceptive my father was and how the social circumstances shaped my attitudes about women's careers. After three years struggling in fine arts programs in college I came home and went to work for my father. Thank goodness he was still there for me.

Most of my education came from on-the-job experience, reading, industry training, and local community colleges and universities. Having the focused attention of a quality mentor, my father, was a definite advantage.

Q. Can you tell us about Wellington Hamrick?

A. Wellington Hamrick was my father's name and he was a true entrepreneur. He had many business ventures during his life including some inventions resulting in U.S. patents. One of the patents was for a precast concrete septic tank with a special internal separation chamber. This design required manufacture and that is how he started in the precast concrete business. He guided me into the ready mix business soon after I came to work with him. The local ready mix company sold out to a larger multi-plant producer, and he saw an opportunity. A few years later he retired and I took over the business. I ran the precast and ready mix operations out of a single location for years, expanding product lines and then opening a new ready mix plant at a second location. Currently, there are two sister corporations, precast and ready mix. Product lines for precast are stormwater and wastewater structures serving distributors and contractors in a 100-mile radius. Ready mix is primarily a main plant and satellite location serving a generally rural area of central western North Carolina. Our markets cover most types of jobs—from residential, commercial, and industrial to highway and bridges.

Q. Can you detail your primary job duties?

A. Since I started as a laborer I have had most every job here, but doing a job helps you understand what kind of employee you need for the job, and how difficult, boring, or challenging a job really is. I have shoveled gravel, laid pipe, shot grade, operated a backhoe, driven a truck, poured concrete, balanced the checkbook, batched concrete, welded, set up customer accounts, entered invoices, even typed statements before computers, set up mix designs, tested concrete, prepared quotes, drawn blueprints, created business plans, designed logos, negotiated product claim disputes, written job descriptions, hired and fired numerous people, conducted safety meetings, implemented industry software, and more. Although most of my daily activities are managerial in nature at this stage of my career, my job responsibilities still have multiple facets—product quality and service, fiscal soundness, personnel management, and the general direction of the

company as it relates to the available market. All these wind up squarely on my desk. For me managing means I may not be doing it myself, but I know who is and how they are getting it done. I may be at my desk all day one day and in the field on a job all day the next.

Q. What are the pros and cons of being a business owner?

- A.** The very largest weight for me as a business owner is the safety and well-being of the people I serve on a daily basis. They may be employees, customers, or the public, but I have a great burden of responsibility to lots of people. It is my job to keep employees, the environment, and the motor-ing public safe from any action on my part as a result of business operations whether by accident, error, or omission. That is a huge responsibility when you lay your head down at night. Then secondly I have a responsibility as a manufacturer to build a product that will perform as designed. This is the trust customers place with you when they purchase your product. Paying the bills and keeping everyone happy is secondary even though that is what most people think of first.

The good thing about being a business owner is that you often have the opportunity to do what is right (give a diligent employee an opportunity to advance, give the employee with a sick spouse a leave, help a not-for-profit with free product, set up payments for a customer who hit on hard times) without the fear of a push back from some corporate machine. There is a great wealth of personal value to be gained in this that has nothing to do with money.

As a woman business owner, there is no male-dominated management to contend with (although there will be outside male dominance to contend with); you are your own ceiling. Do as much or as little as you please. You will learn where you impose your own limits. I am sure if I had gone to work for another concrete company when I was 23, instead of for my dad, I would still be in a clerical position.

Q. What are the key qualities for business owners?

- A.** This is no place for those who are dull and lethargic. You need to be alert and in tune to the object of the game—taking care of the customer. You should be willing to think of yourself as a servant to the cause, serve the business and the business will serve you. You must be able to set your immediate desires aside, delay them, and defer them to the needs of the business, and you will achieve your dreams quicker than you ever imagined.

Q. Have you faced any special challenges as a female working in a male-dominated field? If so, how did you deal with these challenges?

- A.** The challenges for women have changed over my 30 years in construction. Lots of women have been the “firsts” in many nontraditional roles. This helps, but there are still many men who look doubtfully on any woman in a technical field.

Early in my career, a representative of a large competitor arranged a meeting to discuss an offer to purchase my company. He walked into my office and opened his file folder just enough for me to see my (male) manager's card already inside his folder. He had circumvented me and dealt with my plant manager without my knowledge and clearly he intended to retain the manager, not me. Everyone has to earn respect, but women may experience a greater challenge of overcoming the immediate negative presumption. You just have to be patient and demonstrate your skill.

ADDITIONAL INTERVIEWS WITH WOMEN IN NONTRADITIONAL CAREERS

Interview: Betty Jo Dibble

Betty Jo Dibble is the apprentice coordinator for the Alaska Operating Engineers/Employers Training Trust in Anchorage, Alaska. She discussed her career with the editors of *Nontraditional Careers for Women & Men*.

Q. What made you want to enter this career?

A. When I got out of high school I was working in a bakery, baking and decorating cakes. Being outside is where I wanted to be, and I enrolled in the horticulture program at our community college. I got a job working on the grounds crew in the summer and doing snow removal in the winter. The supervisor was really great to me and indulged my interest in operating and understanding how the equipment worked. I became crew leader and worked there running the summer crews for seven years. I moved out of state and with my experience on mowers, backhoes, and forklifts, I was able to get seasonal work with the state forest service, a local landscape company, and then as the lead groundskeeper for a county park system. When I left there and came to Alaska they were taking applications for the operating engineer apprenticeship. I met all the basic requirements, one of which was six months operating experience. I applied and was accepted so I don't know that I can say I chose this, I think my choices lead me here.

Q. What is the one thing that young people may not know about a career as an operating engineer?

A. I think that young people may not realize what a physical job this really is. It looks fun and exciting, which it is, but it takes a lot of concentration and stamina to do this kind of work. It can be very dangerous and safety is a huge concern out on the job. Most operators have people working around or under their piece of equipment and one moment of not paying attention can cost someone their life. They are not toys and not having proper training on them can change someone's life in a huge way!

Q. Can you tell us what is involved in the apprenticeship program for operating engineers?

A. We have three apprenticeships: Heavy Equipment Operator, Heavy Equipment Mechanic, and Heavy Equipment Service Oiler. You can only apply for one apprenticeship. We require that you be 18 years of age, have a high school diploma/GED with a C average in math, high school transcripts, birth certificate, Social Security card, a valid driver's license, a

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three-year driving record/with no DUIs in the last three years, a state trooper background check, WorkKeys tests at/or above level 4, reading for information, locating information, and applied math. Everyone who turns in a complete application gets an interview; everyone then is scored and ranked. We decide how many we are going to take for the given year by the amount of work coming out to bid, how many apprentices have graduated, and how many firm commitments I have from contractors. We go right down the ranking list for selection.

Those who are selected are required to have completed the written CDL tests and have their permit when they report to 12 weeks of training. The first week of training is safety week. They go through OSHA/Forklift, MSHA (Mine Safety & Health) First-Aid/CPR, and NSTC (North Slope Training Card). During their apprenticeship they also come back and get their 40-hour HAZ-MAT certification. After safety week they go into equipment classes: grader/roller, loader, dozer/scrapper, excavator/backhoe, CDL, intro to cranes, and crusher class. After that it's work for the summer. When they get laid off in the fall they come back for skill upgrade classes.

Q. What advice would you give to young women who are interested in the field?

- A.** I would say that women are very capable of this kind of work. I have worked with some outstanding female operators! Have a thick skin and some mechanical and mathematical skills, and be willing to get dirty, work long hours, and most likely work away from home.

Q. What makes this career appealing for women?

- A.** Being a union operator is one of the few professions that female operators get the same pay as male operators. The benefits and retirement pension are also a way to be independent and successful on your own.

Q. Have you faced any special challenges as a female working in such a male-dominated field? If so, how did you deal with these challenges?

- A.** Yes, there are many challenges in working in this field as a female operator. There are a lot of men out there in the field (I will call them OLD SCHOOL) who feel that us women do not belong in construction. Mostly I would keep my opinions to myself and just do my work. I found that once (OLD SCHOOL) saw that I could do the work, took it seriously, and asked honest questions, they would either leave me alone or actually help me. The younger generation of male construction workers are more female friendly in this field. Foreman have told me they like having us girls around because we are easier on equipment (less damage), and we try really hard to do a good job. Our egos are fairly nonexistent, and our only downfall is sometimes we take the criticism a little too much to heart, mainly because of how much we want to get it right. Yes, I feel that discrimination and sexual harassment still happen every day out on construction sites. I know that both have happened to me out in the field. I know it still happens to me in this position. I pick my battles and stand up for what I believe is right and fair. That is the best advice I can give my female apprentices.

Interview: Cathi Chamberlain

Cathi Chamberlain is a building contractor in St. Petersburg, Florida, who is known as “Cathi-the-Contractor.” (Visit www.cathithecontractor.com to learn about her business.) Cathi discussed her career with the editors of *Nontraditional Careers for Women & Men*.

Q. How long have you worked in the field? What made you want to enter this career?

A. I’ve been remodeling since the late ‘90s when I started buying fixer-uppers with my ex-husband. I fell in love with taking old, run-down properties and making them look like new. He did most of the grunt work, leaving the finish work to me. After our 7th fixer-upper, we got divorced! I continued on with the remodeling and soon found a niche for women to remodel for other women. Finding that women homeowners don’t feel as comfortable trusting men with the detail in remodeling (i.e., women would NEVER use a chrome screw in a brass threshold—men will!), I realized a niche for women remodelers was way overdue.

Q. Can you tell us about your business?

A. In 2007, I started the [first] all-girl construction company, calling it “Tool-Timing Babydolls.” Within a couple of months, I already had five full-time girls on payroll, but soon came to realize that I was limited in growing without a contractor’s license. So, I grew the company while cramming for my contractor’s exams and by the end of the first year of operating, I passed all my tests and became a state certified building contractor—something that even men in the biz for 30 years don’t pass the first few attempts.

We grew so fast I could not keep up. It was an easy company to market and I grew it to 18 female employees within the first 2.5 years and procured a contract with a franchise investor as well as an agreement with a New York television producer for a reality show. Unfortunately, I picked the wrong customer for the “pilot” program and she was out to get a bunch of “free” repairs (over \$100k worth) and made the entire project so difficult that everything fell apart. At that point, and due to the economy failing and regulations eating my profits, I was forced to shut the company down. Which is such a shame as it was such a great outlet for women who love the work but not working for men in this field as they are never allowed to do the “fun” stuff!

Q. What are the pros and cons of your job?

A. Today, I stay consistently busy as a one-woman operation, primarily doing remodeling for women who feel they’ve been taken advantage of by male contractors in the past. As the only woman in the area capitalizing on that niche, I have no competition. Approximately 95 percent of my customers are women. I love my work and take pride in the quality of detail I provide. It’s like going to art class every day. Even when I have to repair plumbing or electrical, the problems are always challenging. While I do everything from replacing drywall, bedding, and finishing to laying tile and wood flooring to crown molding, I now “sub” out the larger parts of my projects to men who own their own specialty companies. The regulations in this industry are so strangulating that it

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is very expensive to hire employees directly. The worker's comp alone is restrictive enough for a small company like mine to succeed. And makes it impossible for those who try to work within the rules to compete with undocumented workers and "handymen," neither of whom work within the rules.

Q. What advice would you give to young women who are interested in the field?

- A.** My advice would be, as with everything, follow their hearts and don't be discouraged because of the walls they will hit. This is, without a doubt, a field in which there are lots of roadblocks, mostly from men. Construction is one of the last bastions in which men feel they still rule. If a woman wants to be successful in this field, she cannot be thin-skinned. Men still ridicule, whistle at, and insult more in this field than what is acceptable in most others. If a woman cannot handle that, she may win on short-term principle, but not in long-term success as getting along with men in this industry is paramount to success. Still, there is a lot more acceptance in this field than there was even when I first entered it, so things are changing and certainly worth pursuing.

Q. Have you faced any special challenges as a female working in such a male-dominated field? If so, how did you deal with these challenges?

- A.** I and most women I've spoken to in this field would say that the biggest challenges are obstacles that some men put up to discourage women so they can "prove" women can't do it. I used to get lots of hate email when I owned Tool-Timing Babydolls. Usually they were written by angry, out-of-work, male construction workers who felt that "women" were taking their jobs. The other thing that most women would find challenging is on a jobsite with guys, the woman normally is made to do all the yucky stuff (i.e., mixing mortar, etc). That was the one thing that my female employees always said upon hiring them: that they would finally get an opportunity to do the real stuff. Remodeling really is a lot of fun!

Interview: Georgia Powell

Georgia Powell is the project manager/estimator at Cardinal Roofing, Inc. in Springfield, Missouri. She discussed her career with the editors of *Nontraditional Careers for Women & Men*.

Q. How long have you worked in the field? What made you want to enter this career?

A. I started in the commercial roofing industry 31 years ago in Dallas, Texas. My brother-in-law and his wife were working on a crew in Dallas and needed help. At the time I did not know that I would make this my career. It was just a job. I started out as a crew member, and I have worked my way up the “ladder.” I am the project manager and estimator at Cardinal Roofing. There are many aspects to my job. I still work in the field, but I also work with architects and job superintendents, read blueprints to bid jobs, and supervise the crews.

Q. What is one thing that young people may not know about a career in roofing?

A. When most people think of a roofer they think of shingles or hot tar. Roofing products have come a long way. Our company installs the single ply roof systems, which are much more cleaner, not as physically challenging, and earth friendly. There are many different opportunities in the roofing industry—whether you want to install the roof system or work more with blueprints, project bidding, or developing new products with roofing manufacturers.

Q. What are the pros and cons of your job?

A. Pros: You meet so many different people. Each roofing project offers something new, whether you are bidding the job or working in the field. Each commercial roof has its own makeup of insulation and roof membrane.

One of the cons of my job is the weather. It is hot in the summertime and cold in the winter. when you work out in the field. You are always in the elements. You may not get a 40-hour week every week of the year.

Q. What advice would you give to young women who are interested in the field?

A. It can be physically hard sometimes but there are so many different aspects to the roofing trade. Whether you want to read the blueprints, help develop the new products, or install the roofing system there is a job out there for you in the roofing trade.

Q. Have you faced any special challenges as a female working in such a male-dominated field?

A. It is not as bad as it was when I first started in 1980, but it is still a very male-dominated trade. I had to prove that I could pull my “weight” in the roofing field. In the new single ply roof systems there is more finesse work for the details and penetrations, which women are more geared to do. We are seeing more women reading blueprints, working with architects, and in developing better roof products to make them earth friendly.

Interview: Margie Miller

Margie Miller worked as a carpenter and roofer for 30 years. For almost 20 of these years, she owned her own roofing and light remodeling business. Currently, she works in sales at Curtis Lumber in Ballston Spa, New York. Margie discussed her career with the editors of *Nontraditional Careers for Women & Men*.

Q. What made you want to pursue careers that are considered nontraditional for women?

A. My interest in construction was sparked by a casual conversation with a young woman who had worked on a commercial construction job. She was very enthusiastic about the money she was able to earn, and it made me think of that kind of work as a real possibility for me to try.

Q. Can you tell us a little about your various jobs in the construction industry?

A. My first job in construction was at a large power plant being built by Brown & Root in Stillwater, Oklahoma. At the time, I was only interested in getting a job; there was no consideration regarding my future career. As my boyfriend and I moved about the country (we were vagabonds back then!), I continued to look for employment opportunities in construction.

In 1979, I got my first roofing job while living in Hitchcock, Texas. The owner of the roofing company later told me that he wasn't going to hire me at first, but changed his mind when I called back to see if I had the job. The first words out of my mouth were, "So, are you going to put me to work?!" There was something about my attitude that got me hired! Prior to that, I was a mason tender for a commercial project in Rockdale, Texas, so I was in very good shape—so I thought! Roofing was by far the most strenuous trade I had ever worked in! It was really hard work, but I came to like it.

Eventually I started my own roofing and light remodeling company, working alone most of the time. I liked the freedom that came with self-employment, but there are definitely pluses and minuses to working alone.

Construction is in my blood, and even though I am no longer wearing a tool belt in my career (I have moved to the retail side of construction) it plays a major role in my job. I loved being in the field, "swinging a hammer" for 30 years, and now I love working with customers as they plan their projects. When I explain to customers or contractors about my experience in construction, it adds a greater level of credibility to my recommendations or product knowledge, which makes them more likely to return to the lumberyard where I work and seek me out for future advice on purchases.

People frequently react with surprise when I inform them of my 30 years of experience in construction. Mostly, I think, they are interested in how I got started in the industry, although sometimes their surprise is based more on my size—especially when they see how much I can lift! When I was still in the field, the homeowners were curious to meet me, and sometimes seemed interested in conversing only with me, not the other guys on the project. This was especially true with the women of the house. A comfort level was quickly built with me, which my

coworkers encouraged. They were more than happy to have me be the channel of communication, especially with the female homeowner. It benefited both sides; the guys preferred to focus on the work and the women were comforted to have another woman around, working on their project, who they could easily talk with.

Q. Have you faced any special challenges as a female working in such male-dominated fields? If so, how did you deal with these challenges?

- A.** There were times when I encountered issues that are unique to women in male-dominated fields, but over time I learned ways to effectively diffuse the situation. Humor is often a good way to deal with harassment, but the best way to prevent it is by being confident in yourself and by proving your capabilities. A strong presence is more difficult for bullies to target, and that is more often the basis of that kind of ill-treatment. It is a power play, a form of intimidation, although sometimes just plain ignorance or immaturity.

Q. What makes these careers good options for women?

- A.** Certainly, the obvious contribution is my “female perspective” on the job. More often than not, the decisions in a residential construction project will be predominately made by the female household member, and there is an increased rapport and level of communication built between us. We naturally bond on topics of family and common interests. Understanding their needs on a more personal level contributes to reassurance that the project will fulfill their expectations.

Q. What advice would you give to young women who are interested in working in construction careers?

- A.** Attitude towards and expectations and acceptance of women in construction are all evolving things that improve with each positive example of what women can accomplish on the job and the value they can add to a company. Although it is still uncommon to encounter a woman in a construction role (the number of women in construction has been consistently low over the decades), people have become much more agreeable to working with women in these positions.

My opinion is that diversity adds to the mix. Sometimes the biggest advantage comes from enlightening each other that, even though we have unique difference, males and females aren't as different as we may have been lead to believe. Humans all have similar needs and aspirations, and often our uniqueness is based more on our perspective or personality than on our gender. Fostering greater respect on both sides of the fence is a wonderful thing!

