Oklahoma

2014 STEM Occupations and Employment

Oklahoma Employment Security Commission
Economic Research and Analysis Division

STEM Occupations and Employment: A Brief Review for Oklahoma

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P.O. Box 52003

Oklahoma City, OK 73152-2003

Richard McPherson, OESC Executive Director

Lynn Gray, Director of Economic Research and Analysis

Prepared by

Kristie Brown, Statistical Research Specialist

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STEM Occupations and Employment: A Brief Review for Oklahoma

"... Leadership tomorrow depends on how we educate our students today—especially in science, technology, engineering and math."

— President Barack Obama, September 16, 2010

Science, technology, engineering and mathematics (STEM) employees are the driving force for experimental and creative thoughts through competitive ideal and business— constructing new industries. These occupations are an essential part of our economy. These occupational categories can range from computer science to engineering to life science. The education needed for entry to these positions can range from a high school diploma to doctoral degree to on-the-job training. Because the demand for technology advances has increased, the demand for STEM workers will increase. There is a short supply for individuals who work in the STEM field. "STEM Jobs will continue to expand....The U.S. Bureau of Labor Statistics estimates that at least 8,654,000 U.S. STEM jobs will exist in 2018 and this does not count self-employed STEM individuals," (The Alliance for Science & Technology Research, 2013). Out of those 8,654,000 STEM jobs, 81,000 will come from Oklahoma. Within these STEM jobs, the jobs are expected to come from computer and mathematical science, engineers and technicians, and life and physical scientists. See Figure 1 below.

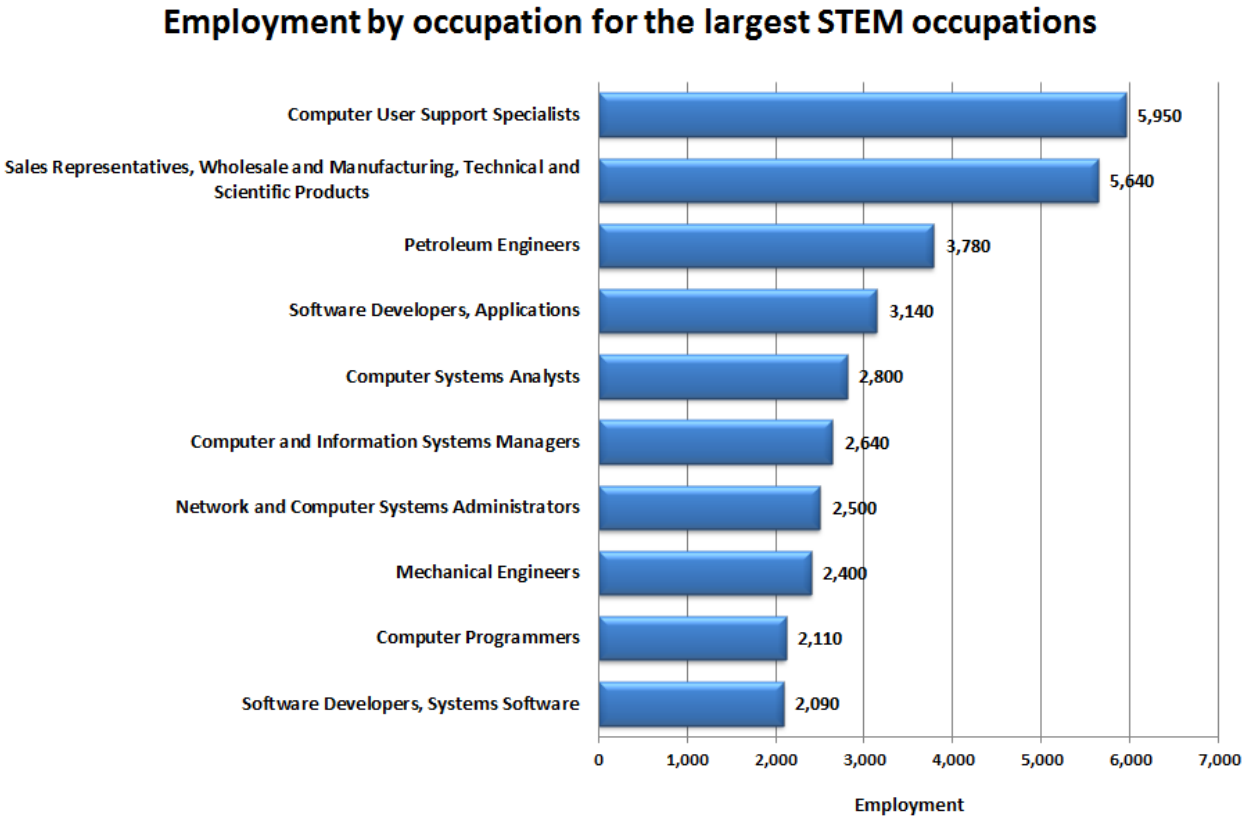
Figure 1: Predicted Oklahoma STEM Jobs

Where will Oklahoma's STEM Jobs be in 2018 by Occupation & Educational Level? (in thousands of job)								
		High School Dropout	High School Graduate	Some College	Associate's Degree	Bachelor's Degree	Graduate Degree	Total
STEM Jobs	Computer & Mathematical Science	0	3	10	4	15	3	**36**
	Architects & Technicians	0	1	2	1	1	0	**6**
	Engineers & Technicians	0	2	3	3	10	3	**22**
	Life & Physical Scienctists	0	1	2	0	5	3	**12**
	Social Scientists	0	0	0	0	2	3	**5**
								81

Source: *Innovation Vital Signs: Oklahoma's Federal R&D and STEM* Jobs Report 2013*, ASTRA, The Alliance for Science & Technology Research in America. Based on data from the U.S. Office of Management & Budget and the National Science Foundation. For the full report see: http://www.usinnovation.org/state/pdf_cvd/CVD2013OklahomaInnovation.pdf.

