

# Scientific, Technology, Engineering, Mathematics, and Social Sciences (STEM) Occupations

- COMPUTER AND MATHEMATICAL SCIENCE OCCUPATIONS
- ARCHITECTS AND TECHNICIANS OCCUPATIONS
- ENGINEERS AND TECHNICIANS OCCUPATIONS
- LIFE AND PHYSICAL SCIENCES OCCUPATIONS
- SOCIAL SCIENCES OCCUPATIONS

STEM, as this group of occupations is known, is the sixth-largest cluster and will also provide the sixth-largest share of job openings in the economy over the next decade. While these occupations are not large in number, they generate the technological changes that shape all other occupations. In 2008, STEM Occupations accounted for about 7.3 million jobs, or about 5 percent of the 147 million in the U.S. economy. By 2018, they are projected to increase to 8.6 million jobs, or 5.3 percent of the nation's 162 million total positions.

The STEM Occupations are broadly represented in all industries, but are most concentrated in the Professional and Business Services (21 percent) and Information Services (14 percent) industries.

This cluster of occupations is forecast to provide 2.8 million job openings through 2018, including 1.2 million net new jobs and an additional 1.6 million replacement openings. Here is a breakdown of projected STEM openings by education requirements. In total, there will be job openings for:

- 9,000 high school dropouts;
- 210,000 high school graduates;
- 274,000 workers with some college but no degree;
- 313,000 workers with Associate's degrees;
- 1.2 million workers with Bachelor's degrees;
- 779,000 workers with Master's degrees or better.

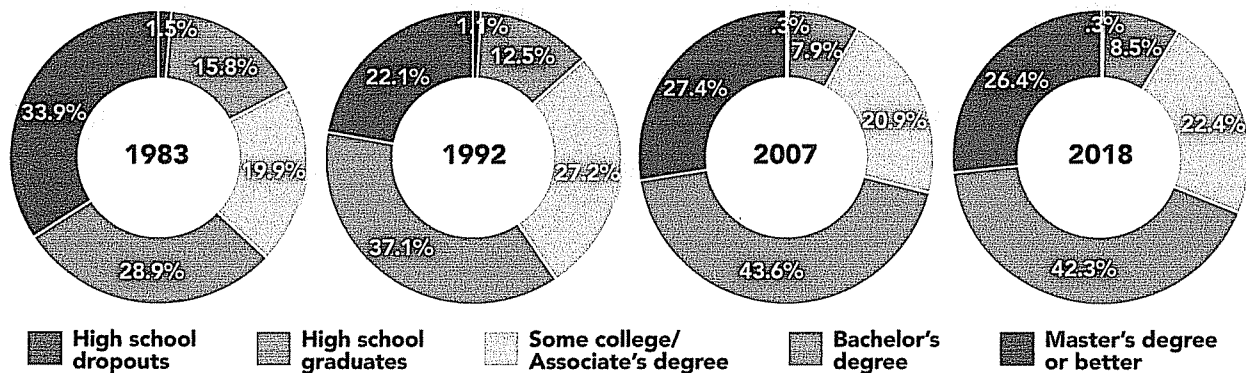
The share of workers with at least some college or better in STEM Occupations has always been high. Almost 83 percent of STEM employees had at least some postsecondary education in 1983, and that number climbed to 92 percent in 2008 and is projected to remain there through 2018. STEM Occupations, along with several other occupational clusters, ranked at the top for their concentrations of postsecondary workers in 2007 and will hold onto that ranking in 2018.

The STEM cluster of occupations includes a wide gamut of scientific and technical job categories. We detail some of those in the following pages.

FIGURE 3-11

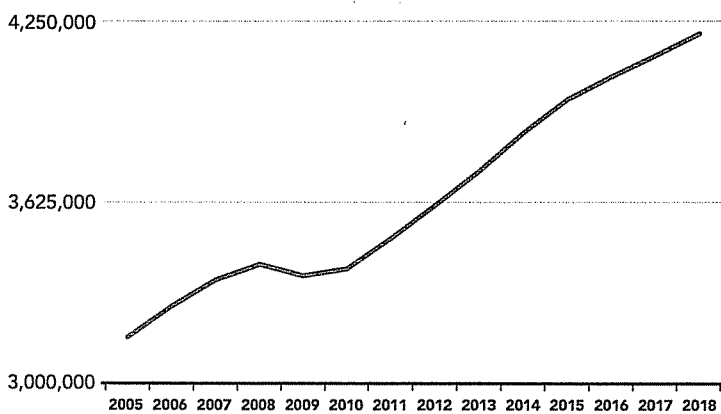
## Educational Attainment in STEM Occupations (1983–2018).

