



TEXAS CTE *In Action*

A College and Career Planning Guide

GROW Your Future

**YOUR GUIDE to careers
in AGRICULTURE,
FOOD, AND NATURAL
RESOURCES**

- Showcasing 25 Careers
- High School Personal Graduation Plans
- Inside College Admissions



Dear Texas Student,

You are probably tired of people asking, “What do you want to be when you grow up?” Some students know exactly what they want to do, but most haven’t got a clue. The idea of choosing a career is intimidating, and it feels like it’s far in the future. There’s little time in the commotion of classes, activities, sports, work, and fun to think about what career you want to pursue after graduation from high school or college.

It pays, though, to take the time to think about your future career. The truth is that you’ll save a lot of time and money if you have a direction in life, as opposed to just finishing high school and worrying about it later. It’s really a matter of dollars and sense. If you choose a career direction now, you can select classes and activities that will make you highly marketable—and highly paid—when you look for work. And it only makes sense to have an idea of what you want to do rather than just wandering aimlessly through school.

Nobody wants that. Not your parents. Not your teachers. Not your friends. They want you to be somebody. They want you to use your talents, follow your interests, and pursue your ambitions to become great at what you love to do in life. That’s what you should want, too.

So the time is right to take charge of your life and think about the future. You need a plan of action for how to get from where you are today to where you want to be in a few years: starting out on a personally and professionally rewarding career.

That’s what Texas CTE is all about. The guide you are holding is one of 16 guides to different career clusters. It is designed to help you make smarter decisions about your education and career options.

You’ve heard the phrase, “Information is power.” Well, this guide is power. It puts you squarely in charge of your future, from creating High School Personal Graduation Plans (see page 5) to choosing college or some other form of education or training after high school. Work with your parents, teachers, and counselors to make decisions, but remind everyone that it is your future at stake and that you are taking charge of it.

Get information. Get a plan. Get a clue about your career direction. It’s alright if that direction changes; choosing a direction now is better than having no direction at all. Just promise yourself that you’ll make smart choices about where to focus your time, energy, and passion.

We’re proud that you are taking steps to plan your career direction, and we pledge that your school, teachers, and counselors will do all they can to help you make wise choices on your plans for success. We wish you the best of luck on your journey.

YOU’VE HEARD

THAT ‘INFORMATION IS POWER.’ WELL, THIS GUIDE IS POWER. IT PUTS YOU IN CHARGE OF YOUR FUTURE.



A Growing Field

AGRICULTURE, FOOD, & NATURAL RESOURCES FOCUS ON THE ESSENTIAL ELEMENTS OF LIFE—WATER, AIR, FOOD, AND LAND. The people who work in the cluster include farmers and ranchers tending Texas crops and livestock; utility operators providing oil, electricity, and natural gas; and conservationists protecting wilderness and wildlife. They put food on our tables and turn raw materials into products we all use. For students and workers in Agriculture, Food, & Natural Resources, the Earth is one giant classroom full of natural wonders to explore. If you love to be outdoors, enjoy caring for plants and animals, and want to help conserve our natural resources, then Agriculture, Food, & Natural Resources could be the right career cluster for you.

ONE OUT OF
EVERY SEVEN TEXANS
IS EMPLOYED IN AGRICULTURE.

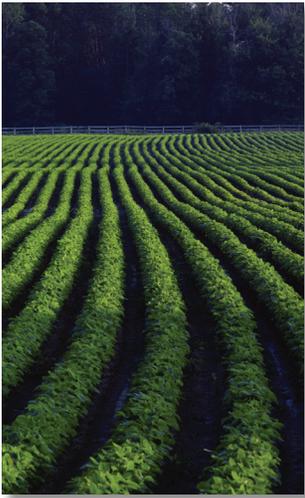
HOT Career Areas

Texas launched a strategic plan that targets state efforts on six industry clusters that economists say will be the engines of economic growth in Texas. As you plan your future, think about a career in one of these new and emerging sectors.

- Advanced Technologies & Manufacturing
 - Molecular technologist
 - Sensor/robotics engineer
- Aerospace & Defense
 - Aerospace engineer
 - Unmanned autonomous vehicle engineer
- Biotechnology & Life Sciences
 - Bioinformatics specialist
 - Biocontainment technician
- Information & Computer Technology
 - System integrator
 - Computer game developer
- Petroleum Refining & Chemical Products
 - Petrochemical engineer
 - Refinery process design engineer
- Energy
 - Wind/solar energy engineer
 - Geophysical (oil and gas) prospector

THE FIRST STEP toward success is making smart decisions about your education and career options.

Plan for Success



When I was in high school," says Sheryl Kovach, Human Resources Director of Environmental Services for Philips Services Corporation in Houston "the only job that I even knew about was receptionist work. I didn't aspire to be a manager or entrepreneur because I really didn't know about those disciplines. I was just looking forward to graduating. That was it. I really didn't know what it was I wanted to do."

Sound familiar? You, too, may not have a clue about what to do with your life.

Don't worry, though. Help is right here in your hands. This magazine is your guide to education and career choices that can shape your future. It's one of 16 career cluster guides published by Texas CTE (www.txcte.org). This edition is all about Agriculture, Food, & Natural Resources.

Let's start with some basic steps you should take to get organized, plan for the future, and start on the road to success.

Assess Your Talents and Abilities

First, you need to figure out some things about yourself. This step can be as simple as writing down a list of your interests (like video games or rock climbing), your hopes and dreams (like helping others), your talents (like writing or math ability), and your weaknesses (if you're squeamish at the sight of blood, for example, you might not want to be a doctor).

Follow up on this informal exercise by taking some formal assessments to determine your interests and abilities. Common assessments include Texas Genuine (www.texasgenuine.org) and CareerTech (www.careertech.org). Ask your principal or counselor about the career assessments available at your school.

Ask your principal or counselor about the career assessments available at your school.

Research Your Career Options

Once you've learned about yourself, learn more about your career options. There are thousands of occupations out there of which you may never have heard, and others that do not yet exist because the technologies have not been developed. Fortunately, there



THE TOP FIVE
AGRICULTURAL COMMODITIES IN TEXAS ARE CATTLE AND CALVES, COTTON, BROILERS (CHICKENS), GREENHOUSE/NURSERY, AND DAIRY PRODUCTS.



are plenty of resources (see inside back cover) for you, and they are as close as the nearest computer.

One of the most helpful is the Texas Career Check from the Texas Workforce Commission. It is a vast database of information about hundreds of professions. You can find Texas Career Check at www.texascareercheck.com. Another good place to start is O*NET (www.onetcenter.org).

Gather information about what you can earn in the careers in which you are interested. Find out whether the careers you are considering have a promising future—are they adding or losing jobs? Check out the education you'll need to enter those careers.

The chart on pages 10–11 presents data on 25 possible professions. Remember, though, that these are just a sampling of careers available in the cluster. Go to Texas Career Check, O*NET, or another resource to investigate other careers.

Create Your High School Graduation Plan

Once you have a better idea of your interests and abilities, you are ready to plan for high school and beyond. The High School Personal Graduation Plan, is your plan for preparing for the career of your choice.

First, you should choose a career cluster and an endorsement, not a particular occupational goal. In the eighth grade you might choose Agriculture leading to a Business & Industry Endorsement and then later become interested in a narrower field such as farm management or large animal care or environmental engineering.

The program of study you choose—your plan—does not stop with graduation from high school. You could then pursue a two-year degree as a geological technician or a four-year degree as a wildlife biologist.

You should set up a High School Personal Graduation Plan that takes you through career preparation after high school, revising your blueprint as needed as you go along. If your career plans include college study, ask your counselor about tests required for admission to college, such as the PSAT, SAT, or ACT.

Seek Out Special Programs

Many Texas schools offer innovative programs to prepare students for specific career areas. These include career and technical education (CTE) programs, academies, and magnet schools. Once you've decided on a career direction, ask your counselor about special programs in your area that may provide related experiences in your chosen career.

Samuel Odamah enrolled in the architecture program at the University of Texas at Arlington, having found his career calling at Dallas's Skyline Career Development Center, a high school with career programs in a number of different fields.

"Skyline is one of the few schools in the country that offer programs in architecture," Odamah says. "In some careers, Skyline students could even get professional certifications or licenses right in high school. It was a great place because you could find out whether you really wanted to enter a career."

Odamah says that the career cluster system at Skyline taught him the value of planning for his career and his life. "We learned about planning ahead," he says. "Those who plan things ahead of time don't have to catch up. It's just a matter of what a person wants out of life. Planning gives you a better platform for success."

Agriculture, Food, & Natural Resources CTSOs

One of the best ways to acquire out-of-class experience in your chosen career is by joining a career and technical student organization (CTSO). In Agriculture, Food, & Natural Resources, the most helpful CTSOs are:

- Business Professionals of America (BPA)
www.texasbpa.com
- Family, Career and Community Leaders of America (FCCLA)
www.texasfccla.org
- Future Business Leaders of America (FBLA)
www.fblatx.org
- Texas Future Farmers of Association
www.texasffa.org



WHAT ARE Career Clusters & Programs of Study ?

In Texas, High School Personal Graduation Plans will guide students' high school and college experiences (see next page). As part of this process, students focus their studies within a chosen career cluster and program of study that lead to an endorsement.

A career cluster is a group of occupations and broad industries that share certain features. The Agriculture, Food, & Natural Resources cluster, for example, includes agricultural engineers and meat processors. Texas has adopted 16 Career Clusters® (see back cover), the same ones designated and developed by the U.S. Department of Education. As the graphic below shows, within each cluster are programs of study, which are more specific groupings of similar occupations. Think of a program of study as being like a college major. In Agriculture, Food, & Natural Resources, you might choose to focus on Agribusiness Systems in high school and college.

