

Oklahoma KEY BUSINESS SYSTEMS

Wealth Building Career Pathways



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Growing up in the small town of Tecumseh, my parents taught me to dream as big as the Oklahoma sky. Today, Oklahoma students can dream even bigger because of the numerous wealth-generating careers available to them. Ensuring all Oklahomans have the opportunity to obtain quality, wealth-building careers not only impacts the well-being of our residents, but also the financial well-being of our state.



As Chairman of the National Governors Association, I have selected America Works: Education and Training for Tomorrow's Jobs as my national initiative. The initiative brings together high schools, colleges, workforce training providers and the business community to develop high standards in education. This collaborative approach ensures when students graduate, they are college, career and citizen ready. My goal with the America Works Initiative is to connect student passions with career opportunities through post-secondary education degrees or credentials, which can ultimately provide a well-educated workforce across our state and nation.

Oklahoma has identified five economic systems, also known as "eco-systems," that contain high-demand, high-wage jobs. These eco-systems are: aerospace and defense, energy, agriculture and biosciences, information and financial services, and transportation and distribution. Each of these areas requires highly skilled, highly educated employees, which means our schools must prepare our students to this high level.

Together, with schools, universities, technology centers, credential-granting entities and the business community, we are working to secure a more prosperous future for all Oklahomans.

Sincerely,

Mary Fallin
Governor



Mary Fallin
Office of the Governor
State of Oklahoma

OKLAHOMA:

An Opportunity for Wealth

FACTS

Economics is often thought of as a complex subject matter analyzing curves and lines on charts and graphs. However, it is much more than this. Economic concepts contribute to better decision making and is key to understanding prosperity and building wealth. No matter what your age, knowing how economics works helps you feel better about finances and addressing situations that involve money management.

The Oklahoma Department of Commerce has identified five key business systems that drive wealth for the state of Oklahoma. These five identified business systems include: Aerospace and Defense, Energy, Agriculture and Biosciences, Information and Financial Services, and Transportation and Distribution. Manufacturing is an industry area that supports all five of these systems and plays an integral part of the success of each. By understanding how these industries build wealth for Oklahoma's economy, students and people already in the workforce can prepare for employment that can generate both personal and corporate wealth.

Financial Literacy: The Key to Understanding Wealth

Becoming financially literate is critical to fulfilling the employment opportunities the five key business systems represent. The challenge for young people is that the workforce opportunities that Oklahoma provides will not make sense without a basic understanding of personal finance, economic reasoning, and the principles of wealth building.

In order to obtain and build wealth, one needs to have good grasp on money management and how it works. When you know how to build wealth

then the importance of graduating high school with a career in mind, staying out of debt, learning on the job, and saving money will become easier and you'll be able to reach life goals and create a prosperous future.

Defined: Financial Literacy

The ability to understand how money works in the world: how someone manages to earn or make it, how that person manages it, how he/she invests it (turn it into more) and how that person donates it to help others. More specifically, it refers to the set of skills and knowledge that allows an individual to make informed and effective decisions with all of their financial resources.

Time, apathy, and understanding relevance are costing young and old alike the opportunity to plan for, act on, and encourage wealth building strategies personally and professionally.

Personal wealth translates into a viable community and leads to a strong economy. When our workforce is building on their personal skills to address demands of growth industries, the motions are in place for our state to be economically prosperous.

Get on the Wealth Building Track What is wealth?

Essentially, wealth is the accumulation of resources. People are said to be wealthy when they are able to accumulate many valuable resources or goods. Wealth is expressed in a variety of ways. For individuals, net worth is the most common expression of wealth.

Defined: Net Worth

What you own minus what you owe. Net worth is a concept applicable to individuals and businesses as a key measure of how much an entity is worth.

How do you acquire wealth?

Obtaining wealth requires a thoughtfully constructed plan and diligently working that plan over time.

Whether you are running the state government, an organization, a business or your own household, building wealth over time depends on the successful execution of three steps: 1) having enough income, 2) saving an adequate portion of that income and 3) prudent investing of monies.

Building wealth basically boils down to doing three things with money:

Make it. This means that before you can begin to save or invest, you need to have a long-term source of income that's sufficient enough to have some left over after you've covered your necessities.

Save it. Once you have an income that's enough to cover your basics, you need to develop a savings plan and follow it.

Invest it. Once you've set aside a monthly savings goal, you need to invest it prudently.

Carpe Diem

By understanding the workforce opportunities inherent in the Oklahoma landscape, you can plan for success today and make it reality by getting the most out of your education and employment experiences.

Seize the day to realize the hope of tomorrow because it is as bright as you want to make it.

OKLAHOMA'S *Economic Development Initiative*

FACTS

Oklahoma's economic performance in the past five years has been markedly better than many other states, and this initiative aims to accelerate that growth and address possible future challenges. Additionally, this plan focuses on nurturing a well-educated, growing workforce and supporting infrastructure needed to continue our growth.

The Oklahoma Economic Development Initiative promotes targeted groups of wealth generating industries for business retention, expansion, and recruitment. In addition, the plan focuses on nurturing a well-educated, growing workforce and supporting infrastructure need-

ed to continue our strong growth well into the future. To determine which group of industries would be a priority, we considered the following criteria based off data.

- Wealth Generation
- Growth Potential
- Competitive Advantage

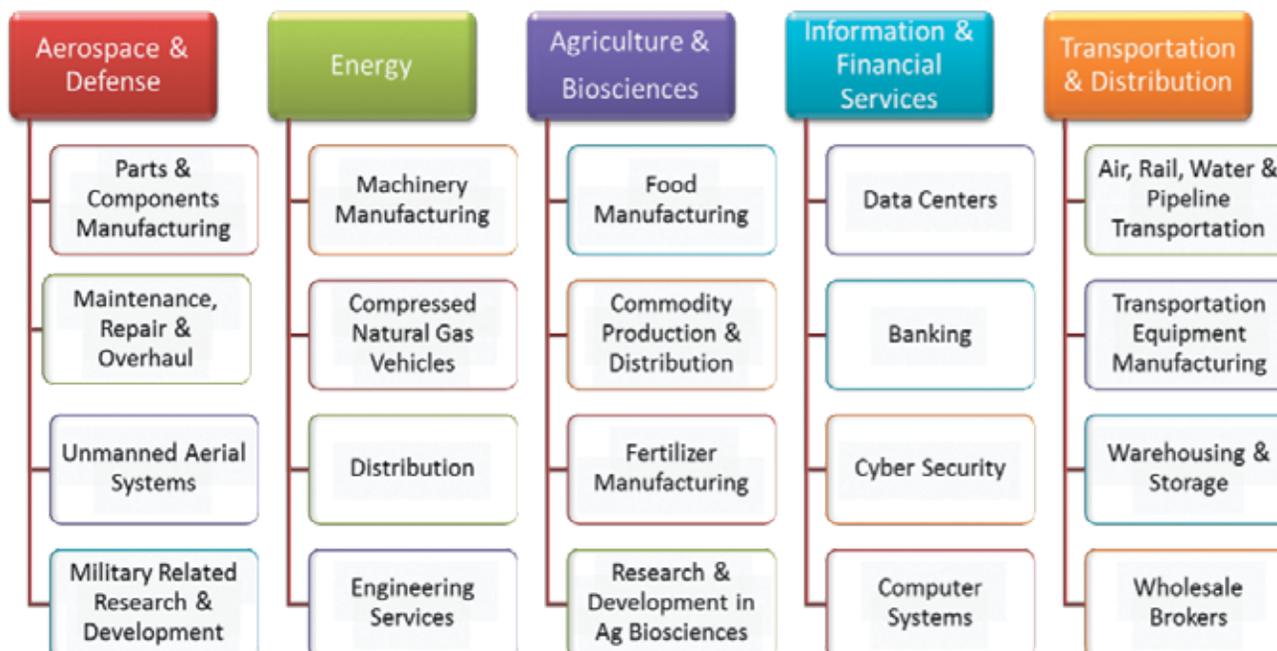
To help support the wealth generating industries we will train an appropriate workforce, remove unnecessary regulation, create pro-growth incentives, identify infrastructure needs and align the state's policies so that our current market winners become even more competitive in the

global economy. For example, those targeted industries are: Agriculture and Biosciences | Energy | Aerospace and Defense | Information and Financial Services | Transportation and Distribution.