Source: Authors' analysis of March CPS data, various years; Center on Education and the Workforce forecast of educational demand through 2018



## COMPUTER AND MATHEMATICAL SCIENCE OCCUPATIONS

Computer and Mathematical Science Occupations (2005–2018)



Education Requirements (2008/2018)

	2008	Percentage	2018	Percentage
High school dropouts	18,009	1%	21,406	1%
High school graduates	251,618	7%	229,500	5%
Some college	393,410	12%	476,684	11%
Associate's degree	336,159	10%	408,244	10%
Bachelor's degree	1,658,123	49%	2,127,160	51%
Master's degree	684,770	20%	844,819	20%
Professional degree	22,378	0.7%	39,267	1%
Doctorate degree	46,710	1.4%	62,463	1%

[SOC 15-1011–SOC 15-2099]

Source: Authors' analysis of March CPS data, various years; Center on Education and the Workforce forecast of educational demand through 2018

Computer and Mathematical Science occupations are the largest category in the STEM cluster. They accounted for 3.4 million jobs in 2008, or 2.3 percent of all jobs, and will grow to 4.2 million jobs in 2018, or 2.6 percent of the total.

Education levels for Computer and Mathematical Science occupations are currently concentrated in Bachelor's and Master's degrees (69 percent) and that should increase to 71 percent by 2018. In addition, the demand for workers with some college and Associate's degrees for Computer and Mathematical Science occupations is significant (22 percent), although it should dip to 21 percent by 2018. Some 1.5 million positions will be available in the category through 2018: 798,000 net new jobs and 707,000 replacement openings. This represents about 3 percent of the total new and replacement jobs forecast during that period and reflects a relatively greater demand for highly skilled computer and mathematical sciences workers to replace retirees. About 94 percent of these new and replacement jobs will require some college or more, with the largest proportion (51 percent) requiring a Bachelor's degree.

Computer and Mathematical Science occupations are dominated by Computer occupations, although Mathematical Science occupations will grow by roughly 20 percent from a relatively small base of nearly 120,000 jobs in 2008.

Computer Specialists account for the largest share of growth in this category. People in these occupations help institutions and individuals keep up with the rapid pace of computer technological change and new network applications. Computer Specialists account for more than 700,000 of the 800,000 new jobs that will be created in this category of occupations. The number of computer programmers will decline, however, as programming gives way to the increased use of software interfaces.

This occupational category will grow in every industry because of its integral role in broad-based technology change. Still, almost half of the growth will occur in Professional and Business Services, which houses Computer Systems Design, the economy's fifth-fastest growing industry. It will grow by nearly \$100 billion in output and

almost 700,000 jobs over the decade. Growth will be driven by demand for increasingly sophisticated Internet and intranet capabilities; the need to connect with mobile computer

and communications technologies; the expansion of electronic healthcare records; and increasing demand for computer-related security.

## ARCHITECTURE AND ARCHITECTURAL TECHNICIAN OCCUPATIONS

Architecture and Architectural Technician Occupations (2005–2018)



Education Requirements (2008/2018)

	2008		2018	
	Count	Percentage	Count	Percentage
High school dropouts	242	0.1%	1,053	0.2%
High school graduates	15,208	3%	13,331	3%
Some college	30,350	7%	15,206	3%
Associate's degree	28,949	7%	27,634	6%
Bachelor's degree	230,269	52%	264,399	56%
Master's degree	115,818	26%	133,360	28%
Professional degree	8,080	2%	7,748	2%
Doctorate degree	11,739	3%	12,194	3%

National Employment Trends (2005–2018)