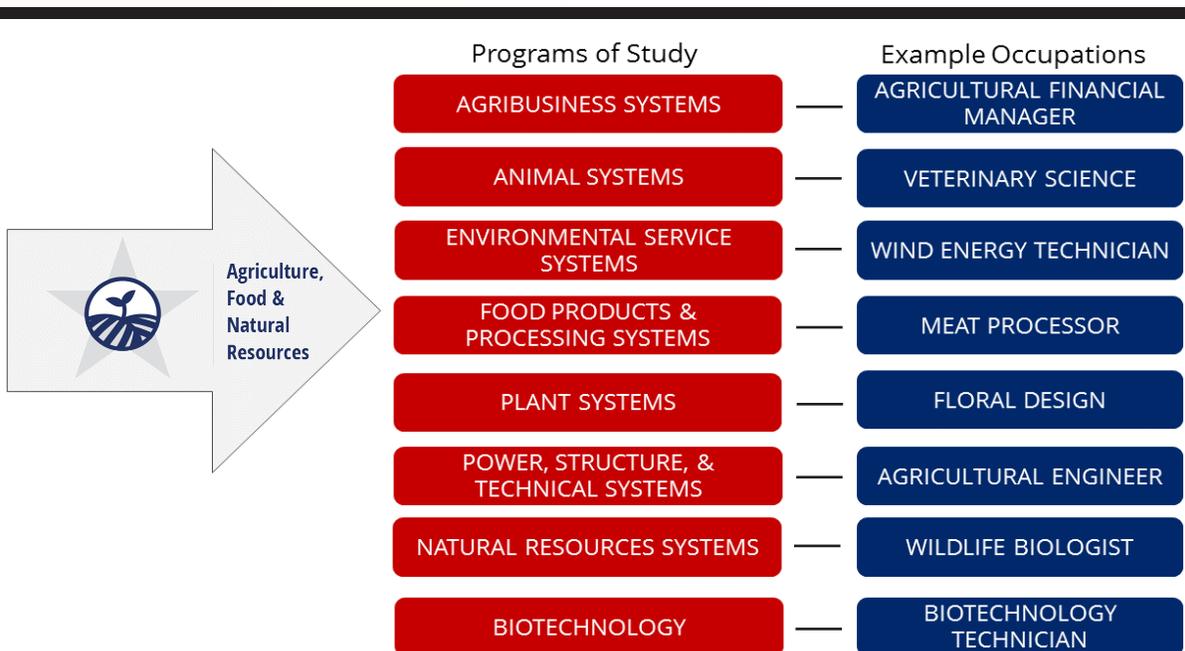
Related Occupations

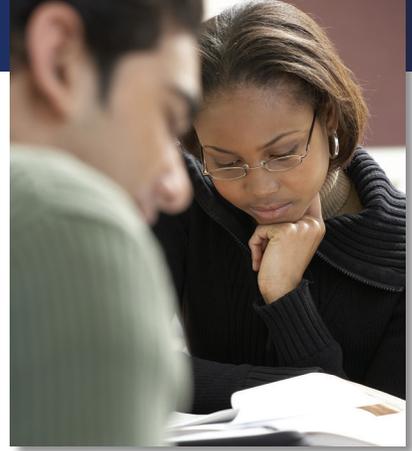
Each career pathway includes a range of related occupations; agriculture financial manager is an example of an occupation that falls within Agribusiness Systems. Choosing a career cluster and career pathway will help you acquire the knowledge and skills you'll need to enter your chosen career. It will allow you to follow a seamless course of

study from high school into college or other postsecondary education or training. The electives you choose can complement your core academic classes to prepare you for the challenges of the real world of work.

Review Your High School Personal Graduation Plan Each Year

Don't get locked into a cluster and program of study you don't like. You should reexamine your 4-year plan at least once a year and change programs or clusters if your interests have changed. Choosing a cluster and program of study, even if it changes later, means that you'll have a direction in life. The idea is to be aware of what's going on in your life and take control of your future. When you know where your education is going and why, your classes will become more meaningful. You'll make contact with students, teachers, and employers who share your interest in a particular career area. You'll have experiences that are fun and exciting. You'll be on your way to success in school, in a career, and in life.





WHAT IS A High School Personal Graduation Plan



It's a smart idea to create a High School Personal Graduation Plan, or 4-year plan, to guide your studies through high school and into college or other postsecondary education or training. Your 4-year plan represents your chance to take control of your education and career choices. Working with your parents/guardians and guidance counselor, you can pick the cluster on which you want to focus your studies as well as your career and

postsecondary education goals. Don't worry. You aren't locked into your choices. You should revisit your 4-year plan at least once a year to update it. You can change clusters, programs of study, and career and postsecondary goals as your interests and ambitions change. Having a plan—even if it changes—is smarter than having no idea of what you want to do and why you are attending school. Here's how to fill out your 4-year plan.

CHOOSE a career cluster on which to focus your high school and college or postsecondary studies. The idea is to offer you a seamless route to follow from high school, through college or other postsecondary education, and into a career. Not all Texas schools offer all clusters, so ask your guidance counselor which clusters are available at your school.

LIST basic information such as your name and school.

PICK a program of study within the cluster. There are eight programs of study within the Agriculture, Food, & Natural Resources cluster (see page 12).

CHOOSE one or more occupations for which you would like to prepare. Use resources such as Texas Career Check (www.texascareercheck.com) to research your options.

PLAN for what you want to do after high school. Your goal may be to attend a four-year university or two-year college, join the military, or enter an apprenticeship program. Your postsecondary goal should influence the classes you take in high school; for example, you will need certain course credits to qualify for admission to a college.

SKETCH out your schedule of classes for your high school years. You will spend time completing requirement for the Foundation High School Program including electives to earn your endorsement in Business & Industry (26 credits). Planning your 4-year plan will help you get the education and experience you need to start your postsecondary and career goals.

PICK extended learning activities that complement your classes (see page 14). Work on community service projects. Plan for paid and unpaid career learning experiences, such as job shadowing and internships. All these extracurricular activities can give you experience that will help you get into college or land a job.

High School Personal Graduation Plan
 Name: Taylor Jones, West High School
 Endorsement: Business & Industry
 Cluster: Agriculture, Food, & Natural Resources
 Program of Study: Agribusiness Systems
 Career Goal: Agricultural Financial Manager
 Postsecondary Goal: Bookkeeper Certificate, Bachelor's Degree in Agricultural Economics

Foundation High School Program Requirements (22 Credits)	Business and Industry Endorsement Requirements (26 Credits)
<ul style="list-style-type: none"> English Language Arts (4 Credits) <ul style="list-style-type: none"> English I English II English III Advanced English Course Mathematics (3 Credits) <ul style="list-style-type: none"> Algebra I Geometry Advanced Mathematics Course Science (3 Credits) <ul style="list-style-type: none"> Biology IPC or Advanced Science Course Advanced Science Course Social Studies (3 Credits) <ul style="list-style-type: none"> U.S. History U.S. Government (one-half credit) Economics (one-half credit) World Geography or World History Physical Education (1 Credit) Languages Other Than English (2 Credits in same language) Fine Arts (1 Credit) Career Related Electives (5 Credits) Proficiency in Speech (Determined locally) 	Math (1 Additional Credit) Science (1 Additional Credit) Career Related Electives (2 Additional Credits) EXAMPLE CAREER RELATED ELECTIVES Principles of Agriculture, Food & Natural Resources Professional Standards in Agribusiness Business Management Banking & Financial Services Agribusiness Management and Marketing Mathematical Applications in Agriculture, Food, and Natural Resources Practicum in Agriculture, Food, and Natural Resources DISTINGUISHED LEVEL OF ACHIEVEMENT 4 Credits in Mathematics (Must complete Algebra II) 4 Credits in Science Requirements for at least the Business and Industry Endorsement Remaining requirements PERFORMANCE ACKNOWLEDGEMENT Outstanding performance <ul style="list-style-type: none"> in a dual credit course in bilingualism and biliteracy on an AP test or IB exam on the PSAT, the ACT-Plan, the SAT, or the ACT Earning a nationally or internationally recognized business or industry certification

Career Learning Experiences: Career Preparation—Paid and Unpaid, Internship, Job Shadowing
 Curricular Experiences: Business Professionals of America (BPA), Future Business Leaders of America (FBLA), Texas FFA Association
 Extracurricular Experiences: Farm Bureau Exchange Programs
 Service Learning Experiences: Girl or Boy Scouts of America, Community Service Volunteer

A CAREER PORTFOLIO (see page 15) is a good way to organize information about your educational experiences, record results of career interest and abilities assessments, and hold examples of your best work.

Get Growing

Careers in AGRICULTURE, FOOD, & NATURAL RESOURCES include farming, biotechnology, wildlife management, and more.



Agriculture is often misunderstood as being all cows, sows and plows,” says Joe Townsend, associate dean in the College of Agriculture and Life Sciences at Texas A&M University. “But there’s a lot more to it than farming.” In fact, Townsend says that close to 70 percent of students currently pursuing degrees in Agriculture, Food, & Natural Resources grew up in cities, not on farms or ranches.

Indeed, this cluster can prepare students for careers as varied as fighting bioterrorism, keeping the food supply safe, and developing healthy menus for astronauts. This cluster has enough jobs, in fact, to employ about 20 percent of all U.S. workers.

A Green Thumb

If you like designing things and figuring out how they work, for example, agricultural engineering might be for you. Do you have a green thumb? Consider becoming a florist or greenhouse manager. If you enjoy spending time surrounded by nature, you might make a good wildlife manager, fish and game officer, or forest ranger.

If nutrition interests you, look into becoming a food scientist. Environmentally responsible? Become a recycling technician. You can even find jobs in this cluster that are related to recreational facilities, such as being a turf manager at a golf course or a range manager for a hunting ranch.

Make the World a Better Place

“Some students go into science, some into sales and marketing, and still others will be lobbyists or leaders in government,” Townsend says. “We’re all about making the world a better place.”

One of the most promising career areas in the cluster

is veterinary technology, a field that is expected to expand because the number of pets people own is on the rise. In addition to working in community veterinary clinics, vet technicians can specialize in a species or in areas such as artificial insemination.

A new and emerging career option is biotechnology, which involves working to ensure that we have a safe and healthy food supply. Jobs in this high-paying field include developing genetically altered plants that don’t need insecticide or that don’t need much water so they can grow in drought conditions—as well as helping to prevent outbreaks of E. coli that contaminate the food supply.