The data in this report comes from the Occupational Employment Statistics (OES) program, a joint collaboration between the Oklahoma Employment Security Commission (OESC) and the Bureau of Labor Statistics (BLS) and the Employment Projections Program produced by the Research and Analysis Division of the Oklahoma Employment Security Commission (see Endnote 1, page 12). More information on the data can be found at the BLS website, http://www.bls.gov/oes/. Nearly 90 STEM Occupations were chosen in this study, including occupational groups from: Computer and Mathematical Sciences; Architecture and Engineering; Life, Physical, and Social Science; Education, Training, and Library Occupations; and Sales and Related Occupations. This study also includes Postsecondary and Managerial Occupations, since their experience and education are needed for the STEM occupations.

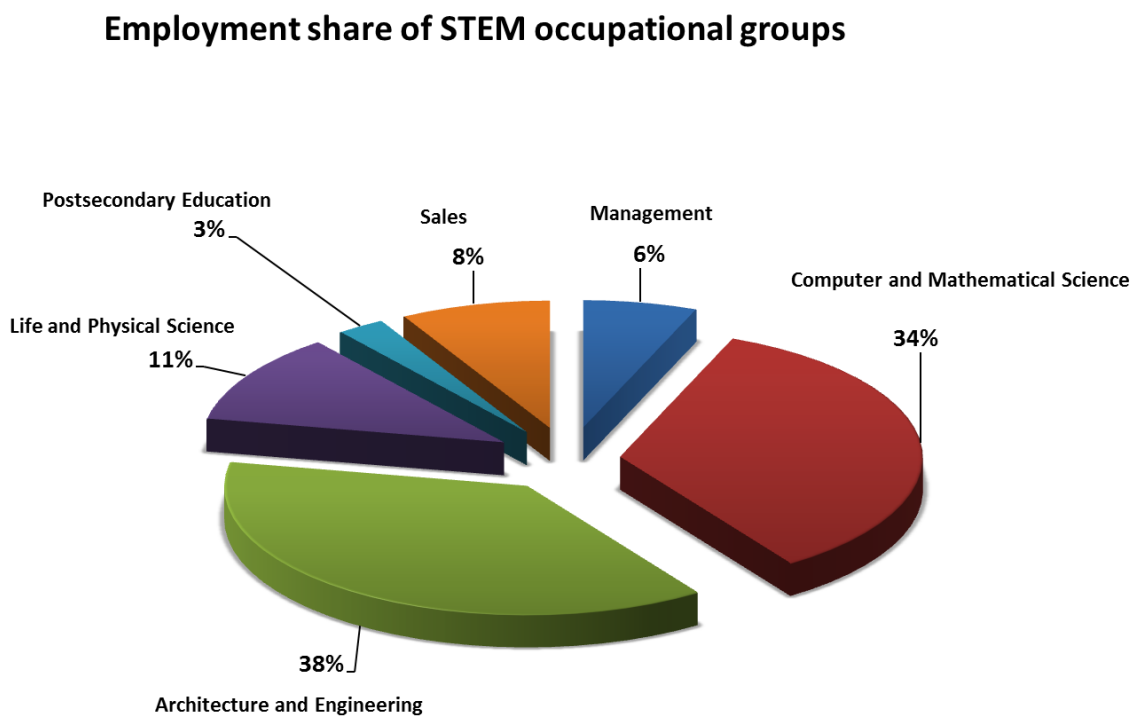
Figure 2



Source: Occupational Employment Statistics (OES), U.S. Bureau of Labor Statistics and Oklahoma Employment Security Commission, May 2013 (published April 2014).

- Figure 2 shows Oklahoma's top ten STEM occupations based on employment levels.
- Computer User Support Specialists was the largest STEM occupation in Oklahoma with 5,950 jobs.
- Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products was second-largest STEM occupation with 5,640 jobs, while Petroleum Engineers ranked third in Oklahoma for STEM occupations with 3,780 jobs.