	Architecture and architectural technician occupations	Total	Percentage
2005	415,146	144,200,000	0.3%
2006	432,743	146,700,000	0.3%
2007	440,064	148,000,000	0.3%
2008	440,656	147,100,000	0.3%
2009	421,233	142,700,000	0.3%
2010	421,013	142,300,000	0.3%
2011	430,072	145,100,000	0.3%
2012	439,687	148,300,000	0.3%
2013	449,341	151,600,000	0.3%
2014	459,486	155,300,000	0.3%
2015	467,087	158,000,000	0.3%
2016	469,815	159,200,000	0.3%
2017	472,136	160,300,000	0.3%
2018	474,926	161,500,000	0.3%

[SOC 17-1011–SOC 17-1022;  
SOC 17-3012–SOC 17-3019;  
SOC 17-3031]

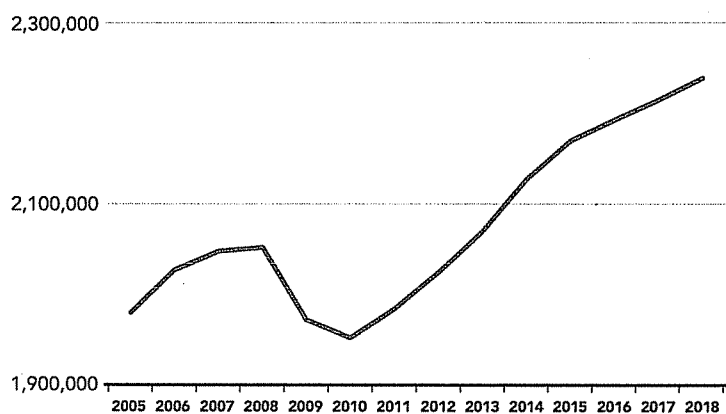
Source: Authors' analysis of March CPS data, various years; Center on Education and the Workforce forecast of educational demand through 2018

Architects and Architectural Technicians accounted for more than 440,000 jobs in 2008, about 0.3 percent of overall employment. They will increase by roughly 30,000 jobs by 2018 and are concentrated in the Professional and Business Services, Durable Manufacturing, and Construction industries. During the recession, job losses in this category have been severe. Sharp decreases in employment since 2007 reflect the battering taken by the Manufacturing and Construction industries in the recession.

Education levels are currently concentrated in Bachelor's degrees and Master's degrees (78 percent of current workers) and will increase to 84 percent by 2018. This category will provide 266,000 total job openings by 2018: 34,000 net jobs and 231,000 openings from retirement. About 257,000 of these openings will require some college education, with the largest concentration (56 percent) requiring a Bachelor's degree.

## ENGINEERS AND ENGINEERING TECHNICIAN OCCUPATIONS

Engineers and Engineering Technician Occupations (2005–2018)



National Employment Trends (2005–2018)

	Engineers and engineering technician occupations	Total	Percentage
2005	1,980,588	144,200,000	1.4%
2006	2,027,266	146,700,000	1.4%
2007	2,048,425	148,000,000	1.4%
2008	2,052,338	147,100,000	1.4%
2009	1,972,149	142,700,000	1.4%
2010	1,952,861	142,300,000	1.4%
2011	1,984,516	145,100,000	1.4%
2012	2,025,906	148,300,000	1.4%
2013	2,070,202	151,600,000	1.4%
2014	2,128,102	155,300,000	1.4%
2015	2,170,895	158,000,000	1.4%
2016	2,193,772	159,200,000	1.4%
2017	2,215,180	160,300,000	1.4%
2018	2,239,368	161,500,000	1.4%

Education Requirements (2008/2018)

	2008	Percentage	2018	Percentage
High school dropouts	71,000	3%	5,246	0.2%
High school graduates	338,594	16%	433,498	19%
Some college	359,624	18%	325,252	15%
Associate's degree	470,703	23%	581,429	26%
Bachelor's degree	526,220	26%	604,506	27%
Master's degree	224,932	11%	240,476	11%
Professional degree	34,984	2%	17,562	1%
Doctorate degree	26,280	1%	31,397	1%

[SOC 17-2011–SOC 17-2199;  
SOC 17-3021–SOC 17-3031]

Source: Authors' analysis of March CPS data, various years; Center on Education and the Workforce forecast of educational demand through 2018

Engineers and Engineering Technicians account for the second-largest share of jobs in STEM Occupations. They accounted for 2 million jobs in 2008, or 1.4 percent of all jobs. This category of occupations will grow by 187,000 jobs through 2018 and maintain its 1.4 percent share.