There is nothing more encouraging than having a living example that it can be done! Over the past decades I have spoken on several occasions to girls and boys from elementary to high school age about my career in construction and the opportunities that exist in the trades. For someone who thrives on physical, outdoor work, there are few options better than construction. The money can be very good, especially for someone who is not academically inclined and is lacking a degree. The level of satisfaction from a completed project is immense. To have a hand in something enduring, useful, and beautiful creates a sense of pride and accomplishment that is rare in many other occupations.

NONTRADITIONAL

CAREERS FOR MEN

DENTAL HYGIENISTS

OVERVIEW

Dental hygienists perform prophylaxis procedures on patients (preventive care that helps a patient avoid gum disease and cavities), take oral x-rays, administer local anesthetics, and remove sutures and dressings. They perform administrative duties such as charting and/or taking oral and medical histories of patients. Dental hygienists also educate patients about the importance of oral preventive care. A minimum of an associate's degree or certificate is required to work as a dental hygienist. Approximately 174,100 dental hygienists are employed in the United States; about 3.4 percent are men. Employment for dental hygienists is expected to grow much faster than the average for all careers during the next decade.

FAST FACTS

High School Subjects

Biology
Health

Personal Skills

Helping
Technical

Minimum Education Level

Associate's degree

Salary Range

\$45,000 to \$68,250 to
\$93,820+

Employment Outlook

Much faster than the average

O*NET-SOC

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THE JOB

Dental hygienists are licensed dental professionals who are responsible for many of the routine duties once performed by dentists—which leaves dentists free to complete more complicated and invasive procedures.

At the beginning of the appointment, the dental hygienist first assesses the patient. He reviews the patient's medical and oral history, takes x-rays, and conducts a clinical exam. Then he examines the condition of the patient's teeth as well as the periodontal area. Dental hygienists report their

findings to the dentist, who then conducts a follow-up exam for a final diagnosis of any dental problems.

If the patient is there for a routine cleaning, the dental hygienist can perform the prophylaxis. This involves the removal of any tartar (hardened mineralized plaque) and stains from the surface of the teeth. Dental hygienists use various hand instruments and power-driven dental instruments to help them during the process. If the patient suffers from periodontal disease, the dental hygienist may administer a local anesthetic before continuing on with scaling (removing plaque and other stains) or root planing (more involved cleaning that focuses on the roots) to help curb the disease. The dental hygienist may also finish the session with an application of fluoride, which prevents tooth decay.

Dental hygienists may also be specially trained to remove sutures or change dressings for patients who have had oral surgery or other invasive procedures. They may also assist the dentist by creating teeth molds in preparation for denture pieces, tooth caps, or implants. They may help the dentist when providing ultrasonic teeth whitening by prepping the gum line with wax or other protective coverings.

Dental hygienists also teach patients about good oral health. They instruct the patient about the proper techniques to use when brushing and flossing their teeth. They may use a model of upper or lower teeth to demonstrate these techniques. If the patient complains of tooth sensitivity, the dental hygienist may recommend a special toothpaste or rinse to help alleviate this problem.

Depending on the size and scope of the dental office, dental hygienists may have additional duties such as charting and keeping track of and ordering necessary medical supplies.

Full-time dental hygienists work about 40 hours a week. Some evening and weekend shifts are required to accommodate patients' schedules. Dental hygienists wear professional attire, often a lab coat. Comfortable shoes are a must, since dental hygienists are on their feet for much of the day, or walking from exam room to exam room. They also wear latex gloves, masks, and other protective equipment when working with patients.

Dental hygienists work in clean, comfortable, well-lit offices. They often sit on stools when performing procedures in order to better reach the patient. Dental hygienists are at high risk of developing carpal tunnel syndrome—nerve damage to the hand caused by the use of small tools in repetitive movements. Dental hygienists often use special braces and perform stretching exercises to reduce the risk of developing carpal tunnel syndrome.

At times, dental hygienists' work schedules can be quite hectic, especially when handling a heavy patient load. They can also fall behind sched-

"A career in dental hygiene is very rewarding. Every day you have returning patients whom you have treated and you can visually see the successes you have made with these patients."

—Peter Gangi, Dental Hygienist

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ule due to a difficult case or a patient who is especially nervous or jittery. They also may work at more than one office—sometimes even in the course of a single workday. If the dental hygienist is employed at more than one facility, he or she needs a reliable means of transportation in order to travel from one office to another.

REQUIREMENTS

HIGH SCHOOL

Take courses in biology, chemistry, psychology, math, and health. Speech classes will help you develop your communication skills, which you will use often when interacting with patients, dentists, dental assistants, and other hygienists.

POSTSECONDARY TRAINING

A minimum of an associate's degree or certificate is required to work as a dental hygienist. More than 310 dental hygiene programs are accredited by the Commission on Dental Accreditation. Visit www.ada.org/267.aspx for a list of accredited programs. Most programs award an associate's degree, but some offer certificates, bachelor's degrees, and master's degrees. According to the American Dental Hygienists' Association (ADHA), a typical associate's degree program offers courses in the basic sciences (anatomy, physiology, pathology, general chemistry, biochemistry, microbiology, pathology, nutrition, and pharmacology), the liberal arts (English, speech, sociology, and psychology), dental science courses (dental anatomy, head and neck anatomy, oral pathology, radiography, oral embryology and histology, periodontology, and pain control and dental materials), and dental hygiene science courses (patient management, clinical dental hygiene, oral health education/preventive counseling, community dental health, and medical and dental emergencies). Students also participate in preclinical and clinical experiences in which they work directly with patients under the close supervision of dental educators. The average associate's degree program requires 86 credit hours, according to the ADHA. Dental hygienists who plan to work in research, clinical practice, or teaching typically have at least a bachelor's degree.

CERTIFICATION AND LICENSING

All states require dental hygienists to be licensed. According to the U.S. Department of Labor, “nearly all states require candidates to graduate from an accredited dental hygiene school and pass both a written and clinical examination. The American Dental Association's Joint Commission on National Dental Examinations administers the written examination, which is accepted by all states and the District of Columbia. State or regional testing agencies administer the clinical examination. In addition, most states require an examination on the legal aspects of dental hygiene practice.”

OTHER REQUIREMENTS

To be a successful dental hygienist, you should have excellent communication and interpersonal skills, since you will spend the majority of your workday interacting with patients, dentists, and dental assistants. You

should have good manual dexterity in order to skillfully use dental instruments to conduct prophylaxis procedures. Other important traits include attention to detail, punctuality, cleanliness, and patience and compassion to deal with patients who may be fearful of undergoing dental procedures.

EXPLORING

There are many ways to learn more about a career as a dental hygienist and dentistry as a whole. You can read books and magazines about the field, visit the websites of college dental hygiene programs to learn about typical classes and possible career paths, and ask your health teacher or school counselor to arrange an information interview with a dental hygienist. Professional associations can also provide information about the field. Both the American Dental Association (www.ada.org) and the American Dental Hygienists' Association (www.adha.org/careerinfo) provide a wealth of information about dental hygiene education and careers at their websites. You should also try to land a part-time job in a dental office. This will give you a chance to interact with dental hygienists and see if the career is a good fit for your interests and abilities.

"My experience as a dental hygienist has allowed me to work directly with patients in a variety of settings, enjoying a flexible work schedule, good income, and advancing professional growth opportunities."

—Michael Long, Dental Hygienist

EMPLOYERS

Approximately 174,100 dental hygienists are employed in the United States; about 3.4 percent are men. Nearly all dental hygienists work in dental offices. Others work for employment services and in physicians' offices, hospitals, nursing homes, prisons, schools, and public health clinics. Some dental hygienists work for companies that sell dental-related equipment and supplies. Opportunities are also available in the U.S. military. About 50 percent of dental hygienists work part-time.

GETTING A JOB

Many dental hygienists obtain their first jobs as a result of contacts made through college internships or networking events. Others seek assistance in obtaining job leads from college career services offices, newspaper want ads, employment websites, and dental auxiliary placement services (which charge a fee for their services). Additionally, professional dental associations, such as the American Dental Association, provide job listings at their web sites. See For More Information for a list of organizations. The American Dental Hygienists' Association offers tips on career planning and résumé writing at its website, www.adha.org/careerinfo/dhcareers.htm.

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Those interested in positions with the federal government should visit the U.S. Office of Personnel Management's website, www.usajobs.gov.

EARNINGS

Salaries for dental hygienists vary by type of employer, geographic region, and the worker's experience level and skills. Median annual salaries for dental hygienists were \$68,250 in May 2010, according to the U.S. Department of Labor (USDOL). Salaries ranged from less than \$45,000 to \$93,820 or more. The USDOL reports the following mean annual earnings for dental hygienists by industry: offices of dentists, \$68,980; outpatient care centers, \$68,390; employment services, \$65,690; offices of physicians, \$63,190; and general medical and surgical hospitals, \$56,950.

Approximately 50 percent of dental hygienists received fringe benefits in 2009, according to a survey by the American Dental Hygienists' Association. Sick leave, paid vacation, and retirement plans were the most commonly cited benefits.

EMPLOYMENT OUTLOOK

Employment for dental hygienists is expected to grow much faster than the average for all careers during the next decade, according to the U.S. Department of Labor. It is one of the fastest-growing careers in the United States, with growth of 36 percent expected from 2008 to 2018. Demand will increase for dental hygienists as a result of the growth of the U.S. population, the increasing focus on preventive dental care, and a growing reliance on hygienists to perform duties that were previously handled by dentists. Competition for jobs will vary by geographic region. In some areas, there is an overabundance of hygienists, which will make finding a job more difficult.

FOR MORE INFORMATION

For information on education and careers, contact

American Dental Association

211 East Chicago Avenue
Chicago, IL 60611-2678
312-440-2500
publicinfo@ada.org
www.ada.org

For information on education, contact

**American Dental
Education Association**

1400 K Street, NW, Suite 1100
Washington, DC 20005-2415
202-289-7201
adea@adea.org
www.adea.org

For comprehensive information about a career as a dental hygienist, contact

**American Dental
Hygienists' Association**

444 North Michigan Avenue,
Suite 3400
Chicago, IL 60611-3980
mail@adha.net
www.adha.org

Interview: Peter Gangi

Peter Gangi is a dental hygienist at P.M.Gangi D.M.D. Inc. in Methuen, Massachusetts. He has worked in the field for 23 years. Peter discussed his career with the editors of *Nontraditional Careers for Women & Men*.

Q. What made you want to become a dental hygienist?

A. A simple conversation with my father was what made me want to enter the field. I was an education major in college and worrying about how I was going to make a decent living being a teacher. My father, who was a dentist, told me to take up dental hygiene as well to supplement my teaching career. He said that with all the vacations and time off I had as a teacher I could schedule patients around my schedule. I thought it was a great idea. But the more I did hygiene the more I loved it. So when I graduated from college I decided dental hygiene would be my full-time job. Ironically, for the last 10 years, I have been teaching dental hygiene as an adjunct clinical faculty instructor at Middlesex Community College in Lowell, Massachusetts.

Q. What is one thing that young people may not know about a career as a dental hygienist?

A. A career in dental hygiene is very rewarding. Every day you have returning patients whom you have treated and you can visually see the successes you have made with these patients.

Q. What are the pros and cons of your job?

A. One of the pros of my job is that you can build relationships with patients and families. I have been working for 23 years, and I am seeing 3rd and 4th generations of families. I have children of former children coming into my office seeking my treatment. One of the cons of the job is that some individuals may find doing the same thing over and over to be tedious, which can lead to professional apathy. This profession is one in which you need to continue to improve your craft and continue to learn new techniques.

Q. What are the most important personal and professional qualities for dental hygienists?

A. You must be very personable. You will need to be a people person because you need to converse with people all day. Some days you encounter confrontational patients and need to handle them with kid gloves. You also encounter dental-phobic type patients and need to be sympathetic towards their fears. All in all you must have a positive attitude towards your patients regardless of their personalities or your personal issues on that day.

Q. What advice would you give to young men who are interested in the field?

A. It is an excellent field for men. Many women in the field work part time because the pay is good. There are opportunities for men who would want to work full time. You must be personable. I would suggest to all people entering the field that you must look at obtaining a higher degree, to allow your job opportunities to be greater.

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Q. What is the future employment outlook for dental hygienists? How is the field changing?

- A.** The employment opportunities are becoming slimmer these days for typical work as a dental hygienist in a dental office. The job market is saturated with new hygienists graduating from hygiene schools. There are opportunities in teaching dental hygiene but you would need a bachelor's degree or higher. Also a new degree/position at the master's level of education has been created called the advanced dental hygiene practitioner. This position has been created to try and help the "access to care" problem in this country. The duties for this position will incorporate some dental restorative treatments.

Interview: Michael Long

Michael Long is a registered dental hygienist practicing in San Francisco, California. He discussed his career and the field of dental hygiene with the editors of *Nontraditional Careers for Women & Men*.

Q. What is one thing that young people may not know about a career as a dental hygienist?

- A.** The registered dental hygienist is a licensed healthcare professional who may work as a clinician, in research, as an educator or sales representative. My experience as a dental hygienist has allowed me to work directly with patients in a variety of settings, enjoying a flexible work schedule, good income, and advancing professional growth opportunities.

Since becoming licensed in 2006 I've been the president of the San Francisco Dental Hygiene Society from 2008-2011, which has enabled me access to influential contacts in public health outreach. I've collaborated with local dental schools, the San Francisco Department of Public Health, San Francisco Unified School District, San Francisco Dental Society, and many other organizations.

Currently, I'm an active part of the California Dental Hygienists' Association's public health council and the American Dental Hygienists' Association's diversity committee. Both bring amazing career opportunities and advancement beyond clinical dentistry.

Registered dental hygienists in the state of California are required to complete 25 units of continuing education every two years as part of their licensure renewal requirements. These continuing education programs are offered online, locally, and also give you the opportunity to travel both nationally and internationally. I've traveled to Chicago, Seattle, Las Vegas, Nashville, and Glasgow, Scotland. In the near future I will travel to Phoenix, Boston, Los Angeles, and Cape Town, South Africa. These are just my personal travels as a dental hygienist, but many more opportunities exist.

Q. What are the pros and cons of your job?

- A.** Mostly the general public still doesn't recognize dental hygienists as an important part of the healthcare profession. Their lack of understanding of our responsibilities, education, and influence as oral health leaders is

an area we continue to build on. As far as being a male in this profession, many conclude this is a stepping stone to becoming a dentist.

Q. What is it like being a male dental hygienist in a female-dominated field? Any special challenges?

- A.** Men in this profession make up only 1 percent of dental hygienists nationally. Ethnicity, religion, gender, sexual orientation, and more are continually being discussed as we realize the growing needs of our community and the disparities within our profession. Increasing diversity within our profession is a priority. As a male in this female-dominated field I have always been well received by my peers and have been asked to encourage more men to become active and visible in our profession.

Q. What advice would you give to young men who are interested in the field?

- A.** Before entering a path to any career I would recommend talking to local dental hygienists. There are many resources at the American Dental Hygienists' Association's website that will lead you to state and local components. Go for it!

Q. What is the future employment outlook for dental hygienists? How is the field changing?

- A.** As our population continues to grow the demand for access to preventive health care services will increase and the career opportunities for dental hygienists will expand throughout the nation.

Collaboration with other healthcare providers is essential for the growth of our profession and the increased health of our nation. For example, early childhood cavities are the most common infectious disease in children. The bacteria that causes cavities are transmissible, generally acquired from children's primary caregivers. Above all, cavities are preventable. Another example is the direct association between patients with diabetes and periodontal (gum) disease or prescription medications, which causes a reduction of salivary flow contributing to a high risk of cavities.

There is a huge need in healthcare prevention for registered dental hygienists, and doors are open all over the world. In addition I truly believe this is a career where you get out of it what you put into it. The possibilities are endless and the needs are great.

ELEMENTARY- AND MIDDLE- SCHOOL TEACHERS

OVERVIEW

Elementary- and middle-school teachers instruct young and adolescent children on subjects such as reading, writing, math, spelling, history, and science. These teachers are critically important to young children's development. The way children view themselves and the world is shaped by what they learn and experience during their early years. This image has a strong influence during their later years, whether in high school, in college, at work, or even in their personal lives. Teachers prepare for the field by earning at least a bachelor's degree from a teacher education program. There are nearly 2.4 million elementary- and middle-school teachers employed in the United States; 18.2 percent are men. Employment is expected to grow faster than the average for all careers during the next decade.

FAST FACTS

High School Subjects

English

Speech

Personal Skills

Communication

Helping

Leadership

Minimum Education Level

Bachelor's degree

Salary Range

\$34,390 to \$50,000 to

\$80,940+

Employment Outlook

Faster than the average

O*NET-SOC

25-2021.00, 25-2022.00

GOE

12.03.03

DOT

092

NOC

4142

THE JOB

Think about a favorite teacher from your past. What set him or her apart? Was it his or her passion for the subject? Did he or she inspire you to love mathematics or science? Did the teacher use creative means to teach lessons? Or did he or she just make you laugh and help you through some of your early challenges? Chances are it was a combination of all these factors that made this teacher stand out.

Elementary- and middle-school teachers are responsible for laying the educational foundation for young children and adolescents. Early-childhood education in basic skills such as reading, writing, and counting sets children up for success in later classes in literature, composition, and algebra. It is the job of these early educators to make their lessons interesting and engaging to emphasize at an early stage the importance and even the enjoyment that can be found in education.

What these teachers instruct varies greatly depending on the age of the student.

Elementary-school teachers teach all subjects, working with children roughly ages six to 10. They use textbooks, chalkboards, activity workbooks, computers, and other tools to teach early skills such as basic math, spelling, and writing. They also introduce history and cover other science subjects besides what can be found in nature. It is during this time that children learn math skills such as adding and subtracting numbers, memorizing multiplication tables, and doing basic division.

Middle-school teachers typically focus on one subject and work with students roughly ages 10 to 14. They use textbooks, workbooks, chalk or whiteboards, videos, computer programs, and more in their lessons. These teachers begin approaching more advanced levels of math, such as long division, and introduce vari-



An elementary-school teacher helps a student with a homework assignment.

(Photo courtesy of Photos.com)

ables to lay the foundations for algebra and even precalculus. Students will start to write short papers on reading assignments to develop writing skills as well as be tested regarding their reading comprehension and analysis skills. In general, middle-school teachers assign a larger quantity, as well as more complex, homework as children advance in grade level to prepare them for high school and beyond.

Regardless of the age of their students, much of teachers' time is spent outside the classroom, preparing lessons, creating assignments and tests, and grading homework and tests. They also meet with pupils before and after class and make time to meet with parents or other education professionals to discuss students' progress.