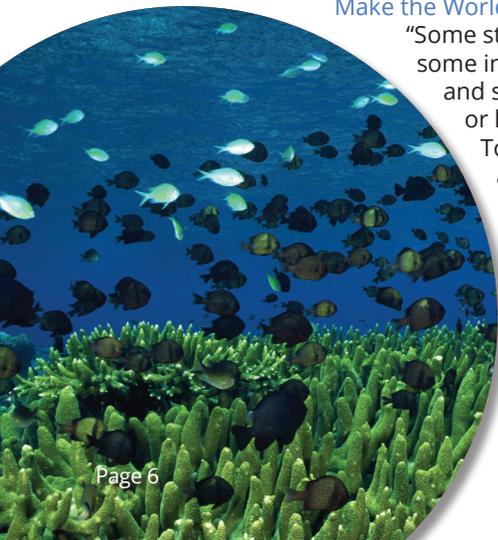
Aquafarming

Aquaculture, which deals with subjects such as fish farming and keeping streams and oceans healthy, is another rapidly expanding field that pays well. Water is becoming a precious commodity and we have to do a better job of taking care

10 Fast-Growing Careers

Occupation	Growth Rate (2012–2022)	Avg Annual Openings (2012–2022)
Mining & Geological Engineers	30%	45
Geological & Petroleum Technicians	29%	425
Veterinary Technologists & Technicians	28%	340
Environmental Engineering Technicians	27%	50
Nonfarm Animal Caretakers	26%	585
Environmental Engineers	24%	140
Farm Equipment Mechanics	22%	115
Wholesale & Retail Buyers, Ex. Farm Products	20%	395
Water & Waste Treatment Plant & System Operators	18%	480

This is a projection of 10 fast-growing careers in Agriculture, Food, & Natural Resources in Texas from the year 2012 to 2022 and the number of average annual openings in each occupation. Note that while the percentage of growth in jobs may be high, the actual number of jobs created may be low. Source: Texas Workforce Commission.



10 Top-Paying Careers

Occupation	Average Wage	Entry-Level Wage	Experienced Wage
Petroleum Engineers	\$76.61	\$42.63	\$93.59
Mining & Geological Engineers	\$67.81	\$25.78	\$88.83
Veterinarians	\$49.40	\$29.06	\$59.57
Forestry & Conservation Science Teachers, Postsecondary	\$47.51	\$34.00	\$54.26
Environmental Engineers	\$47.28	\$25.96	\$57.94
Agricultural Science Teachers, Postsecondary	\$40.45	\$24.41	\$48.46
Agricultural Engineers	\$39.39	\$21.09	\$48.54
Farmers, Ranchers & Other Agricultural Managers	\$33.88	\$13.21	\$44.21
Gas Plant Operators	\$30.85	\$23.30	\$34.62
Wildlife Biologists	\$30.53	\$20.31	\$35.65

This is a chart of hourly wages for 10 of the top-paying careers in the Agriculture, Food, & Natural Resources cluster in Texas. Note how entry-level wages are often much lower than pay for the average worker and experienced workers in each profession. Source: Texas Workforce Commission.

of that resource, including maintaining a safe and healthy water supply. Texas needs everything from water monitoring technicians to welders who can lay pipelines. This is definitely an up-and-coming area.

Management of natural resources is also important to the tourism industry. Hunting is popular in Texas, says Dr. Steven Frazee who is the Department Chairman, Agriculture Education and Communications at Texas Tech University. "In some parts of the state," he points out, "the game population is as important economically as livestock on farms." Professionals in environmental protection help ensure that game populations remain stable.

Horticulture, including floral design and landscaping of residential lawns and gardens, is another popular area of study in the cluster. "Turf grass is huge," says Frazee. Horticulture as a whole contributes \$14.9 billion to the state economy each year and employs almost 200,000 Texans.

Down on the Farm

Of course, farming is still a big part of the Agriculture, Food, & Natural Resources cluster. "More than 14 percent of working Texans are employed in farming, ranching, or other agriculture-related jobs," notes Kirk Edney, curriculum specialist at Texas A&M University. "About 12% of our state's population is located in rural areas, so that impact is felt even more deeply there."

Agricultural careers run the whole gamut, including commodity brokers, agricultural economists, embryo technologist, and food and fiber engineers. Engineering applications are evident throughout the industry, such as electrical engineering and mechanical engineering. Data management careers deal with global positioning systems and geographical information systems. Students can find a place in this cluster to showcase their strengths.

Big Business, Big Opportunities

Graduates won't have to look very far for jobs, either. Texas is second in the nation in agricultural producing states. The food, horticulture, and fiber industry is the second-largest industry in Texas, generating \$106 billion a year, or about 8.4 percent of the total gross state product.

Job security is another major advantage to a career in this cluster. "Agriculture touches every aspect of our lives," notes Todd Staples, Texas Commissioner of Agriculture. "Our population is projected to double by the year 2060, and that will place enormous demands on the food, fiber, and horticultural infrastructure. No matter if the economy is good or bad, people have to eat." Career opportunities throughout the cluster are expected to remain strong for at least the next five years, he stresses. After all, he notes, "agriculture is life."



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Z

Is Agriculture, Food, & Natural Resources the right cluster for you? Take this quiz to find out. Answer "yes" or "no" to the following questions.

1.

Do you like working outdoors?

2.

Are you good with animals?

3.

Are you organized?

4.

Do you like working with your hands?

5.

Are you interested in environmental issues?

6.

Do you like working with tools and machinery?

7.

Do you enjoy gardening?

8.

Do you like hunting and fishing?

9.

Are you interested in biological sciences?

10.

Do you like camping?

If you answered "yes" to five or more of the above questions, Agriculture, Food, & Natural Resources may be the right cluster for you. To get a more specific and scientific measurement of your attitudes and abilities, ask your guidance counselor or teacher about taking a career assessment test or interest inventory.

What Employers Want

EDUCATION AND EXPERIENCE

"I am not a cotton farmer," says Davon Cook, assistant manager of Buster's Gin cotton gin in Ropesville. "I don't grow it—but I do interact daily with people who do, so I have to have knowledge of plant genetics, physiology, and how the plant is grown." For that reason, Cook recommends interested students take courses in economics, finance, business, "and anything involved with the production of agriculture." Some prior experience, even if it's a summer job or internship, is also quite helpful, she notes, adding, "It makes students more marketable employees if they have some knowledge of the day-to-day aspects of the job."

RELIABILITY

"I want people with a strong work ethic who will show up for their shift consistently," Cook adds. "Our biggest issue by far is turnover, especially in seasonal workers." Echoes Kirk Edney, curriculum specialist for Texas A&M University: "People skills are very important, according to what employers tell us. That's why students need personal skills development—like goal setting, time management, and group dynamics."

ENTHUSIASM

John Chumbley, president of Dorchester Grain Company and also of Chumbley Genetics, stresses that job applicants must be willing and eager to do the work for which they are interviewing. "They must present themselves well, and be interested in and enthusiastic about the business," he says.

ORGANIZATION

Organizational skills are a big plus, explains The Cattleman editor Ellen Brisendine. "I'm talking about either the natural ability to keep things straight, or having external tools to help keep you organized, such as calendars, folders, personal digital assistants (PDAs), and computers," she says.

SOCIAL CONSCIENCE

Professionals in Agriculture, Food & Natural Resources are involved in feeding the world and protecting its resources, says Matt Baker, chair of the Department of Agricultural Education and Communications at Texas Tech University. "In this field," he says, "we have to be aware of our responsibility to help people around the world achieve a better quality of life."



Your future can BLOSSOM IN A CAREER in Agriculture, Food, & Natural Resources.

Michelle Pittman's work is out of this world—literally. Pittman, a registered dietitian for Lockheed Martin Space Operations, works on a contract basis for NASA developing menus for the space shuttle crew. "It's interesting. It's fun. And it's always changing," she says.

Her favorite part is meeting the astronauts and having them sample the food she's considering for the menus. About six months before a launch, she invites the shuttle crew to taste test 40–50 different items. "They rate them, and then I use their scores to develop the menus they will be using in space as well as for the seven days they will be in quarantine before the launch," explains Pittman.

After she's designed the menus, Pittman puts the data into a software program that runs a nutritional analysis on the food. "That helps me ensure that the food meets the daily needs for calories, protein, vitamins, and minerals," she says.

Yet the menus are just a part of what Pittman handles. "I have to understand the whole process of getting a food shipment to the international space station," she explains. "I have to consider how the food items are packed, how they get into

the shuttle, and what happens when they're in space."

Keeping informed of the latest nutritional news is also important. As a dietitian, Pittman is required to take 75 hours of continuing education every five years. "I'm always learning new things," she says.

AGRICULTURAL PRODUCTS IN TEXAS, VALUED AT \$25.3 BILLION IN 2012, ARE 4TH IN AGRICULTURAL EXPORTS, RANKED BY STATES.

Wildlife Surveys

There are no typical job duties in Agriculture, Food & Natural Resources because careers in the cluster are so varied. For example, wildlife biologist Dana Wright works in the Paducah field office of the Texas Parks & Wildlife Department, and her duties involve performing regular wildlife surveys from the air.

Every January she climbs into a helicopter to fly over a nine-county region to count mule deer. In June, she peers out the window of a fixed-wing



airplane to count pronghorn antelope. For surveying bird species, she uses a car.

"I drive a 20-mile route at 20 miles per hour and report all the birds I see along that route," she says. "When I'm surveying mourning doves in May, I start at sunrise and stop every mile and listen for three minutes to count how many I can hear calling." She does similar counts of quail in August and pheasants in October.

Wright works with people, too. She helps graduate students do wildlife research projects, and presents educational programs at schools and civic clubs. She also develops wildlife management plans for ranchers and farmers, helping them accomplish goals such as growing bigger bucks or improving their quail habitat.

Business Experience

John Chumbley wears two agricultural hats. He spends most of his time as the president of the Dorchester Grain Company, a grain elevator business that buys wheat, corn, and soybeans from

farmers and then resells them. But in his newest venture, a small business known as Chumbley Genetics, he raises and sells show pigs.

"A friend and I just decided to try it," he says. "We're trying to raise good animals that people appreciate." So far, he's been successful; the list of awards his pigs have won is impressive. Chumbley oversees the feeding and breeding of 40 sows and 12 boars, selling his swine mainly to participants in 4-H and FFA who are interested in raising and showing them. "I have a grandson in Junior FFA who shows," he notes. "Winning is good, but the learning experience is valuable."

Women at Work

Ellen Brisendine believes in charting new territory. Brisendine is the first female editor of *The Cattleman*, the Texas and Southwestern Cattle Raisers Association's magazine, since its founding in 1914. "There are plenty of opportunities for women in Agriculture, Food, & Natural Resources," she says.

"There's no reason for gender to get in the way."

Brisendine writes, assigns, and edits stories, interviewing sources and meeting with freelance writers daily. "Today I'm working on an article on water quality," she says. "Tomorrow I'll be working on an article about beef." She also works closely with photographers and graphic artists.

Her position requires not only a solid knowledge of English, but also strong self discipline and a good work ethic. As she points out, "Every month is a deadline."