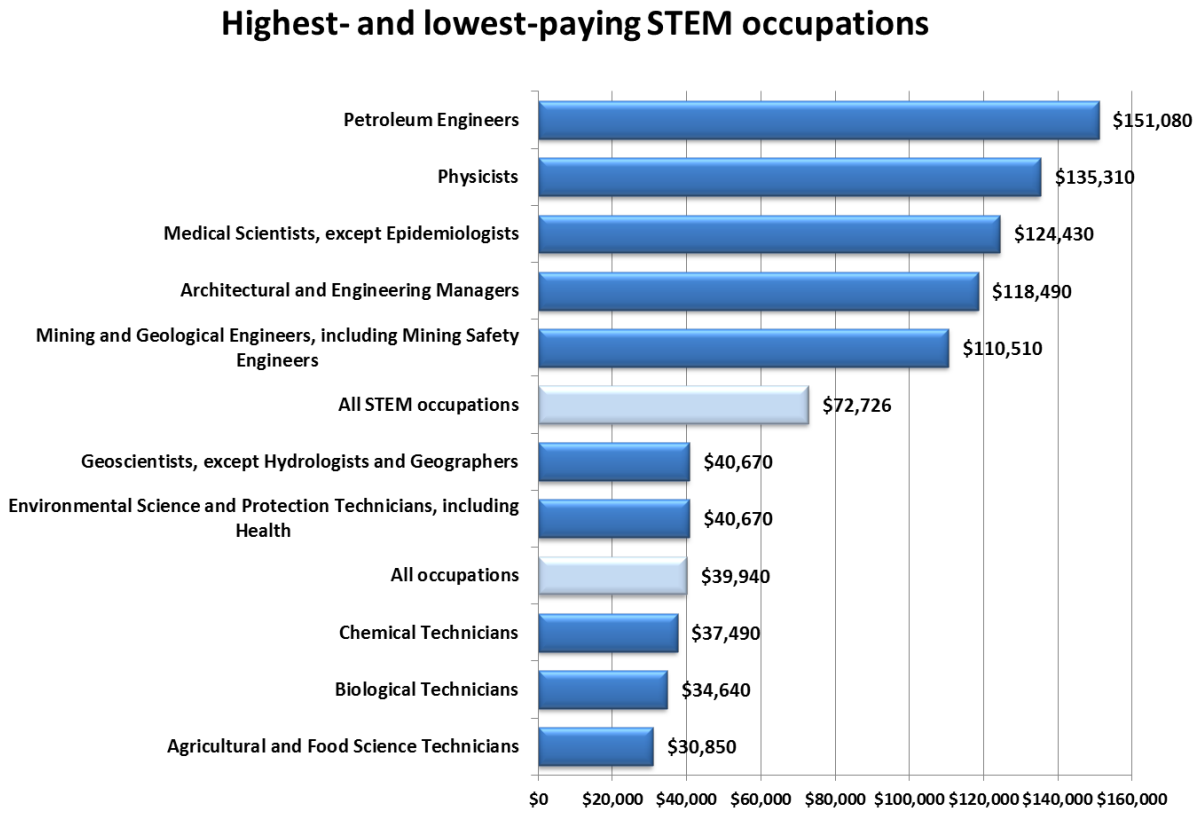
Figure 3



Source: Occupational Employment Statistics (OES), U.S. Bureau of Labor Statistics and Oklahoma Employment Security Commission, May 2013 (published April 2014).

- Oklahoma had a total of approximately 73,710 STEM jobs in 2013, accounting for nearly 5 percent of state total employment.
- The Architecture and Engineering occupations group had the largest share of STEM occupations comprising 38 percent of the total STEM employment and employing 27,620.
- The second-largest STEM occupational group was Computer and Mathematical Science, with 25,360 jobs and accounting for 34 percent of the total STEM employment.

Figure 4



Source: Occupational Employment Statistics (OES), U.S. Bureau of Labor Statistics and Oklahoma Employment Security Commission, May 2013 (published April 2014).

- The average annual wage for all STEM jobs was $72,726 compared to the average annual wage for all occupations at $39,940.

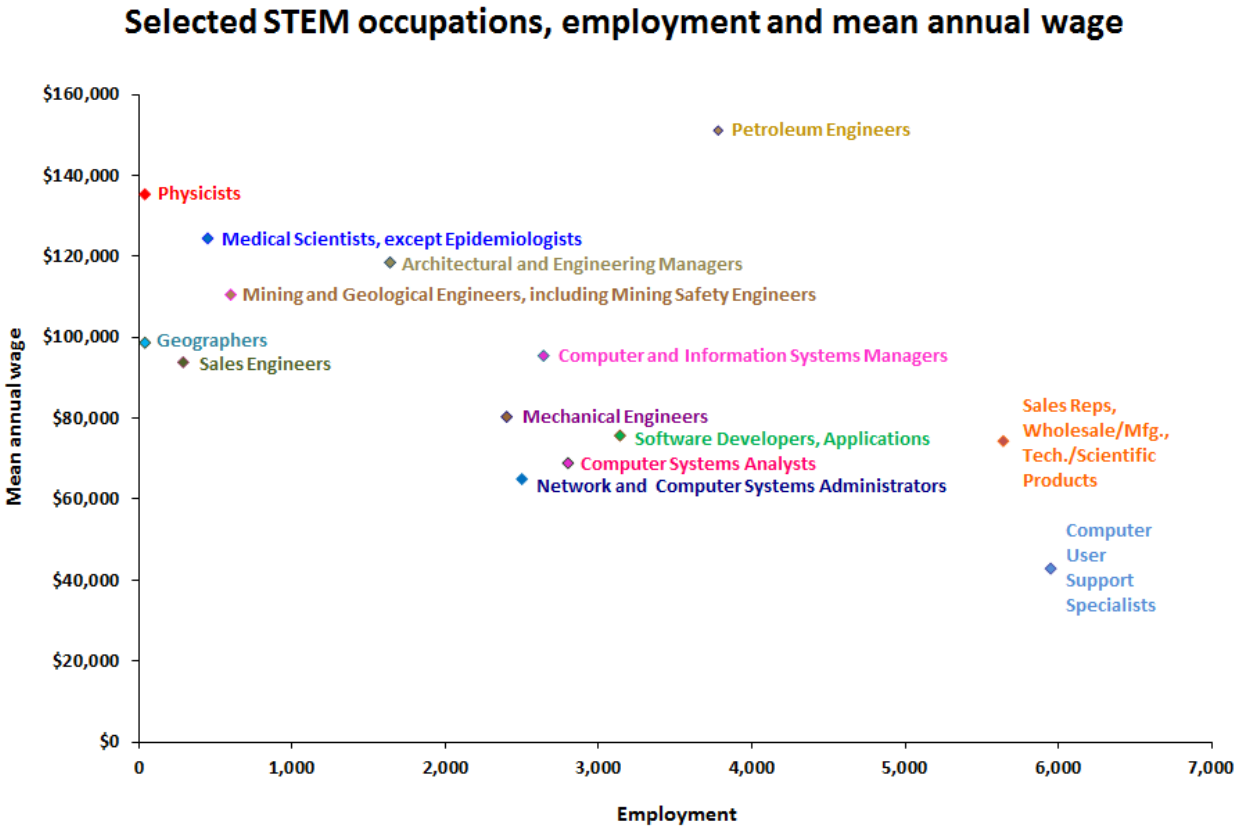
- The highest-paying STEM occupation was Petroleum Engineers with the average annual wage of $151,080.