Teachers sometimes attend workshops to learn about new methods or technologies or teaching strategies that they can apply in their own classrooms. Many are also involved in other school-based activities, such as participating in field trips, coaching a sports team, supervising a club, or leading the school band.

Teachers work with students of many different cultures. Some students may speak English only as a second language. Teachers learn about different ethnic backgrounds so that they can be more helpful to these students. Those who are bilingual—especially speaking Spanish as a second language—will be more marketable.

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Most teachers enjoy seeing children learn and develop. However, sometimes teaching a whole class of young children or adolescents—some of whom may misbehave, act out, struggle, or have emotional outbursts—can be stressful.

Summer vacation is a definite perk to the job. Teachers may travel, enjoy free time, or pursue professional development during their vacations. Some teachers may work, whether choosing to teach summer school or working for a school that has a year-round schedule. These schools break up vacations more evenly throughout the school year.

Some states offer tenure to public-school teachers who have put in their time and proved their excellence with the district. These teachers cannot be fired without just cause and due process. Tenure does not guarantee a job, but it does provide some security with a school district.

REQUIREMENTS

HIGH SCHOOL

Take a college-preparatory curriculum in high school that includes classes in mathematics, science, English, speech, government, social studies, computer science, and psychology.

POSTSECONDARY TRAINING

Teachers prepare for the field by earning at least a bachelor's degree from a teacher education program. They may earn a degree in education, childhood education, or a particular major, such as biology or mathematics. The National Council for Accreditation of Teacher Education (www.ncate.org) and the Teacher Education Accreditation Council (www.teac.org) accredit teacher education programs.

CERTIFICATION AND LICENSING

Voluntary national certification is offered by the National Board for Professional Teaching Standards (www.nbpts.org). Obtaining certification is highly recommended. It is an excellent way to stand out from other job applicants and demonstrate your abilities to prospective employers. Certified teachers also typically earn higher salaries and are reimbursed for continuing education and certification fees.

All public-school teachers must be licensed by the state in which they plan to teach. Licensing requirements typically include attending an approved teacher education program and having a bachelor's degree. Some states require teachers to obtain a master's degree within a specified amount of time after they begin teaching. Contact your state department of education for more information on licensing requirements.

Many states are now offering alternative routes to licensing for people who do not have a degree in education but want to become teachers.

OTHER REQUIREMENTS

To be a successful teacher, you need to have a strong desire to help young people learn. You should have patience, enthusiasm, good organizational

skills, and the ability to motivate and inspire young people to learn. Other key traits include strong communication skills, leadership ability, dependability, creativity, and a willingness to work outside of traditional school hours to prepare lesson plans, grade papers and tests, and otherwise prepare for the next school day.

Most teachers belong to unions—mainly the American Federation of Teachers and the National Education Association. Unions represent the professional interests of teachers, negotiating with school districts regarding work hours, salaries, and other employment issues.

EXPLORING

There are many ways to learn more about a career as a teacher. You can talk to teachers at your school about their careers, read books and magazines about the field, and visit the websites of college teacher preparation programs to learn about typical classes. Professional associations can also provide information about the field. The American Federation of Teachers provides a useful publication called *Becoming a Teacher* at its website, www.aft.org/pdfs/tools4teachers/becomingateacher0608.pdf. You should also work as a teacher at a summer camp, community center, or other organization that offers classes.

EMPLOYERS

There are 2.4 million elementary- and middle-school teachers employed in the United States; 18.2 percent are men. Opportunities are available throughout the United States at public and private schools.

GETTING A JOB

Many teachers obtain their first jobs as a result of contacts made through student teaching positions, career fairs, or networking events. Others seek assistance in obtaining job leads from college career services offices, newspaper want ads, and employment websites. Job-search sites and teacher placement services include Project Connect (<http://careers.education.wisc.edu/projectconnect/MainMenu.cfm>), USteach (www.usteach.com), and TopSchoolJobs (www.topschooljobs.org).

EARNINGS

Salaries for teachers vary by type of employer, geographic region, and the individual's experience, education, and skill level. Elementary-school teachers earned median annual salaries of \$51,660, according to the U.S. Department of Labor. Ten percent earned less than \$34,390, and 10 percent earned \$80,140 or more. Middle-school teachers earned salaries that ranged from less than \$34,990 to \$80,940, with a median salary of \$51,960. Some teachers earn extra pay for coaching sports, supervising clubs and other extracurricular activities, or by receiving advanced degrees and/or certification.

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Employers offer a variety of benefits, including the following: medical, dental, and life insurance; paid holidays, vacations, and sick and personal days; 401(k) plans; profit-sharing plans; retirement and pension plans; educational assistance programs; and free subsidized housing (some private school teachers).

EMPLOYMENT OUTLOOK

Employment for elementary- and middle-school teachers is expected to grow faster than the average for all careers during the next decade, according to the U.S. Department of Labor. Approximately 372,400 new positions are predicted to be available by 2018 as a result of a large number of expected retirements, as well as the fact that some teachers leave the profession after a few years due to job burnout or other factors. Middle-school teachers with expertise in areas where there is a shortage of qualified educators—such as mathematics, science, special education, and bilingual education—will have the best job prospects. There is currently an oversupply of teachers in health education, physical education, and social studies.

Strong opportunities will be available for all teachers who are willing to work in less-desirable urban or rural school districts. Teachers who are bilingual, certified, and willing to relocate for positions will have the best job prospects.

Opportunities will be strongest in geographic regions that are experiencing fast population growth. The largest enrollment growth is expected in states in the South and West. Enrollment is expected to remain about the same in the Midwest and to decline in the Northeast.

FOR MORE INFORMATION

Contact the following organizations for information about education, careers, and union membership.

American Federation of Teachers

555 New Jersey Avenue, NW
Washington, DC 20001-2029
202-879-4400
www.aft.org

National Education Association

1201 16th Street, NW
Washington, DC 20036-3290
202-833-4000
www.nea.org

For information for men who are interested in becoming teachers, visit

MenTeach

www.menteach.org

HEALTH INFORMATION MANAGEMENT SPECIALISTS

OVERVIEW

Health information management specialists, also known as health information management technicians, capture, analyze, and protect patients' medical information. This information is stored in paper or electronic format. Information they coordinate includes patients' medical history, diagnoses, laboratory tests, x-ray and other diagnostic procedure reports, and treatment plans. An associate's degree is typically required to enter the field. Approximately 277,700 medical records and health information management technicians are employed in the United States; 11.3 percent are men. Employment opportunities are expected to be very good during the next decade.

FAST FACTS

High School Subjects

Computer science
Health
English

Personal Skills

Critical thinking
Organizational
Technical

Minimum Education Level

Associate's degree

Salary Range

\$21,240 to \$32,350 to
\$53,430+

Employment Outlook

About as fast as the average
(medical transcriptionists)
Much faster than the average
(all other health information
management specialists)

O*NET-SOC

29-2071.00, 31-9094.00

GOE

09.07.02

DOT

079

NOC

1244, 1413

THE JOB

Every time a patient goes to the emergency room, is admitted to the hospital, visits a primary-care physician for an annual physical, or undergoes laboratory tests, a record is made of that visit or procedure, as well as every referral or second-opinion consultation. The notes taken during an actual examination or procedure are considered the "primary patient record." It includes patient data, which physicians use to get a better idea of a patient's medical condition. Primary patient records also include any documentation, observations, or instructions made by the physician. A "secondary patient record" is created from information taken from the primary record and includes data pertinent to nonclinical people such as administration, regulation, and billing/payment history. The collection of information documenting a patient's health care services is considered the

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“patient health record.” It includes all clinical or office records, all care, tests, and procedures done in health care or home care settings, as well as patient evaluations, and any participation in research or clinical databases. It’s important that all medical records are organized and can be accessed by physicians, nurses, and other health care workers. A complete record gives a clear picture of a patient’s medical condition as well as saves time and money by preventing duplication of laboratory tests and other procedures. It also allows medical billing workers to send appropriate bills to the patient or to request reimbursement from insurance companies.

Great efforts have been made to organize and streamline the methods used by hospitals, clinics, and physicians’ offices to gather and store patient records. At the center of this system are health information management specialists, who are key to the day-to-day operations of medical records departments.

At the start of every workday, health information management (HIM) specialists receive a request list from different physicians or departments of, say, a hospital or clinic. This list names every patient who will be seen that day—whether for an examination or follow-up, or perhaps for a blood test or x-ray. Other physicians may submit a list of patients needed for charting purposes or further research. Using this list, HIM specialists “pull” or electronically retrieve patients’ records and deliver them to the appropriate physician or department.

Throughout the day, the medical records department will receive additional patient information from various sources, including off-site laboratories, hospitals, and physician’s offices. This information could contain test results, physician consults, or a variety of other medical information. HIM specialists are responsible for coding any new diagnoses and incorporating new information into the patient’s existing medical records.

As recently as 10 years ago, most medical records were in paper form, and a great deal of time was spent filing these papers into a patient’s medical chart. Unfortunately medical records were sometimes misfiled due to human error. Today, most hospitals and clinics, and the majority of physician’s offices, keep their medical records in an electronic format. Not only do electronic medical records reduce the chance for human error, they make it easier to quickly enter and obtain information. HIM specialists often attend training sessions to keep abreast of any new computer software applications or techniques to manage electronic medical records.

Some technicians are specially trained to work with medical coding. *Medical coders*, also known as *coding specialists*, transform medical diagnoses and procedures into a universally accepted set of numeral codes known as ICD-9-CM, which helps providers and insurance companies in their diagnosis and treatment of a disease, reimbursement, and surveillance of potential disease outbreaks. (The United States is scheduled to transition to a new coding system called ICD-10-CM on October 1, 2013.) This coded information is used by insurance companies or programs such as Medicare in the processing of claims.

Other technicians are specially trained to keep track of patients as they manage their illnesses. *Cancer registrars*, also known as *tumor registrars*, are needed to track information regarding patients and their fight against cancer. This information is used by researchers, health care professionals, and public policymakers to identify cancer groups, track treatment success, create cancer education programs, and support funding for additional treatment centers. Cancer registrars begin their work by creating a case file for every newly diagnosed patient in their assigned workplace, usually a hospital or cancer clinic. Information compiled includes the diagnosis of a cancerous or benign tumor, pathology reports, and medical reports. This first step will determine the patient's eligibility for the cancer registry. Next, cancer registrars abstract the case, or summarize the patient's medical records into standard coding used by the medical and research community. Specific coding is assigned to different data such as the patient's demographic, the type of cancer and its location, the stage of disease, and prescribed treatment details. Cancer registrars need to locate information and results from different locations, as patients are often sent to various physicians, clinics, and hospitals for various tests and procedures. Cancer registrars also conduct a yearly follow-up with each case, detailing any hospital admissions or changes in treatment as well as surveys from all attending physicians. Also important is the written follow-up with patients on how they have fared in the past year. All registry data is submitted to state cancer registries to identify high-risk groups, implement screening procedures, and give an estimated prognosis for many types of cancer.

Other HIM specialists work as *medical transcriptionists*. This is the process of taking handwritten notes or recorded evaluations and transforming them into an electronic format. Some hospitals and health care settings often outsource this duty, while others may keep it in-house. Transcription could mean simply keyboarding the physicians' notes, or finding and including the appropriate diagnosis or procedural code.

Health information administrators supervise health information management workers. They develop and implement policies that assure the appropriate storage and dissemination of health information.

Health information management specialists have other duties, including speaking with physicians or representatives from insurance companies, creating monthly work schedules, and ordering office supplies.

Full-time health information management specialists work about 40 hours a week, with opportunity for overtime. Those employed at hospitals or other health care facilities that offer round-the-clock care will have shift work.

HIM specialists work indoors in comfortable offices with cutting-edge computer technology. There may be separate areas for specific tasks such as file retrieval, transcription, coding, or quality review. Much of the work is detail oriented and done using a computer.

While they work in health care, HIM specialists (except cancer registrars) do not have any patient contact. However, they do interact with people from many different professions in order to clarify diagnoses or to obtain additional data.

REQUIREMENTS

HIGH SCHOOL

In high school, take courses in anatomy and physiology, biology, chemistry, mathematics (especially algebra), health, and computer science to prepare for the field.

POSTSECONDARY TRAINING

An associate's degree is typically required to enter the field, though some move into this field with work experience and on-the-job training. Health information administrators need at least a bachelor's degree.

The Commission on Accreditation for Health Informatics and Information Management Education accredits health information management programs. Visit its website, www.cahiim.org/accredpgms.asp, for a list of accredited programs. More than 200 programs are accredited by the Commission. Typical classes in a health information management program include Medical Terminology; Human Anatomy, Physiology, and Pathology; Health Data Management; Introduction to Pharmacology; Clinical Classification Systems; Clinical Data Analysis; Legal and Qualitative Aspects of Health Information; Principles of Health Information Management; Medical Reimbursement; Medical Transcription Practicum; Medical Coding Practicum; Medical Ethics; and Database Security and Management.

The American Health Information Management Association approves certificate programs in medical coding. Visit www.ahima.org/careers/college_search/search.aspx for a list of accredited programs. Sixty-nine percent of coders have some postsecondary training, according to a member survey from the AAPC; 18 percent have a bachelor's degree or higher.

CERTIFICATION AND LICENSING

Certification is offered by several professional associations, including the American Health Information Management Association, the AAPC, the Board of Medical Specialty Coding, the Association for Healthcare Documentation Integrity, the Professional Association of Healthcare Coding Specialists, the Practice Management Institute, the Institute of Certified Records Managers, and the National Cancer Registrars Association. Certification, while voluntary, is highly recommended. It is an excellent way to stand out from other job applicants and demonstrate your abilities to prospective employers.

OTHER REQUIREMENTS

Although the work is administrative in nature, HIM specialists must have a background in the health sciences, since accuracy and understanding of medical terminology are exceptionally important in these careers. They must translate physician notes, spot any inconsistencies, and avoid errors at all costs. Being detail oriented is a must for a career in health information management. Other important traits for HIM specialists include strong communication skills, the ability to work as a member of a team, and a willingness to continue to learn throughout one's career.

EXPLORING

There are many ways to learn more about a career as a health information management specialist. You can read books and journals (*Advance for Health Information Professionals*, www.advanceforhim.com) about the field, visit the websites of college health information management programs to learn about typical classes and possible career paths, and ask your teacher or school counselor to arrange an information interview with a HIM specialist. Professional associations can also provide information about the field. The American Health Information Management Association provides information on education and careers at its website, <http://hicareers.com>. You should also try to land a part-time job in a medical office. This will give you a chance to interact with HIM specialists and see if the career is a good fit for your abilities and interests.

EMPLOYERS

Approximately 277,700 medical records and health information technicians are employed in the United States; 11.3 percent are men. Nearly 40 percent of medical records and health information specialists are employed in hospitals. Other employers of HIM specialists include offices of physicians and other health care practitioners, outpatient clinics, surgical centers, nursing homes, managed-care facilities, home health agencies, pharmaceutical companies, long-term care facilities, state and federal government agencies that collect and disseminate health care information, and other health care facilities. Some HIM specialists are self-employed.

GETTING A JOB

Many health information management specialists obtain their first jobs as a result of contacts made through college internships, career fairs, or networking events. Others seek assistance in obtaining job leads from college career services offices, newspaper want ads, and employment websites. Additionally, professional associations, such as the American Health Information Management Association, the Association for Healthcare Documentation Integrity, the National Cancer Registrars Association, and the AAPC, provide job listings at their websites. See For More Information for contact information. *Advance for Health Information Professionals* also offers job listings for HIM specialists at its website, <http://health-care-jobs.advanceweb.com>. Medical transcriptionists can access job listings at MTJOBS (www.mtjobs.com). Those interested in positions with the federal government should visit the U.S. Office of Personnel Management's website, www.usajobs.gov.

EARNINGS

Salaries for health information management specialists vary by type of employer, geographic region, and the worker's experience, education, and skill level. Median annual salaries for HIM specialists were \$32,350 in May

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2010, according to the U.S. Department of Labor (USDOL). Salaries ranged from less than \$21,240 to \$53,430 or more. The USDOL reports the following mean annual earnings for HIM specialists by industry: federal government, \$46,090; general medical and surgical hospitals, \$37,020; nursing care facilities, \$33,380; outpatient care centers, \$31,440; and offices of physicians, \$29,030.

Medical transcriptionists earned salaries that ranged from less than \$21,960 to \$46,220 or more in May 2010, according to the USDOL. Those employed in general medical and surgical hospitals earned mean annual salaries of \$34,970.

Employers offer a variety of benefits, including the following: medical, dental, and life insurance; paid holidays, vacations, and sick and personal days; 401(k) plans; profit-sharing plans; retirement and pension plans; and educational-assistance programs. Self-employed and part-time workers must provide their own benefits. Approximately 14 percent of HIM specialists are self-employed.

EMPLOYMENT OUTLOOK

Employment for health information management specialists is expected to grow much faster than the average for all careers during the next decade, according to the U.S. Department of Labor (USDOL). More opportunities are becoming available because of the increasing number of medical tests, procedures, and treatments that are being conducted and the federally mandated transition of paper medical records to electronic format. HIM specialists with a good knowledge of computer software and other technology will have the best job prospects.

Employment for medical transcriptionists is expected to grow about as fast as the average for all occupations during the next decade. The USDOL reports that “growing numbers of medical transcriptionists will be needed to amend patients’ records, edit documents from speech recognition systems, and identify discrepancies in medical reports.”

FOR MORE INFORMATION

For information on certification, contact the following organizations

AAPC

2480 South 3850 West, Suite B
Salt Lake City, UT 84120-7208
info@aapc.com
www.aapc.com

ARMA International

11880 College Boulevard, Suite 450
Overland Park, KS 66210
www.arma.org

Association for Healthcare Documentation Integrity

4230 Kiernan Avenue, Suite 130
Modesto, CA 95356
ahdi@ahdionline.org
www.ahdionline.org

Practice Management Institute

9501 Console Drive, Suite 100
San Antonio, TX 78229-2033
800-259-5562
info@pmimd.com
www.pmimd.com

continued on page 227

For More Info, continued from page 226

**Professional Association of
Healthcare Coding Specialists**

218 East Bearss Avenue, #354
Tampa, FL 33613
888-708-4707
info@pahcs.org
www.pahcs.org

For information on careers in health
information management and accred-
ited programs, contact

**American Health Information
Management Association**

233 North Michigan Avenue,
21st Floor
Chicago, IL 60601-5809
312-233-1100

info@ahima.org
www.ahima.org

For a list of schools offering accred-
ited programs, contact

**Commission on Accreditation for
Health Informatics and Information
Management Education**

233 North Michigan Avenue,
21st Floor
Chicago, IL 60601-5800
www.cahiim.org

To learn more about a career as a can-
cer registrar, contact

**National Cancer
Registrars Association**

www.ncra-usa.org

MEDICAL ASSISTANTS

OVERVIEW

Medical assistants perform administrative and clinical duties at medical offices, hospitals, inpatient/outpatient clinics, nursing homes, and long-term care facilities, and in other health care settings. Their duties include taking patients' medical histories, assisting physicians during procedures, conducting simple tests, updating patients' files in electronic databases, and completing paperwork. Some medical assistants have specialized duties based on the size or type of practice. There are no formal education requirements for medical assistants. Some learn their skills via on-the-job training; many train for the field by completing postsecondary programs that last one or two years. Approximately 609,000 medical assistants are employed in the United States; 9.3 percent are men. Opportunities for medical assistants are expected to be excellent during the next decade.