5 Cool Careers

CHECK OUT THESE EXCITING CAREERS IN AGRICULTURE, FOOD, & NATURAL RESOURCES.

- 1. GOLF COURSE TURF MANAGER**
Do you like the idea of challenging work in a country-club setting? Golf course turf managers are responsible for keeping golf greens watered, fertilized, cut, and precisely manicured. They landscape, prune, do soil surveys, handle pest and weed control, and even help design and construct golf courses. They must know how to manage plant disease, operate irrigation and sprinkler systems, and manage a crew of workers.
- 2. AQUAFARMER**
Aquafarming involves the science and business of cultivating freshwater fish (like trout, catfish, and salmon) as well as shellfish, usually in large tanks where the environment can be carefully controlled. Fish farming requires workers to be well versed not only in the life cycle and diseases of various forms of fish, but also in the technology necessary to manage a huge operation.
- 3. GAME MANAGER**
Game managers protect wildlife and boost tourism in natural areas. In some parts of Texas, wildlife (including deer, turkey, and quail) is more economically important than cattle and other domestic farm animals. Game managers for hunting ranches and outdoor recreation lodges evaluate the property and make a conservation management plan to maximize the production of the game animals and to minimize harmful species, such as feral pigs.
- 4. PRECISION FARMING TECHNICIAN**
This career uses high-tech methods to boost efficiency and production. Precision agriculture relies on the Global Positioning System (GPS) and satellite technology along with complex software programs to run large-scale farming operations. Such equipment can, for example, determine precisely what areas of a field need fertilizer, herbicide, or pesticide, in addition to automatically adjusting irrigation. Technology can even guide tractors through the fields with no one at the wheel.
- 5. PARK NATURALIST**
These professionals are on the front lines of environmental protection. Naturalists survey national, state, and local parkland to determine the nature and health of the park's plant and animal life. They also educate the park's visitors about the unique features of the park's environment by conducting natural history programs, giving historical talks, or leading group hikes. They may also design and construct nature displays in visitor centers and produce newsletters, news releases, and visitors' guides.



25

CAREER CHOICES

Agriculture, Food, & Natural Resources

Listed below are 25 careers you might consider in the Agriculture, Food, & Natural Resources cluster. Occupations available to you at different education levels.

SOC: Stands for Standard Occupational Code, which organizations like the U.S. Department of Labor use to categorize career information. Sometimes you can find data on a career faster by searching for its SOC.

GROWTH: This is the projected annual growth in Texas for the career between 2012 and 2022. Fast-growing occupations may offer greater career opportunities for young adults.

OPENINGS: This is the projected number of job openings for the career in Texas each year. Even though a career may be fast growing, there may not be a lot of positions available. Careers with more openings will give an entry-level worker a better chance of getting a job and greater job security.

WAGES: This is the amount the average person in the career earns in Texas per year. Naturally, entry-level wages are lower than the average, and those for workers with years of experience are generally higher.

SOC	Occupation	Growth	Openings	Wages	Education
11-9013	Farmer, Rancher, and Other Agricultural Manager	-12%	4,105	\$70,462	Bachelor's plus experience
19-1023	Zoologist and Wildlife Biologist	21%	20	\$63,513	Bachelor's degree
17-2081	Environmental Engineer	24%	140	\$98,348	Bachelor's degree
25-9021	Farm & Home Management Advisors	17%	15	\$35,729	Bachelor's degree
19-1031	Conservation Scientist	11%	75	\$55,300	Bachelor's degree
19-4041	Geological and Petroleum Technician	29%	425	\$61,484	Associate's degree
17-3025	Environmental Engineering Technician	27%	50	\$52,367	Associate's degree
45-2011	Agricultural Inspector	9%	30	\$47,296	Work experience in a related occupation
13-1021	Buyers & Purchasing Agents, Farm Products	14%	20	\$52,594	Work experience in a related occupation
37-1012	First-Line Supervisors of Landscaping, Lawn Services	24%	475	\$43,644	Work experience in a related occupation
45-1012	Farm Labor Contractor	0%	0	\$58,891	Work experience in a related occupation
45-1011	First-Line Supervisor of Farming, Fishing, and Forestry Workers	7%	115	\$42,472	Work experience in a related occupation
45-2093	Farmworkers; Farm, Ranch, & Aquacultural Animals	8%	1,565	\$24,186	Long-term on-the-job training
51-8013	Power Plant Operator	8%	130	\$63,582	Long-term on-the-job training
51-8031	Water and Liquid Waste Treatment Plant and System Operator	18%	480	\$35,090	Long-term on-the-job training
51-8092	Gas Plant Operator	16%	100	\$64,169	Long-term on-the-job training
27-1023	Floral Designer	15%	180	\$24,083	Moderate-term on-the-job training
39-2011	Animal Trainer	33%	165	\$26,511	Moderate-term on-the-job training
45-4011	Forest and Conservation Worker	10%	5	\$32,224	Moderate-term on-the-job training
37-2021	Pest Control Worker	34%	315	\$30,195	Moderate-term on-the-job training
45-2021	Animal Breeder	-20%	85	\$30,493	Moderate-term on-the-job training
45-2091	Agricultural Equipment Operator	11%	110	\$23,151	Short-term on-the-job training
39-2021	Nonfarm Animal Caretaker	26%	585	\$21,243	Short-term on-the-job training
37-3013	Tree Trimmer and Pruner	38%	325	\$26,446	Short-term on-the-job training

Source: Texas Workforce Commission (TWC)

Note: This chart is a sampling of careers in the cluster, not recommendations from TWC or any other agency or organization. Always do thorough research and consult with your parents/guardians before making a career choice.

er. These are not all the career options in the cluster—they are just a sampling showing the variety of

EDUCATION: This is the minimum preferred level of educational attainment for people working in the career in the United States. This can range from short-term on-the-job training to a doctoral degree taking several years of college.

EDUCATION LEVELS: The color bars show the mix of education levels attained by people actually working in the profession in Texas (see bars at right). If a bar features mostly one color, that means that level of education is likely the one you'll need to reach to work in the profession. Look at environmental engineer, for example, and you'll see that nearly everyone in the field has a college degree or better. If the three colors in the bar are roughly equal in size, that means that there are opportunities in the profession for people of all education levels. For example, about 37 percent of the people working as agricultural inspector have a high school diploma, while 31 percent have some college, and 32 percent have four-year degrees or better.

High School	Some College	College or Better
Percentage of people in the occupation who have at most high school diplomas	Percentage of people in the occupation who have some college	Percentage of people in the profession who have a four-year college degree or better

JOB DESCRIPTION: These are brief descriptions of each career from O*NET Online (www.onetcenter.org).

Education Levels	Job Description
	Run establishments that produce crops, livestock, and dairy products.
	Study the origins, behavior, diseases, genetics, and life processes of animals and wildlife. May specialize in wildlife research and management, including the collection and analysis of biological data to determine the environmental effects of present and potential use of land and water areas.
	Design, plan, or perform engineering duties in the prevention, control, and remediation of environmental health hazards utilizing various engineering disciplines. Work may include waste treatment, site remediation, or pollution control technology.
	Advise, instruct, and assist individuals and families engaged in agriculture, agriculture-related processes, or family and consumer sciences activities. Demonstrate procedures and apply research findings to solve problems; instruct and train in product development, sales, and the utilization of machinery and equipment to promote general welfare.
	Manage, improve, and protect natural resources to maximize their use without damaging the environment. May conduct soil surveys and develop plans to eliminate soil erosion or to protect rangelands from fire and rodent damage.
	Assist scientists in the use of electrical, sonic, or nuclear measuring instruments in both laboratory and production activities to obtain data indicating potential sources of metallic ore, gas, or petroleum. Analyze mud and drill cuttings. Chart pressure, temperature, and other characteristics of wells or bore holes.
	Apply theory and principles of environmental engineering to modify, test, and operate equipment and devices used in the prevention, control, and remediation of environmental pollution, including waste treatment and site remediation.
	Inspect agricultural commodities, processing equipment, and facilities, and fish and logging operations, to ensure compliance with regulations and laws governing health, quality, and safety.
	Purchase farm products for further processing or resale.
	Plan, organize, direct, or coordinate activities of workers engaged in landscaping or groundskeeping activities, such as planting and maintaining ornamental trees, shrubs, flowers, and lawns, and applying fertilizers, pesticides, and other chemicals, according to contract specifications.
	Recruit, hire, furnish, and supervise seasonal or temporary agricultural laborers for a fee. May transport, house, and provide meals for workers.
	Work with agricultural scientists in food, fiber, and animal research, production, and processing; assist with animal breeding and nutrition work; under supervision, conduct tests and experiments to improve yield and quality of crops or to increase the resistance of plants and animals to disease or insects.
	Attend to live farm, ranch, or aquacultural animals that may include cattle, sheep, swine, goats, horses and other equines, poultry, finfish, shellfish, and bees. Attend to animals produced for animal products, such as meat, fur, skins, feathers, eggs, milk, and honey. Duties may include feeding, watering, herding, grazing, castrating, branding, de-beaking, weighing, catching, and loading animals. May maintain records on animals; examine animals to detect diseases and injuries; assist in birth deliveries; and administer medications, vaccinations, or insecticides as appropriate. May clean and maintain animal housing areas. Includes workers who shear wool from sheep, and collect eggs in hatcheries.
	Control, operate, or maintain machinery to generate electric power. Includes auxiliary equipment operators.
	Operate or control an entire process or system of machines, often through the use of control boards, to transfer or treat water or liquid waste.
	Distribute or process gas for utility companies and others by controlling compressors to maintain specified pressures on main pipelines.
	Design, cut, and arrange live, dried, or artificial flowers and foliage.
	Train animals for riding, harness, security, performance, or obedience, or assisting persons with disabilities. Accustom animals to human voice and contact, and condition animals to respond to commands. Train animals according to prescribed standards for show or competition.
	Under supervision, perform manual labor necessary to develop, maintain, or protect forest, forested areas, and woodlands through such activities as raising and transporting tree seedlings; combating insects, pests, and diseases harmful to trees; and building erosion and water control structures and leaching of forest soil.
	Spray or release chemical solutions or toxic gases and set traps to kill pests and vermin, such as mice, termites, and roaches, that infest buildings and surrounding areas.
	Breed animals, including cattle, goats, horses, sheep, swine, poultry, dogs, cats, or pet birds. Select and breed animals according to their genealogy, characteristics, and offspring. May require a knowledge of artificial insemination techniques and equipment use. May involve keeping records on heats, birth intervals, or pedigree.
	Drive and control farm equipment to till soil and to plant, cultivate, and harvest crops. May operate stationary equipment to perform post-harvest tasks, such as husking, shelling, threshing, and ginning.
	Feed, water, groom, bathe, exercise, or otherwise care for pets and other nonfarm animals, such as dogs, cats, ornamental fish or birds, zoo animals, and mice. Work in settings such as kennels, animal shelters, zoos, circuses, and aquariums.
	Cut away dead or excess branches from trees or shrubs to maintain right-of-way for roads, sidewalks, or utilities, or to improve the appearance, health, and value of the trees. Prune or treat trees or shrubs using handsaws, pruning hooks, shears, and clippers. May use truck-mounted lifts and power pruners.