- The lowest-paying STEM occupation was Agricultural and Food Science Technicians with the average annual wage of $30,850.

- Petroleum Engineers, Physicists, Medical Scientists (except Epidemiologists), Architectural and Engineering Managers, and Mining and Geological Engineers (including mining safety engineers) are the top five highest paid STEM occupations in Oklahoma with an average annual wage.

- Agricultural and Food Science Technicians, Biological Technicians, Chemical Technicians, and Environmental Science and Protection Technicians (including Health) were the lowest-paying STEM Occupations in Oklahoma.

Figure 5



Source: Occupational Employment Statistics (OES), U.S. Bureau of Labor Statistics and Oklahoma Employment Security Commission, May 2013 (published April 2014).

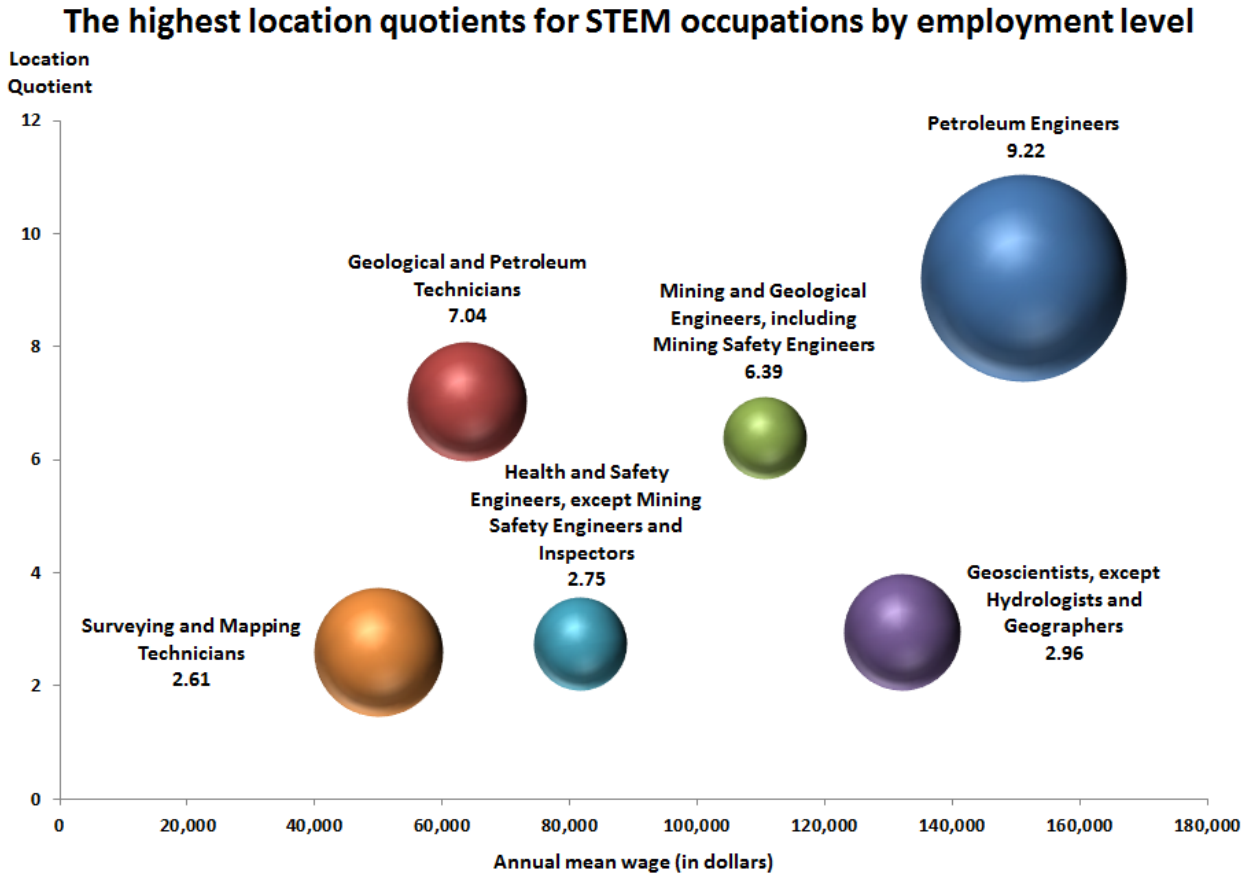
- Figure 5 displays the eight STEM occupations with the highest annual wages and the eight STEM occupations with the largest employment. Petroleum Engineers had the highest annual wages and the third-highest level of employment.

- The five top STEM occupations with the higher average annual wages include Petroleum Engineers, Physicists, Medical Scientists (except Epidemiologists), Architectural and Engineering Managers, and Mining and Geological Engineers (including Mining Safety Engineers).

- Physicists and Geographers had the lowest employment levels; however, these occupations were in the top five highest paid occupations.

- Computer User Support Specialists has one of the largest employment levels; however, the average annual wage tends to be low.

