

Maryland's STEM Report Card 2014

There's bipartisan consensus: the U.S. needs to **live within its means, cut the federal deficit — and do it the smart way.**

*STEM =

Science

Biology, Chemistry, Marine Biology, Physics, Science

Technology

Computer / Information Systems, Game Design, Developer, Web / Software Developer

Engineering

Chemical, Civil, Computer, Electrical / Electronics, Photonics, General & Mechanical Engineering

Mathematics & Statistics

We want our children and grandchildren to have good jobs — and that means that **science research & development (R&D) and STEM Education** should be top priorities for federal investments.

Especially in times of fiscal austerity, we need to **SET PRIORITIES** and make wise **INVESTMENTS** that create new and high-paying jobs, keep **Maryland** and the U.S. competitive, increase our standard of living and grow the private sector.

Our free market economy relies heavily upon federally-supported scientific research. A National Science Foundation (NSF) study found that 73% of the scientific papers cited in commercial patents

were funded by taxpayers through the federal government, especially university research operations.¹

Maryland received **\$3.55 billion in federal R&D contracts in FY 2013, with approximately 7,005 transactions taking place.**² Maryland universities and colleges received \$3.32 billion in federal R&D spending, including grants, in FY 2012.³

Key Reports and On-Line Resources

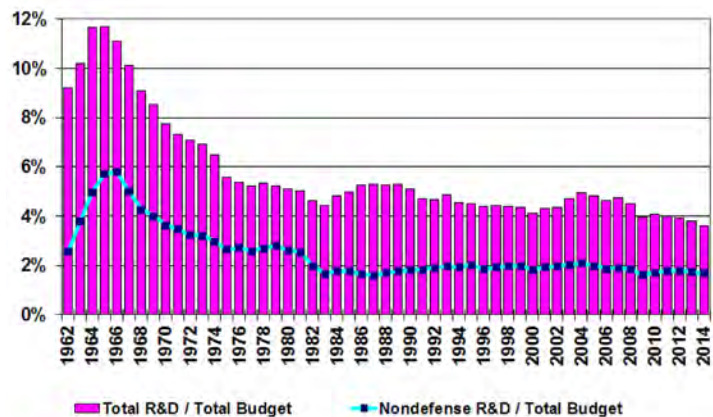
- The Science-Engineering-Technology Working Group (SETWG) sponsors the annual Congressional Visits Day Program. See www.setcvgd.org
- Science & Engineering Indicators 2014*, published by the National Science Board, provides a broad base of quantitative information on the U.S. and international science and engineering enterprise. It is created biennially by the National Science Foundation's Division of Science Resources Statistics (SRS) See www.nsf.gov/statistics/seind14/
- ASTRA's Web Sites include www.usinnovation.org. See also store.usinnovation.org for free downloads of all *State STEM Reports 2014*, *EdTech Revolution in Education 2013* book and our latest publications.

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Declining Support: Federal R&D outlays as Percentage of Federal Budget 1962-2014:



Source: Budget of the U.S. Government FY 2014 Historical Tables. FY 2014 is the Presidential Budget Request. FY 2013 figures do not yet reflect final appropriations or sequester results.



Top 5 Recipients of Federal R&D Contracts (not Grants)² Performed in Maryland FY 2013* (rounded)

1. Johns Hopkins University	\$788,829,101
2. Lockheed Martin Corporation	\$321,096,114
3. General Dynamics Corporation	\$260,884,346
4. Northrop Grumman Corporation	\$214,816,560
5. Westat Inc.	\$212,487,925

* Note: R&D contract & grant amounts do not include management and administrative fees for the operation of Government-Owned, Contractor-Operated (GOCO) facilities under OMB definitions.

Top 5 Contracting Agencies for Maryland R&D Investments During FY 2013²

1. Department of Defense	\$1,909,539,593
2. Dept. of Health and Human Services	\$718,287,061
3. NASA	\$637,880,752
4. Department of Transportation	\$202,604,934
5. Department of Commerce	\$30,837,498



Maryland

241,000 Maryland STEM* Jobs to fill for 2018



241,000 = the number of STEM and STEM-related jobs Maryland will need to fill by 2018.⁴ Maryland kids and parents need to know about the potential for rewarding — and high paying careers in STEM. STEM professions and occupations are among the highest paying jobs.