Why this strategy?

This strategy is being implemented because it addresses more than business recruitment. It addresses a broader set of policies that can expand and accelerate industries that are already here, like workforce education incentives and infrastructure needs. For instance, labor supply is one of the top concerns of this initiative. It addresses the fact that in today's environment, developing, growing and sustaining an educated and qualified workforce is crucial to success. Just as industries are targeted, so are critical occupations.

Beyond education and training, infrastructure needs must be addressed in order for business to run optimally. While traditional assets like roads and bridges will continue to be maintained and require updates, we will also need to pay attention to new "roads" of commerce like wireless broadband and new airspace radar technologies.



OKLAHOMA IS: *Soaring*

FACTS

SEE ACTIVITY ON PAGE 8

Oklahoma has a distinguished aerospace heritage. In the 1910s, Clyde Cessna began testing aircraft in the state. In the 1920s, two airlines were established that helped jumpstart the development of Oklahoma's aerospace industry: Tulsa-Oklahoma City Airways (founded by Tom and Paul Braniff, who went on to establish Braniff Airways) and Southwest Air Fast Express (S.A.F.E.), founded by Erle Halliburton. Both were purchased by American Airways, the precursor to American Airlines, which began the company's long relationship with Oklahoma.

Oklahoma is also home to aviation great Wiley Post who flew around the world solo in his airplane Winnie Mae in 1933. During WWII, two large Douglas Aircraft Company facilities were built in Oklahoma to manufacture and repair bombers for the U.S. Air Force. After the war, the Douglas plant in Oklahoma City became a part of Tinker Air Force Base. The end of World War II also brought the U.S. Civil Aeronautics Administration (CAA) to Oklahoma City. Oklahoma's junior senator, A. S. "Mike" Monroney wrote the Federal Aviation Act in 1958 which created the Federal Aviation Agency (FAA), replacing the CAA.

Today, Oklahoma is home to an impressive collection of aerospace and defense companies and government facilities. In 2013, there were close to **120,000** Oklahomans employed by companies in the Aerospace and Defense Ecosystem.

Oklahoma's central location has made it a hub for Maintenance, Repair, and Overhaul (MRO) facilities where skilled workers rebuild and repair aircraft.

- Tinker Air force Base has the largest military aircraft MRO site in the nation.
- In Tulsa, American Airlines operates the largest commercial aircraft MRO in the nation.

Oklahoma has other reasons to be proud of its aerospace and defense economy:

- Tinker Air Force Base is the state's largest single site employer with 26,000 military personnel and civilians working there.
- The FAA Mike Monroney Aeronautical Center is located in Oklahoma City and is the central training and support facility in the nation for the FAA and

the U.S. Department of Transportation. The center employs 5,500 people and trains more than 20,000 students each year.

- More NASA astronauts come from Oklahoma than any other state.
- Oklahoma's Spaceport near Burns Flat, is one of only a few in the country and with a 13,500-ft main runway, has one of the longest runways in North America.
- The U.S. Department of Homeland Security designated the state as an Unmanned Aerial Systems (UAS) test site.
- Oklahoma universities were the first in the nation to offer UAS-focused Master's and Ph.D. degrees.
- 12 colleges and universities in the state have aerospace programs and six technology centers have dedicated training for the aerospace industry.

In addition to the five military installations across the state employing tens of thousands, some of Oklahoma's top aerospace and defense employers include the FAA Mike Monroney Aeronautical Center, American Airlines, Spirit AeroSystems, The Boeing Company, The Nordham Group, SAIC, and Flight Safety.

Examples of Aerospace & Defense Industries:

- Parts and Components Manufacturing
- Maintenance, Repair, and Overhaul
- Unmanned Aerial Systems
- Military-Related Research & Development

EXAMPLES OF AEROSPACE & DEFENSE OCCUPATIONS	OKLAHOMA AVG. HOURLY EARNINGS	EDUCATION LEVEL
General & Operations Mgrs	\$41.39	Bachelor's + work exp.
Computer Systems Analysts	\$30.20	Bachelor's degree
Computer Programmers	\$28.62	Bachelor's degree
Software Developers, Applications	\$34.82	Bachelor's degree
Software Developers, Systems	\$38.26	Bachelor's degree
Computer User Support Specialists	\$19.82	Associate's degree
Civil Engineers	\$39.92	Bachelor's degree
Mechanical Engineers	\$36.92	Bachelor's degree
Electrical & Electronic Equipment Assemblers	\$14.53	Short-term on-the-job training

Sources:

<http://orgs.utulsa.edu/spcol/?p=2798>

<http://okcommerce.gov/location-or-expansion/oklahomas-business-ecosystems/aerospace-defense/>



Name:

Joseph P. (Half Pint) Dunagan

Occupation: Systems Engineer – Director of Engineering, ARINC Aerospace

How long serving in this current position: 1 year, 35 years in industry

Education Level Attained: Masters of Aeronautical Science, Gradu-

ate Certificate Military Strategy

Did you know in middle school or high school this is type of industry/work you wanted to be in? Yes, I was always fascinated by aviation and the art, science and history of flight.

If so, what gave you that understanding? If not, when did you begin to realize your career path? Reading!, Reading! And Reading. I grew up in a military family, my father was a flight engineer in the Air Force and I would read his flight manuals as early as 8 years old. Then whenever I had to write essays or book reports and had the option to select the topic it was always about the applications of flight or airpower.

What educational path did you follow to gain knowledge about this industry? I challenged myself to take the science, math and technology courses in high school with the goal of going into college to be a pilot. However, life's choices took me on a more circular path and I joined the US Military where I continued my college education and flew as a military crew member in a variety of aircraft. I got my pilots license before I completed college.

What apprenticeships or workplace experience contributed to your expertise? My military career gave me a great introduction to flight; I started as a technician, then expanded into engineering and then learned about the aviation industry. All of these activities introduced me to the science of flight, the engineering principals, and the theories of flight. It is easy to work and learn a subject that you have a passion for, everyone should work in the field they love, then it really is not work.

What challenges and/or obstacles did you personally overcome to succeed? I was told by my high school guidance counselor that not everyone was meant to go to college and the world needed auto mechanics, which is what I did in high school. So I was forced to overcome friends and family who thought I should stay in rural Georgia, get married and have a family and work in the family auto business. My family did not have the money to send me to school and my grades were at best average, so I had to work my way through college, study hard and hold down several jobs to eat.

Who was the most influential person(s) along the way that supported you to be where you are today? There is not one person I can credit as many people helped me get to where I am today. From my supervisors who would turn their heads when I had homework to do while manning my post in the military to a wife who watched and did both mother and father jobs so I could study or be away for long periods of work. You also have to credit yourself for the sacrifices you have to make.

What career goals or professional aspirations do you have now? I still would like to complete my doctoral studies in the history of airpower and maybe teach when the pace of life slows down.