HERE ARE the programs of study available within the Agriculture, Food, & Natural Resources cluster in Texas high schools.* The State has created descriptions of each of these programs of study. These documents detail high school classes you might take, extended learning opportunities, and postsecondary programs.

AGRIBUSINESS SYSTEMS

Financial managers explain funding options and teach money management skills to clients engaged in agriculture.

ANIMAL SYSTEMS

Professionals in these occupations feed, bathe, groom, exercise, breed, and provide veterinary care for animals. Ranchers raise and sell livestock for profit.

ENVIRONMENTAL SERVICE SYSTEMS

Professionals in environmental service manage systems, such as water treatment systems, to protect and renew the environment.

FOOD PRODUCTS & PROCESSING SYSTEMS

Employees in food processing cook, preserve, prepare, store, and distribute food.

PLANT SYSTEMS

Plant system professionals are involved in the cultivation and marketing of crops and other plants.

POWER, STRUCTURAL & TECHNICAL SYSTEMS

People who work in this field apply knowledge of engineering, hydraulics, pneumatics, electronics, power, structures, and controls to the practice of agriculture.

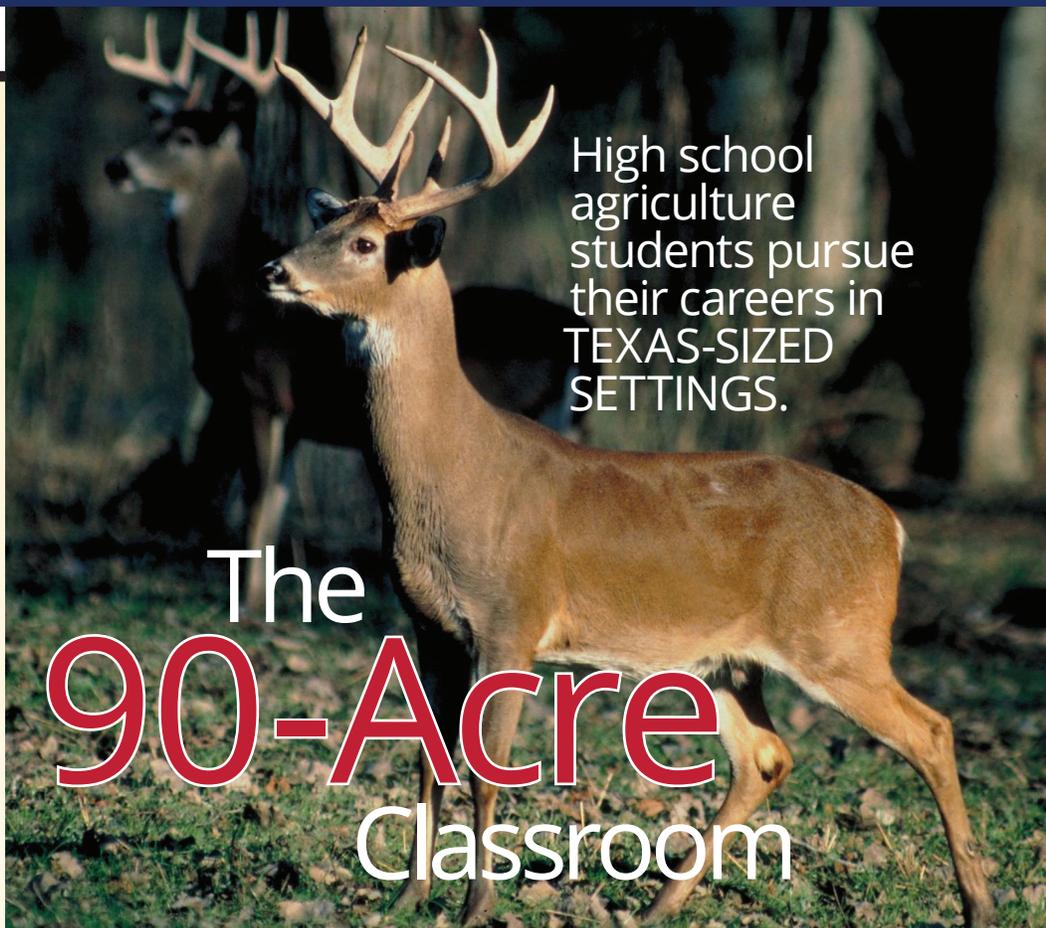
NATURAL RESOURCES SYSTEMS

Professionals in this field manage, maintain, and, in some cases, extract and harvest natural resources for human use.

BIOTECHNOLOGY

Professionals in Biotechnology conduct standardized test and laboratory analyses to evaluate the quantity or quality of physical or chemical substances in food and other products.

* Not all schools offer all programs of study or clusters. Ask your counselor which programs are available at your school.



High school agriculture students pursue their careers in TEXAS-SIZED SETTINGS.

The 90-Acre Classroom

Russell Graves's students can't wait to get to class each day. But you won't necessarily find them sitting in neat rows of desks, reading from textbooks or watching instructional videos. Their favorite classroom is a 90-acre land lab purchased with a grant from the National Fish and Wildlife Foundation.

"One section is a controlled research area with an 8-foot-tall fence where students do genetic and nutritional research with our own herd of white-tailed deer," explains Graves, an agricultural science instructor at Childress High School in Childress. "They look at things like whether feeding the deer supplemental protein will increase antler growth. Some of the land is open range, where students research topics such as prescribed burning, planting food plots with winter-hardy plants, or creating a wetland for waterfowl."

Programs of Study

Not all high school programs in the Agriculture, Food, & Natural Resources cluster have 90-acre classrooms, but many of them involve similar opportunities that help students learn through doing.

Course work in the cluster provides a foundation for study of any of seven

different specialty areas (see "Program Profiles" at left). Each of the programs of study in the cluster offer overview classes as well as more advanced classes.

For example, Introduction to Agricultural Science provides an overview of agricultural science and technology, while Leadership and Communications develops more specific communication skills in an agricultural setting.

Agribusiness Management presents the basic management concepts and skills needed for managing any kind of agribusiness, from a cattle ranch to a flower shop. Food Technology gives students an overview of food technology topics, including food production and processing, and the government regulations that ensure the safety of our food supply.

Master the Basics

Dr. Steven Frazee, the Department Chairman of Agricultural Education and Communications at Texas Tech University in Lubbock, says his department is looking for high school graduates who have taken and mastered rigorous academic classes—math, science, English, and social studies.

"I want the very best performers in high school in all subjects," he says, "students who understand science and scientific processes, students who communicate well, in writing as well as orally."

Fraze says students who come out of high school with a broad and strong academic base hold the keys for success in college and in careers in agriculture. "I want students with inquisitive minds who have learned to be self-starters," he says, "because what I want is what the industry wants."

Unique Opportunities

The 90-acre land laboratory at Childress High School is not the only example of unusual classroom learning opportunities offered in Agriculture, Food, & Natural Resources. Several agriscience magnet schools located in Texas offer unique opportunities.

At James Madison High School in San Antonio, for example, Northeast Agriscience Magnet Program Director John Mack proudly cites the facilities available to his students. "Even though we're an urban school," he says, "We

have a 15-acre school farm with a big barn housing 350 head of livestock, including cattle, sheep, goats, swine, poultry, and rabbits.

"We have an aquaculture center with huge tanks and a pond [see "In the Swim" below] and a horticulture center with a state-of-the-art greenhouse, garden plots, and orchard.

"Our meat-processing lab includes a smokehouse, hanging coolers, and freezers," Mack continues. "Students learn about meat processing and making specialty products like jerky. In our mechanized agriculture lab, students do everything from restoring vintage tractors and building trailers to concrete and electrical work."

These hands-on activities not only make learning more interesting, they give students the kind of experience that makes them stronger job candidates.

Industry Certifications

Certifications of specific skills, usually administered by industry associations in conjunction with courses taught in high school, work to students' advantage. Earning any one of a few dozen different

certificates offered in the agriculture cluster makes them better candidates for employment.

For example, a student who earns the high school floral certification regulated by the Texas State Florists' Association (TSFA) can begin working as an entry-level florist rather than as an assistant.

To earn the certification, students must complete a year long Texas Education Agency approved floral design curriculum and then pass both a written and a practical exam administered by the TSFA.

Other popular certification programs include Certified Landscape Technician, Meat Processing, Texas Master Gardener, and Certified Veterinary Assistant.

These certification programs give students an advantage in the employment marketplace and are also valuable for college-bound students. If students are working while attending college, the certification enables them to land better jobs that will pay more toward their education.

SPOTLIGHT

IN THE SWIM Northeast Agriscience Magnet Program Teaches Aquaculture

The Aquaculture program at James Madison High School in San Antonio gives students a chance to get their feet wet in Agriculture, Food, & Natural Resources.

"We have five courses in that program of study," notes Northeast Agriscience Magnet Program Director John Mack, "and they provide students with an opportunity to study fish in every stage from egg to plate. We use everything from large 500-gallon tanks in a converted greenhouse to big outdoor ponds to breed the fish, to grow them from eggs to maturity, and then to harvest them."

For the first time this fall, students will actually be selling the catfish and tilapia they raise in the meat science lab's retail market. Students will begin working with saltwater



tanks to grow coral for use in aquariums.

Although still a relatively small industry, aquaculture is the fastest-growing segment of agriculture, Mack points out. "It's definitely up-and-coming," he says. "Just about all of the fish you buy in stores or eat in restaurants are now farm-raised."

In addition to raising fish, students in aquaculture courses research water quality and availability issues. Students learn about conservation and environmental technology through projects covering subjects like

erosion control and pesticide runoff.