FAST FACTS

High School Subjects

Biology
Mathematics

Personal Skills

Following instructions
Helping
Technical

Minimum Education Level

High school diploma

Salary Range

\$20,810 to \$31,075 to
\$40,190+

Employment Outlook

Much faster than the average

O*NET-SOC

31-9092.00

GOE

14.02.01

DOT

079

NOC

1222, 1414

THE JOB

Medical assistants work under the supervision of physicians, nurses, and managers. Many of their duties are administrative in nature. These include checking patients in, answering the phone, sorting mail, and scheduling appointments. *Administrative medical assistants* also maintain medical records, file patient records, and complete requests for insurance reimbursement. Some are trained to perform monthly insurance electronic billing for services rendered as well as to send out monthly statements and record payments that are received. Others are specially trained to perform medical transcription (the written or typed transcription of a doctor's recorded notes).

Clinical medical assistants have some administrative duties but largely focus on helping the doctor before, during, and after patient examinations and procedures. Before bringing a patient to the examination room, clinical medical assistants prepare the room, making sure the examination table is

clean and that supplies and instruments are ready for use. They then take the patient's pulse, blood pressure, and temperature; measure his or her weight; and talk with the patient regarding the nature of his or her visit and any complaints about health or symptoms, writing this information down for review by the physician. They assist the physician during examinations and certain procedures by handing instruments to the physician or readying medications or supplies for use. After each procedure, clinical medical assistants dispose of contaminated supplies and sterilize equipment and instruments. Some clinical medical assistants are trained to remove sutures, change dressings and bandages, collect specimens, or administer injections. They also operate diagnostic equipment such as electrocardiogram or x-ray machines. As directed by a physician, clinical medical assistants also help patients arrange for hospital admission, give needed orders for laboratory work, pass along physician referrals, and give instruction to patients regarding new prescriptions, special diets, or additional treatments.

Some medical assistants have specialized duties specific to their workplace. For example, *podiatric medical assistants* are trained to make castings of feet, take x-rays of the feet or ankles, and assist the podiatrist during surgeries.

Optometric medical assistants and *ophthalmic medical assistants* have special duties related to care and health of the eyes. They conduct tests such as a lensometry (which measures for proper lens prescription) or tonometry (which determines fluid pressure, a sign of glaucoma). They also conduct other tests to measure visual acuity or eye muscle function. Some administer drops to dilate the eye in preparation for an exam or administer other medicinal drops. Ophthalmic medical assistants also educate patients about the proper care and insertion of contact lenses.

Medical assistants work in well-lit, clean offices. Full-time medical assistants work 40 hours a week, with some evening or weekend hours required. There is no official uniform, but most medical assistants choose to wear medical scrubs or smocks with pants. Comfortable shoes are a must, since medical assistants are on their feet for a good part of the day. Medical assistants often use gloves, masks, or other protective gear, especially when assisting physicians with procedures or handling spent syringes or needles.

REQUIREMENTS

HIGH SCHOOL

Take health and science classes in high school—especially anatomy, physiology, biology, and chemistry. English and speech classes will help you develop your writing skills, which you will use frequently during your workday. Since medical professionals are increasingly using computers to record and store data about patients, computer science classes (especially those involving database management) will be useful. If you attend a vocational high school, you might be able to take medical-assisting classes or even participate in a specialized training program to prepare for the field.

POSTSECONDARY TRAINING

There are no formal education requirements for medical assistants. Some learn their skills via on-the-job training; many train for the field by completing post-secondary programs that last one or two years. Some of the topics covered in medical-assisting classes include anatomy, physiology, medical terminology, clinical and diagnostic procedures, pharmaceutical principles, laboratory techniques, first aid, medical ethics, and office skills (such as keyboarding, record-keeping, transcription, accounting, and insurance processing). Students also complete an internship at a medical office as part of their studies.

The Accrediting Bureau of Health Education Schools and the Commission on Accreditation of Allied Health Education Programs accredit medical-assisting programs. The Commission on Accreditation of Ophthalmic Medical Programs accredits ophthalmic medical-assisting programs. See the For More Information section for contact information for these organizations.

CERTIFICATION AND LICENSING

Certification is offered by several associations, including the American Association of Medical Assistants, the Association of Medical Technologists, and the National Healthcareer Association. Specialty certification is available from the American Society of Podiatric Medical Assistants and the Joint Commission on Allied Health Personnel in Ophthalmology. Certification, while voluntary, is highly recommended. It is an excellent way to stand out from other job applicants and demonstrate your abilities to prospective employers.

OTHER REQUIREMENTS

Medical assistants interact with patients, physicians, nurses, and other health care professionals throughout the day, so it's important that you be able to get along with many different types of personalities and work as a member of a team. You should also be organized and work well under pressure, especially when work is busy and you are asked to perform multiple tasks. Other important traits include the ability to follow instructions, compassion, and manual dexterity and good vision.

EXPLORING

There are many ways to learn more about a career as a medical assistant. You can read books and magazines (such as *CMA Today*, www.aama-ntl.org/CMAToday) about the field, visit the websites of college medical assisting programs to learn about typical classes and possible career paths, and ask your teacher or school counselor to arrange an information interview with a medical assistant. Professional associations can also provide information about the field. The American Association of Medical Assistants provides a wealth of information on medical assistants and careers at its website, www.aama-ntl.org. Try to land a part-time job in a medical office. This will give you a chance to interact with medical assistants and see if the career is a good fit for your interests and abilities.

EMPLOYERS

Approximately 609,000 medical assistants are employed in the United States; 9.3 percent are men. Approximately 62 percent of medical assistants work in offices of physicians. Thirteen percent work at public and private hospitals, and 11 percent work in offices of other health practitioners, such as optometrists, podiatrists, and chiropractors. Others are employed at outpatient care centers and residential care facilities.

GETTING A JOB

Many medical assistants obtain their first jobs as a result of contacts made through college internships, career fairs, or networking events. Others seek assistance in obtaining job leads from college career services offices, newspaper want ads, and employment websites. Additionally, professional associations, such as the Association of Technical Personnel in Ophthalmology, provide job listings at their websites. See For More Information for a list of organizations. Those interested in positions with the federal government should visit the U.S. Office of Personnel Management's website, www.usajobs.gov.

EARNINGS

Salaries for medical assistants vary by type of employer, geographic region, and the worker's experience, education, and skill level. Median annual salaries for medical assistants were \$28,860 in May 2010, according to the U.S. Department of Labor (USDOL). Salaries ranged from less than \$20,810 to \$40,190 or more. The USDOL reports the following mean annual earnings for medical assistants by employer: psychiatric and substance abuse hospitals, \$39,220; offices of dentists, \$36,880; scientific research and development services, \$35,550; general medical and surgical hospitals, \$30,770; outpatient care centers, \$30,490; offices of physicians, \$30,110; and offices of other health practitioners, \$26,820.

The American Association of Medical Assistants reports that certified medical assistants earned average annual salaries of \$31,075 in 2011. Medical assistants with 0-2 years of experience earned average salaries of \$24,882. Those with 16 or more years experience earned \$35,882.

Medical assistants usually receive benefits such as health and life insurance, vacation days, sick leave, and a savings and pension plan. Part-time workers must provide their own benefits.

EMPLOYMENT OUTLOOK

Employment for medical assistants is expected to grow by 34 percent from 2008 to 2018, according to the U.S. Department of Labor—making it one of the fastest-growing occupations in the nation. Factors that are fueling growth include the increasing U.S. population (especially the elderly, who typically need more medical care than other demographic groups), technological advances that are allowing people to live longer, the increasing

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number of medical facilities that need support staff such as medical assistants, and the increasing prevalence of certain diseases and conditions, such as diabetes and obesity, which will create demand for more support staff to help treat patients. Opportunities will be best for those with formal training and certification.

FOR MORE INFORMATION

For information on accreditation, contact

Accrediting Bureau of Health Education Schools

7777 Leesburg Pike, Suite 314-North Falls Church, VA 22043-2411
www.abhes.org

For information on careers, earnings, and certification, contact

American Association of Medical Assistants

20 North Wacker Drive, Suite 1575
Chicago, IL 60606-2963
312-899-1500
www.aama-ntl.org

For certification information, contact

American Medical Technologists

10700 West Higgins Road, Suite 150
Park Ridge, IL 60018-3707
847-823-5169
www.americanmedtech.org

For information on career options for optometric medical assistants, contact

American Optometric Association

243 North Lindbergh Boulevard
Creve Coeur, MO 63141
800-365-2219, ext. 4152
www.aoa.org

For information on certification and careers in podiatric medical assisting, contact

American Society of Podiatric Medical Assistants

888-882-7762
www.aspma.org

For information on careers in ophthalmic medical assisting, contact

Association of Technical Personnel in Ophthalmology

2025 Woodlane Drive
St. Paul, MN 55125-2998
800-482-4858
www.atpo.org

For information on accredited programs, contact

Commission on Accreditation of Allied Health Education Programs

1361 Park Street
Clearwater, FL 33756-6039
www.caahep.org

For information on accredited programs, contact

Commission on Accreditation of Ophthalmic Medical Programs

2025 Woodlane Drive
St. Paul, MN 55125-2998
651-731-7244
www.coa-omp.org

For information on certification, contact the following organizations

Joint Commission on Allied Health Personnel in Ophthalmology

2025 Woodlane Drive
St. Paul, MN 55125-2998
jcahpo@jcahpo.org
www.jcahpo.org

National Healthcareer Association

7500 West 160th Street
Stilwell, KS 66085-8100
800-499-9092
info@nhanow.com
www.nhanow.com

OCCUPATIONAL THERAPISTS

OVERVIEW

Occupational therapists work with patients who are suffering from mentally, physically, developmentally, or emotionally disabling conditions. They help patients improve their ability to perform daily-living and work-related tasks. Using exercises or programs to increase strength, visual acuity, or performance, occupational therapists teach patients how to live independently and have productive lives. A minimum of a master's degree in occupational therapy is required to enter the field. Approximately 104,500 occupational therapists are employed in the United States; 13 percent are men. Employment in the field is expected to grow much faster than the average for all careers during the next decade.

FAST FACTS

High School Subjects

Biology
Health

Personal Skills

Helping
Problem solving

Minimum Education Level

Master's degree

Salary Range

\$48,920 to \$72,320 to \$102,520+

Employment Outlook

Much faster than the average

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THE JOB

People sometimes are physically or mentally limited due to the effects of illness, injury, age, or a physical or psychological condition. These limitations can affect the way they live, work, play, and even learn. People often turn to occupational therapists to help them cope and adjust their activities in a way that makes them more productive, mobile, and independent.

Occupational therapists use games, activities, exercises, and various equipment and tools to improve a patient's basic motor functions and his or her basic reasoning skills. Activities or adaptations may also be designed to compensate for permanent loss of function. Occupational therapists work with patients with a wide range of conditions—from those recuperating from illness or accident, to those with developmental issues—and ages, from infants to senior citizens. While many patients undergo a combination of physical and occupational therapy programs, there is a big difference between the two disciplines. Physical therapy works to restore movement and mobility, while occupational therapy focuses on fine motor skills to restore function.

When working with a new patient, occupational therapists must first assess the patient's needs in all areas—home, work, and recreation.

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Occupational therapists identify problem areas or activities in their client's home or workplace, and they work to remove the barriers or help the patient make necessary adaptations. For example, when working with a patient who has severe arthritis, occupational therapists may create adaptive equipment for, say, cooking or gardening, to make those particular tasks easier and more productive. Occupational therapists may introduce patients to ergonomic cooking tools, gardening equipment, or other assistive devices to improve mobility and dexterity in these areas.

Once problem areas are identified, occupational therapists assist the patient to develop, maintain, or, in some cases, relearn skills to a more satisfactory level of living and play. Some occupational therapists practice general therapy, meaning they treat people of all ages and conditions. However, most occupational therapists specialize in a particular area, such as pediatrics, gerontology, rehabilitation, or psychiatry.

Pediatric occupational therapists work with infants, children, and adolescents with a variety of conditions, including developmental delays; delays in gross, fine, motor, or visual skills; autistic-spectrum delays; and even children with adoption-related concerns. In addition, pediatric occupational therapists work with age-appropriate patients needing help due to illness, disease, or injuries. Early-intervention therapy is important for infants and toddlers who may be at risk for developmental delays as identified by their parents, pediatrician, or teacher.

Tools and equipment, many of which are play based, are often tailored to fit the age, size, and attention span of children. Some sessions may be one on one, while others are held in a group setting. Therapists may have children play with modeling clay, hammer sets, or other toys to stimulate fine motor skills. They teach children different grasps to help them better hold a pencil or other writing implement. Occupational therapists use therapeutic listening techniques to help children improve their attention spans, behavior, and cognitive processing, which in turn will help them perform better in school. Other therapies help children develop their social skills or teach them skills used for dressing and grooming.

As people age, many find it harder to perform many activities and tasks due to increasing sensory impairment and conditions common with older populations, such as arthritis or Alzheimer's disease. Occupational therapy for gerontology greatly helps the elderly lead more independent and active lives. *Gerontological occupational therapists* may give patients exercises to compensate for difficult movements. Tools such as a bilateral sander—a box with handles on either side—require patients to move the handles backwards and forwards, or side to side, which improves strength and range of motion. Attaching and detaching Velcro blocks can also improve strength and dexterity, both of which are needed for many of the patient's activities of daily living. Cognitive games such as cards, peg boards, or other activities can improve a patient's memory and critical-thinking skills. Other tools and techniques are used to improve patients' cooking, grooming, or dressing skills, as well as other activities that are important to the patients' lives and well-being.

After assessing the patient's home, an occupational therapist may suggest adaptive aids such as safety bars or handles for the bathtub, shower,

or toilet area to prevent accidents. They also suggest walking aids or techniques to improve speed and prevent injuries. Some therapists specially trained in driver rehabilitation can teach elderly patients skills that will help them be better and safer drivers.

Rehabilitation is another occupational therapy specialty. Patients recovering from injury or conditions such as a stroke or heart attack often need therapy to help them assimilate back into their everyday lives. For example, stroke patients with short-term memory loss may be taught to make lists or other reminder cues to help in recall. Occupational therapists may use computer games to help patients improve their sequencing, coordination, and problem-solving skills. Exercises done with rubber balls, bands, and other tools can also be implemented to help improve strength and dexterity. Patients suffering from vision loss can be taught techniques to make better use of their remaining vision or can be trained with adaptive equipment such as audio recordings, talking devices, computer technology, or special writing materials. Occupational therapists also help patients use adaptive equipment such as wheelchairs or orthotics. Sometimes, occupational therapists design special tools to better fit a patient's condition, needs, or environment, including grasping claws to reach items, computer-aided equipment for communication, or other aids to facilitate dressing, eating, grooming, and other daily tasks.

Psychiatric occupational therapists help patients with acute mental health conditions or learning disabilities. Activities, which are geared to improve skills such as time management and socialization, give patients the confidence to live independently or take part in social activities. Occupational therapists also work with patients suffering from alcoholism, drug addiction, depression, eating disorders, or stress-related conditions. They can help patients improve their skills to do everyday tasks such as shopping, cooking, cleaning, using public transportation, or even holding a job.

Occupational therapists also have administrative duties. After each session, they track and chart a patient's progress. They often consult with physicians, nurses, social workers, and other health care professionals regarding a patient's condition or treatment plan. Some occupational therapists supervise occupational therapy assistants, medical assistants, or volunteers.

Approximately 31 percent of occupational therapists employed in the United States work part-time, with some working for more than one employer at various times. Full-time therapists work about 40 hours a week, with some evening and weekend hours scheduled. Occupational therapists can expect to work indoors in large, spacious, well-lit workrooms. Some work is done outdoors, especially when conducting activities such as gardening, games, exercises, or perhaps practice visits to various stores. At times, occupational therapists make follow-up visits to patients' homes, schools, or workplaces to determine their rate of progress.

This career can be demanding and tiring; occupational therapists spend much of their day on their feet or walking from activity to activity. They also run the risk of injury—especially to their back—when supporting, lifting, or shifting patients, or when moving heavy equipment.

REQUIREMENTS

HIGH SCHOOL

Take courses in anatomy and physiology, biology, chemistry, health, physics, psychology, art, computer science, and the social sciences.

POSTSECONDARY TRAINING

There are no baccalaureate-level occupational therapy programs. Aspiring occupational therapists typically earn undergraduate degrees in anatomy, anthropology, biology, kinesiology, liberal arts, psychology, or sociology.

You will need a minimum of a master's degree in occupational therapy to work in the field. Combined bachelor's/master's degree programs are available for those who have not earned a bachelor's degree before entry into an occupational therapy educational program. Visit the American Occupational Therapy Association's website, www.aota.org/Students/Schools.aspx, for a list of approximately 150 occupational therapy programs that are accredited by the Association.

Typical classes include Introduction to Occupational Sciences and Occupational Therapy, Kinesiology for the Occupational Therapist, Theoretical Foundations of Occupational Therapy, Technologies in Occupational Therapy, Occupations of Infants and Children, Applied Neuroscience for Occupational Therapy, Research and Occupational Therapy, Occupations of Adolescents and Young Adults, Pathophysiology: Impact of Conditions on Occupation, Occupations of Adults and Older Adults, and Professional Trends and Issues in Occupational Therapy. In addition to classes, students participate in at least 24 hours of fieldwork, where they work with patients under the supervision of experienced occupational therapists.