The largest growth in this cluster will be for civil engineers, who will be employed in updating the nation's infrastructure. Openings for civil engineers will increase by more than 100,000 to fill newly created jobs and replace workers projected to retire over the next decade.

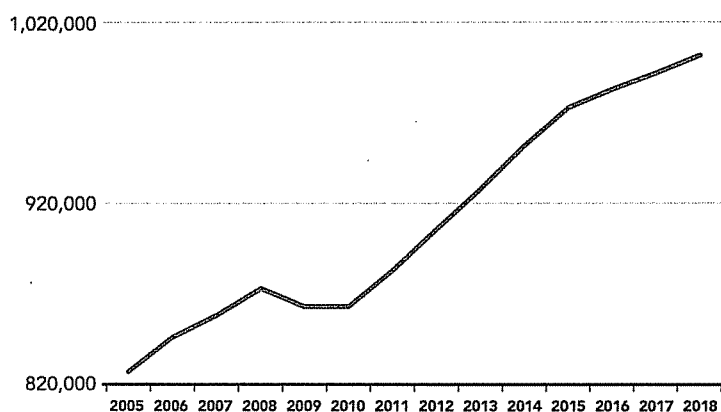
Engineers are concentrated in the Professional and Business Services; Durable Manufactures; Public Administration; and Construction industries. The above graph shows that steep job losses will be followed by a robust return. The sharp

decreases in employment most likely reflect losses connected to construction and infrastructure during the Great Recession.

Educational attainment for this occupational category currently concentrates in Bachelor's and Master's degrees (56 percent), increasing to 63 percent by 2018. There is also significant demand for workers with some college education and Associate's degrees. In 2008, 18 percent of incumbent workers had some college but no degree and another 23 percent had an Associate's degree—a percentage that will increase to 26 percent by 2018. Engineers and related occupations will generate 522,000 total job openings by 2018: 187,000 net new jobs and 335,000 replacement openings. Some 420,000 of these jobs will require at least some college education, with the largest proportion (27 percent) requiring a Bachelor's degree.

## LIFE AND PHYSICAL SCIENCES OCCUPATIONS

Life and Physical Sciences Occupations (2005–2018)



Education Requirements (2008/2018)

	2008		2018	
	Count	Percentage	Count	Percentage
High school dropouts	-	0%	-	0%
High school graduates	17,958	2%	20,299	2%
Some college	26,493	3%	11,085	1%
Associate's degree	16,669	2%	-	0%
Bachelor's degree	368,244	42%	430,905	43%
Master's degree	267,649	31%	281,855	28%
Professional degree	24,078	2.8%	28,962	3%
Doctorate degree	152,326	17%	229,590	23%

National Employment Trends (2005–2018)

	Life and physical sciences occupations	Total	Percentage
2005	827,280	144,200,000	0.6%
2006	846,550	146,700,000	0.6%
2007	858,311	148,000,000	0.6%
2008	873,416	147,100,000	0.6%
2009	863,449	142,700,000	0.6%
2010	863,929	142,300,000	0.6%
2011	883,968	145,100,000	0.6%
2012	906,305	148,300,000	0.6%
2013	928,734	151,600,000	0.6%
2014	952,941	155,300,000	0.6%
2015	973,288	158,000,000	0.6%
2016	983,729	159,200,000	0.6%
2017	992,865	160,300,000	0.6%
2018	1,002,696	161,500,000	0.6%

[SOC 19-1011–SOC 19-2099;  
SOC 19-4011–SOC 19-4099]

Source: Authors' analysis of March CPS data, various years; Center on Education and the Workforce forecast of educational demand through 2018

Life and Physical Sciences occupations account for a tiny share (0.6%) of total employment, amounting to about 873,000 jobs in 2008 but are expected to add almost another 130,000 positions by 2018. This occupational category will provide 263,000 total job openings by 2018: 129,000 net new jobs and 134,000 openings from retirements. About 258,000 of these jobs will require some college education or more, with the largest proportion (43 percent) requiring a Bachelor's degree.