One senior has received three national awards for her aquaculture research, which involved testing which water-filtering systems are the most efficient for filtering out fish waste.

"She's won \$20,000 so far just from competitions," Mack says, "and she has more opportunities for scholarships, as well. This research is her ticket to college."

BOOST YOUR CAREER prospects with firsthand experience in Agriculture, Food, & Natural Resources.

Lauren Schroeder graduated with a degree in animal science from Texas A&M University in 2006. While in high school, she was involved in livestock judging with 4-H and attended summer livestock judging camps for high school students at Texas A&M for two years.

“It was a great experience,” she says. “Students practice judging and giving oral explanations of their decisions. It teaches critical thinking skills because judges have to make a prompt decision and then defend it. It also teaches speaking and communication skills and helps them develop the self-confidence to speak in front of a group of people,” she adds.

A Variety of Opportunities

Some of the most valuable lessons high school students in Agriculture, Food, & Natural Resources learn evolve



outside the classroom. Extended learning opportunities come in many varieties, including special summer programs like the one Schroeder attended, summer or after-school jobs, internships, job shadowing, student organizations, volunteering, and work-based learning programs that allow students to split their time between school and working in an occupation that interests them.

Popular areas include jobs in landscaping, small-engine equipment repair, meat departments at supermarkets, and horticulture. A lot of students working in the gardening department of conglomerates like Home Depot.

Logan West, now a sophomore at Texas A&M University, worked for a local feed store in the afternoons during his senior year. “I kept the warehouse clean, unloaded shipments, took inventory, and sold feed and pharmaceuticals,” he says. “It was a great experience. I earned an income and it was good for my resume, too. I learned accounting principles that I still use today.”

Internships

Not all extended learning opportunities allow students to collect paychecks, but even if the positions are unpaid, they provide plenty of other payoffs, notes Kirk Edney, a curriculum specialist at Texas A&M University.

“Students interested in animal science who have an internship with a veterinarian might not get paid,” he explains, “but the internship makes it easier for student to get accepted to veterinary school after college, and that isn’t always easy.”

Some fields or jobs limit student participation for legal reasons. “For example, employees have to be over 18 to operate a meat slicer,” Edney says. “But there are plenty of other jobs students can do.”

Student Organizations

Groups such as 4-H and FFA are especially rich in hands-on learning opportunities (see “Cultivating Leadership”), as well as scholarships—each organization provides \$2 million in scholarship money in Texas every year. FFA has more than 72,000 high school

THE RUBY RED GRAPEFRUIT,
THE FIRST GRAPEFRUIT TO BE GRANTED A
U.S. PATENT, WAS DEVELOPED IN TEXAS.



members across Texas, representing about 65 percent of all the state's Agriculture, Food, & Natural Resource students. The 4-H program offers 92 project areas to its 650,000 Texas members, who range in age from 9 to 19.

"We're known for livestock-related projects," says Jeff Howard, associate state program leader for 4-H & Youth Development. "But we do more than that. For example, our statewide technology team works with web development, computer applications, and even the Global Positioning System."

Volunteering

Volunteer work is yet another rich opportunity for students to gain experience outside the classroom.

"Students in agricultural mechanics might enjoy volunteering for organizations like Habitat for Humanity," Edney suggests. "If you are a horticulture student, you can look for civic beautification projects around town," he adds. "County fairs offer still more opportunities for volunteers, maybe working at the children's barnyard or being an educational expert who explains agriculture to fair visitors."

CREATE a Career PORTFOLIO

One valuable tool that can help you get ready for college and beyond is a career portfolio—a collection of items that document your achievements both in and out of school, assembled in one convenient package.

A career portfolio is not simply a resume, although it can certainly include one. So what should go in a career portfolio? A variety of things, depending on your own personal experiences. It could include transcripts and grades; writing samples; letters of recommendation from teachers, mentors, or employers; awards you've received; and items that document other activities, such as internships and job shadowing experiences.

"You need to be specific—dates, how many years, any awards, what they meant, and who you received them from," says Grace Brauchle, who helps students put their portfolios together as the career center coordinator for Lehman High School in Kyle.

Brauchle says portfolios come in handy when students apply for jobs or admission to college. "First impressions are a very big thing," she says, "and you want to be the one whose papers get passed around the office. You want to be the one where the admissions counselors say, 'Wow, look at this one!'"

SPOTLIGHT

CULTIVATING LEADERSHIP FFA and FBLA Build Personal Skills for Success

If students choose the Agriculture, Food, & Natural Resources cluster, chances are that they'll be involved in FFA—the oldest student organization in the U.S. (founded in 1928). "If a student is enrolled in agriculture classes but not involved with FFA," says Tom Maynard, executive director of the Texas FFA Association, "he or she won't get the full effect of the agricultural education experience."

Logan West, a sophomore at Texas A&M University who plans to major in either agricultural business or agricultural leadership development, gained a lot from FFA—not the least of which was a \$15,000 scholarship. West says there's more to FFA than promotion of farming and ranching.

"FFA also involves public speaking and leadership opportunities," he says. "For example, I helped organize a convention of 8 to 10 thousand people in Fort Worth. It took a lot of work, but the experience was well worth it."

Skills like this are also important to employers. "An oil company executive once said to me, 'We can teach young people the hard skills, like how to run the equipment,'" Maynard remembers. "But they need to come to us with the soft skills, such as being responsible for their actions, getting along

with people, having the discipline to get to work on time.'

"Those are the kinds of personal character traits that FFA instills in students," he says.

Many agriculture students also participate in Future Business Leaders of America (FBLA) to develop leadership skills. Malia Hudson, a sponsor of FBLA at Plano East Senior High School in Plano, says several of her students have excelled in FBLA skill competitions.

One of them, Hunter Morris, was "barely interested in school and only to appease his mother's wishes became involved in FBLA," Hudson says. After excelling at an FBLA competition, Morris wound up "discovering his true calling in the field of economics," she says.



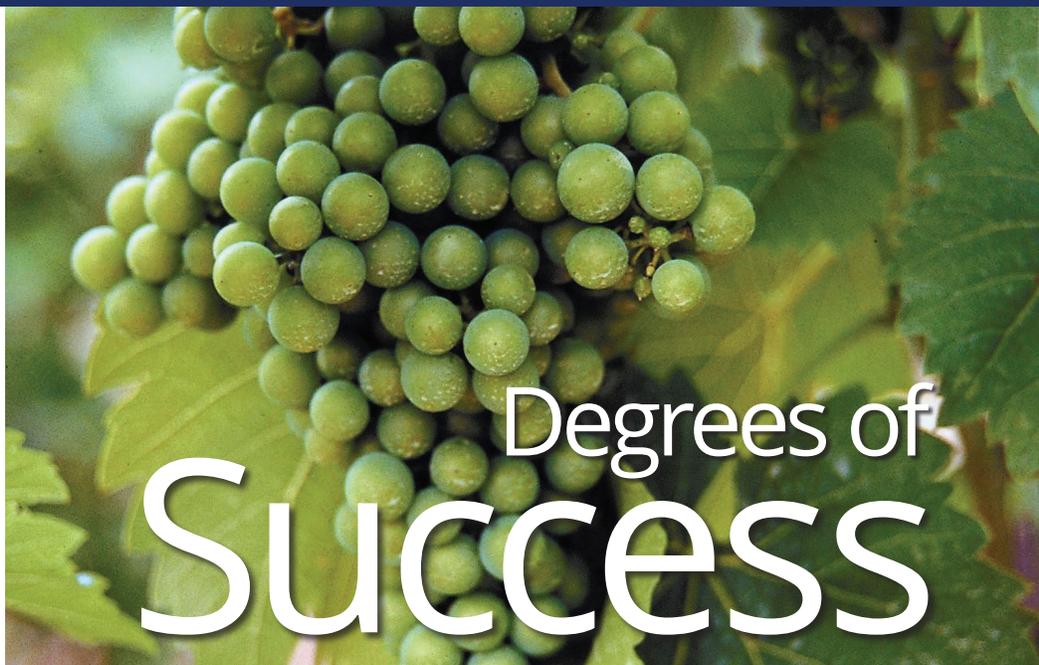
AFTER HIGH SCHOOL, students should pursue additional education in Agriculture, Food, & Natural Resources.

Wine making is a \$200 million industry in Texas. To become part of the industry, students can pursue a two-year associate's degree in viticulture and enology—also known as grape growing and wine making—from one of the few degree programs in the country specializing in this area. Grayson County Community College in Denison teaches winery operations, management, production, and marketing—in short, everything students need to know to turn grapes into gold.

Postsecondary Options

Grayson's program is just one of the interesting options for graduates in Agriculture, Food, & Natural Resources. Students can go immediately into the workforce, or can attend one-year certificate programs, two-year associate's degree programs like Grayson's, or four-year bachelor's degree programs. The choice is determined by how much education and training a particular field of interest requires.

"There are probably 40 community colleges in Texas that offer programs in agriculture and life sciences," notes Joe Townsend, associate dean in the College of Agriculture and Life Sciences at Texas A&M University. Students can turn many of these two-year degrees into four-year programs, he adds, taking their education to the next level.



Degrees of Success

Agricultural Technicians

An example of a popular two-year degree program (with a one-year certificate option) is the John Deere agricultural technician program at Navarro College in Corsicana, which teaches students every aspect of servicing John Deere equipment.

"There's a tremendous demand for technicians in this area," notes John Dawley, department chair and instructor with the Agricultural Technology program at Navarro. "Most of the students will graduate with job offers from a John Deere dealership."

Here are just a few other examples of community colleges with two-year programs (many with one-year certificate options in the same subjects):

- Texas State Technical College in Waco offers a dozen programs in diesel equipment technology. Those who go to the college's Texas State Marine Education Center in Palacios can get a marine specialization.
- Cedar Valley College in Lancaster offers an accredited veterinary technology program. Graduates are eligible to take the examination to become registered veterinary

technicians (RVTs). Cedar Valley has an agreement with the University of North Texas that allows its vet tech students to apply all of their credits toward a bachelor's degree in applied technology and performance improvement.

- Western Texas College in Snyder offers a golf course and landscape technology program that will allow graduates to begin their careers as assistant golf course superintendents or as irrigation or pesticide technicians. Associate's degree graduates can find jobs in the landscape and irrigation industry, in parks and recreation, or in sales of horticultural products or turf and landscape equipment.
- Clarendon College in Clarendon offers a well-respected ranch and feedlot operations program—one

THE 2012 U.S. CENSUS OF AGRICULTURE RECORDED
248,000 FARMS IN TEXAS
 AND A STATEWIDE NET FARM INCOME OF \$25.3
 BILLION.