CERTIFICATION AND LICENSING

National certification is available from the National Board for Certification in Occupational Therapy (NBCOT). Certification is required as one criterion of becoming licensed. To become certified, you must graduate from an accredited occupational therapy program, complete the clinical practice period, and pass a written test. Those who meet these requirements are awarded the designation of occupational therapist, registered. In addition, the NBCOT offers several specialty certifications, including board certification in gerontology, mental health, pediatrics, and physical rehabilitation, as well as specialty certification in driving and community mobility; environmental modification; feeding, eating, and swallowing; and low vision.

All states and the District of Columbia require occupational therapists to be licensed or meet other forms of professional regulation. To become licensed, you must graduate from an accredited occupational therapy program, and then take and pass the NBCOT certification exam. In some states, you must meet additional requirements, such as passing an exam that measures your knowledge of state statutes and regulations.

OTHER REQUIREMENTS

The ability to communicate well is important for occupational therapists, who teach, instruct, and motivate their patients when working with them one on one. In addition, they frequently write reports detailing their treatment plans for patients and document patients' progress. A successful occupational therapist will remain emotionally calm and stable when dealing with sometimes stressed, angry, or uncooperative patients. Other important traits for occupational therapists include patience, imagination, creativity, and good problem-solving skills.

EXPLORING

Does the career of occupational therapist sound interesting? If so, there are many ways to learn more about this career. You can read books and journals (such as *OT Practice*, www.aota.org/Pubs/OTP.aspx) about the field, visit the websites of college occupational therapy programs to learn about typical classes and possible career paths, and ask your teacher or school counselor to arrange an information interview with an occupational therapist. Professional associations can also provide information about the field. The American Occupational Therapy Association provides a lot of helpful information on education and careers at its website, www.aota.org/Students/Prospective.aspx. You should also try to land a part-time job in the office of an occupational therapist. This will give you a chance to interact with therapists and assistants and see if the career is a good fit for your interests and abilities.

EMPLOYERS

Approximately 104,500 occupational therapists are employed in the United States; 13 percent are men. Occupational therapists are employed by hospitals; nursing homes; intermediate-care facilities; public and private schools; mental-health centers; rehabilitation hospitals; home health agencies; group homes; individual and family services; community care facilities for the elderly; offices of physicians and other health care practitioners; government agencies; and outpatient clinics. A small number of occupational therapists work in private practice.

GETTING A JOB

Many occupational therapists obtain their first jobs as a result of contacts made through college internships, career fairs, or networking events. Others seek assistance in obtaining job leads from college career services offices, newspaper want ads, and employment websites. Additionally, the American Occupational Therapy Association provides job listings at its website, www.otjoblink.org. Those interested in positions with the federal government should visit the U.S. Office of Personnel Management's website, www.usajobs.gov.

EARNINGS

Salaries for occupational therapists vary by type of employer, geographic region, and the worker's experience, education, and skill level. Median annual salaries for occupational therapists were \$72,320 in May 2010, according to the U.S. Department of Labor (USDOL). Salaries ranged from less than \$48,920 to \$102,520 or more. The USDOL reports the following mean annual earnings for occupational therapists by employer: home health care services, \$83,920; nursing care facilities, \$77,700; offices of other health practitioners, \$74,910; general medical and surgical hospitals, \$73,160; and elementary and secondary schools, \$65,000.

Employers offer a variety of benefits, including the following: medical, dental, and life insurance; paid holidays, vacations, and sick and personal days; 401(k) plans; profit-sharing plans; retirement and pension plans; and educational-assistance programs. Self-employed therapists must provide their own benefits.

EMPLOYMENT OUTLOOK

An increase in the number of people who have disabilities or who have limited function, growth in the number of individuals age 65 and over (who often have a higher incidence of illness and disability), and advances in medical technology and therapy techniques will create strong opportunities for occupational therapy professionals during the next decade, according to the U.S. Department of Labor (USDOL). In fact, the USDOL predicts that employment for occupational therapists will increase much faster than the average for all occupations during this time span, with job opportunities "good for licensed occupational therapists in all settings, particularly in acute hospital, rehabilitation, and orthopedic settings because the elderly receive most of their treatment in these settings." The American Occupational Therapy Association reports that opportunities should be good in early-intervention programs and in schools for children with disabilities served by the federal Individuals with Disabilities Improvement Act. Occupational therapists who have specialized knowledge in an area such as gerontology will have the best job prospects.

FOR MORE INFORMATION

For information on accredited occupational therapy programs and careers, contact

American Occupational Therapy Association

4720 Montgomery Lane,
PO Box 31220
Bethesda, MD 20824-1220
www.aota.org

For information on certification, contact

National Board for Certification in Occupational Therapy

12 South Summit Avenue, Suite 100
Gaithersburg, MD 20877-2090
www.nbcot.org

PARALEGALS

OVERVIEW

Paralegals, also known as *legal assistants*, provide support to lawyers. One of their primary duties is to help lawyers prepare for trials, hearings, closings, or corporate meetings, but they may also be responsible for conducting legal preparatory work such as research and writing drafts. The most popular method of educational preparation for a career as a paralegal is an associate's degree. Approximately 263,800 paralegals are employed in the United States; 14.1 percent are men. Employment for paralegals is expected to grow much faster than the average for all careers during the next decade.

THE JOB

Paralegals are trained and certified to help lawyers with much of their work. They may be viewed by some as merely legal aides, but many paralegals conduct their work independently and, in today's legal offices, have many of the same responsibilities as lawyers. However, paralegals are prohibited by law from giving legal advice, setting legal fees, or presenting a case in court. Paralegals work in a variety of legal specialties such as bankruptcy, corporate law, criminal law, employee benefits, family law, immigration, intellectual property, labor law, litigation, personal injury, and real estate.

Paralegals conduct research; maintain general contact with clients; and draft and revise contracts, depositions, closings, or agreements. Paralegals have other additional duties or functions depending on their area of specialization.

Paralegals working for large corporations or independent law firms may be involved in litigation. When assigned a case, paralegals may have general duties such as maintaining a database of current court rulings or reviewing past legal periodicals and all material relevant to the case or area of law. They may also maintain a litigation docket, calendar, or tickler system to help keep track of important deadlines, meetings, or court appearances.

Paralegals prepare legal documents and conduct research or any necessary investigation before bringing a lawsuit to trial. Tasks at this stage include

FAST FACTS

High School Subjects

Computer science
English
Government

Personal Skills

Communication
Following instructions
Judgment and decision making
Time management

Minimum Education Level

Some postsecondary training

Salary Range

\$20,000 to \$46,680 to
\$80,000+

Employment Outlook

Much faster than the average

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preparing the client's background information, interviewing witnesses, and examining public records that are relevant to the lawsuit. They are responsible for locating and hiring expert witnesses, if necessary. If the case goes to trial, paralegals coordinate the deposition schedule with the client and attorneys, including the opposing counsel. They also help in reviewing and assembling all documents to be used in the depositions, including drafting an outline of all examination and cross-examination questions used in court. Paralegals are often available to help prepare witnesses for a deposition, including discussing courtroom etiquette with the client and witnesses. They also work with graphic designers and multimedia artists to coordinate exhibits, videos, animations, or any computer presentations used as trial evidence. Post-trial, paralegals may draft a notice of appeal or documents regarding satisfaction of judgment.

Paralegals specializing in immigration law also have similar general duties as those working in litigation. They are responsible for maintaining a tickler file to keep track of deadlines for filing extensions, petitions, and applications with U.S. Citizenship and Immigration Services (USCIS) or the U.S. Department of Labor (USDOL). Oftentimes, they must draft letters and affidavits, or organize required documents supporting these applications and petitions. Some documents—such as foreign birth records, military service records, or police records—may be difficult to obtain. All documents must be certified as valid. *Immigration law paralegals* are often responsible for coordinating the translation of foreign documents or determining the equivalency of foreign degrees. Some may be responsible for preparing the client for interviews with officials from the USCIS, or perhaps outlining immigrant and nonimmigrant visa alternatives. Another important duty is acting as a liaison between the USCIS, USDOL, and the law firm.

Some paralegals specialize in tax law. Their additional duties in this area include maintaining records and drafting returns for corporate income tax and annual and quarterly employer returns, as well as completing applications for tax-exempt organizations, charitable organizations, or private foundations. They gather information for audits and tax reviews and maintain federal and state tax form files and publications. Paralegals may also research current tax laws and recent tax court decisions, especially if these laws are applicable to current cases.

Paralegals employed in a real estate office, or mortgage and title office, specialize in real estate law. They may use a lawyer's notes or perhaps an interview transcript to draft a purchase agreement or make necessary revisions to an existing agreement. They pay special attention to details such as dates and any contingencies listed in the contracts. *Real estate paralegals* may conduct title searches and check the property's legal description against a map and county records. In preparation for a real estate closing, paralegals review insurance agreements and contracts, prorate property taxes and utilities, and adjust closing figures. They create a final closing checklist and folders. If necessary, paralegals may accompany lawyers to real estate closings.

Paralegals have additional administrative duties, regardless of their specialty. Depending on the size of the office, paralegals may be responsible for office management, especially the supervision of legal secretaries and other

paralegals. They maintain financial office records and coordinate in-house training sessions, seminars, or continuing-education classes. Some paralegals also act as their firm's notary public.

The work environment for paralegals depends on the firm or company and its specialty, though most paralegals work in comfortable, well-lit offices or law libraries. The office atmosphere is professional in manner of dress and conduct. At times paralegals may be required to assist lawyers while at court, especially if assigned to a major or high-profile case.

Paralegals work a standard 40-hour workweek, with time off on weekends and holidays. However, paralegals should expect to work longer hours, especially when working on time-sensitive assignments, in order to prepare for an important case or to meet a deadline. Travel is sometimes necessary to complete an investigation, to conduct additional research, or to interview witnesses.

REQUIREMENTS

HIGH SCHOOL

Take a wide range of subjects in high school to prepare for college. These include government, computer science, social studies, and foreign languages, especially Latin and Spanish. English and speech classes will help you to develop your communication skills.

POSTSECONDARY TRAINING

The most popular method of educational preparation for a career as a paralegal is an associate's degree in paralegal studies. Some people enter the field after earning a bachelor's degree in another field and a certificate in paralegal studies. A few schools offer bachelor's and master's degrees in paralegal studies. Some employers provide on-the-job training to legal secretaries or promising college graduates who do not have legal experience.

More than 1,000 postsecondary programs offer formal paralegal training programs. Approximately 260 paralegal programs are approved by the American Bar Association (ABA). Visit the ABA website, www.abanet.org/legalservices/paralegals/directory/home.html, for a list of approved programs.

CERTIFICATION AND LICENSING

Certification, while voluntary, is highly recommended. It is an excellent way to stand out from other job applicants and demonstrate your mastery of paralegal duties to prospective employers. Certification is offered by the National Association of Legal Assistants, the American Alliance of Paralegals, the National Federation of Paralegal Associations, and NALS...the association for legal professionals. Contact these organizations for more information.

OTHER REQUIREMENTS

Paralegals may be responsible for multiple cases at a time, or they may be assigned to work with a group of lawyers. It is important for paralegals to be well organized in such situations and to be able to juggle a variety of tasks, deadlines, and personalities. They also need excellent oral and written communication skills. Paralegals are in steady contact with lawyers, other par-

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alegals, legal secretaries, court workers, law librarians, and others throughout their workday. Other important traits include excellent research and investigative skills, an understanding of legal terminology and procedures, a mastery of legal databases and computer programs, and a willingness to continue to learn in order to upgrade their skills throughout their careers.

EXPLORING

There are many ways to learn more about a career as a paralegal. You can read books and magazines (such as the National Federation of Paralegal Associations' *The National Paralegal Reporter*) about the field, visit the websites of college paralegal studies programs to learn about typical classes and possible career paths, and ask your teacher or school counselor to arrange an information interview with a paralegal. Professional associations can also provide information about the field. The National Association of Legal Assistants and NALS...the association for legal professionals provide a wealth of information on paralegal education and careers at their websites (see For More Information). You should also try to land a part-time or summer job in a law office. This will give you a chance to interact with paralegals and see if the career is a good fit for your interests and abilities.

EMPLOYERS

Approximately 263,800 paralegals are employed in the United States; 14.1 percent are men. Seventy-one percent of paralegals work for private law firms. Paralegals are employed by law firms, federal government agencies [such as the Justice Department (the largest federal employer), Federal Trade Commission, Social Security Administration, Treasury Department, Internal Revenue Service, and Interior Department], state and local agencies, corporate legal departments, and other organizations that provide legal services. An increasing number of insurance companies, real estate and title insurance firms, and banks are hiring paralegals. Some paralegals start their own freelance businesses.

GETTING A JOB

Many paralegals obtain their first jobs as a result of contacts made through college internships or networking events. Others seek assistance in obtaining job leads from college career services offices, newspaper want ads, and employment websites. Additionally, professional associations, such as the National Federation of Paralegal Associations and NALS...the association for legal professionals, provide job listings at their websites. See For More Information for a list of organizations. Those interested in positions with the federal government should visit the U.S. Office of Personnel Management's website, www.usajobs.gov.

EARNINGS

Salaries for paralegals vary by type of employer, geographic region, and the worker's education level and skills. Paralegals earned salaries that ranged from

less than \$29,460 to \$74,870 or more in May 2010, according to the U.S. Department of Labor (USDOL). They earned median annual salaries of \$46,680. Paralegals employed in the legal services industry (the largest employer of paralegals) earned mean annual salaries of \$47,690. The USDOL reports the following mean annual earnings for paralegals by government level: federal, \$64,210; state, \$43,970; and local, \$50,630.

According to the National Association of Legal Assistants' *2010 National Utilization and Compensation Survey Report*, paralegals earned an average of \$55,281 in total compensation (\$52,188 in salary and \$3,093 in bonuses). Salaries ranged from less than \$20,000 to \$80,000 or more.

Employers offer a variety of benefits, which may include the following: medical, dental, and life insurance; paid holidays, vacations, and sick days; personal days; 401(k) plans; profit-sharing plans; retirement and pension plans; bonuses (as compensation for working long hours); free legal representation; a leased car/mileage; and educational-assistance programs. Self-employed workers must provide their own benefits.

EMPLOYMENT OUTLOOK

Employment for paralegals is expected to grow much faster than the average for all occupations during the next decade, according to the U.S. Department of Labor (USDOL). Because paralegals are able to perform many of the same tasks as lawyers, but do not command a lawyer's salary, it makes economic sense for employers to hire paralegals to share in the legal workload. Many law firms, government agencies, and, especially, corporations, are moving in this direction. Additionally, the growing U.S. population will require more legal services. The USDOL predicts that this growth will create especially strong opportunities for paralegals in criminal law, elder law, environmental law, health care law, intellectual property law, and international law. Other promising areas include real estate, bankruptcy, medical malpractice, product liability, and community legal service programs.

Despite the prediction for strong growth, there will be considerable competition for jobs. Many people are attracted to the field because it offers good pay and only an associate's degree is required to enter the field. Paralegals with advanced education, experience, and industry certifications will have the best job prospects.

FOR MORE INFORMATION

For information on certification, contact

American Alliance of Paralegals

4023 Kennett Pike, Suite 146
Wilmington, DE 19807-2018
info@aapipara.org
www.aapipara.org

For a database of paralegal studies programs and advice on choosing a program, visit the association's website.

**American Association
for Paralegal Education**

19 Mantua Road
Mt. Royal, NJ 08061-1006
856-423-2829
info@aafpe.org
www.aafpe.org

continued on page 244

For More Info, continued from page 243

For information about careers in the legal field, contact

American Bar Association

Standing Committee on Paralegals
321 North Clark Street
Chicago, IL 60610-7598
800-285-2221
www.americanbar.org/groups/paralegals.html

For information on careers, contact

Association of Legal Administrators

75 Tri-State International, Suite 222
Lincolnshire, IL 60069-4435
847-267-1252
www.alanet.org

For information on careers and certification, contact

NALS...the association for legal professionals

8159 East 41st Street
Tulsa, OK 74145-3313
918-582-5188
info@nals.org
www.nals.org

For information about education, careers, earnings, and certification, contact

National Association of Legal Assistants

1516 South Boston Avenue, Suite 200
Tulsa, OK 74119-4013
918-587-6828
nalanet@nala.org
www.nala.org

For detailed information about paralegal education and careers, contact

National Federation of Paralegal Associations

PO Box 2016
Edmonds, WA 98020-9516
425-967-0045
info@paralegals.org
www.paralegals.org

For information on paralegal schools, contact

National Paralegal Association

PO Box 406
Solebury, PA 18963-0406
215-297-8333
admin@nationalparalegal.org
www.nationalparalegal.org

REGISTERED NURSES

OVERVIEW

Registered nurses work to promote health, prevent disease, and help patients who are sick or injured. They also serve as health educators for patients, families, and communities. Registered nurses train for the field by earning a bachelor's degree, an associate's degree, or a diploma in nursing from an approved nursing program. Registered nurses who decide to become *advanced practice nurses* (clinical nurse specialists, nurse anesthetists, nurse-midwives, and nurse practitioners) must earn master's degrees and industry certifications. Registered nurses (RNs) make up the largest occupational group in the health care industry, comprising approximately 2.6 million jobs; 8.9 percent are men. Employment opportunities for RNs are expected to be excellent during the next decade.

FAST FACTS

High School Subjects

Biology
Chemistry
Health

Personal Skills

Active listening
Communication
Critical thinking
Helping
Judgment and decision making

Minimum Education Level

Some postsecondary training

Salary Range

\$44,190 to \$64,690 to
\$95,130+

Employment Outlook

Much faster than the average

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THE JOB

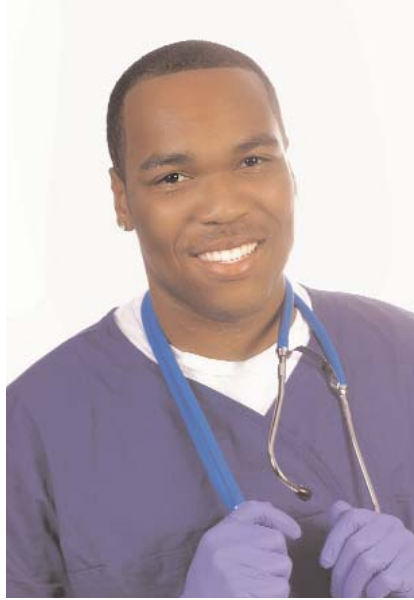
Most RNs provide direct patient care. They observe, assess, and record patient symptoms, reactions, and progress. Nurses collaborate with physicians and other medical professionals on patient care, treatments, and examinations, and they administer medications.

RNs work closely with physicians to care for patients. It is their job to implement the doctor's orders regarding the treatment of a patient. In addition to interacting with patients, RNs also have a lot of contact with patients' families, so they must have good "bedside manner" and put people at ease.