What advice do you have for students who want to work in this industry? I have two simple pieces of advice, first love the industry you choose and second don't ever take no for an answer. No never solved a problem or put an airplane in the air.

OKLAHOMA IS: *Full of Energy*

FACTS

Oklahoma is a land with a rich heritage of energy resources. Its fossil fuel reserves are part of the Mid-Continent Oil Region, an enormous oil and gas producing area extending from Texas northward, and bordered by the Mississippi River to the east and the Rocky Mountain states to the west.

The discovery of oil in Oklahoma transformed the area's economy. Wildcatter Edward Byrd drilled the first successful oil well in Indian Territory near present day Chelsea, Oklahoma in 1890. Excited by the discovery of "black gold," oil explorers and investors quickly flocked to the state. Large gushers began to blow across Oklahoma and wooden oil derricks became a familiar sight. Areas like Bartlesville, Glenpool, Drumright, and Muskogee boomed as each new well drew more lease buyers, oil field workers and entrepreneurs to the area. Rail and pipelines were built to send the oil to places like Kansas where it could be processed into kerosene and other products. Oklahoma was the largest oil producer in the nation by the time it became a state in 1907 - with Tulsa claiming the title of "Oil Capital of the World."

Natural gas was discovered in the state shortly after the first oil wells were drilled in the early 1900s. Natural gas has become an increasingly important source of energy for its cleanliness and ability to burn at an even temperature. Governor Mary Fallin has been leading the charge to increase the use of compressed natural gas (CNG) vehicles in the state. Oklahoma and a number of other states have joined together in a pledge to replace older state fleet vehicles with newer ones that run on CNG. Oklahoma now has the largest number of public access CNG filling stations in the U.S. per capita.

For more than a century, natural gas and oil have advanced and sustained the state through good times and bad. Many important oil and gas companies and organizations trace their origins to Oklahoma. Today, Oklahoma is the nation's 5th largest crude oil producer and 4th largest natural gas producer. Oil and gas represents one third of the state's economic output. Oklahoma is also home to the world's largest and most important oil storage hub in Cushing. So much oil flows in and out of storage tanks in Cushing that the city is known as the "Pipeline Crossroads of the World."

Renewable energy sources are also an important part of Oklahoma's energy generation mix. In fact, 10% of the state's electricity needs are met by renewables. With all the wind sweeping down the Oklahoma plains, it's not unusual to see

large wind turbines dotting the landscape. Oklahoma is a national leader in wind power and has the sixth highest level of wind capacity in the country. The U.S. Department of Energy predicts Oklahoma could be the second-largest wind energy generator by 2030.

Lots of energy means lots of jobs. The energy industry employs the state's largest workforce - with nearly **194,000** people. And, the industry is not slowing down. It is expected to add 31,000 jobs by 2017, an increase of over 9%. It's no surprise that Oklahoma is a major contributor to energy research and development and is home to several universities with strong energy-related degree programs and research facilities.

Many of the world's largest energy companies have significant footprints in Oklahoma, including Devon, Chesapeake, Continental, Sandridge, and Chaparral.

Examples of energy industries:

- Machinery Manufacturing
- Natural Gas Products
- Extraction
- Engineering Services

EXAMPLES OF ENERGY OCCUPATIONS	OKLAHOMA AVG. HOURLY EARNINGS	EDUCATION LEVEL
Property, Real Estate and Community Assoc. Managers	\$21.47	Work exp. in a related occupation
Wellhead Pumpers	\$81.37	Bachelor's degree
Mobile Heavy Equipment Mechanics	\$66.02	Bachelor's degree
Industrial Machinery Mechanics	\$24.12	Short-term on-the-job training
Petroleum Engineers	\$16.49	Moderate-term on-the-job training
Geoscientists	\$25.38	Moderate-term on-the-job training
Title Examiners, Abstractors and Searchers	\$16.43	Long-term on-the-job training
Heavy and Tractor-Trailer Truck Drivers	\$21.74	Long-term on-the-job training
Roustabouts	\$17.82	Short-term on-the-job training
Extraction Workers	\$26.70	Moderate-term on-the-job training

Sources:

<http://www.ok.gov/energy/documents/Governor%20Fallin%27s%20Energy%20Plan.pdf>
<http://www.eia.gov/state/analysis.cfm?sid=OK>
<http://aoghs.org/petroleum-industry-pioneers/first-oklahoma-oil-well/>
<http://digital.library.okstate.edu/encyclopedia/entries/n/na017.html>

SEE ACTIVITY ON PAGE 8



Name: Dorysa Moore

Occupation: Government Relations Manager

How long serving in this current position: 3 years in Government Relations, 13 years total

Education Level Attained: Bachelor's Degree in Business, minor in Communications

Did you know in middle school or high school this is type of industry/

work you wanted to be in? I did not know what I wanted to do for a career. I had always envisioned working in a big building in corporate America.

If so, what gave you that understanding? If not, when did you begin to realize your career path? My first job was at a big corporation. It was not until I moved to Houston 13 years ago, that I realized and truly understood the importance of oil & gas and the central role these energy sources play in our economy.

What educational path did you follow to gain knowledge about this industry? I was able to identify a mentor early in my career at Marathon Oil and meet with her frequently to further understand the energy industry. I started my career in Human Resources, so I spent a lot of time interviewing new employees and discussing key skills and qualifications for our technical and operations departments, which helped me to understand more about these roles within the company. Overall, it was a combination of all of this exposure, training and a personal commitment to continued professional development that has helped me to grow into a leadership position.

What apprenticeships or workplace experience contributed to your expertise? Something that is key to being successful is being able to learn, articulate and discuss the importance of our business with those outside of the energy industry. I was able to have a mentor in this role who told me it was OK to ask lots of questions and she helped me learn about things that had worked for her in the past to make her successful.

What challenges and/or obstacles did you personally overcome to succeed? One of my biggest challenges was leaving my home, Oregon, to move to California for a job. I was close to my family and did not want to be far away, but recognized the importance of taking a good job and learning to grow on my own.

Who was the most influential person(s) along the way that supported you to be where you are today? My parents were the most influential people in my life growing up and continue to play a big role in my life now. They continued to talk to me about the importance of science, math and skills that typically were more challenging than other subjects.

What career goals or professional aspirations do you have now? I continue to want to develop my skills as a government relations manager. I would like to see this lead to further mentoring of others at my company. I ultimately would like to be an executive and demonstrate that even those who do not carry a technical degree in energy can still help to make the decisions important to the company's growth.

What advice do you have for students who want to work in this industry? Do not be afraid to try an industry like energy that you may not have a lot of knowledge of because anyone can learn about oil and gas with hard work and the commitment to learn.

OKLAHOMA IS: *Fertile Ground*

FACTS

SEE ACTIVITIES ON PAGE 8 & 9

Agriculture

After Oklahoma's Land Run of 1889, thousands of people rushed to farm the state's red soil, ushering in an agriculture based economy. Agriculture was the state's leading industry well into the 20th century – with farmers producing a wide range of crops such as corn, cotton, winter wheat, oats, milo, maize, potatoes, peanuts, alfalfa, broomcorn, and hay. Oklahoma farms have historically not had an easy time. They have battled periodic droughts, low prices for crops and livestock, and severe dust storms. Over the years, the total number of farms in Oklahoma has dwindled as smaller operators bowed out of the industry.

Today, agriculture is still an important part of Oklahoma culture – with farmland accounting for more than 75% of all land area in the state. Oklahoma produces 18.2% of America's rye, 8.3% of America's pecans, 6.8% of American wheat, 6% of America's beef, and 3.5% of American pig products.

