

Minnesota's STEM Workforce

STEM jobs are growing faster than jobs overall in Minnesota and offer salaries that are much higher than the average for all industries in the state.

Minnesota is poised for growth, thanks to a diverse economy that supports a wide variety of industries and occupations. One field that has been emerging in recent years is STEM, which stands for science, technology, engineering and math. Because of their appeal, STEM jobs have drawn the attention of policymakers and educators, who have encouraged students and job seekers to consider those disciplines for their careers.

Unfortunately, many definitions of STEM are muddy — including and excluding different industries and occupations — and the STEM landscape is constantly evolving as new technologies emerge. In addition, the skills typically associated with STEM, including scientific reasoning, engineering knowledge and mathematical competency, are not exclusive to STEM jobs, although STEM occupations and industries make greater use of these skills than others.



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This article uses the Workforce Information Council report “Exploring the High-Tech Industry”¹ to identify STEM industries and occupations. After reviewing the national average concentrations of STEM jobs across all industry sectors, the Workforce Information Council selected only those industry sectors with a concentration level of 2.5 times the national average, categorizing 33 industry subsectors in the STEM Core Component and 13 in Health Care.

According to data from DEED’s Quarterly Census of Employment and Wages (QCEW), Minnesota had about 545,000 jobs in STEM industries through 2013, accounting for about one in five jobs statewide. This article will focus primarily on the STEM Core Component industries identified by the Workforce Information Council. Those industries accounted for just under 40 percent of STEM employment in Minnesota (210,000 jobs). STEM Health

TABLE 1 **Employment in Minnesota's STEM Core Industries, 2003-2013**

NAICS Industry Title	NAICS Code	Number of Establishments 2013	Number of Jobs 2013	Average Annual Wages 2013	2009-2013 Job Change	2007-2013 Job Change	2003-2013 Job Change
Total, All Industries	0	165,051	2,691,763	\$50,128	+4.6%	+0.1%	+4.4%
Total, STEM Industries		15,370	208,718	\$85,531	+4.9%	+4.6%	+10.1%
Oil and Gas Extraction	2111	12	34	\$362,128	+240.0%	+240.0%	+240.0%
Electric Power Generation, Transmission and Distribution	2211	321	12,101	\$97,552	+4.8%	+10.3%	+11.8%
Petroleum and Coal Products Manufacturing	3241	20	2,158	\$109,304	+0.3%	-8.9%	-8.6%
Basic Chemical Manufacturing	3251	47	1,343	\$69,680	+15.6%	+23.0%	+44.3%
Resin, Synthetic Rubber, Fibers and Filaments Manufacturing	3252	11	385	\$81,640	+8.8%	0.0%	+32.3%
Pharmaceutical and Medicine Manufacturing	3254	57	3,258	\$73,840	-5.3%	+7.6%	+41.8%
Industrial Machinery Manufacturing	3332	100	3,014	\$71,916	+20.8%	-1.2%	+7.7%
Commercial and Service Industry Machinery Manufacturing	3333	71	3,409	\$69,888	-2.4%	-13.0%	-30.3%
Engine, Turbine and Power Transmission Equipment Manufacturing	3336	17	458	\$50,700	+26.5%	-19.8%	-27.0%
Computer and Peripheral Equipment Manufacturing	3341	59	8,795	\$108,264	-16.3%	-33.2%	-42.2%
Communications Equipment Manufacturing	3342	34	1,900	\$72,956	-12.3%	-20.1%	-28.2%
Audio and Video Equipment Manufacturing	3343	20	208	\$48,308	-43.8%	-61.5%	-67.1%
Semiconductor and Other Electronic Component Manufacturing	3344	134	8,989	\$57,252	+2.7%	-17.3%	-15.9%
Navigational, Measuring and Electromedical Instruments Manufacturing	3345	196	24,553	\$97,396	-3.3%	-1.2%	+6.4%
Manufacturing and Reproducing Magnetic and Optical Media	3346	20	355	\$61,360	-29.1%	-54.0%	-69.2%
Electrical Equipment Manufacturing	3353	69	5,195	\$64,480	+11.6%	+12.2%	+39.3%
Professional and Commercial Equipment and Supplies Wholesalers	4234	1,106	13,178	\$86,268	+5.8%	-4.6%	-7.5%
Electrical and Electronic Goods Merchant Wholesalers	4236	572	8,068	\$66,924	-0.8%	-13.4%	+2.9%
Drugs and Druggists' Sundries Merchant Wholesalers	4242	195	2,239	\$113,828	-16.4%	-18.3%	-26.5%
Pipeline Transportation of Crude Oil	4861	15	200	\$102,596	+250.9%	+325.5%	ND
Software Publishers	5112	297	6,336	\$95,836	+14.1%	+7.8%	+10.6%
Wired Telecommunications Carriers	5171	445	9,138	\$69,732	-4.7%	ND	ND
Wireless Telecommunications Carriers (except Satellite)	5172	145	2,811	\$62,816	-12.8%	-22.8%	-7.5%
Satellite Telecommunications (Q2 2011 data)	5174	10	231	\$81,016	ND	ND	ND
Other Telecommunications (Q2 2011 data)	5179	204	1,332	\$69,836	ND	ND	ND
Data Processing, Hosting and Related Services	5182	372	8,107	\$78,832	+9.5%	+5.8%	-4.3%
Other Information Services	5191	702	4,562	\$51,376	+7.8%	+8.7%	+38.5%
Monetary Authorities - Central Bank	5211	24	1,143	\$86,736	ND	ND	ND
Architectural, Engineering and Related Services	5413	1,914	19,656	\$76,336	+4.0%	-4.1%	+4.2%
Computer Systems Design and Related Services	5415	4,707	32,312	\$96,980	+16.9%	+9.1%	+39.5%
Management, Scientific and Technical Consulting Services	5416	3,009	15,043	\$87,412	+15.1%	+20.3%	+47.5%
Scientific Research and Development Services	5417	465	8,207	\$117,780	+18.6%	+18.1%	+16.3%