Specific work responsibilities vary from one RN to the next. An RN's duties and title are often determined by his or her work setting, such as *emergency room nurses*, who work in hospital emergency rooms, or *radiology nurses*, who administer x-rays and other body scans to patients or care for those undergo-

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ing radiation treatments for cancer. These nurses generally work in hospitals, clinics, or outpatient care facilities. RNs can also work outside of health care facilities, in settings such as schools, workplaces, and summer camps.



An increasing number of men—especially young men—are becoming nurses. In fact, 30.1 percent of male nurses are under age 40, according to *MinorityNurse.com*. (Photo courtesy of Photos.com)

Other nurses are defined by the types of patients served. *Hematology nurses*, for example, help patients with blood disorders. *Oncology nurses* specialize in treating patients with cancer. These nurses are employed virtually anywhere, including physicians' offices, outpatient treatment facilities, home health care agencies, and hospitals. Those that specialize in a disease or condition may also specialize in the age of the patients served. Some examples include *neonatal nurses* (newborns), *pediatric nurses* (children and adolescents), and *geriatric nurses* (the elderly).

Finally, other RNs specialize in working with one or more organs or systems, such as *respiratory nurses*, who care for those with respiratory illnesses such as cystic fibrosis or asthma. RNs specializing in treatment of a particular organ or body system usually are employed in hospital specialty or critical-care units, specialty clinics, and outpatient care facilities.

RNs can be one or a combination of these nursing types, such as a *geriatric dialysis nurse*, who specializes in care for elderly patients with kidney failure.

Registered nurses who pursue advanced degrees and certification are called *advanced practice nurses (APNs)*. There are four advanced practice nursing specialties: *clinical nurse specialists*, *nurse anesthetists*, *nurse-midwives*, and *nurse practitioners*.

Instead of working in teams under the direction of a physician, APNs work relatively independently. Clinical nurse specialists provide specialized expertise in a specific area of nursing, such as rehabilitation, mental health, or geriatrics. Nurse anesthetists administer anesthesia and provide pain management services before and after surgical, therapeutic, diagnostic, and obstetric procedures. Nurse-midwives provide primary care to women, including gynecological exams, prenatal and neonatal care, and direct assistance in labor and delivery. Finally, nurse practitioners serve as primary and specialty care providers, providing a blend of nursing and health care services to patients and families. Specialties include pediatrics, family practice, and women's health, among others.

In addition to caring for patients with existing conditions and illnesses, nurses also perform a valuable service by providing education and preven-

tive care to healthy populations. A good example of this type of nurse includes an *occupational health nurse*, who seeks to prevent job-related injuries and illnesses and supports employers in implementing health and safety standards.

Some RNs work in applied nursing jobs, or in positions that require the medical knowledge of a nurse without the traditional hands-on work with patients. The following paragraphs detail some popular applied nursing specialties:

Nurse educators evaluate existing or create new professional development plans for student nurses and RNs. They teach a variety of nursing classes to students.

Forensic nurses provide legal testimony in investigations of accidents or crimes.

Legal nurse consultants are registered nurses with considerable nursing experience and knowledge of the legal system. They use these skills to assist lawyers in health-care-related cases. According to the American Association of Legal Nurse Consultants (www.aalnc.org), legal nurse consultants offer support to the law profession in the following practice areas: personal injury, product liability, medical malpractice, workers' compensation, toxic torts, risk management, medical licensure investigation, criminal law, elder law, and fraud and abuse compliance.

Nursing informatics specialists organize a database of patients' medical information in an accessible format. They may customize and test the database according to the needs of different medical departments or specialties. Nursing informatics specialists also train nurses on computer charting, which consists of adding information to or retrieving it from the database. They may also write and install new programs or software applications to help nursing staffs work more efficiently.

As the types of nursing varieties are numerous, so are the settings in which nurses work. In addition to hospitals, doctor's offices, and medical clinics, nurses work in patients' homes, schools, large corporations, community centers, and other locations. Hospitals or other 24-hour facilities must be staffed around the clock, so some nurses work holidays, weekends, and overnight shifts.

Nurses follow strict guidelines in handling hazardous medical waste or dangerous instruments such as needles. They are also exposed to patients with contagious diseases, so they must wear protective gear such as masks and gloves. Hand washing is constant and methodical in nursing to prevent the transmission of communicable diseases.

While their jobs may be stressful, most nurses find caring for others enjoyable and rewarding.

REQUIREMENTS

HIGH SCHOOL

Take health, mathematics, biology, anatomy and physiology, chemistry, physics, English, speech, and computer science classes in high school to prepare for a career in nursing.

POSTSECONDARY TRAINING

Prospective RNs have the option of pursuing one of three training paths: associate's degree, diploma, and bachelor's degree. Associate's degree programs in nursing last two years and are offered by community colleges. Diploma programs in nursing typically last three years and are offered by hospitals and independent schools. Bachelor of science in nursing programs are offered by colleges and universities. They typically take four—and sometimes five—years to complete. Graduates of each path are known as graduate nurses and must take a licensing exam in their state to obtain the RN designation. Visit www.discovernursing.com for a database of nursing programs.

Students who are interested in becoming nurse managers should earn at least a bachelor's degree. Those interested in becoming nursing educators or advanced practice nurses or advancing as an RN should earn at least a master's degree in nursing, plus industry certifications.

CERTIFICATION AND LICENSING

Certification or credentialing, while voluntary, is highly recommended. It is an excellent way to stand out from other job applicants and demonstrate your abilities to prospective employers. Certification is offered by the American Nursing Credentialing Center, the National League for Nursing, and many other nursing organizations.

Nurses must be licensed to practice nursing in all states and the District of Columbia. Licensure requirements vary by state but typically include graduating from an approved nursing school and passing the National Council Licensure Examination, which is administered by the National Council of State Boards of Nursing.

OTHER REQUIREMENTS

To be a successful registered nurse, you should be detail oriented, have excellent communication skills, be sympathetic and caring, be calm under pressure, have leadership skills, and be willing to continue to learn throughout your career. You will need to be emotionally strong, since you will encounter many heartbreaking cases and emergency situations. You will also need to be physically fit, since you will spend many hours on your feet and often bend and stoop, and lift patients, as needed.

EXPLORING

Read books about nursing, talk with your counselor or teacher about setting up a presentation by a nurse, take a tour of a hospital or other health care setting, or volunteer at one of these facilities. Nursing websites, including those of professional associations, can also be a good source of information. Here are a few suggestions: Cybernurse.com (www.cybernurse.com), Discover Nursing (www.discovernursing.com), and Nurse.com (www.nurse.com). You should also join Future Nurses organizations or student health clubs at your school.

There are many resources for young men who are interested in careers in nursing. Discover Nursing (<http://www.discovernursing.com>) offers articles

about males in nursing. The American Association of Nurse Anesthetists offers a Men in Nursing DVD. Visit www.aana.com for more information. Other useful resources include MinorityNurse.com, *Men in Nursing* magazine (www.nursingcenter.com), NurseLookUp.com, and *Male Nurse Magazine* (www.malenursemagazine.com).

EMPLOYERS

Approximately 2.6 million registered nurses are employed in the United States; 8.9 percent are men. The U.S. Department of Labor reports that 60 percent of registered nurses work at hospitals, 8 percent in offices of physicians, 5 percent in home health care services, 5 percent in nursing care facilities, and 3 percent in employment services. Other RNs are employed by colleges and universities, prisons, corporations, government agencies, and social assistance agencies. Some RNs with advanced education work as college nursing professors.

GETTING A JOB

Many registered nurses obtain their first jobs as a result of contacts made through college internships, clinical rotations, or networking events. Others seek assistance in obtaining job leads from college career services offices, newspaper want ads, and employment websites. Additionally, professional associations, such as the American Nurses Association, provide job listings at their websites. See For More Information for a list of organizations. Those interested in positions with the federal government should visit the U.S. Office of Personnel Management's website, www.usajobs.gov.

EARNINGS

Salaries for registered nurses vary by type of employer, geographic region, and the worker's experience level and skills. Median annual salaries for registered nurses were \$64,690 in May 2010, according to the U.S. Department of Labor (USDOL). Salaries ranged from less than \$44,190 to \$95,130 or more. The USDOL reports the following mean annual earnings for registered nurses by employer: offices of physicians, \$70,530; general medical and surgical hospitals, \$68,610; outpatient care centers, \$67,550; home health care services, \$63,850; and nursing care facilities, \$59,990.

Employers offer a variety of benefits, including the following: medical, dental, and life insurance; paid holidays, vacations, and sick days; personal days; 401(k) plans; profit-sharing plans; retirement and pension plans; and educational-assistance programs. Self-employed workers must provide their own benefits.

EMPLOYMENT OUTLOOK

The career outlook for nurses is excellent. The U.S. Department of Labor (USDOL) predicts that more than 737,000 new and replacement nurses will be needed by 2018 to care for the growing—and aging—U.S. popu-

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lation. The next several years will be an excellent time to pursue a career in nursing. Employment for nurses will be best in offices of physicians. This sector will experience growth of 48 percent through 2018, according to the USDL. Employment for nurses in home health care services will grow by 33 percent; by 25 percent in nursing care facilities; by 24 percent in employment services; and by 17 percent in hospitals, public and private.

Many nursing specialties are experiencing strong growth. One of the fastest-growing areas is the care of geriatric populations. As baby boomers continue to reach their mid-60s and beyond, there will be increasing demand for nurses with specialized training in geriatric care. According to *Who Will Care for Each of Us?: America's Coming Health Care Crisis*, the ratio of potential caregivers to those who need care (including the growing elderly population) will decrease by 40 percent between 2010 and 2030, creating a strong need for health care professionals, including nurses. In addition, the USDL reports that clinical nurse specialists, nurse practitioners, nurse-midwives, and nurse anesthetists will be in strong demand. Opportunities should also be good for nurses who "provide specialized long-term rehabilitation for stroke and head injury patients."

Despite the rosy outlook, the American Association of Colleges of Nursing (AACN) reports that enrollment in entry-level baccalaureate nursing programs grew by only 3.6 percent from 2008 to 2009. This growth is not enough to fill all available openings. The Health Resources and Services Administration states that "to meet the projected growth in demand for RN services, the U.S. must graduate approximately 90 percent more nurses from U.S. nursing programs."

Many students are interested in studying nursing, but they are finding it hard to land a coveted spot in nursing school. The AACN notes that 39,423 qualified applicants to baccalaureate and graduate nursing programs were turned away in 2009 due to "insufficient number of faculty, clinical sites, classroom space, clinical preceptors, and budget constraints."

What is causing the faculty shortages? Earnings and age are two of the most significant factors. According to the *New York Times*, nursing educators earn 40 to 50 percent less than nurses employed in clinical settings, which keeps qualified nurses who might be interested in pursuing a career in academe on the sidelines due to financial considerations. Additionally, many nurses are becoming educators late in their careers—the average age of nursing educators is 57—and many educators are retiring without being replaced.

To address these shortages, professional nursing organizations are working to secure federal funding for faculty development programs, creating scholarship programs for doctoral education (the typical educational requirement for top positions in nursing education), and attempting to develop a more direct route to the Ph.D. in order to encourage students to pursue nursing education at a younger age.

FOR MORE INFORMATION

For information on opportunities for men in nursing, contact

**American Assembly
for Men in Nursing**

PO Box 130220
Birmingham, AL 35213-0220
www.aamn.org

For information on careers in assisted living facilities, contact

**American Assisted
Living Nurses Association**

PO Box 10469
Napa, CA 94581
www.alnursing.org

For information on accredited nursing programs and diversity issues, contact

**American Association
of Colleges of Nursing**

One Dupont Circle, NW, Suite 530
Washington, DC 20036-1135
www.aacn.nche.edu

Visit the ANA website for a wealth of information about education, careers, and credentialing.

**American Nurses
Association (ANA)**

8515 Georgia Avenue, Suite 400
Silver Spring, MD 20910-3492
www.nursingworld.org

For info on certification, contact

**American Nurses
Credentialing Center**

c/o American Nurses Association
8515 Georgia Avenue, Suite 400
Silver Spring, MD 20910-3492
www.nursecredentialing.org

For industry news, visit the society's website.

**American Society
of Registered Nurses**

1001 Bridgeway, Suite 233
Sausalito, CA 94965-2104
www.asrn.org

For information on licensing, contact

**National Council of
State Boards of Nursing**

111 East Wacker Drive, Suite 2900
Chicago, IL 60601-4277
www.ncsbn.org

For general information about nursing, contact

National League for Nursing

61 Broadway, 33rd Floor
New York, NY 10006-2701
www.nln.org

The (N-OADN) serves as an advocate for registered nurses who have earned an associate's degree. Visit its website for more information.

**National Organization for Associate
Degree Nursing (N-OADN)**

7794 Grow Drive
Pensacola, FL 32514-7072
www.noadn.org

For membership information, contact

**National Student
Nurses' Association**

45 Main Street, Suite 606
Brooklyn, NY 11201-1099
www.nsna.org

For information on nursing education, careers, scholarships, and articles about men in nursing, visit

Discover Nursing

www.discovernursing.com
www.discovernursing.com/men-in-nursing

For resources for aspiring and current nurses with disabilities, visit

ExceptionalNurse.com

www.exceptionalnurse.com

SPECIAL EDUCATION TEACHERS

OVERVIEW

Special education teachers design and modify curricula and teaching methods to work with children and adolescents who have special needs—from the hearing or visually impaired, to students with physical or mental/emotional disabilities, to students with specific learning disabilities. Some also work with intellectually gifted students, those who have suffered physical or mental abuse, and those who do not speak English proficiently. Special education teachers work in schools (pre-K through high school) either within general education classes or in separate classrooms. They also work in hospitals and make home visits. All special education teachers must be licensed. Some states require teachers to have a bachelor's degree in special education as part of their licensing requirements; others require a master's degree. Approximately 473,000 special education teachers work in the United States; 14 percent are men. Employment opportunities should be excellent during the next decade.

FAST FACTS

High School Subjects

English

Speech

Personal Skills

Communication

Helping

Leadership

Minimum Education Level

Bachelor's degree

Salary Range

\$34,690 to \$53,500 to

\$86,380+

Employment Outlook

Faster than the average

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25-2053.00, 25-2054.00

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THE JOB

A typical day for a special education teacher varies depending on the age and disability of the students they serve and on the work setting. Disabilities that may require students to participate in special education include autism, combined deafness and blindness, emotional disturbance, hearing impairments, mental retardation, multiple disabilities, orthopedic impairments, specific learning disabilities, speech or language impairments, traumatic brain injury, visual impairments, and other health problems. The most common work settings include preschools and elementary, middle, and secondary schools. A few special education teachers work with infants and toddlers.

Educators who work with young children focus on using play to teach, much like general elementary teachers. However, these special educators have to consider the emotional or physical constraints of their students when developing their lessons. For example, they may have to use modified toys to help a student who is visually impaired. *Middle- and high-school special education educators* teach older students with special needs. As curriculum and testing become more advanced, these teachers must modify teaching and assessment tools to ensure that students have an equal opportunity to learn and advance. For example, they may discover that one student may learn better through oral lessons rather than reading a textbook. In this instance, they prepare special audio recordings or CDs for the student to listen to at home. A student with a physical disability might need to learn with the assistance of computer touch-screen technology. Another student may have challenges with time constraints when taking tests, so the special educator will administer tests untimed in order to provide the student with extra time to complete the test.

In addition to varieties in ages and disabilities, special education teachers' careers vary by employment setting. Some work in general classrooms alongside teachers (this approach is called "mainstreaming"). These classes, also called "inclusive" or "self-contained" classes, mix general education students with students with special needs. The special educator will take the classroom teacher's lesson plans or unit goals and modify them to better suit the special-needs student. Some may create lesson plans from scratch. Other special education teachers work in resource rooms with students coming in and out all day based on specific schedules. This method, called the "pull-out classroom," allows the teacher to work one-on-one with the student, but it has disadvantages in that it can make the student feel singled out or isolated from his or her peers. Some schools mix the two methods.

All students, regardless of their needs, have what is called an Individualized Education Plan (IEP). The IEP establishes personalized goals for the student based on his or her disability and learning style. The ultimate goal of the IEP is to prepare the student for advancement to the next educational level and/or employment. It is usually the job of the special education teacher to develop and record progress on the student's IEP. This is used to communicate progress and goals to parents and all teachers within the school who work with the student. The IEP is also used for state reporting. Preparing and maintaining students' IEPs can be challenging—especially because the teacher must also grade student performance, take attendance, meet with other teachers to discuss student performance and education goals, and correspond and/or meet with parents regarding their children's progress.

Did You Know?

Slightly more than 5 percent of the 53.9 million school-aged children (ages five to 17) in the United States were reported to have a disability in 2010, according to the U.S. Census Bureau.

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All special education teachers, whether they work in classrooms or in special resource rooms, need to be able to collaborate with others. Students with special needs achieve more when they have the full cooperation of teachers, special education teachers and assistants, parents, community agencies, and school administrators, who all work together to assist the student. Each member of the team brings unique insight and expertise that can be used to help the child remain challenged and focused and continue to learn.

Some special education teachers specialize in preparing students for life after graduation by assisting with job training and placement or life skills development (such as balancing a checkbook, developing good grooming habits, or learning how to use public transportation). They work with community agencies to line up jobs, training programs, or other resources for a student once he or she transitions out of the school.

Special education teachers may also conduct home visits or visit hospitalized children with disabilities.

A career as a special education teacher can be physically and emotionally draining. Educators may become frustrated by uncooperative students or get overwhelmed working with a student who has an increasing number of setbacks. The amount of paperwork required for the job can also be frustrating. However, most special educators agree that helping students succeed in life and in school is incredibly rewarding and outweighs the frustrations. They also cite their ability to build strong relationships with students as another perk of the job.

REQUIREMENTS

HIGH SCHOOL

In high school, take courses in health, mathematics, English, speech, computer science, and psychology. Participate in any activities in which you can help or teach others.

POSTSECONDARY TRAINING

All special education teachers must be licensed. Some states require teachers to have a bachelor's degree in special education as part of the licensing requirements; others require a master's degree. Some states offer alternative qualification programs for people with bachelor's degrees but no experience in education. Special education training programs are offered at the undergraduate, master's, and doctoral degree levels. Visit www.personnelcenter.org/get.cfm for a searchable database of programs.

CERTIFICATION AND LICENSING

The American Academy of Special Education Professionals offers voluntary board certification to special education teachers who have at least a master's degree and pass an examination. Contact the academy for more information.