Figure 6



Note: Bubble size represents employment level

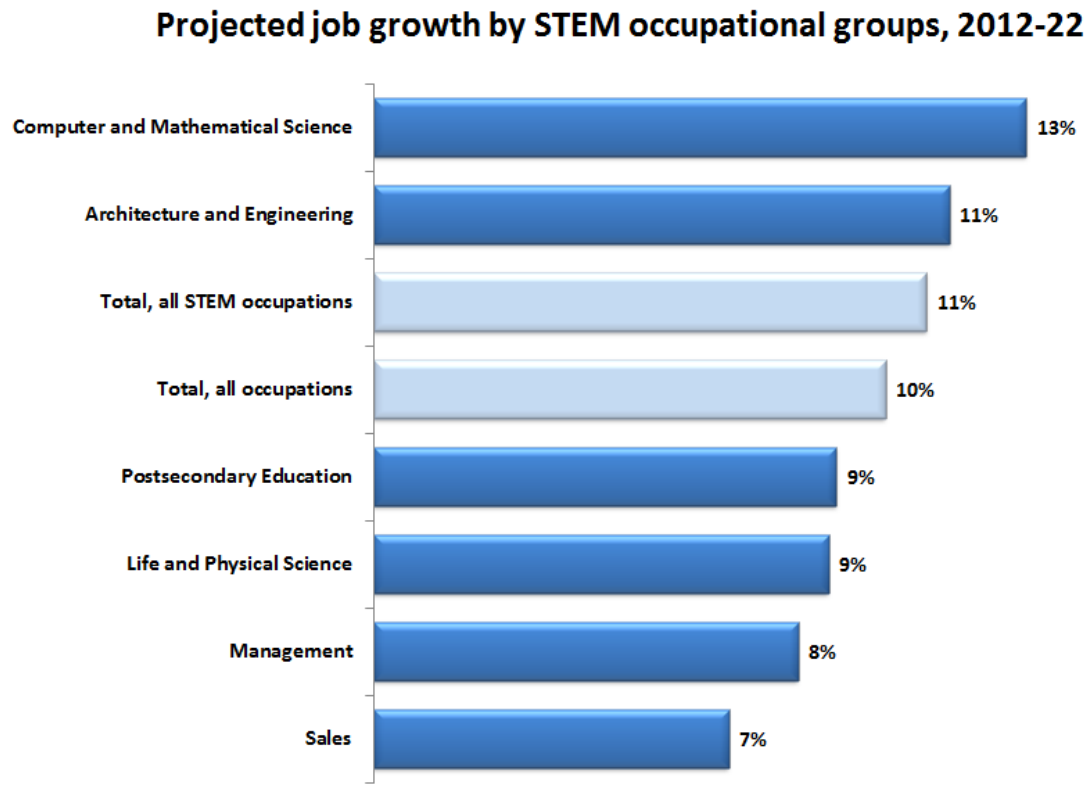
Source: Occupational Employment Statistics (OES), U.S. Bureau of Labor Statistics and Oklahoma Employment Security Commission, May 2013 (published April 2014).

- Location quotients for STEM occupations are calculated as a ratio comparing the STEM occupation employment concentration of Oklahoma to the U.S. as a whole (see Endnote 2, page 12-13).

- A location quotient less than 1.0 suggests that the STEM occupational employment is less concentrated in Oklahoma compared to the U.S as a whole, while a location quotient greater than 1.0 implies that STEM occupational employment is more highly concentrated in Oklahoma compared to the U.S. as a whole.

- Figure 6 shows six of the highest STEM occupation location quotients in Oklahoma. Five of these six occupations are closely related to the mining sector.

Figure 7



Note: Each STEM occupational group only includes STEM occupations.

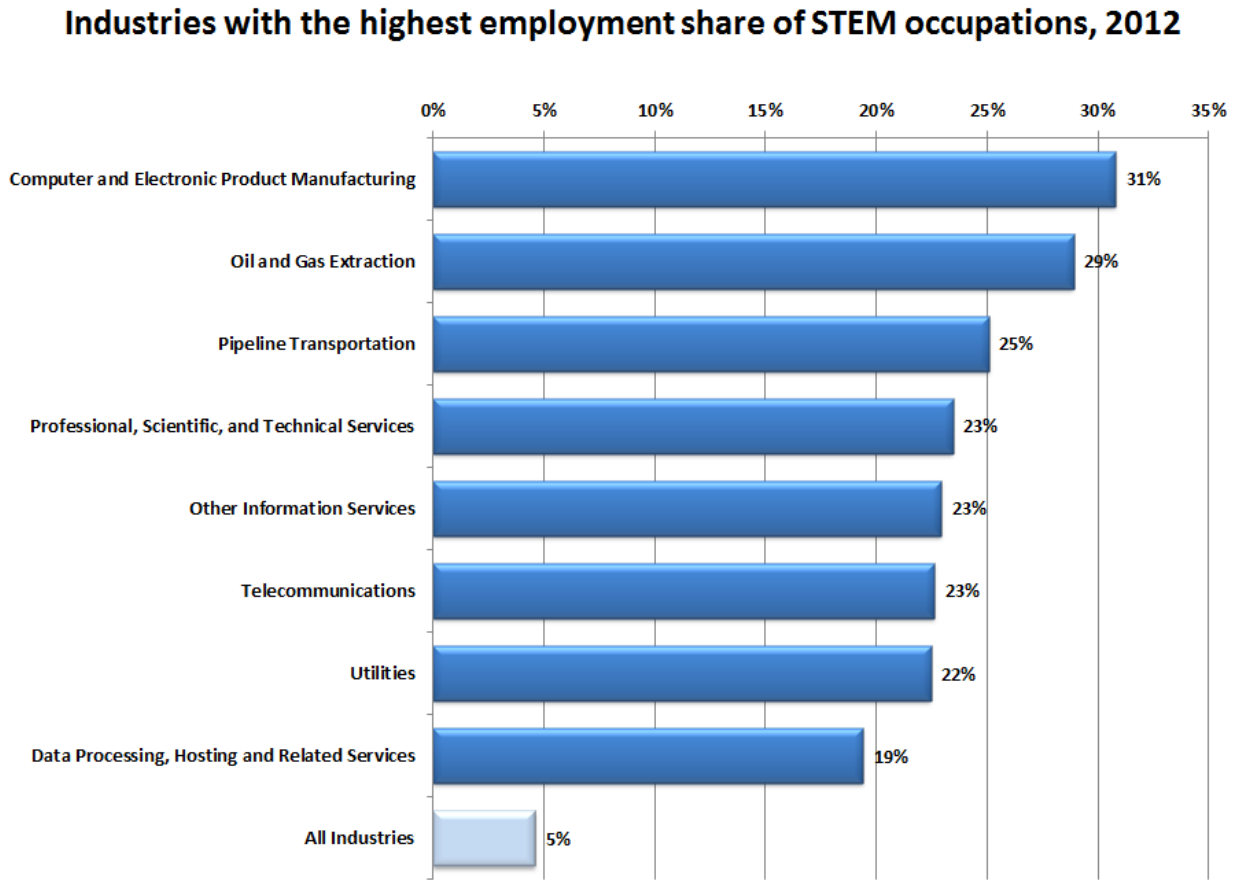
Source: Employment Projections Program, Oklahoma Employment Security Commission, Research & Analysis Division, July 2014