Source: DEED Quarterly Census of Employment & Wages (QCEW) program



Care, which includes the other 335,000 jobs, will be covered in a future article.

STEM Industries with Many Roots

STEM Core industries are a significant part of the state economy and have grown recently. Of the STEM Core industry sectors, 15 were in manufacturing, seven were in information, four were in professional, scientific and technical services, three were in wholesale trade, three were in energy (either extraction, generation or transportation) and one was in finance.

In the last decade, STEM Core industries added jobs more than twice as fast as all industries in

Minnesota and were affected less by the recession. Between 2003 and 2013, STEM Core industries gained over 19,000 jobs, a 10.1 percent increase compared with a 4.4 percent increase in all industries. While the state suffered a 4.3 percent decline in jobs from 2007 to 2009, STEM Core industries declined just 0.2 percent. Since coming out of the recession, STEM Core industries have grown about 5 percent, slightly outpacing the state in growth from 2009 to 2013 (see Table 1).

The largest employing STEM sector in Minnesota was computer systems design and related services, with more than 32,000 jobs at 4,700 business establishments. The next largest sector was navigational,

measuring, electromedical and control instruments manufacturing, with 24,500 jobs at about 200 firms. Other large sectors include architectural, engineering and related services; management, scientific and technical consulting services; professional and commercial equipment and supplies merchant wholesalers; and electric power generation, transmission and distribution.

More than half of the STEM Core sectors have seen employment growth in Minnesota since 2009, led by huge gains in computer systems design; management, scientific and technical consulting services; and scientific research and development services. The fastest growth occurred in pipeline transportation of crude oil and in oil and gas extraction, which both expanded more than 240 percent from 2009 to 2013, but they still combine for fewer than 240 jobs in the state.

Despite the recession, several STEM manufacturing sectors also saw steady job growth in Minnesota, including basic chemical manufacturing; pharmaceutical and medicine manufacturing; electrical equipment manufacturing; and resin, synthetic rubber, fibers and filaments manufacturing, which all increased more than 30 percent over the last decade.

TABLE 2 **Top 25 Largest STEM Core Occupations in Minnesota**

Occupational Title	SOC Code	Estimated Employment, 2014	Median Hourly Wage, 2014	Median Annual Wage, 2014	Projected Change in Jobs, 2012-2022	Projected Total Job Openings, 2012-2022
Total, All Occupations	0	2,688,580	\$18.15	\$37,766	+7.0%	901,620
Computer Systems Analysts	151121	12,880	\$38.70	\$80,482	+17.0%	4,290
Computer User Support Specialists	151151	11,710	\$23.02	\$47,864	+11.0%	2,910
Software Developers, Applications	151132	11,260	\$44.14	\$91,813	+10.7%	3,030
Computer and Information Systems Managers	113021	9,160	\$56.43	\$117,369	+9.5%	2,240
Computer Occupations, All Other	151199	8,780	\$34.47	\$71,700	+9.5%	1,830
Software Developers, Systems Software	151133	8,690	\$46.47	\$96,659	+6.4%	1,660
Network and Computer Systems Administrators	151142	8,060	\$35.85	\$74,553	+4.3%	1,730
Industrial Engineers	172112	7,380	\$38.77	\$80,644	+4.7%	2,650
Mechanical Engineers	172141	6,660	\$38.88	\$80,877	+3.4%	2,310
Sales Representatives, Wholesale and Mfg., Technical and Scientific Products	414011	6,310	\$40.77	\$84,801	+2.0%	1,700
Computer Programmers	151131	5,700	\$35.21	\$73,238	-2.2%	1,640
Engineering Managers	119041	3,920	\$59.85	\$124,492	+2.3%	1,370
Civil Engineers	172051	3,800	\$37.95	\$78,944	+15.4%	1,430
Computer Network Architects	151143	3,790	\$44.64	\$92,845	+6.1%	820
Electrical Engineers	172071	3,400	\$40.98	\$85,237	+3.1%	1,030
Computer Network Support Specialists	151152	3,290	\$28.83	\$59,964	+1.7%	580
Industrial Engineering Technicians	173026	2,790	\$24.55	\$51,061	+0.5%	620
Database Administrators	151141	2,690	\$40.78	\$84,832	+11.6%	780
Web Developers	151134	2,630	\$32.17	\$66,905	+11.5%	680
Mechanical Drafters	173013	2,570	\$26.49	\$55,088	-4.0%	380
Civil Engineering Technicians	173022	2,450	\$27.36	\$56,909	-5.1%	470
Medical Scientists, Except Epidemiologists	191042	2,420	\$26.74	\$55,624	+11.2%	840
Electrical and Electronic Engineering Technicians	173023	2,410	\$25.80	\$53,672	-7.4%	600