All 50 states and the District of Columbia require special education teachers to be licensed. The National Center for Special Education Personnel and

Related Service Providers offers information on licensing requirements for each state at its website, www.personnelcenter.org/licensure.cfm.

OTHER REQUIREMENTS

Successful special education teachers are empathetic, emotionally stable, open-minded, creative, organized, patient, and good motivators. They also have strong communication skills. In addition to working closely with students, they interact frequently with parents, other teachers, social workers, psychologists, therapists, and school administrators. Approximately 64 percent of special education teachers belong to a union or are covered by a union contract.

EXPLORING

There are many ways to learn more about a career as a special education teacher. You can read books and periodicals about the field, visit the websites of college special education programs to learn about typical classes and possible career paths, and talk to a special education teacher at your school about the rewards and challenges of his or her career. Perhaps you can observe a special education class while it is in session. You should also consider volunteering to work with people with special needs at a day camp, community agency, residential facility, or other employer. Professional associations can also provide information about the field.

EMPLOYERS

Approximately 473,000 special education teachers are employed in the United States; about 14 percent are men. Most work in private and public schools. A few work at residential facilities, social-assistance agencies, home settings, correctional facilities, and hospitals. Others pursue careers as teachers in higher education.

GETTING A JOB

Many special education teachers obtain their first jobs as a result of contacts made through college internships, career fairs, or networking events. Others seek assistance in obtaining job leads from college career services offices, newspaper want ads, and employment websites. Additionally, professional associations such as the National Association of Special Education Teachers (www.naset.org), American Academy of Special Education Professionals (<http://aasep.org>), and Council for Exceptional Children (www.specialedcareers.org) provide job listings at their websites. The National Center to Improve the Recruitment and Retention of Qualified Personnel for Children with Disabilities offers information on state teacher employment clearinghouses, job banks, and recruitment initiatives at its website, www.personnelcenter.org/tate_clearinghouses.cfm. Other job-search sites and teacher placement services include TopSchoolJobs (www.topschooljobs.org), USteach (www.usteach.com), and Project Connect (<http://careers.education.wisc.edu/projectconnect/MainMenu.cfm>).

EARNINGS

Salaries for special education teachers vary by type of employer, geographic region, and the worker's experience, education, and skill level. The U.S. Department of Labor reports that special education teachers earned the following mean annual salaries by employer in May 2010: preschool, kindergarten, and elementary school, \$52,250; middle school, \$54,810; and secondary school, \$52,900. Salaries for all special education teachers ranged from less than \$34,690 to \$86,380 or more.

Special education teachers usually receive benefits such as health and life insurance, vacation days, sick leave, and a savings and pension plan. Self-employed teachers must provide their own benefits.

EMPLOYMENT OUTLOOK

The U.S. Department of Labor predicts that employment for special education teachers will grow faster than the average for all occupations during the next decade. Opportunities will vary by geographic region; for example, positions in rural areas and inner cities will be more readily available than those in suburban or affluent urban areas. Employment will also be strong in the South and West due to increases in the student populations in these areas. Finally, employment prospects will vary by specialty. Teachers who work with children with multiple disabilities and severe disabilities (such as autism), as well as those who work with young children and those with bilingual skills, will be in strong demand.

Nearly seven million students between the ages of six and 21 are enrolled in special education programs, according to the National Association of Special Education Teachers. This number is expected to rise as the U.S. population continues to grow and more children become eligible for special education programs under the Individuals with Disabilities Education Improvement Act. Unfortunately, there is a shortage of qualified special education teachers to meet these increases.

Several factors are causing this shortage. Certification requirements have become more demanding, which is making it harder for people to become qualified to enter the field. Another key factor causing the shortage is the fact that more special education teachers leave the field after one year than do general educators as a result of the demanding nature of the career, lack of support from school administration, and isolation from other educators.

States and school districts are seeking to attract special education candidates by creating recruitment, retention, and mentoring programs; offering financial aid; and creating alternative routes to certification for those who have bachelor's degrees in subjects other than education.

FOR MORE INFORMATION

For information on careers and board certification, contact

American Academy of Special Education Professionals

700 12th Street, NW, Suite 700
Washington, DC 20005-4052
800-754-4421, ext. 106
info@aasep.org
http://aasep.org

The Council works to improve the educational success of individuals with disabilities and/or gifts and talents. Visit its website to read teachers' blogs and other publications.

Council for Exceptional Children

2900 Crystal Drive, Suite 1000
Arlington, VA 22202-3557
866-509-0218
www.cec.sped.org

For special education resources, contact

Council of Administrators of Special Education

101 Katelyn Circle, Suite E
Warner Robins, GA 31088-6484
478-333-6892
www.casecec.org

Visit the association's website for resources for special education teachers, information on board certification, and answers to FAQs about special education teachers.

National Association of Special Education Teachers

1250 Connecticut Avenue, NW, Suite 200
Washington, DC 20036-2643
800-754-4421
contactus@naset.org
www.naset.org

Visit the center's website for a database of postsecondary training programs and information on careers and licensing.

National Center to Improve the Recruitment and Retention of Qualified Personnel for Children with Disabilities

National Association of State Directors of Special Education
1800 Diagonal Road, Suite 320
Alexandria, VA 22314
www.personnelcenter.org

For information on government-sponsored special education programs, contact

**U.S. Department of Education
Office of Special Education and
Rehabilitative Services**

400 Maryland Avenue, SW
Washington, DC 20202-7100
202-245-7468
www.ed.gov/about/offices/list/osers/index.html

SPEECH-LANGUAGE PATHOLOGISTS AND AUDIOLOGISTS

OVERVIEW

Speech-language pathologists, also known as *speech therapists*, assess, diagnose, and treat people with voice disorders, including speech, language, cognitive-communication, and fluency irregularities. *Audiologists* work with people who have hearing, balance, and other related ear problems. Speech-language pathologists need a master's degree in speech-language pathology to work in the field. Audiologists must have a doctorate in audiology to become certified. Approximately 119,300 speech-language pathologists and 12,800 audiologists are employed in the United States. Men make up 4.2 percent of speech-language pathologists and 23 percent of audiologists. Employment prospects for speech-language pathologists and audiologists are expected to be favorable during the next decade.

THE JOB

People who suffer from illnesses and injuries involving hearing loss, and those with speech rhythm and fluency problems, developmental delays, or physical delays or disorders, often seek out the services of speech-language pathologists. These include patients with brain injury or deterioration, developmental delays or disorders, stroke, learn-

FAST FACTS

High School Subjects

Biology
Health
Speech

Personal Skills

Communication
Complex problem solving
Helping
Technical

Minimum Education Level

Master's degree (speech-language pathologists)
Doctorate (audiologists)

Salary Range

\$42,970 to \$66,920 to
\$103,630+ (speech-language pathologists)
\$42,590 to \$66,660 to
\$102,210+ (audiologists)

Employment Outlook

Faster than the average
(speech-language pathologists)
Much faster than the average
(audiologists)

O*NET-SOC

29-1127.00 (speech-language pathologists)
29-1181.00 (audiologists)

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ing disabilities, cleft palate, voice pathology, cerebral palsy, mental retardation, and emotional problems. These problems can be acquired, developmental, or congenital. Speech-language pathologists assess, diagnose, treat, and, in some cases, prevent further damage or delays.

When working with a new patient, speech-language pathologists use written and oral tests to assess the nature and extent of the impairment. They also use special technology such as electronic speech fluency rating instruments for patients with fluency irregularities such as stammering or stuttering.

After diagnosis, speech-language pathologists create an individualized plan of care. They start patients on a regular therapy treatment schedule, the length and scope depending on the patient and his or her condition. Some treatments include breathing exercises or oral motor exercises to strengthen muscles that are used in swallowing and speaking. Speech therapists also teach patients how to form their mouth and tongue, by demonstration, in order to achieve different sounds. Patients with hearing loss or cochlear implants can be trained to use special audio devices for the telephone. Others may be taught to use sign language or other alternative communication methods. Treatments are also tailored to the patient's age. For example, when working with young children with cognitive communication disorders or speech delays, speech-language pathologists may incorporate games with repetitive exercises specially designed to hold a child's interest and attention span.

Many speech-language pathologists also work with patients who want to correct their speech rhythm and fluency problems. Some patients who depend on their voices for a living may seek help to erase an accent or reduce harshness in their voices. Others, such as transgender patients, often use speech therapy to change the pitch of their voices. Some speech-language pathologists are employed by businesses to help employees improve communication with their customers.

Speech-language pathologists in medical settings often consult with doctors, nurses, psychologists, and other therapists and health care workers when evaluating a new patient. In schools, they work closely with teachers, social workers, interpreters, and other professionals. Speech therapists stay in close contact with them throughout the course of therapy, as well as with patients and their families. Speech-language pathologists keep detailed records of patients' diagnoses, treatments and therapies, and continuing progress.

Audiologists work with people who have hearing loss, balance problems, or other issues concerning the ear. These conditions can be the result of injury, illness, infections, birth defects, exposure to loud noises, or simply advanced age.

When working with a new patient, audiologists use a battery of hearing tests to determine the level of impairment. They often consult with doctors, nurses, teachers, and family members to get a clearer picture of the patient's situation. Treatments include a thorough cleaning of the ear canal, as sometime excess wax may hinder hearing. Audiologists may suggest hearing devices or cochlear implants to improve a patient's hearing level.

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Audiologists also help patients adjust for hearing impairment by training them in the use of various hearing instruments or providing them with strategies to improve their listening skills. Some patients may be trained in lip reading. Audiologists may also encourage patients to use large area amplification devices or alerting devices in their homes.

Some people suffer from hearing loss due to their work environment. Patients include musicians and factory workers with work-related hearing problems. Audiologists try to prevent such injuries by measuring noise levels at the workplace. With extreme situations, they may suggest that clients wear protective ear devices to reduce excessive noise.

Speech-language pathologists and audiologists also are responsible for completing paperwork, billing, and supervising assistants and other staff. In addition to their clinical work, some speech-language pathologists and audiologists teach at the university level or conduct research on a particular specialty.

Full-time speech-language pathologists and audiologists work 40 hours a week, though most work longer hours in order to accommodate high patient loads. Some evening and weekend hours should be expected. Speech-language pathologists and audiologists who work part-time at several facilities need a reliable vehicle in order to travel from site to site.

Speech-language pathologists and audiologists who work in private practice have the added expense of overhead costs, including office space, furniture and equipment, and staff salary and benefits.

Speech-language pathologists and audiologists work in a wide range of settings, including schools, hospital rooms, rehabilitation centers, clinics, doctor's offices, and in private practice (in office settings and in a patient's home). Their offices are located indoors and are clean and comfortable. A quiet atmosphere is often needed when working with patients. Speech-language pathologists and audiologists must relate to patients and their families, often explaining complicated medical terminology or treatments, or updating them on the patient's development and progress. They also consult with other health care professionals regarding patients.

REQUIREMENTS

HIGH SCHOOL

In high school, take courses in biology, anatomy and physiology, physics, mathematics, the social sciences, speech, English, languages, and psychology.

POSTSECONDARY TRAINING

The minimum educational requirement to work as a speech therapist is a master's degree in speech-language pathology. The Council on Academic Accreditation (CAA) has accredited approximately 265 graduate-level academic programs in speech-language pathology.

Audiologists need a doctorate in audiology (known as the Au.D.) to become certified. The CAA also accredits education programs in audiology. Approximately 75 doctoral programs in audiology are accredited by the organization. Typical classes for audiologists include Acquisition and

Development of Speech and Language, Electrophysiology, Audiological Assessment and Diagnosis, Acoustic Phonetics, Auditory Disorders, Application of Hearing Aids to Auditory Disorders, Sign Language, and Ethical Issues in Audiology.

Both speech therapists and audiologists participate in clinical rotations during their college study. These become progressively more challenging and involve less direct supervision as the student proceeds in the program.

The American Speech-Language-Hearing Association offers a list of schools that award degrees in speech pathology and audiology at its website, www.asha.org/students/academic/EdFind.

CERTIFICATION AND LICENSING

Certification for speech-language pathologists and audiologists is available from the American Speech-Language-Hearing Association. Applicants must meet educational requirements, complete a supervised clinical practicum, and pass an examination, among other requirements. Speech therapists who complete these requirements are awarded the certificate of clinical competence in speech-language pathology, while audiologists receive the certificate of clinical competence in audiology. In addition, board certification in audiology is offered by the American Board of Audiology (www.americanboardofaudiology.org). The Board also offers specialty certification in cochlear implants. Those who obtain professional credentialing may satisfy some or all state licensing requirements. Speech-language pathologists with advanced training can become board recognized in child language, fluency disorders, and swallowing disorders. Visit www.asha.org/students for more information.

Nearly all states regulate speech-language pathologists. According to the U.S. Department of Labor, “typical licensing requirements are a master’s degree from an accredited college or university; a passing score on the national examination on speech-language pathology, offered through the Praxis Series of the Educational Testing Service; 300 to 375 hours of supervised clinical experience; and nine months of postgraduate professional clinical experience.” Contact your state’s regulatory board for information on regulation and eligibility requirements. Speech-language pathologists who work in public schools may need to meet additional licensing requirements. Check with your state’s department of education for more information.

All states require audiologists to be licensed. Nearly 20 states require applicants to have a doctoral degree in audiology as a condition of licensure. Some states may also require audiologists to acquire a separate hearing-aid dispenser license. Contact your state’s medical or health board for information on licensing requirements in your state.

OTHER REQUIREMENTS

Since they work with patients of all ages, speech-language pathologists and audiologists must be able to work with people who have a variety of personalities and attention spans. Successful professionals are able to stay patient and focused, with great attention to detail. They need excellent communication skills in order to write reports, interact with coworkers,

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and discuss test results and treatment plans with patients and their families. Other important traits include strong organizational skills, scientific aptitude, an empathetic personality, good listening skills, and a willingness to continue to learn about new diagnostic and treatment technologies throughout one's career.

Approximately 40 percent of speech-language pathologists and 15 percent of audiologists are members of a union or covered by a union contract.

EXPLORING

There are many ways to learn more about a career as a speech therapist or audiologist. You can read books and journals about the field, ask your teacher or school counselor to arrange an information interview with a speech therapist or audiologist, and visit the websites of college speech-language pathology or audiology programs to learn about typical classes and possible career paths. Professional associations can also provide information about the field. The American Speech-Language-Hearing Association provides a wealth of information on education and careers, as well as profiles of workers, at its website, www.asha.org/students. You should also try to land a part-time job in a setting that employs speech-language pathologists or audiologists. This will give you a chance to interact with these professionals and see if the career is a good fit for your interests and abilities.

EMPLOYERS

Approximately 119,300 speech-language pathologists are employed in the United States; men make up 4.2 percent of this total. Nearly 50 percent of speech-language pathologists work in educational services. Others are employed by health maintenance organizations; hospitals; public health departments; research agencies; nursing care facilities; home health care services; individual and family services; outpatient care centers; child day care centers; long-term care facilities; rehabilitation centers; government agencies; and corporate speech-language pathology programs. About nine percent of speech therapists are self-employed.

About 12,800 audiologists are employed in the United States, with men comprising 23 percent of this total. Approximately 64 percent of audiologists work in health care facilities. These include offices of physicians or other health practitioners, outpatient care centers, and hospitals. About 14 percent work in educational services. Government agencies also employ audiologists. Some audiologists work as audiology professors, as designers of hearing instruments and testing equipment, and in industrial settings (such as factories) creating hearing conservation programs for workers.

GETTING A JOB

Many speech-language pathologists and audiologists obtain their first jobs as a result of contacts made through college internships, career fairs, or

networking events. Others seek assistance in obtaining job leads from college career services offices, newspaper want ads, and employment websites. Additionally, the American Speech-Language-Hearing Association provides job listings and career advice (such as preparing a résumé, acing a job interview, and negotiating a salary) at its website, www.asha.org/careers/job. Those interested in positions with the federal government should visit the U.S. Office of Personnel Management's website, www.usajobs.gov.

EARNINGS

Salaries for speech-language pathologists and audiologists vary by type of employer, geographic region, and the worker's experience, education, and skill level. Median annual salaries for speech-language pathologists were \$66,920 in May 2010, according to the U.S. Department of Labor (USDOL). Salaries ranged from less than \$42,970 to \$103,630 or more. The USDOL reports the following mean annual earnings for speech-language pathologists by industry: home health care services, \$89,800; nursing care facilities, \$80,310; offices of other health practitioners, \$75,810; general medical and surgical hospitals, \$73,490; and elementary and secondary schools, \$64,310.

Speech-language pathologists who worked in health care earned average salaries of \$70,000 in 2011, according to the American Speech-Language-Hearing Association.

Audiologists earned salaries that ranged from less than \$42,590 to \$102,210 in May 2010, according to the USDOL. They earned a median annual salary of \$66,660.

Employers offer a variety of benefits, including the following: medical, dental, and life insurance; paid holidays, vacations, and sick and personal days; 401(k) plans; profit-sharing plans; retirement and pension plans; and educational-assistance programs. Self-employed and part-time workers must provide their own benefits. Approximately 20 percent of speech-language pathologists work part-time.

"Generally speaking, the field of speech-language pathology appears to be one that will not slow down in the foreseeable future. It appears that the number of career opportunities will continue to grow as there continue to be advances in health care, which results in a great number of individuals who, for a number of reasons, may not have needed to access those services offered by a qualified speech-language pathologist."—Ivan Mejia, Speech-Language Pathologist

EMPLOYMENT OUTLOOK

Employment for speech-language pathologists is expected to grow by 19 percent from 2008 to 2018, according to the U.S. Department of Labor

(USDL)—or faster than the average for all careers. Increases in elementary- and secondary-school enrollments, the aging of the large Baby Boomer generation (which will have a growing number of neurological disorders and associated language, speech, and swallowing impairments), and medical advances that are increasing survival rates for trauma and stroke victims and premature infants (who may require speech therapy) are all creating an increased demand for speech-language pathologists. Demand will be best for speech-language pathologists who speak a second language, such as Spanish, and who are willing to relocate to areas of the United States where demand is higher for speech therapists.

Job opportunities for audiologists are expected to grow much faster than the average for all occupations through 2018, according to the USDL. But since only a small number of people are employed in the field, it will be difficult to land a job. Those who have the Au.D. degree will have the best job prospects. As school enrollments continue to grow, there will be good job prospects for audiologists who work at elementary and secondary schools. Areas that have a large number of retirees, who typically have more hearing problems than other demographic groups, will also offer strong prospects for audiologists.