More than 610 companies make up Oklahoma's food manufacturing industry, which accounts for almost 2% of the state's employment base. Small companies make up the majority of Oklahoma's food manufacturing industry, which is extremely diversified.

Oklahoma is one of the three largest fertilizer manufacturing states in the U.S. Fertilizer is essential to domestic and global food production and U.S. fertilizer manufacturers provide considerable direct and indirect economic benefits to Oklahoma's economy. Oklahoma's fertilizer industry has the second highest employment rate in the U.S., with an average economic output of just over 2 billion dollars.

Some of the state's largest agriculture ecosystem employers include Tyson Poultry, Terra Nitrogen, Koch Nitrogen, Archer Daniels Midland, Seaboard Farms, Inc., and Bar-S Foods Company.

Examples of agriculture industries:

- Food Manufacturing
- Commodity Production and Distribution
- Fertilizer Manufacturing
- Research and Development

EXAMPLES OF AGRICULTURE OCCUPATIONS	OKLAHOMA AVG. HOURLY EARNINGS	EDUCATION LEVEL
Farmers, Ranchers & Other Agricultural Managers	\$8.94	Work exp. in a related occupation
Animal Trainers	\$11.34	Moderate-term on-the-job training
Agricultural Equipment Operators	\$19.55	Short-term on-the-job training
Farmworkers & Laborers, Crop, Nursery & Greenhouse	\$10.30	Short-term on-the-job training
Fishers & Related Fishing Workers	\$13.10	Moderate-term on-the-job training

Biosciences

Oklahoma's strong economic climate, low tax rates, and agricultural tradition have made the state an attractive location for the bioscience sector. The bioscience industry in Oklahoma is vibrant and growing and has emerged as one of the state's strongest economic forces. The industry provides a variety of high quality, high-wage jobs with more than 44,000 people employed with a direct economic impact of \$1.95 billion. With more than 500 bioscience-related businesses and organizations, the total economic impact of biosciences is more than \$6.7 billion.

A key component to Oklahoma's bioscience, agriculture and research and development momentum is the relationship between clinical researchers, academic institutions and the public and private sector. The state has several cutting-edge, world-class bioscience facilities that are recognized internationally for their strengths in select areas of human, plant, and animal science. In 2012, Oklahoma institutions attained 471 patents and received

over \$96 million in federal grants.

Some of the state's top technology and research centers include:

- Samuel Roberts Noble Foundation
- Stephenson Research & Technology Center
- Oklahoma Medical Research Foundation
- Oklahoma Health Center
- Harold Hamm Oklahoma Diabetes Center
- Dean McGee Eye Institute

A few of the state's largest employers in the bioscience sector are Astellas Pharma Technologies, Solae LLC, Allergy Laboratories, Inc., and 3M IMTEC Corporation.

Examples of Bioscience Ecosystem industries:

- Research, Testing, and Development
- Drugs and Pharmaceuticals
- Medical Devices and Equipment
- Agricultural Feedstocks and Chemicals

EXAMPLES OF BIOSCIENCE OCCUPATIONS	OKLAHOMA AVG. HOURLY EARNINGS	EDUCATION LEVEL
Medical & Health Services Managers	\$38.47	Bachelor's degree
Chemical Technicians	\$18.88	Associate's degree
Physicians & Surgeons, All Other	\$69.04	First Professional degree
Medical & Clinical Laboratory Technologists	\$23.80	Bachelor's degree
Radiologic Technologists	\$24.08	Associate's degree

Sources:

http://www.nass.usda.gov/Statistics_by_State/Oklahoma/Publications/Annual_Statistical_Bulletin/Binder2013.pdf
<http://farmlavor.com/us-ag/oklahoma/industry-overview-oklahoma/oklahoma-agriculture/>
<http://digital.library.okstate.edu/encyclopedia/entries/f/fa019.html>
<http://okcommerce.gov/location-or-expansion/oklahomas-business-ecosystems/agriculture-bioscience/>

1 – AEROSPACE & DEFENSE ACTIVITY

Engineering Helicopters

- Go to <http://bit.ly/NASAhelicopter> to download and print the template and instructions for building a paper helicopter.
- Follow the instructions to cut and construct your paper helicopter.
- Design an experiment to test how your helicopter performs under different circumstances such as changing: number of paper clips you add to alter the weight, length of the wings, shape of the wing tips, or the type of paper used to construct the helicopter.

What were your results? How did your helicopter respond to the changes? Write a summary statement about what factors (variables) impact the performance of the helicopter.

2 – ENERGY ACTIVITY

Build a Model of a Windmill

Materials: construction paper, cardstock, printer paper, plastic straws, string, paperclip, tape, scissors, glue, wooden skewers, hole punch

Procedure:

- Cut out a square of each type of paper. (We recommend a 4 inch square, however you can experiment with different sizes)
- Draw an X diagonally, from corner to corner, on each one.
- Use a hole punch to make a hole in the center large enough for the straw to fit through.
- Cut along each line, but stop about half an inch from the center hole.
- Bring each free corner down to where the cut stops near the center of the paper and secure it with glue. This will create the 'sails' for your windmill.
- Insert a straw through the center of each windmill, this will serve as the axis.
- Insert a wooden skewer through the straw so it can rotate freely.
- Towards the end of the straw, tape one end of a piece of string to the straw. Tie or tape the other end of the string to a paperclip.
- Hold the ends of the wooden skewer and blow on the sails of your windmill model or place your model in front of a fan. What happens? Which windmill works the best and why?

Image and activity from: http://www.education.com/science-fair/article/engineering_windmill/

3 – AGRICULTURE ACTIVITY

Building Mini-Biogas Digesters

(Work with an adult)

Instructions for setting up mini-biogas digester:

- Mix manure (can be purchased at a home and garden store) with about 1/2 cup to 3/4 cup of water.
- Pour the mixture into an empty water bottle (May be helpful to use a funnel).
- After the mixture is placed in the empty water bottle, place shredded or cut up pieces of newspaper in the bottle.
- The paper serves as carbon food for the tiny organisms in the mixture called methogens. Methanogens breakdown carbon sources for energy in a process known as anaerobic cellular respiration. A byproduct in this process the methanogens produce a form of natural gas called methane.
- Put the lid on the bottle and let it sit for 3-5 days. You will notice pressure building in the bottle. You will need to "burp" the bottle to relieve the pressure.
- Hold the bottle out in front of you and gently unscrew the water bottle cap. This will release a small amount of methane, which will make a sound similar to a pop bottle being opened.
- Repeat the experiment using other food sources (e.g. banana peels, kitchen scraps, hard boiled egg yolks, etc.)

What is responsible for the sound you heard and the odor you smell?

This gas can be utilized as a source of fuel to run industries, vehicles, or even farming operations. If you have a computer, you may want to research its uses.

4 – BIOSCIENCES ACTIVITY

Every living thing contains DNA. It is often referred to as the blueprint of life, why do think this is? In this activity you will extract DNA from food.

DNA Extraction

- Place fruit into a re-sealable container with 1/8 tsp salt and 1 cup cold water
- Squeeze mixture together until blended.
- Add 2 T of liquid detergent to the mix.
- Let the mixture sit for 5-10 minutes.
- Pour mixture into small glass container and add a pinch of meat tenderizer (pineapple juice or contact lens solution can be used instead) – only fill 1/3 of the container with the mixture.
- Stir gently
- Pour alcohol into the container using the side of the glass (you do not want splashing) until you have a layer of alcohol equal in volume to the fruit/enzyme mixture.
- You will see white stringy stuff rise to the alcohol layer from the fruit/enzyme mixture – this is the DNA!
- Collect some DNA by using a straw or wooden stick to pick it up out of the alcohol.