Source: DEED Occupational Employment Statistics (OES), DEED 2012-2022 Employment Outlook

Where IT's At

The state also saw steady job growth in information technology (IT), with both short- and long-term gains at software publishers; data processing, hosting and related services; and other information services, which includes Internet publishing, broadcasting and Web search portals. Combined, these three industries increased over 10 percent and now provide over 19,000 jobs in the state.

Not surprisingly, many of the top employing STEM careers in Minnesota are concentrated in the IT field. Based on employment estimates from DEED's Occupational

Employment Statistics (OES) program, seven of the top 10 as well as 12 of the top 25 largest STEM Core occupations in Minnesota have an IT focus. Combined, they account for 88,640 jobs, or about 40 percent of the state's total STEM Core occupations (see Table 2).

These IT occupations comprise a large segment of the STEM landscape and should continue to grow in the future. According to DEED's 2012-2022 employment projections, information technology jobs are expected to increase by just over 9 percent in the next decade, about 2 percent faster than the total for all occupations.

The fastest-growing IT occupations are expected to be information security analysts, operations research analysts, computer systems analysts, and computer and information research scientists.

In addition to new jobs, many of these occupations will also have a large number of replacement openings — jobs that become open due to retirements or other existing workers leaving the labor force.

Billie Chock, an IT manager with General Mills, believes new and future graduates will play a critical role in Minnesota's workforce in the next decade.

TABLE 3 **Top 10 Highest-Earning STEM Core Occupations in Minnesota**

Occupational Title	SOC Code	Estimated Employment, 2014	Median Hourly Wage, 2014	Median Annual Wage, 2014	Projected Change in Jobs, 2012-2022	Projected Total Job Openings, 2012-2022
Total, All Occupations	0	2,688,580	\$18.15	\$37,766	+7.0%	901,620
Physicists	192012	60	\$66.88	\$139,121	+20.2%	50
Engineering Managers	119041	3,920	\$59.85	\$124,492	+2.3%	1,370
Computer and Information Research Scientists	151111	380	\$58.49	\$121,659	+13.4%	90
Computer and Information Systems Managers	113021	9,160	\$56.43	\$117,369	+9.5%	2,240
Engineering Teachers, Postsecondary	251032	720	\$53.47	\$111,218	+5.4%	150
Materials Scientists	192032	210	\$52.56	\$109,326	+4.5%	10
Natural Sciences Managers	119121	1,120	\$52.51	\$109,218	+5.1%	260
Biomedical Engineers	172031	1,040	\$51.64	\$107,404	+12.2%	420

Source: DEED Occupational Employment Statistics (OES), DEED 2012-2022 Employment Outlook

“They certainly will be major contributors,” she says. “We need bright minds that are passionate about solving complex problems that span disciplines.”

She says some of the challenges include finding new ways to use technology to help businesses succeed by utilizing data, automating processes, helping customers and consumers, and improving processes at work.

Cashing In

STEM Core industries and occupations are much higher paying than the jobs in all industries. As shown in Table 1, average annual wages in the STEM Core sectors were just

over \$85,500 in 2013, which was more than \$35,000 higher than the total for all industries. Thirteen of the 33 sectors averaged more than \$85,500 per year, including six industries that earned over \$100,000 per year. And despite being much higher to start, wages increased faster in the STEM Core industries over the last decade, especially during the last four years.

Not every job in these industries, however, is in a STEM discipline. Though they have a higher concentration of technical occupations, many jobs in these industries are not STEM-related but still might be higher paying. Looking just at the list of STEM Core occupations, almost half

(42) earned more than \$75,000 per year, and all 90 earned more than the median annual wage for the total of all occupations. The 10 lowest-earning STEM occupations still earned an average of about \$45,000 per year, while the top 10 highest earning STEM jobs all earned over \$100,000 (see Table 3). [19](#)



¹⁹Exploring the High-Tech Industry."STEM-Driven High-Tech Industry Taxonomy. Page 3. www.labor.idaho.gov/publications/Exploring_High-Tech_Industry.pdf