The educational attainment of Life and Physical Sciences occupations is concentrated in Bachelor's and Master's degrees (73 percent), but there is a significant demand for Doctoral degree jobs, too—17 percent in 2008, climbing to 23 percent in 2018.

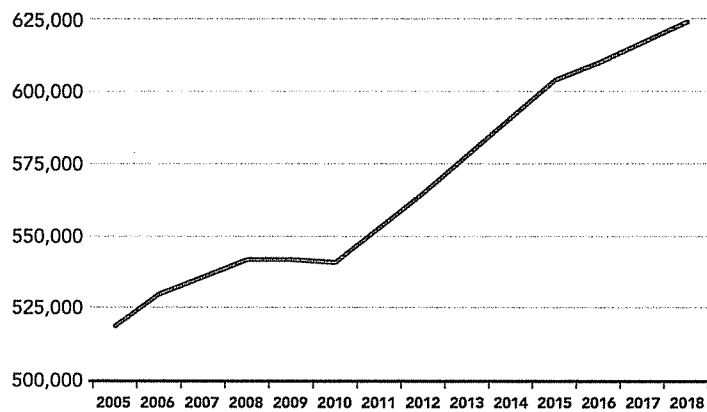
Life Sciences occupations include Biologists, Zoologists, Agricultural and Food Scientists, Conservation Scientists, and

Medical Scientists. Medical Scientists represent the largest share of Life Sciences occupations and will experience the greatest growth between 2008 and 2018, increasing by almost 50,000 over the period. Medical Scientists search for new treatments, and thereby expand the demand for healthcare. With retirements, job openings for Medical Scientists will total more than 70,000.

Physical Sciences occupations include Astronomers, Physicists, Chemists, and Environmental Scientists. Environmental Health Scientists represent the largest share of the Physical Sciences category and will experience the greatest growth by 2018, increasing by almost 25,000 over the period. With retirements, job openings for Environmental Health Scientists will number almost 50,000.

## SOCIAL SCIENCES OCCUPATIONS

Social Sciences Occupations (2005–2018)



National Employment Trends (2005–2018)

	Social sciences occupations	Total	Percentage
2005	519,829	144,200,000	0.4%
2006	530,260	146,700,000	0.4%
2007	536,335	148,000,000	0.4%
2008	542,292	147,100,000	0.4%
2009	542,495	142,700,000	0.4%
2010	541,919	142,300,000	0.4%
2011	553,750	145,100,000	0.4%
2012	565,490	148,300,000	0.4%
2013	578,020	151,600,000	0.4%
2014	591,682	155,300,000	0.4%
2015	604,614	158,000,000	0.4%
2016	610,818	159,200,000	0.4%
2017	617,106	160,300,000	0.4%
2018	624,385	161,500,000	0.4%

Education Requirements (2008/2018)

	2008	Percentage	2018	Percentage
High school dropouts	6,914	1%	-	0%
High school graduates	39,117	7%	32,398	5%
Some college	36,153	7%	36,859	6%
Associate's degree	27,769	5%	36,285	6%
Bachelor's degree	186,603	34%	186,966	30%
Master's degree	106,752	20%	143,586	23%
Professional degree	46,408	9%	47,880	8%
Doctorate degree	92,576	17%	140,411	22%

[SOC 19-3011–SOC 19-3099]

Source: Authors' analysis of March CPS data, various years; Center on Education and the Workforce forecast of educational demand through 2018

Social Sciences occupations account for only about 0.4 percent of overall U.S. employment, and are concentrated in the Healthcare, Education, Professional Services, and Public Administration industries. Social Sciences occupations accounted for roughly 550,000 jobs in 2008 and will grow by more than 82,000 jobs by 2018. Between growth and retirements, total job openings may total as high as 275,000 jobs over the decade. More than half the growth in Social Sciences occupations will come from increases in demand for Market and Survey Research workers.

Education levels in this occupational category are concentrated in Bachelor's and Master's degrees (54 percent), although that number is expected to dip slightly to 53 percent by 2018. There also is a significant demand for workers with Doctoral degrees—17 percent of today's jobs require a PhD, and that is expected to reach 22 percent by 2018.