What roles do the detergent and meat tenderizer serve in this activity? What are some benefits of being able to extract DNA? The following website gives additional information on the activity above.

<http://learn.genetics.utah.edu/content/labs/extraction/howto/>

5 – TRANSPORTATION ACTIVITY

- Draw a concept map or timeline illustrating the journey of an egg transported from the farm, to the store then home to you. How are easily breakable materials transported safely?
- Can you come up with a better material to transport an egg from the farm to the store than is currently used? Assume that all egg cartons are lost or destroyed. Your challenge is to find a new way to transport an egg from the farm to the store assuming the egg was on a truck on a bumpy road.
- Make several different containers to transport the egg and test each. (You may want to put the egg in a plastic bag to keep the mess at a minimum.) Talk with an adult about what materials you might use and collect them. (You might consider using items such as a small container or cup with plastic, paper, cloth, grass, popsicle sticks).
- Place your designed container, with egg inside, on a vehicle such as bicycle, wagon, skateboard or wheelbarrow and travel across various surfaces to see how well your container protects the egg. Check with an adult before testing and be sure you are somewhere that you don't make a mess or break anything.

Think about:

What type of materials work best for transportation of an egg and why?

6 – MANUFACTURING ACTIVITY

Design a Cellphone or Tablet Case

- Go to <http://bit.ly/1cmgraphpaper> to download and print 1cm square graph paper (Print as many pages as you need for the project).
- Be sure to ask around and research what features people would like in a new case.
- Use this graph paper, scissors, and tape to design and build a mock-up model of a new and improved cellphone or tablet case. Be sure to decorate and describe the features of your case and what it will be made of.
- Calculate the cost to manufacture your case. Consider the following:
 - Material cost \$1.42 per sheet of graph paper or \$0.003 per square cm.
 - (Time to build 1 case) X \$7.25 (min. wage per hour)
- How much would you sell your new case for and what will be your profit for each case?

Tell a parent or a family member about your new case and why you think it should be manufactured and marketed.

OKLAHOMA IS: *Plugged In*

FACTS

When companies adopt internet and mobile-based technologies to deliver services to their customers and manage their businesses, they often turn to information and financial service providers. Oklahoma's strong economy and business-friendly policies allow information and financial service companies to thrive.

Information Services

Oklahoma has great assets which allow information service providers to excel, including: low cost energy, public-private partnerships, higher education, top tier training programs, high-speed broadband initiatives, and a competitive labor force. These will allow Oklahoma to compete in a global environment.

Other facts about Oklahoma's information services sector:

- Industrial energy prices are 20% to 30% below the national average -this helps companies that operate large networks of computers or data centers keep their operation costs down.
- Oklahoma is home to over 70 data centers serving the IT storage needs of a wide range of industries. Notable companies with data centers in the state include Google, IBM, Avaya, ADP, Hyatt Hotels, Hertz, Avis Budget Group, Dollar, and Midcon.
- High-speed broadband will connect 89% of the state's population by 2014.
- Oklahoma boasts some of the most highly regarded IT security programs in the nation such as the Institute for Information Security at the University of Tulsa and Rose State College's Committee of National Security System certification programs.
- Oklahoma universities house four supercomputers and many related research centers.

Top information service employers in Oklahoma include Cox Communications, AT&T, Dell, Hewlett Packard, and Level 3 Communications.

Examples of information services industries:

- Data Centers
- Cyber Security
- Computer Systems
- Telecommunications

EXAMPLES OF INFORMATION SERVICES OCCUPATIONS	OKLAHOMA AVG. HOURLY EARNINGS	EDUCATION LEVEL
Computer Programmers	\$28.62	Bachelor's degree
Computer Network Support Specialists	\$25.75	Associate's degree
Customer Service Representatives	\$13.98	Short-term on-the-job training
Word Processors and Typists	\$13.68	Short-term on-the-job training
Telecommunications Line Installers & Repairers	\$21.43	Long-term on-the-job training

Financial Services

Banks were some of the first businesses to be established in Oklahoma following the Land Run of 1889. Early banks were private businesses and anyone who could attract deposits was able to start a bank. By the time Oklahoma became a state in 1907, there were almost 900 banks and they were more heavily regulated to ensure customers' money was safe in the event of bank failures. By the mid-20th century, loans for oil activities along with low interest rates helped grow the financial industry. Banks began to occupy large downtown high rises as their businesses grew. But in the late 1970s and 1980s, interest rates took a tumble, hurting business. Many banks in the state in the 1980s failed because of "problem loans" – particularly in the oil industry. Financial institutions bounced back in the 1990s and early 2000s and mergers and acquisitions by out-of state companies have become common practice. As of 2013, Oklahoma had 165 chartered banks.

Today, the top financial service employers in the state of Oklahoma largely consist of commercial banks and insurance companies. The majority of the largest financial service employers in the state are located either in Oklahoma City or Tulsa; however community banks play a very important role in Oklahoma's economy. This is particularly true in rural communities throughout the state. These companies finance the expansion of Oklahoma businesses and help secure financial assets for Oklahoma citizens. There are more than 55,000 Oklahomans employed at more than 6,000 finance/insurance institutions in the state.

Top financial service employers include Bank of Oklahoma, Arvest Bank, Farmers Insurance, BancFirst and American Fidelity Assurance.

Examples of financial services industries:

- Banking
- Investment
- Insurance
- Accounting

EXAMPLES OF FINANCIAL SERVICES OCCUPATIONS	OKLAHOMA AVG. HOURLY EARNINGS	EDUCATION LEVEL
Financial Managers	\$38.39	Bachelor's or higher degree + work exp.
Claims Adjusters, Examiners & Investigators	\$25.86	Long-term on-the-job training
Accountants and Auditors	\$27.67	Bachelor's degree
Personal Financial Advisors	\$27.22	Bachelor's degree
Loan Officers	\$25.10	Moderate-term on-the-job training

Sources:

<http://okcommerce.gov/location-or-expansion/oklahomas-business-ecosystems/information-financial-services/>

<http://digital.library.okstate.edu/encyclopedia/entries/B/BA011.html>



Name:
Denise
Brinkmeyer

Occupation:
Senior
Systems Analyst,
President & CEO
of JUMP Techno-
logy Services

How long serving

in this current position: 8 years, 14 years total with this company

Education Level Attained: Bachelor of Science, Communications

Did you know in middle school or high school this is type of industry/work you wanted to be in? No. I thought I was going to be a teacher or a nurse.

If so, what gave you that understanding? If not, when did you begin to realize your career path? I was a nursing major when I entered college, but within a few weeks knew I needed to change to communications. I trained to be a teacher in communications.

What educational path did you follow to gain knowledge about this industry? What apprenticeships or workplace experience contributed to your expertise? I took time off from teaching to raise my family. Information technology was just beginning to boom and I started learning a lot from online auctions I was posting. As a matter of fact, I had one of the first eBay consignment companies back in 1998. That's when I began to learn HTML and began to seek out people who knew more about programming. After a few months I knew I wanted a career in this field. I was 35 at the time. I took every free online class that I could and studied everything I could find.

What challenges and/or obstacles did you personally overcome to succeed? A lot of people told me that it would be hard to get a job as a programmer when I had been a teacher, but my plan to get certified worked out. It got me an interview.

Who was the most influential person(s) along the way that supported you to be where you are today? My husband, Alan; he has been a programmer for a very long time. He encouraged me that I had the right skills and especially the right passion for learning to be successful in our industry.

What career goals or professional aspirations do you have now? I am busy growing our company, but I continue to get certifications.