- Figure 7 shows the projected job growth by major STEM occupational groups from 2012 to 2022. Total STEM occupational employment is projected to grow slightly faster (11 percent) than overall occupational employment (10 percent).

- The Computer and Mathematical Science occupational group is forecast to have the highest job growth by STEM occupational groups at 13 percent between 2012 and 2022.

- Architecture and Engineering had the second-highest projected job growth by STEM occupational groups at 11 percent.

Figure 8



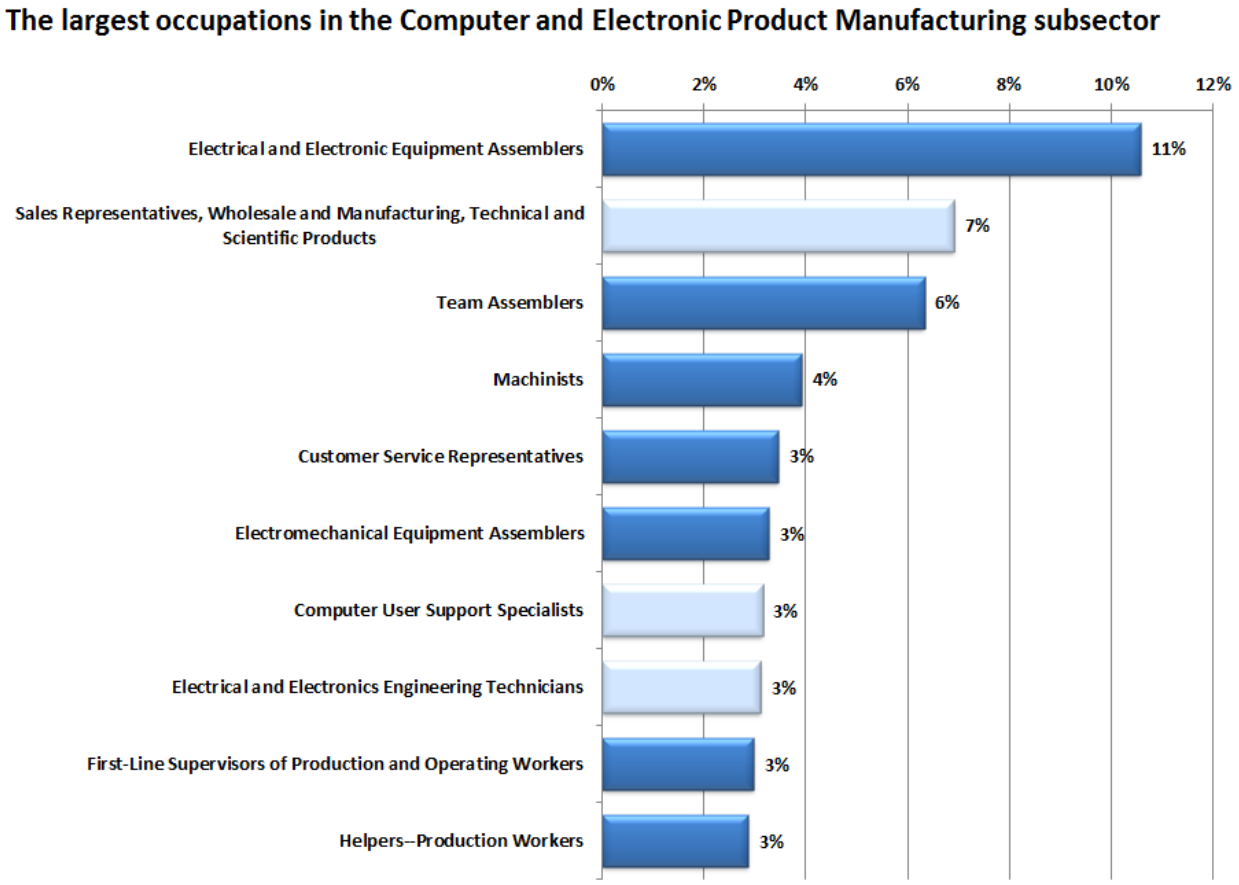
Source: Employment Projections Program, Oklahoma Employment Security Commission, Research & Analysis Division, July 2014.

- Figure 8 shows the top eight industry subsectors with the highest share of STEM occupational employment in Oklahoma, The employment share of STEM occupations for all industries was about 5 percent in 2012 (see Endnote 3, page 13).

- Computer and Electronic Product Manufacturing had the highest STEM employment share at 31 percent.

- Oil and Gas Extraction; Pipeline Transportation; Professional, Scientific and Technical Services; Other Information Services; and Telecommunications were also among the top five sectors with the largest share of STEM occupation employment.