FOR MORE INFORMATION

For information on hearing and balance disorders, contact

American Auditory Society
19 Mantua Road
Mt. Royal, NJ 08061-1006
www.amauditorysoc.org

For a wealth of information on education and careers, contact

American Speech-Language-Hearing Association
2200 Research Boulevard
Rockville, MD 20850-3289
800-638-8255
www.asha.org

For information on the Au.D. degree, contact

Audiology Foundation of America
480-219-6124
www.audfound.org

To learn more about audiologists who work in education and other settings, contact

Educational Audiology Association
3030 West 81st Avenue
Westminster, CO 80031-4111
800-460-7322
admin@edaud.org
www.edaud.org

This association is for undergraduate and graduate students studying normal and disordered human communication. Visit its website for more information.

National Student Speech Language Hearing Association
2200 Research Boulevard, #450
Rockville, MD 20850-3289
nsslha@asha.org
www.nsslha.org

Interview: Ivan Mejia

Ivan Mejia is a bilingual speech-language pathologist at Bilingual Speech Therapy of Houston (www.bilingualspeech.org) in Houston, Texas. He discussed his career with the editors of *Nontraditional Careers for Women & Men*.

Q. How long have you worked in the field? What made you want to enter this career?

A. I have worked in the field of speech-language pathology for more than 10 years. When I was a child, I knew that I wanted to pursue the rewards of being in a helping profession. I also had a keen interest in the sciences, namely the health sciences. Due to a lack of knowledge of the various professions available that would suit my wants and needs, I enrolled in a university and embarked on a quest for information. While on my quest for information, I began working in a library on the college campus.

Upon befriending the librarians, I was introduced to a breadth of resources that helped to steer me in the right direction. Along the way, I met another student with a similar background who was studying speech-language pathology. She gave me great insight into the field. The combination of word-of-mouth and my research would ultimately help me decide my chosen path. Ultimately, this would result in one of the best decisions in my life.

Q. What is one thing that young people may not know about a career in speech-language pathology?

A. Speech-language pathology is a truly diverse discipline that lacks significant diversity. One can work in a variety of settings including hospitals, schools, daycares, nursing homes, private residences, colleges, and universities—the list of potential workplaces is endless. Naturally, the populations and demographics vary widely as well. A qualified speech-language pathologist may diagnose and/or treat individuals who present with speech, language, swallowing, and/or cognitive-linguistic deficits. Additionally, one may assist in the evaluation and/or treatment of individuals with reading or writing difficulties.

Despite the tremendous variability in work loads and potential work sites, diversity is lacking when it comes to finding qualified speech-language pathologists with backgrounds to match. For instance, there is a true lack of qualified individuals to serve many historically underserved segments of the population. In my own experiences, I have met less than 15 males [who work as speech-language pathologists]. The number declines sharply when accounting for linguistic diversity. In all my professional experiences, I have personally met or known of less than 10 bilingual speech-language pathologists who also happen to be male. The number of bilingual female speech-language pathologists is similar. In essence, there is a dearth of qualified personnel to meet the needs of the bilingual patients on many individuals' caseloads. Without the addition of more qualified individuals with diverse linguistic backgrounds, many would-be patients, students, and the like may never fully realize their potential.

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Q. What are the pros and cons of your job?

A. Pros:

- ✓ The field is very rewarding.
- ✓ Therapy can be quite effective.
- ✓ No two days are the same.
- ✓ The hours are flexible.
- ✓ One can be a specialist or a generalist, i.e.; one can focus on one area of speech-language pathology or practice in several areas of the discipline.
- ✓ One can change the focus of their work, i.e., to hospital, private clinic, etc.
- ✓ Interdisciplinary components/collaboration

Cons:

- ✓ It's difficult to keep up with and be effective in all aspects of the field if you do not choose to specialize in a particular area of the discipline.
- ✓ There are not enough qualified individuals to meet the needs of all those seeking our services.

Q. What are the most important personal and professional qualities for people in your career?

- #### **A.**
- The most important personal and professional qualities for people who practice speech-language pathology are a thirst for knowledge; adaptability; organization; personal drive; compassion; empathy; patience; dedication; self-motivation; creative thinking; analytical skills; and strong writing skills and strong verbal communication skills. Leadership qualities are also desirable as they can help to open the doors to countless opportunities.

Q. What advice would you give to young men who are interested in the field?

- #### **A.**
- Anyone interested in the field of speech-language pathology should consider harvesting any and all information possible to help in their decision-making processes. There are excellent sources of information available such as the website of the American Speech-Language-Hearing Association, www.asha.org. The U.S. Bureau of Labor Statistics also has great resources that provide excellent career specific information; visit www.bls.gov. After accessing the wealth of information one will see on these great websites, one should consider arranging an information-gathering interview with someone who is already practicing in the field of speech-language pathology. Additional sources of collecting data may come in the form of direct observation of a professional speech-language pathologist in action in any or all of the settings listed earlier.

If the discipline appears to be one of great interest to the potential future speech-language pathologist, then additional sources of data will be critical. As with any field, academic preparation and foundation skills must be obtained. In addition to the aforementioned, there are undergraduate- and graduate-level college guides available that illustrate the specific requirements for successful entry to and exit from the academic program in question. Lastly, as indicated and to answer the question above, there is no distinction between males and females when harvesting information to make a well-informed career-based decision.

Q. What is the future employment outlook for speech-language pathologists and bilingual speech-language pathologists? How is the field changing?

- A.** As mentioned in my last response, there are at least two great, valid, and reliable sources of information that will provide the reader with a great wealth of knowledge about speech-language pathology. In addition to those resources, there are some more obscure sources of data, e.g., the *Statistical Abstract of the United States*, that yield information related to population trends with any specific number or type of factors to take into consideration. Generally speaking, the field of speech-language pathology appears to be one that will not slow down in the foreseeable future. It appears that the number of career opportunities will continue to grow as there continue to be advances in health care, which results in a great number of individuals who, for a number of reasons, may not have needed to access those services offered by a qualified speech-language pathologist. In addition, as mentioned earlier, there are numbers of unserved or underserved segments of the United States population that currently need and will continue to need the services of a qualified speech-language pathologist.

The opportunities for employment for a bilingual speech-language pathologist are ever-increasing and there does not appear to be any slowing in sight. Reasons for the continuous need for more speech-language pathologists is related, as one might have inferred, to trends in health care and trends in population. On the world stage, there are many languages growing in popularity; however, in the United States it is quickly becoming common knowledge that Spanish is one of the more rapidly increasing languages of use. This, in combination with the advances in science and technology as well as the paucity of qualified professionals to meet the unique needs of non-English speakers, namely Spanish speakers, or bilingual Spanish-English speakers, results in countless career opportunities and a venture into the newest frontier of speech-language pathology.

Interview: Ahmad Alexander

Ahmad Alexander, Au.D., CCC-A is an audiologist at Reynolds Army Community Hospital in Lawton, Oklahoma. He discussed his career with the editors of *Nontraditional Careers for Women & Men*.

Q. How long have you worked in the field? What made you want to enter this career?

- A.** I am currently in my second year as a licensed audiologist. I entered the field of audiology because of past experiences in life. I was hit by a truck at the age of five years while walking across a street. Shortly thereafter, I was in a coma for three days. Upon being discharged from Oschner Hospital in New Orleans, Louisiana, I had to receive speech therapy services. While attending college many years later, a friend introduced me to the department and field of communicative disorders (speech language pathology and audiology), which brought back memories from my early childhood. Reminiscing about what I had experienced brought about a

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passion that I felt I could use to give back to others. During my final year in college, I decided to pursue audiology as a specialty.

Q. What is one thing that young people may not know about a career in audiology?

- A.** Audiology encompasses a wide array of opportunities. With a doctorate in audiology, one may work in a variety of settings such as the following: private audiology practices, ear, nose, and throat clinics, hospitals, Veteran's Administration hospitals, rehab centers, military, etc. An audiologist may be capable of providing services ranging from basic comprehensive audiometry (i.e., identification, diagnosis and treatment of hearing loss) to vestibular testing and rehabilitation, electrocochleography (EcoG), cochlear implant programming, hearing aid fittings, hearing loss prevention, and hearing protection devices, etc. Audiology is a very rewarding career!

Q. What are the pros and cons of your job?

- A.** Advantages: 1) There is a huge need for audiologists so there should always be a high demand for those in the profession. 2) There is an amazing opportunity to provide a means of communication in so many ways for those who suffer from hearing loss. 3) There is a joy that you get when you know that you have helped to improve a patient's quality of life—did I mention it's a very rewarding career!

Disadvantages: Autonomy or lack thereof (direct access to patient care)

Q. What is like being a male audiologist in a female-dominated field? Any special challenges?

- A.** It has become the norm for me because I have been surrounded by females within the field since my beginning years of college. Upon entering the field as a student, I was the only male in the entire program. As I have encountered different work environments during clinical rotations, residency, and work, it is also common to have a very small percentage of males as compared to females within the field. I do not feel as though there are any special challenges when it comes to being a male audiologist in a female-dominated field. One of the only drawbacks may be that it may sometimes be difficult to discuss "guy topics" (i.e., sports, guns, automobiles, etc.) among an entire group of females when you're the only guy present. It may also sometimes be uncomfortable for certain females to discuss "women topics" where there is a known male presence. However, I have rarely encountered those circumstances during my time as an audiologist. I have learned to adapt to different situations and those around me have done the same.

Q. What advice would you give to young men who are interested in the field?

- A.** My advice to anyone who is considering the field of audiology is to "do your research." Do what is necessary to ensure that you understand what is entailed within audiology as well as what is required to obtain and maintain a job in audiology. It is an opportunity to be involved in the medical profession and an opportunity to effect change in the lives of many individuals. If you are single, it is also an opportune time to meet very nice young ladies and maybe a possible future wife.

- Q. What is the future employment outlook for audiologists? How is the field changing?**
- A.** From my understanding, audiology has been rated one of the top 10 careers by certain sources. As mentioned earlier, there is a great demand for audiologists. Hearing loss is inevitable. There will always be someone who needs an audiologist, whether it is a parent bringing in a child for a newborn hearing screening or an elderly couple who are having difficulty communicating with one another because of their progression of hearing loss over time. It may be a soldier who has been exposed to hazardous noise levels (acoustic trauma or noise-induced hearing loss) during his/her career in the military—and the list goes on.
- The field is changing in that one has to now obtain a doctorate, instead of a master's degree, in order to have the opportunity to practice as a licensed audiologist. I believe audiology will be around for a very long time!

APPENDIX I: WOMEN'S CONSTRUCTION ASSOCIATIONS

The following professional associations offer support to women in the construction trades. Some are national organizations, others serve tradesworkers in a particular city, state, or region. Resources that they provide include career advice, job listings, career fairs, career information sessions, newsletters and other publications, conventions, profiles of women tradesworkers, mentoring programs, videos, blogs, pre-apprenticeship training, summer camps, and fix-it workshops for teens.

**ANew-Apprenticeship
and Nontraditional
Employment for Women**

550 SW 7th Street, Suite B305
Renton, WA 98057
206-381-1384
www.anewaop.org

**Canadian Association of
Women in Construction**

365 Brunel Road, Unit #1
Mississauga, ON L4Z 1Z5 Canada
info@cawic.ca
www.cawic.ca

Canadian Construction Women

142 – 757 West Hastings Street,
Suite 290
Vancouver, BC V6C 1A1 Canada
www.constructionwomen.org

Chicago Women in Trades

4425 South Western Boulevard
Chicago IL 60609
773-376-1450
cwitinfo@cwit2.org
www.chicagowomenintrades.org

Hard Hatted Women

4220 Prospect Avenue
Cleveland, OH 44103
216-861-6500
Info@HardHattedWomen.org
hardhattedwomen.org

Missouri Women in the Trades

8300 Manchester Road
Brentwood, MO 63144
314-963-3200
info@mowit.org
missouriwomenintrades.org

**National Association of Professional
Women in Construction, Inc.**

315 East 56th Street
New York, NY 10022
212-486-4712
pwc@pwcusa.org
www.pwcusa.org

**National Association
of Women in Construction**

327 South Adams Street
Fort Worth, TX 76104
800-552-3506
nawic@nawic.org
www.nawic.org

**Nontraditional
Employment for Women**

243 West 20th Street
New York, NY 10011
212-627-6252
www.new-nyc.org

Sisters in the Building Trades

PMB #131
17701 108th Avenue South East
Renton, WA 98055
206-618-6715
www.sistersinthebuildingtrades.org

Tradeswomen Inc.

1433 Webster Street
Oakland, CA 94612
<http://tradeswomen.org>

Vermont Works for Women

32A Malletts Bay Avenue
Winooski, VT 05404
800-639-1472
info@vtworksforwomen.org
www.vtworksforwomen.org

Washington Women in Trades

PO Box 24972
Seattle, WA 98124-0972
206-903-9508
www.wawomenintrades.com

**Women Construction
Owners and Executives**

www.wcoeusa.org

Women Contractors Association

10909 Jones Road, PMB 164
Houston, TX 77065
713-807-9977
www.womencontractors.org

Women in Non

Traditional Employment Roles

3655 South Grand Avenue, Suite 210
Los Angeles, CA 90007
213-749-3970
www.winterwomen.org

Women Unlimited

103 Winthrop Street
Augusta, ME 04330
800-281-5259
www.womenunlimited.org

Women's Bureau

U.S. Department of Labor
200 Constitution Avenue, NW
Washington, DC 20210
800-827-5335
www.dol.gov/wb

APPENDIX II: NONTRADITIONAL OCCUPATIONS OF EMPLOYED WOMEN IN 2010

Bricklayers, Block Masons, and Stone Masons: 0.1 percent
 Cement Masons, Concrete Finishers, and Terrazzo Workers: 0.3 percent
 Electrical Power Line Installers and Repairers: 0.4 percent
 Carpet, Floor, and Tile Installers and Finishers: 0.5 percent
 Heating, Air Conditioning, and Refrigeration Mechanics and Installers:
 0.6 percent
 Structural Iron and Rebar Workers: 0.6 percent
 Bus and Truck Mechanics and Diesel Engine Specialists: 0.7 percent
 Roofers: 1 percent
 Logging Workers: 1.1 percent
 Heavy Vehicle and Mobile Equipment Service Technicians and Mechanics:
 1.2 percent
 Automotive Body and Related Repairers: 1.2 percent
 Carpenters: 1.4 percent
 Plumbers, Pipelayers, Pipe Fitters, and Steamfitters: 1.5 percent
 Electricians: 1.5 percent
 Operating Engineers and Other Construction Equipment Operators:
 1.5 percent
 Stationery Engineers and Boiler Operators: 1.7 percent
 Aircraft Mechanics and Service Technicians: 2.3 percent
 Drywall Installers, Ceiling Tile Installers, and Tapers: 2.5 percent
 Locomotive Engineers and Operators: 2.6 percent
 Construction Laborers: 2.7 percent
 Pest Control Workers: 3.3 percent
 Industrial and Refractory Machinery Mechanics: 3.5 percent
 Firefighters: 3.6 percent
 Machinists: 3.9 percent
 Sheet Metal Workers: 4 percent
 Security and Fire Alarm Systems Installers: 4.4 percent
 Drivers/Sales Workers and Truck Drivers: 4.6 percent
 Aircraft Pilots and Flight Engineers: 5.2 percent
 Welding, Soldering, and Brazing Workers: 5.4 percent
 Water and Liquid Waste Treatment Plant and System Operators: 5.9 percent
 Industrial Truck and Tractor Operators: 6.2 percent

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Railroad Conductors and Yardmasters: 6.5 percent
Mechanical Engineers: 6.7 percent
Construction Managers: 6.8 percent
Television, Video, and Motion Picture Camera Operators and Editors:
7.2 percent
Painters, Construction and Maintenance: 7.2 percent
Electrical and Electronic Engineers: 7.2 percent
Telecommunications Line Installers and Repairers: 7.5 percent
Engineering Managers: 7.7 percent
Refuse and Recyclable Material Collectors: 7.9 percent
Construction and Building Inspectors: 8.7 percent
Radio and Telecommunications Equipment Installers and Repairers:
9.1 percent
Civil Engineers: 9.7 percent
Broadcast and Sound Engineering Technicians and Radio Operators:
9.9 percent
Computer Hardware Engineers: 10.3 percent
Aerospace Engineers: 10.8 percent
Surveying and Mapping Technicians: 10.9 percent
Computer, Automated Teller, and Office Machine Repairers: 11 percent
Cost Estimators: 11.6 percent
Police and Sheriff's Patrol Officers: 13 percent
Engineering Technicians, Except Drafters: 13.2 percent
First-Line Supervisors/Managers of Police and Detectives: 15.4 percent
Network and Computer Systems Administrators: 16.5 percent
Transportation, Storage, and Distribution Managers: 17.4 percent
Chemical Engineers: 17.4 percent
Clergy: 17.5 percent
Farm, Ranch, and Other Agricultural Managers: 18.1 percent
Chefs and Head Cooks: 19 percent
Industrial Engineers: 20 percent
Chiropractors: 20.2 percent
Security Guards and Gaming Surveillance Officers: 20.8 percent
Computer Software Engineers: 20.9 percent
Computer Programmers: 22 percent
Detectives and Criminal Investigators: 22.8 percent
Architects, Except Naval: 24.4 percent

Source: U.S. Department of Labor

APPENDIX III: NONTRADITIONAL OCCUPATIONS OF EMPLOYED MEN IN 2010

Preschool and Kindergarten Teachers: 2.2 percent
Dental Assistants: 2.4 percent
Dental Hygienists: 3.4 percent
Secretaries and Administrative Assistants: 3.9 percent
Speech-Language Pathologists: 4.2 percent
Child Care Workers: 5.3 percent
Receptionists and Information Clerks: 7.3 percent
Teacher Assistants: 7.6 percent
LPNs: 8.6 percent
Registered Nurses: 8.9 percent
Bookkeeping, Accounting, and Auditing Clerks: 9.1 percent
Medical Assistants: 9.3 percent
Maids and Housekeeping Cleaners: 11 percent
Medical Records Workers: 11.3 percent
Nursing, Psychiatric, and Home Health Aides: 11.8 percent
Dietitians and Nutritionists: 12.7 percent
Occupational Therapists: 13 percent
Personal and Home Care Aides: 13.9 percent
Special Education Teachers: 14 percent
Paralegals: 14.1 percent
Massage Therapists: 14.3 percent
Office Clerks, General: 15.8 percent
Elementary and Middle School Teachers: 18.2 percent
Librarians: 18.2 percent
Social Workers: 19.3 percent
Travel Agents: 20.3 percent
Audiologists: 23 percent
Library Technicians: 23.6 percent

Source: U.S. Department of Labor

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