What advice do you have for students who want to work in this industry? Be committed to learning and understand that the most important skill is problem solving. If you can take a lot of information and pull out the parts that matter and discard the rest, you're well on your way.

OKLAHOMA IS: *On The Move*

FACTS

SEE ACTIVITY ON PAGE 9

Transporting and distributing goods around and through Oklahoma is easy today with its inland ports, extensive railways, 140 public-use airports and a growing metropolitan transit system. By the early 1900s, the state had a robust network of rail lines in place and Oklahoma's state Highway Department began its first projects. In 1916, the Federal Road Act provided matching grants that helped initiate the construction of numerous state and county roads and highways, including the well-known Route 66. Toll roads are also an important part of Oklahoma's transportation history. The Turner Turnpike opened in 1953 and proved that major roads can be self-sustaining.

Federal Highway Acts in the 1940s and 1950s gave birth to Oklahoma's most notable highways of today. Thanks to the intersection of highways I-35, I-40 and I-44, Oklahoma is often called the "Crossroads of America." 500 million tons of goods are moved on 12,000 miles of Oklahoma highways a year.

Oklahoma has three major inland river ports. The Port of Catoosa is the state's largest. It connects to the Mississippi River via the McClellan-Kerr Arkansas River Navigation system and ships and receives more than 2.2 million tons of cargo each year. The Port of Muskogee and Port 33 play significant roles in the state distribution network as well. Oklahoma's ports help complement the state's 3,850 miles of rail that bring goods to and from port terminals.

In addition to the above-ground transportation and distribution networks in Oklahoma, there are more than 18,509 miles of interstate and intrastate pipeline that form a gathering and distribution network for oil and natural gas transport. The upstream pipelines send oil from the fields to storage facilities where it is ultimately pumped to major pipelines for transport to refineries. The downstream portion of Oklahoma's pipelines send refined oil products (such as gasoline, jet fuel and home-heating oil) to depots for wholesale and distribution. The pipeline complex in Oklahoma continues to be a major employer.

Oklahoma's central location makes it an attractive location for transportation and distribution logistics companies. The number of trains along some of the state's rail corridors is expected to double in the next 20 years – which will help Oklahoma's transportation and distribution workforce grow. Oklahoma is also home to a number of schools and training programs for drivers and maintenance workers, helping meet the industry's growing demands.

Major transportation, distribution, and logistics companies in the area include BNSF & UP rail, Melton Truck Lines, The Hodges Cos., Groendyke and numerous steel, grain, chemical and heavy machinery distribution centers at the Tulsa Port of Catoosa and across the state.

Examples of transportation & distribution industries:

- Air, Rail, Water, and Pipeline
- Equipment Manufacturing
- Warehousing and Storage
- Pipeline Distributors

EXAMPLES OF TRANSPORTATION & DISTRIBUTION OCCUPATIONS	OKLAHOMA AVG. HOURLY EARNINGS	EDUCATION LEVEL
Dispatchers	\$16.65	Moderate-term on-the-job training
Aircraft Mechanics & Service Technicians	\$24.44	Post-Secondary Non-Degree Award
Bus & Truck Mechanics & Diesel Engine Specialists	\$17.37	Post-Secondary Non-Degree Award
Heavy & Tractor-Trailer Truck Drivers	\$17.82	Short-term on-the-job training
Laborers & Freight, Stock & Material Movers, Hand	\$12.03	Short-term on-the-job training

Sources:

<http://digital.library.okstate.edu/encyclopedia/entries/b/bao11.html>
<http://okcommerce.gov/location-or-expansion/oklahomas-business-ecos...>



Name:
Bob Portiss
Occupation: Port Director, Tulsa Port of Catoosa
How long serving in this current position:
30 years

Education Level Attained:

Masters Degree in Economics

Did you know in middle school or high school this is the type of industry/work you wanted to be in? No.

If so, what gave you that understanding? If not, when did you begin to realize your career path? While serving in the U.S. Navy I served on ships and grew to love water. That's what I went into the Navy for. After that I worked for the Kiamichi Economic Development District in southeast Oklahoma as director of projects. I helped small communities put together packages to get grants and aid programs.

What educational path did you follow to gain knowledge about this industry? Economic Development

What apprenticeships or workplace experience contributed to your expertise? U.S. Navy, an Economic Development District, and the Industrial/Economic Development Institute at the University of Oklahoma.

What challenges and/or obstacles did you personally overcome to succeed? Learning to be an effective communicator and to be responsive to site location clients.

Who was the most influential person(s) along the way that supported you to be where you are today? My first boss at the Port was an Army Corps of Engineers Colonel Harley Ladd. He really sold me on the idea of developing the Port along with Early Cass who was on the Board when I applied for the job.

What career goals or professional aspirations do you have now? To educate children and adults about Oklahoma's Maritime Industry.

What advice do you have for students who want to work in this industry? Review web sites for both shallow draft and deep draft Ports and learn the elements of the Maritime industry – it has special terminology. Visit with both Private and Public Ports and Terminals.

OKLAHOMA IS: *Innovating & Producing*

FACTS

SEE ACTIVITY ON PAGE 9

Manufacturing plays a key supportive role in the state's five ecosystems and in boosting the economy. Before the land run of 1889, Oklahoma's manufacturing industry was based on local resources such as lumber, leather for saddles and boots, and clay for brick, pottery and tile making. In the early 1900s, manufacturing in the state became more diversified as its workforce grew larger and its transportation and distribution network matured. Oklahoma's manufacturing boom also began to center in larger cities and goods were produced for both the state and national markets.

Flour milling, meat packing, and broom making thrived in Oklahoma in the early 20th century. Manufacturing rapidly expanded to include a wide variety of products including glass, tires, airplanes and automobiles. As the state's oil and gas production increased, petroleum-related manufacturing took off. By 2001, there were almost 1,000 fabricated metal product plants in the state – making things like boilers, tanks, shipping containers, and valves.

In 2013, 143,381 people were employed in the manufacturing sector at over 4,000 establishments in Oklahoma. The state's exports account for approximately \$6.9 billion, with products shipped all over the world.

The top five countries Oklahoma ships its manufactured goods to are:

- Canada
- Mexico
- China
- Japan
- Germany

And, because Oklahoma's energy and aerospace industries are so strong, it's no surprise that goods servicing those ecosystems are among the state's most exported.

The top five commodities the state exported in 2012 were:

- Civilian Aircraft Engines and Parts
- Parts for Liquids Pumps
- Swine Meat
- Medical and Surgical Related Instruments
- Appliances and Electric Conductors

Examples of Manufacturing Industries:

- Oil and Natural Gas Production
- Iron and Steel Mills
- Food Production
- Machine Shops

EXAMPLES OF MANUFACTURING OCCUPATIONS	OKLAHOMA AVG. HOURLY EARNINGS	EDUCATION LEVEL
Mechanical Engineers	\$36.92	Bachelor's degree
Assemblers	\$14.23	Moderate-term on-the-job training
Machinists	\$17.97	Long-term on-the-job training
Welders	\$17.98	Post-Secondary Non-Degree Award
Inspectors, Testers, Sorters, Samplers & Weighers	\$21.90	Moderate-term on-the-job training

Sources:

<http://www.census.gov/foreign-trade/statistics/state/data/ok.html>

EMSI

<http://digital.library.okstate.edu/encyclopedia/entries/M/MA017.html>



Name: Chuck Mills

Occupation: President, Mills Machine Company (est. 1908)

How long serving in this current position: 31 years

Education Level Attained: BBA, Management, University of Central Oklahoma

Did you know in middle school or high school this is the type of industry/work you wanted to be in? No

If so, what gave you that understanding? If not, when did you begin to realize your career path? I was like many high school graduates then and now that really didn't know what I wanted to do but thought that I would figure it out when I got to college. I eventually came to the realization that no matter which path I took a business degree would serve me well for almost any vocation that I pursued.