Figure 9



Note: Lighter bars indicate STEM occupations

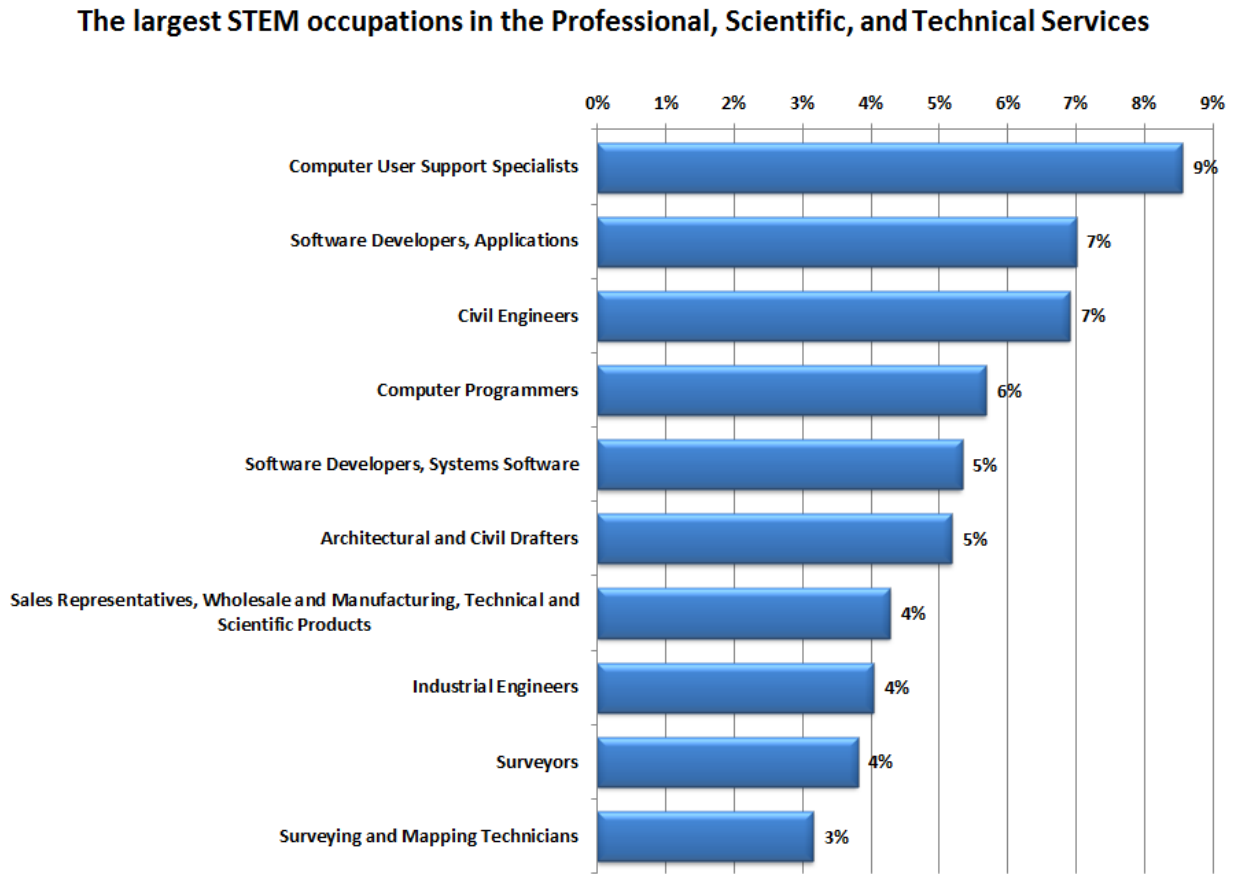
Source: Employment Projections Program, Oklahoma Employment Security Commission, Research & Analysis Division, July 2014

- Figure 8 shows the ten largest occupational employment shares in the Computer and Electronic Product subsector in 2012.

- Electrical and Electronic Equipment Assemblers and Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products had the largest occupational employment in Computer and Electronic Product Manufacturing.

- Electrical and Electronics Engineering Technicians had one of the lowest STEM occupational employment levels in Computer and Electronic Product Manufacturing.