THERE ARE
130 MILLION ACRES
 OF CROPLAND IN TEXAS.

of only two in the country. The required courses cover a variety of both technical and management skills designed to teach students how to own and operate an efficient and profitable ranch or feedlot operation.

- Richland College, one of seven two-year colleges in the Dallas County Community College District, has an ornamental horticulture technology program that offers a number of certificates, including technician, floral/interiorscape specialist, irrigation specialist, nursery/greenhouse management specialist, landscape/turf management specialist, and landscape design specialist.

Four-Year Degrees

High school graduates in this cluster also have the option of applying to four-year bachelor's degree programs, either immediately after high school or by transferring from a two-year degree program at a community college. The majority of these students attend one of the two largest schools of agriculture and natural resources in Texas, Texas A&M University and Texas Tech University.

Texas A&M's College of Agriculture and Life Sciences in College Station offers dozens of bachelor's and master's

degrees, including those in agribusiness, agricultural communications and journalism, animal breeding and genetics, biotechnology, dairy science, environmental studies, fisheries science, forestry, nutritional sciences, horticulture, natural resources development, poultry science, rangeland ecology and management, and wildlife science—to name just a few.

Texas Tech's College of Agricultural Sciences and Natural Resources in Lubbock offers numerous programs: agricultural and

applied economics, agricultural education and communications, animal and food sciences, landscape architecture, plant and soil science, and natural resources management.

Texas Tech's agricultural education program prepares students for careers as teachers. "There's a growing demand for high school agriculture teachers," says Matt Baker, professor. "Fifteen hundred agriculture teachers in the state are nearing retirement age."

Another four-year program is the farm and ranch management program at Texas Christian University in Fort Worth. This curriculum is appropriate for students who want to go into agricultural resource management in traditional occupations as well as such cutting-edge areas as commodity investment, agricultural marketing, and international agricultural trade.

Graduate Degrees

Students who want to further their education in Agriculture, Food, & Natural Resources for more than four years can continue to work toward a master's and even a doctorate degree.

For example, the University of Texas at Dallas (UT Dallas) is known for its pioneering work in developing a graduate certificate program in geospatial information sciences (GIS), a fast-growing field that combines data collection, mapmaking, and spatial analysis using the increasingly popular Global Positioning System (GPS).

UT Dallas's innovative program covers the use of GIS in more traditional environmental and geological applications as well as in newer areas such as government and business. Students who successfully complete all five classes in the program to receive the certificate can then count those classes toward a master of science degree in geospatial information sciences. For those who don't want to stop there, UT Dallas recently began offering one of the nation's first Ph.D. degrees in GIS.

"GIS careers are in high demand," notes Kirk Edney, curriculum specialist at Texas A&M University, which also offers a graduate degree in GIS. "This is a new and emerging occupation worth keeping an eye on."



Get the CREDIT You Deserve

Dual credit in Texas is a great way to earn college credits toward a postsecondary degree while you're still in high school. Dual credit programs center on "articulation agreements," contracts between the student, his or her high school, and postsecondary institutions the student would like to attend. While most students take basic core courses such as English, history, math, science, and social science, coursework may include areas in Career and Technical Education.

Dual credit courses cover the same material as the equivalent college course, allowing the student to receive credit toward the college degree. It's like a bank account. The credit is banked for you at the college, and you withdraw it when you enroll.

Ask your counselor about advanced placement, dual credit, or articulated courses and other opportunities to earn college credit.

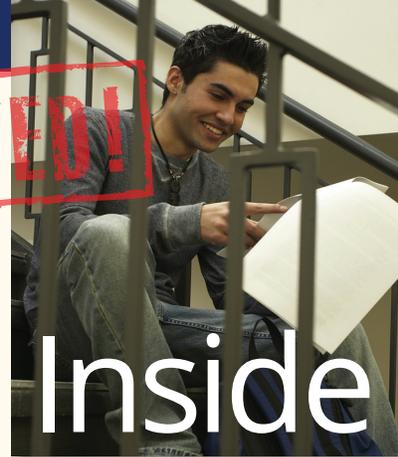


ACCEPTED!

SIX THINGS Texas students should know about getting into college

Applying to college is a lot like looking for a job or trying out for a team. You choose something that interests you, and then try your best to convince whoever is in charge that you have what it takes to be part of their organization. But whereas there might be only a few spots open on your high school's varsity football squad, there are thousands of places available in hundreds of colleges each year. Whether you are the first in your family to apply to college or both of your parents have advanced degrees, going through the admissions process can be stressful. Fortunately, there are plenty of free resources available for Texas college-bound students. The best is College for All Texans (www.collegeforalltexans.com), which features a list of all the state's colleges and universities, a checklist for selecting a school, and a link to the online Texas Common Application. To help you get started on your own college search process, here are six steps you should take.

Inside College Admissions



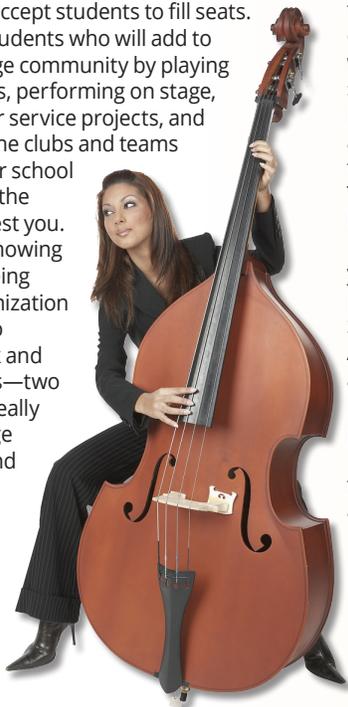
1. Make School Your Job

The first thing college admissions officers look for on your application is your grade point average. It's simple—you have to make the grades in high school to earn your spot in a college. The easiest way to do that is to think of school as your job, starting in your first year. If you show up late for work, slack off, and talk back to the manager, you'll get fired faster than you can say, "Do you want fries with that?" But if you always arrive on time, work really hard, and try to learn from management, then pretty soon you'll probably get a raise or a promotion.

What works on the job works in the classroom, too. Take challenging courses. Turn in all your work on time. Pay attention in class. Contribute to discussions. Ask for help when you don't understand something. By treating school as a career, you'll have a better shot at earning the grades and teacher recommendations that you need to move to the next level.

2. Get Involved in Activities

Colleges don't accept students to fill seats. They look for students who will add to the entire college community by playing on sports teams, performing on stage, volunteering for service projects, and so on. Look at the clubs and teams available at your school and sign up for the ones that interest you. In addition to showing school spirit, being part of an organization is a great way to build teamwork and leadership skills—two traits that can really help your college application stand out from the pack.



3. Build a Resume Portfolio

What if you had to take a final exam on the last three years of a subject and didn't have any notes to study? Well, that's exactly what it's like trying to complete a college application if you haven't kept an ongoing file of all your activities, honors, and employment.

Start your first year and build a career portfolio (see page 15). It's also smart to create a computer file called "college resume" and add to it each time you participate in a service project, win an award, get a new job, and so on. Use technology to create a resume format or ask your parents or guidance counselor for help. When you sit down to complete your college applications, review your career portfolio and call up the resume—all the information you need will be right at your fingertips.

4. Prep for Tests

Most colleges use scores from the SAT, SAT II, or ACT tests in making their admissions decisions. Check which tests the schools you're interested in require and sign up to take them in time to include the scores in your application. College for All Texans (www.collegeforalltexans.com) also has a free ACT, SAT, and GRE prep course.

Spend time preparing for the tests before you walk into the room with your No. 2 pencils and calculator. Go through sample SAT questions at www.collegeboard.org or ACT tests at www.actstudent.org. There are also dozens of test-prep books you can buy, some including software that tracks your progress as you go through sample exams.

Remember: If you don't do well on a test the first time, you usually can take it again and try to improve your score.



5. Make a List of Colleges

Do you want to stay in Texas for college or see another part of the country? Would you be more comfortable at a big university or a small college?

Think about what you would like to study and what matters most to you (like location, size, or religious affiliation), and then start developing a list of colleges that fit your criteria.

Use online tools like www.collegeforalltexans.com or www.collegeboard.org to learn more about each school and take online campus tours. Buy or borrow from the library some of the many college guides available. If possible, schedule visits to the schools you are interested in, or, through the school's admissions office, arrange an interview with a recent grad who lives in your area so you can ask questions about courses, faculty, or anything else.

By the fall of your senior year, narrow the list down to the top five or six choices. While some online applications are free, it can cost up to \$70 per school to apply, so be realistic about how much you can spend on applications.

6. Submit Polished Applications

Once you send in an application to a college there's no taking it back, so make sure you get it right the first time. Double-check your spelling. If you use the same essay for multiple schools, remember to change the name of the school to fit each application. Make sure you have any required standardized test results (ACT, SAT, SAT II) sent to each school.

Be neat and complete, and meet every deadline. Make copies of each application before you hit the send button or pop it in the mail. If you don't receive an email or postcard confirming that your application was received, contact the college to make sure it arrived. Items can get lost or misdirected, especially when thousands of students are sending in applications at the same time. By having copies, you can easily submit again.

EVEN IF you get accepted to college, you'll never be able to pay the bill, right? Wrong! There's financial aid available if you know where to look.

College isn't cheap. With tuition and room and board at private schools often topping \$40,000, and even in-state, public schools costing several thousand dollars a year, you may wonder why you should even apply.

Well, don't worry. Every Texas student can afford to go to college.

"Access and affordability of higher education can be intimidating to students and parents; however, there are numerous resources available to walk you through the process and into an exciting future," says Heather V. Crowson, vice president for enrollment management at Sam Houston State University.

The secret to getting the aid you need to go to school is in filling out the necessary forms, getting good grades, and applying to schools that offer generous financial aid packages. (A financial aid package consists of need- or merit-based scholarships and grants plus work-study jobs and low-interest student loans.)

Here's a quick overview of steps you can take to get the financial aid you need to continue your studies after high school. For more information about the aid available at a specific college or university, go to the school's website and click on the "Admissions and Financial Aid" link. Many schools provide an online form you and your parents can fill out that will give you the estimated financial aid package you might receive if accepted to that school.