What educational path did you follow to gain knowledge about this industry? Obviously my college business degree had a lot to do with my success but the most valuable lessons came as a result of my hands-on experience at the company primarily after I graduated from college.

What apprenticeships or workplace experience contributed to your expertise? I started working with my dad at 11 years old and worked every fall and spring break until I graduated from college. I started out on the plant floor cleaning, grinding, painting, welding, machining, shipping and receiving, purchasing, production planning, sales and product design.

What challenges and/or obstacles did you personally overcome to succeed? Even though our family business has been around for over one hundred years it doesn't guarantee success. I am no different from most small business owners and have had to make difficult decisions to have persevered through multiple recessions and increasing government regulations that hinder our growth.

Who was the most influential person(s) along the way that supported you to be where you are today? My father was the most influential person in my life providing with me with the old school values of honesty, hard work and perseverance.

What career goals or professional aspirations do you have now? I continually strive for growth and excellence in any endeavor, whether personal or business related. I personally enjoy working with business related issues and try to make a positive impact on global trade, workforce and educational issues. Business wise I continually strive to offer a quality product at competitive prices with personalized customer service. Last but not least I want to continue our growth in other drilling industries, develop new innovative products and expand our global trade opportunities.

What advice do you have for students who want to work in this industry? Explore career path opportunities early and often to determine what it is that you really like to do and then pursue the educational opportunities presented to you. A guaranteed plan for success is to educate yourself so that when opportunity crosses your path you will be able to recognize it and take advantage of it.

OKLAHOMA IS: *Growing & Thriving*

FACTS

Complementary Systems

All jobs are important to a thriving economy. The result is an increased standard of living for Oklahomans, more disposable income to support resident-serving industries, and increased giving for philanthropic and community needs. Oklahoma's ecosystems are supported by three important areas:

- **Infrastructure:** is important because building assets like the roads, buildings, and airports allow businesses to transport the goods they manufacture. An efficient and developed infrastructure system makes it easier to transport the goods a company manufactures. The cost to transport the goods a company makes is important to businesses and can decide if a business is successful. While traditional assets like roads, bridges, rail lines, airports and waterways continue to be required and maintained, new needs such as wireless broadband and modern airspace radar technologies will require attention for future opportunities.
- **Skills, Knowledge, and Abilities:** Education and knowledge are important for workers because it helps secure good jobs and businesses need an educated workforce to operate. Developing, growing and sustaining an educated and qualified workforce is important for any economy to grow and thrive. It is critical to determine

what occupations will be important in the future so that career paths for today's pre-K - 12 students can result in tomorrow's workforce. Creative industries are important because they invent new products and increase the quality of life.

- **Quality of Life:** is the last complementary system. A healthy worker is more productive and happy at work. Tourism and recreation is important because people want to live in places where they can interact and participate in the community.

Workforce

Due to the global economic crisis and resulting Great Recession, state budgets have seen drastic cuts. As baby boomers age and health care costs rise, new pressures have been put on already strained public services. To maintain a right-sized government and respect citizens' rights to keep and invest their own monies, Governor Fallin has identified priorities to which Oklahoma's resources should be directed. Further, as government attempts to become more streamlined and modernized, elected officials and agencies need priorities to redirect programs, activities and staff to their best use. Developing, growing, and sustaining an educated and qualified workforce is essential for any economy to grow and thrive.

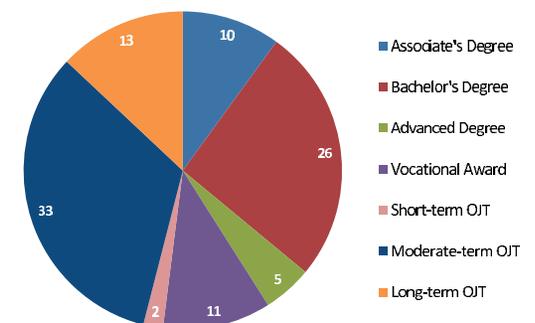
The landscape for Oklahoma's workforce is changing. As businesses develop new technologies, different occupations will be needed in the

future. It is clear from the graph that new job requirements in the future will require different educational attainment. Going forward, Oklahoma businesses will need more occupations that require vocational certificates and college degrees. Oklahoma businesses are already growing faster than the national rate. In order to continue increasing this lead, we must address one of our future challenges: a qualified workforce large enough to keep up with the growing demand. In order to provide this workforce, we must create incentives that facilitate STEM education (Science, Technology, Engineering and Mathematics).

Just as industries may be targeted, critical occupations can be identified within the initiative's ecosystems so that career paths for today's pre-K - 12 students can result in tomorrow's workforce. An efficient economy is supported by policies aligned to meet the administration's goals of growth.

Educational Requirements

OK Ecosystems' 100 Critical Occupations by Attainment



Nontraditional Careers

What is a Nontraditional Career?

A job is considered nontraditional if 25 percent or less of the workforce is of your gender.

Why Consider a Nontraditional Career?

Because people who choose careers based on their interests, skills, and abilities, rather than based on gender stereotypes, experience greater rewards and job satisfaction.

What to Expect When Going into a Nontraditional Career

You may get a lot of attention simply because you are in a nontraditional field. When asked why you chose your career, be sincere about your reason.

Nontraditional Careers for Women Architecture & Construction

- Bricklaying and Masonry
- Heating, Ventilation & A/C Refrigeration

Transportation, Distribution and Logistics

- Auto Collision Repair Technician
- Automotive Maintenance Technician

Information Technology

- Computer Support Specialist
- Web Analyst/Programmer

Science, Technology, Engineering & Math

- Environmental Chemist
- Fire Prevention & Safety Tech, Civil Engineer

Manufacturing

- Machine Tool Technician
- Welding

Non-traditional Careers for Men

Business, Management & Administration

- Medical Administrative Specialist
- Office Support Specialist

Health Sciences

- Dental Assistant
- Nurse
- Therapeutic Massage Therapist

Human Services

- Cosmetologist
- Early Childhood Care Worker

Education

- Special Ed Educator
- School Librarian
- Early Childhood Educator

Benefits

- Higher Pay – Many nontraditional careers have higher salaries & better benefits compared to other careers that require the same level of education.
- Job Satisfaction – Careers chosen for an individual's characteristics & strengths tend to increase job satisfaction.
- Advancement Opportunities – Nontraditional careers are often unionized or have established career ladders so that employees can work their way up to even higher salaries and better benefits.

Challenges

- Discrimination and/or Harassment – Discrimination & sexual harassment are against the law, & employers can be held liable if these acts occur.
- Sense of Isolation – A sense of not fitting in may exist for employees who do not have coworkers of the same gender.
- Fear of Failure and/or Lack of Self-Confidence – What we tell ourselves and what others have told us has a dramatic impact on what we think we can do.

Top 10 Reasons to Choose a Nontraditional Career

- Your job choice should be based on abilities and interest not gender stereotypes.
- You'll spend more than 30 years working, and you'll want to enjoy it.
- You can earn up to 30 percent more working in nontraditional jobs.
- You can earn enough to get what you want from life
- Your training and education lay a solid foundation for your future.
- You'll learn new ways of thinking and dealing with others.
- Your skills will be needed in key fields.
- You'll see that less than one-third of new jobs require a four-year degree.
- You do have a choice!
- You want to succeed!