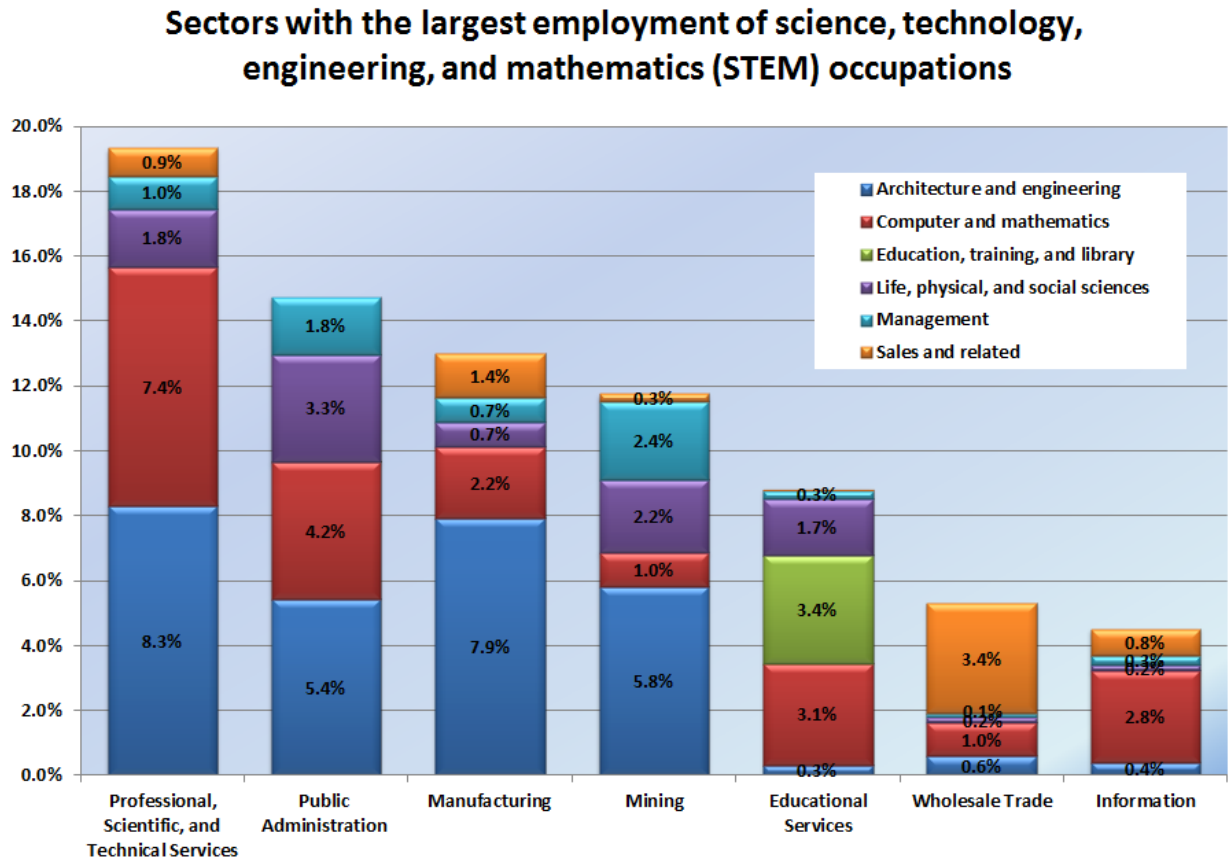
Figure 10



Source: Employment Projections Program, Oklahoma Employment Security Commission, Research & Analysis Division, July 2014

- Figure 10 shows the largest STEM occupations in the Professional, Scientific, and Technical Services subsector.
- Professional, Scientific, and Technical Services subsector had one of the largest STEM occupations in 2012 with 23 percent of total employment.
- Computer User Support Specialists had the largest share of STEM occupations in the Professional, Scientific, and Technical Services subsector at about 9 percent.
- Software Developers, Applications and Civil Engineers followed with approximately 7 percent STEM occupations each.

Figure 11



Source: Employment Projections Program, Oklahoma Employment Security Commission, Research & Analysis Division, July 2014.

- Figure 11 shows the industry sectors in Oklahoma with the largest STEM occupational employment.

- Professional, Scientific, and Technical Services sector had about 20 percent of STEM occupational employment of total STEM employment.

- Architecture and Engineering and Computer and Mathematics occupations dominate the Professional, Scientific, and Technical Services sector, accounting for nearly 16 percent of total STEM employment in that sector.

- Public Administration was the second-highest industry sector with nearly 15 percent STEM employment.

Summary

- From 2012 to 2022, STEM jobs in Oklahoma are expected to grow 10.8 percent.
- Overall, STEM occupations are high-paying occupations with an average annual wage of $72,726, compared to $39,940 for all occupations.
- The largest STEM occupation in Oklahoma was Computer User Support Specialists, employing about 5,950 in 2013.
- The highest-paying STEM occupation in Oklahoma was Petroleum Engineers with an average annual wages at $151,080.
- Computer and Electronic Product Manufacturing had the largest STEM employment share at 31 percent in the industry.
- The Professional, Scientific, and Technical Services sector had the highest employment portion of STEM occupations at nearly 20 percent.

Endnotes

1) The Occupational Employment Statistics (OES) program estimates employment and wage for over 800 occupations based on semiannual mail surveys. The survey is a cooperative program between the Bureau of Labor Statistics (BLS) and State Workforce agencies (for Oklahoma, it is the Oklahoma Employment Security Commission), covering all full-time and part-time wage and salary workers in nonfarm industries.

2) Location quotient shows the occupations share of an area's employment relative to the national average. In the analysis, we compare the employment in Oklahoma to the U.S. average for each occupation. If an occupation in Oklahoma has a higher employment share than expected, compared to this occupational employment share at the U.S. average, there is evidence suggesting this occupational employment is more concentrated in Oklahoma relative to the national average, or the occupation has a comparatively competitive skills advantage in Oklahoma.

Take mechanical drafters for example, we compute the location quotient for mechanical drafters in Oklahoma by comparing it to national figures, based on the following statistics:

Table 1: Total and occupation employment, Oklahoma and the U.S., 2009

	Employment in mechanical drafters	Total Employment
Oklahoma	1,170	1,525,330
U.S.	71,890	130,647,610

Table 2: Computation of the location quotient for Oklahoma for mechanical drafters

LQ part 1 = region occupation/ region total = 1,170/ 1,525,330 = 0.00076705
LQ part 2 = State occupation / state total = 71,890 / 130,647,610 = 0.00055026
LQ part 3 = region ratio / state ratio = 0.00076705 / 0.00055026 = 1.394

Therefore the location quotient in Oklahoma for mechanical drafters is 1.394, which is greater than 1.0 (the employment share for mechanical drafters in Oklahoma is greater than the U.S. average) suggesting that the employment of mechanical drafters was more concentrated in Oklahoma, compared with the U.S. average in 2009.

3) Sector, subsector and industry group: The North American Industry Classification System (NAICS) is a two- through six-digit hierarchical classification system, offering five levels of detail. Each digit in the code is part of a series of progressively narrower categories, and the more digits in the code signify greater classification detail.

Sector: Two-digit codes designate *economic sectors*, the highest level of aggregation.

Subsector: Three-digit codes designate *subsectors*, a more detailed level of aggregation.

Industry group: Four-digit codes designate *industry groups*, which is even more detailed than subsectors.