Apply: You definitely won't get any financial aid if you don't apply. To figure out how much grant money (which you don't pay back) and loans (which you do pay back) you'll need to afford school, colleges use a formula that factors in your parents' income and investments, your income, the number of kids in the family who will be in college at the same time, and other financial information. Families of all income levels may receive aid, so fill out the forms.



Financial Aid

BASICS



All schools require the Free Application for Federal Student Aid (FAFSA), which determines eligibility for federal aid, such as work-study, Pell grants, and the Stafford loan program; and for college grants and, sometimes, merit scholarships. Complete the application as soon as possible at the beginning of October your junior year. FAFSA forms and instruction booklets are available in your guidance counselor's office, or you can complete the form online at www.fafsa.ed.gov.

Most private schools also require applicants to complete a school financial aid application and, in some cases, the CSS/Financial Aid Profile form (<https://student.collegeboard.org/css-financial-aid-profile>), which is used to award nonfederal student aid funds. Carefully read each college's application to determine financial aid deadlines and what forms you will need to submit.

Study In-state: Whether you choose a public or a private school, staying in-state for college will cut your costs considerably. Plus, since Texas covers 267,339 square miles, you can "go away" to college without ever leaving the state.

To help ensure that qualified Texas high school graduates with financial need can go to college, the State Legislature established the TEXAS (Towards Excellence, Access, and Success) Grant Program. Grants can be used to study at any public college or university in the state and are equal to the student's tuition and required fees. In 2012-2013, approximately 33,100 students received TEXAS Grants. To apply, fill out the FAFSA.

Another way to score some serious state aid is to get good grades in high school. Texas students who are in the top 10 percent of their graduating class are eligible for automatic admission to any public university in the state. With that automatic admission comes the opportunity to apply for merit scholarships and special programs available at each school.

Take Two at a Community College: The first two years of many college programs are filled with core courses that could easily be taken at a local community college for a lot less money. If you fill out all the forms, do the math, and still can't afford a four-year school, enroll in a community college for the first two years, then transfer to a four-year school.

By living at home, working part-time, and getting required courses out of the way, you could save tens of thousands of dollars in tuition and room and board, and be able to afford to attend the college of your choice for junior and senior years. For a complete list of the state's community colleges, go to the Texas Association of Community Colleges website at www.tacc.org.

Target Your Search: Applying to a couple of colleges where your grades and talents put you near the top of the typical talent pool makes it more likely you'll qualify for merit aid and other special school scholarships and grants. Do a little research on college websites to find schools where your standardized test scores and grade point average rank you in the top 25 percent or so of the most recently accepted first-year class. Colleges want to attract the best and brightest students available, and often will offer attractive scholarship/grant/loan packages to convince those students to come to their school.

There are also more than 1 million local, national, and college-specific scholarships available each year. The trick is to find and apply for scholarships that best fit your strengths and talents. FastWeb (www.fastweb.com) is a free college scholarship search source. Register online and you will start receiving email notices about scholarships, internships, and other opportunities that fit the profile information you submit.



LOOK IT UP! Here are key words and phrases used in this guide that you may not already know.



What does that mean?

Articulation agreements: formal agreements between or among educational organizations (high schools, community colleges, and universities) that align courses and majors in a way that allows students to transition from one institution to another without loss of course credit or time.

Associate's degree: a two-year degree awarded by a community or technical college.

Bachelor's degree: a four-year degree awarded by a university.

Career and technical student organizations (CTSOs): curricular organizations for students that offer activities and competitions related to particular careers.

Career cluster: a way of organizing curricula, instruction, and assessment around specific occupational groups (for example, Information Technology or Health Science) that offers students core academics, coursework related to specific occupations, and extended learning experiences.

Career guidance: structured developmental experiences presented systematically from kindergarten through 12th grade that help students analyze and evaluate abilities, skills, and interests.

Career portfolio: a collection of student work indicating progress made in subjects, activities, or programs. In career cluster systems, portfolios are often used to assess student performance in extended learning experiences.

Doctoral degree: a degree awarded by universities for study beyond a master's degree. Also referred to as a Ph.D. or professional degree.

Dual credit: credit given in both high school and college for college-level courses taken while in high school.

Extended learning experiences: participation in career and technical student organizations, extracurricular activities, job shadowing, internships, or service learning.

Financial aid: scholarships, grants, loans, and work-study funds awarded to students to pay for college expenses.

Internship: an extended learning experience in which students work temporarily at entry-level jobs in careers that interest them.

Job shadowing: an extended learning experience in which students observe professionals in particular careers as they go through a day on the job.

Master's degree: a degree awarded by universities for study beyond a bachelor's degree.

Postsecondary education: education beyond high school. Middle school and high school are referred to as secondary education, so postsecondary means after high school.

Program of study: a way of organizing the curricula and educational activities within a career cluster related to a student's specific academic and career goal.

Service learning: an extended learning experience in which students do volunteer work related to their career goals.

Targeted industry clusters: six industry clusters that have been identified by Texas as high-demand, high-growth sectors paying high wages. As they are developed by the State, these may be hot areas in which to build a rewarding career.

Program of Study: an education plan suggesting the high school courses a student should take to prepare successfully for graduation and transition into postsecondary education. The vision for Texas CTE is that eighth graders, in consultation with their parents/guardians, counselors, and teachers, will select a program of study and create a plan. Plans are to be reviewed and revised at least once each school year.





Online Info

Explore these Internet resources for more about your education and career options.

America's Career InfoNet www.acinet.org/acinet

This is the place to search for occupational information, industry information, and state-specific labor market information.

College for All Texans www.collegeforalltexans.com

Here is everything a Texan needs to know about preparing for, applying for, and paying for college or technical school. And it's all in one up-to-date, easy-to-navigate mega-site almost as big as the state itself. Remember: \$4 billion is available every year to help Texans attend college.

Employability Skills Framework <http://cte.ed.gov/employabilityskills/>

Employability skills are general skills that are necessary for success in the labor market at all employment levels in all sectors. The Employability Skills Framework is a one-stop resource for information and tools to inform the instruction and assessment of employability skills.

My Next Move www.mynextmove.org/

This is a career planning resource for students, parents, career changers, and career advisors.

TEXAS CAREER CHECK

The State of Texas has created a special website for students and others researching careers. It's called Texas Career Check. Texas Career Check lets you explore higher education options by looking at detailed information by school and program of study, AND you can explore careers, occupational information, and postsecondary education options. You'll find a wealth of information about hundreds of career choices. To explore Texas Career Check, go to www.texascareercheck.com.

O*NET (Occupational Information Network) www.onetcenter.org

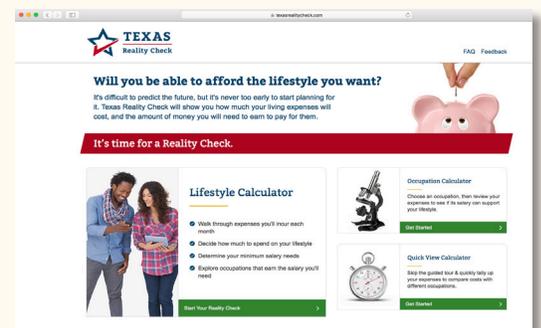
Also available in schools and libraries, O*NET provides full information on occupations, including compensation, employment prospects, and skill matching for students. Information on compensation is available on a state-by-state basis.

U.S. Department of Labor Occupational Outlook Handbook www.bls.gov/htm

This nationally recognized resource offers information on job responsibilities, earnings, working conditions, and job prospects for the future.

Take a Reality Check

The Texas Workforce Commission has created an online resource called Reality Check to help you understand how much money you'll need to live on your own after high school or college and how you can earn it. There are three ways to explore careers, expenses, and earnings. For the first option, which is called "Get a Reality Check," you choose an area you'd like to live in, such as Austin. You then go through a series of screens with real-world costs for items such as housing, clothing, transportation, health care, and personal expenses. The site automatically adds up your estimated monthly expenses, then uses salary information for Texas to show you careers that will make you that much money. The second option, called "Future Salary," starts with the wages you expect to earn, what education you plan to pursue, and the career cluster that interests you. Then it generates a list of careers in which you can make that amount of money. The third option, "Occupation Direct," begins with your occupational choice and the area where you want to live, then shows how your estimated expenses subtract from the salary for your chosen job. The site, which is at www.careerwise.mnscu.edu/careers/realitycheck.html, is a great way to play "what if" when it comes to mixing your job, earnings, and expense options.



The results of Reality Check show you how expenses add up quickly when you are living on your own.

Texas CTE Career Clusters



**Agriculture,
Food &
Natural
Resources**

Processing, production, distribution, and development of agricultural commodities and natural resources



**Architecture &
Construction**

Designing, managing, building, and maintaining the built environment



**Arts, A/V
Technology &
Communications**

Creating, exhibiting, performing, and publishing multimedia content



**Business
Management &
Administration**

Organizing, directing, and evaluating functions essential to productive business operations



**Education &
Training**

Providing education and training services, and related learning support services



Finance

Financial and investment planning, banking, insurance, and business financial management



**Government
& Public
Administration**

Executing governmental functions at the local, state, and federal levels



Health Science

Providing diagnostic and therapeutic services, health informatics, support services, and biotechnology research



**Hospitality
& Tourism**

Managing restaurants and other food services, lodging, attractions, recreation events, and travel-related services



**Human
Services**

Providing for families and serving human needs



**Information
Technology**

Designing, supporting, and managing hardware, software, multimedia, and systems integration



**Law,
Public Safety,
Corrections
& Security**

Providing legal, public safety, protective, and homeland security services



Manufacturing

Processing materials into intermediate or final products



Marketing

Performing marketing activities to reach organizational objectives



**Science,
Technology,
Engineering &
Mathematics**

Performing scientific research and professional and technical services



**Transportation,
Distribution
& Logistics**

Managing movement of people, materials, and goods by road, pipeline, air, rail, and water

About Texas CTE You may have seen the name Texas CTE on the cover of this magazine. What exactly is that?

Texas CTE is the name of Texas' college and career education initiative. The idea behind it is simple: Planning for the future so that students achieve lifelong success. As Texas CTE grows, you'll see how subjects such as English, math, science, and social studies are relevant to your personal goals and ambitions. You'll get the chance to begin a plan that gets you where you want to go in life. You'll have the opportunity to take courses and engage in extended learning experiences that give you marketable skills. Best of all, you'll be in control of your future. Read all 16 editions of Texas CTE in Action (available through your counselor) to explore Texas' career clusters and start on the road to success.