Source: Office of State Director for Career and Technical Education, University of Hawaii

The 100 Critical (Degrees and Awards)

Associate's Degrees (10)	Bachelor's Degrees (26)
<ul style="list-style-type: none"> • Computer Specialists • Electrical & Electronic Engineering Technicians • Industrial Engineering Technicians • Mechanical Engineering Technicians • Engineering Technicians, Except Drafters • Chemical Technicians • Geological & Petroleum Technicians • Life, Physical, & Social Science Technicians 	<ul style="list-style-type: none"> • Logisticians • Accountants & Auditors • Financial Analysts • Insurance Analysts/Underwriters • Financial Specialists • Computer Programmers • Computer Software Engineers • Computer Systems Analysts • Database Administrators • Network & Computer Systems Administrators • Network Systems & Data Communications Analysts • Aerospace Engineers • Chemical Engineers • Civil Engineers • Computer Hardware Engineers • Electrical Engineers • Electronics Engineers • Industrial Engineers • Mechanical Engineers • Mining & Geological Engineers
Advanced Degrees (5)	
<ul style="list-style-type: none"> • General & Operations Managers • Management Analysts • Operations Research Analysts • Geoscientists • Medical Scientists 	

■	STEM Intense
■	STEM Related
■	Non-STEM

The 100 Critical (Certificates)

Moderate-term on-the-job training (33)	Long-term on-the-job training (13)
<ul style="list-style-type: none"> • Operating Engineers & Other Construction Equipment Operators • Derrick Operators, Oil & Gas • Rotary Drill Operators, Oil & Gas • Service Unit Operators, Oil, Gas, & Mining • Earth Drillers, Except Oil & Gas • Explosives Workers, Ordnance Handling Experts, & Blasters • Control & Valve Installers & Repairers • Maintenance Workers, Machinery • Aircraft Structure, Surfaces, Rigging, & Systems Assemblers • Structural Metal Fabricators & Fitters • Team Assemblers • Computer-Controlled Machine Tool Operators • Rolling Machine SOT • Cutting, Punching, & Press Machine SOT • Drilling & Boring Machine Tool SOT • Grinding, Lapping, Polishing, & Buffing Machine Tool SOT • Lathe & Turning Machine Tool SOT • Milling & Planing Machine SOT • Molding, Coremaking, & Casting Machine SOT • Multiple Machine Tool SOT • Chemical Equipment Operators & Tenders • Crushing, Grinding, & Polishing Machine SOT • Mixing & Blending Machine SOT • Cutting & Slicing Machine SOT 	<ul style="list-style-type: none"> • Farmers & Ranchers • Boilermakers • Electricians • Plumbers, Pipefitters, & Steamfitters • Sheet Metal Workers • Farm Equipment Mechanics • Mobile Heavy Equipment Mechanics • Industrial Machinery Mechanics • Machinists • Tool & Die Makers • Gas Plant Operators • Petroleum Pump System Operators
	Short-term on-the-job training (2)
	<ul style="list-style-type: none"> • Truck Drivers, Heavy & Tractor-Trailer • Industrial Truck & Tractor Operators

Note: SOT is Setters, Operators and Tenders

WHAT IS THE *Career Pathways Initiative?*

FACTS

Career Pathways is a workforce development strategy used to help students' and workers' transition from education into and through the workforce. This approach is intended to increase education, training and learning opportunities for America's current and emerging workforce. The Career Pathway initiative consists of a partnership among community colleges, primary and secondary schools, workforce and economic development agencies, employers, labor groups and social service providers.

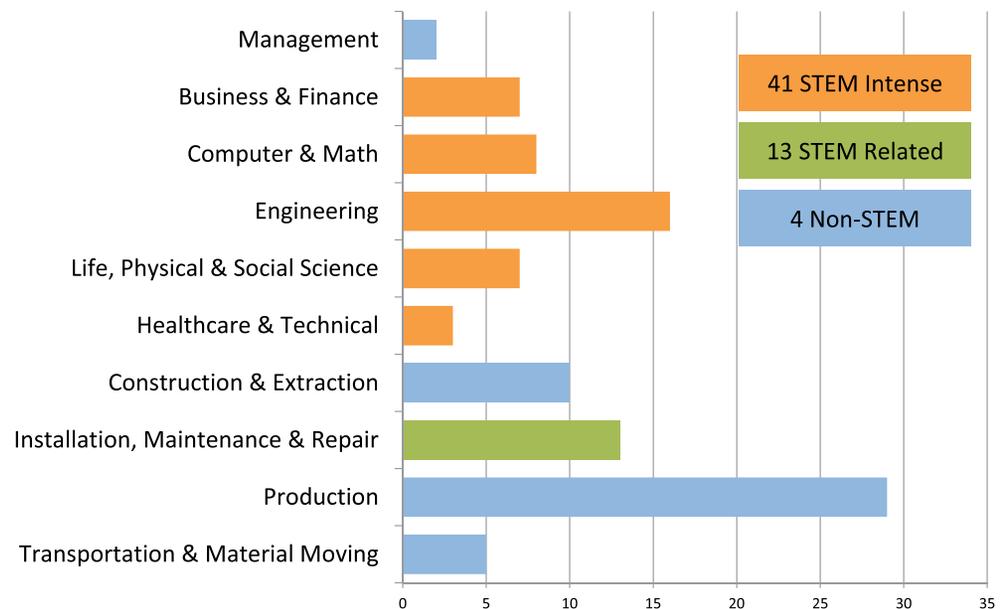
No matter what the occupation or industry, every job requires certain knowledge, skills and competencies, which can be learned by industry designated certificates or academic degrees. These organizations work together to offer programs and services intended to develop students' core academic, technical and employability skills; provide them with continuous education, training; and

place them in high-demand, high-opportunity jobs. Whether you are a middle school or high school student planning with your parents for the future or an adult looking to prepare for a new career, gaining counseling and knowledgeable assistance to

make the best choices along the way can create a solid plan to meet your career goals.

Classification

100 Critical Occupations by Major Grouping



NOTE: STEM (Science, Technology, Engineering & Mathematics) qualification defined by the Georgetown University Center for Education & Workforce

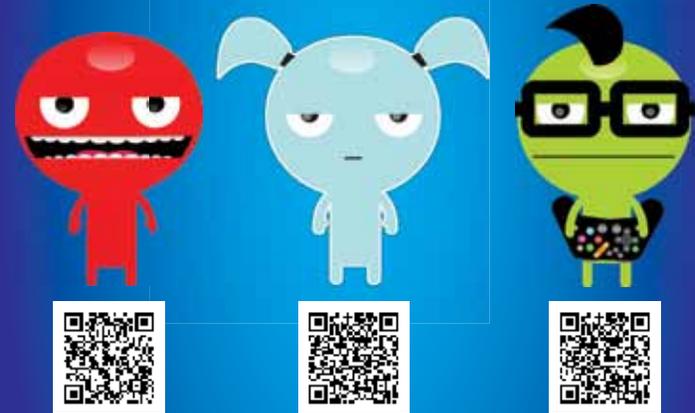
A **JOB** for every
Oklahoman
and a
WORKFORCE
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OKLAHOMA
DEPARTMENT OF COMMERCE

Boeing proudly supports
those who work to
ensure that the best
learning environments
have no boundaries.



THE STATE CHAMBER SUPPORTS COMMON CORE BECAUSE:

- A quality education leads to more opportunities for success after graduating from high school.
- Nearly all of the top 20 fastest growing occupations in Oklahoma require some type of education or training beyond high school.
- Students need to be prepared for college or certificate programs to put them on the path to successful and rewarding careers.



www.ExpectMoreOK.org