*STEM =

Science

Biology, Chemistry,
Marine Biology,
Physics, Science

Technology

Computer / Information
Systems, Game Design,
Developer, Web /
Software Developer

Engineering

Chemical, Civil,
Computer, Electrical /
Electronics, Photonics,
General & Mechanical
Engineering

Mathematics & Statistics

They are also the basis for a successful, globally competitive and innovative Maryland and U.S. economy. During the next decade, overall U.S. demand for scientists and engineers is expected to increase at four times the rate for all other occupations.

Where will Maryland's STEM Jobs be in 2018 by Occupation & Educational Level? (in thousands of jobs)

		High School Dropouts	High School Graduates	Some College	Associate's Degree	Bachelor's Degree	Graduate Degree	Total
STEM Jobs	Computer & Mathematical Science	0	7	23	10	53	33	127
	Architects & Technicians	0	2	2	1	4	3	11
	Engineers & Technicians	0	4	7	5	20	18	54
	Life & Physical Scientists	0	1	1	1	8	21	32
	Social Scientists	0	0	1	0	3	12	17
								241,000

Change in Maryland Jobs by Education Level: 2008 and 2018

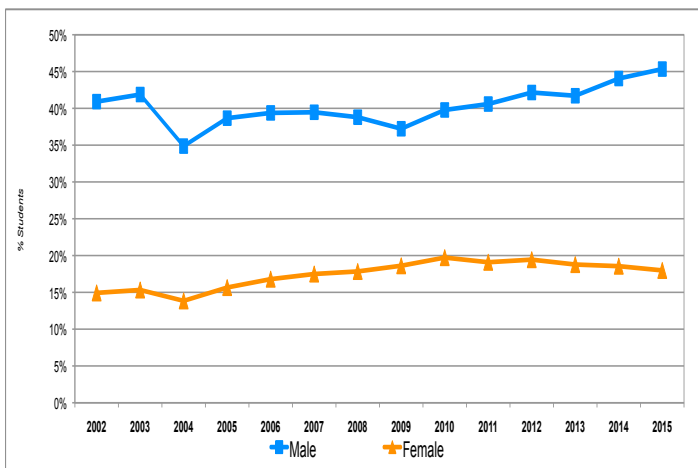
Educational Level	2008 Jobs	2018 Jobs	Difference
High School Dropouts	275,000	305,000	30,000
High School Graduates	787,000	863,000	77,000
Postsecondary	1,751,000	1,964,000	213,000

4. Source of data: Anthony Carnevale, Nicole Smith & Jeff Strohl, Georgetown University Center on Education and the Workforce publication *Help Wanted: Projections of Jobs and Education Requirements Through 2018*. June 2010. See www.cewgeorgetown@georgetown.edu

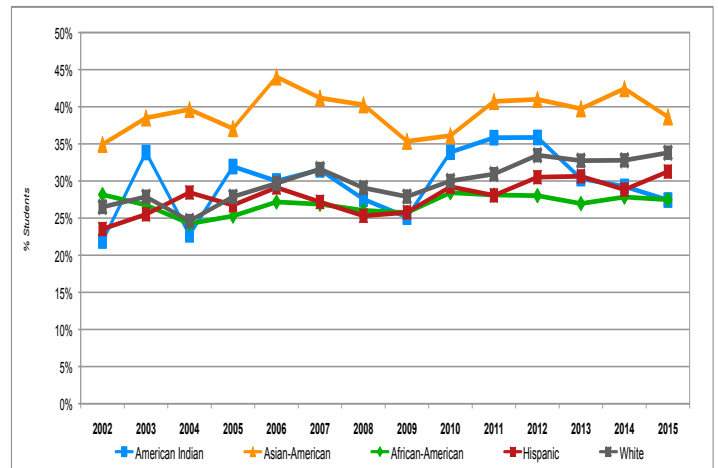
What Percentage of Maryland High school students are interested in STEM Careers?

The Charts ⁵ on this page represent Maryland's portion of an in-depth nationwide look at more than 6 million high school students in the MyCollegeOptions[®] program in 2013. Their college major/career aspirations were used to determine their interest in STEM-related fields, revealing that nearly 30% — more than 1.6 million students — who would like to pursue STEM in their futures. Keeping such students from dropping out of the STEM Talent Pipeline is essential in meeting U.S. STEM workforce demands for the future.

5. Source: MyCollegeOptions.org[®] for more information e-mail shapingthefuture@mycollegeoptions.org



STEM Interest by Gender



STEM Interest by Self-Identified Ethnicity



Why STEM Diversity, Ethnicity & Gender Matter

Increasing the number of Under-represented Minorities (URM's) in the U.S. STEM workforce would solve many of the skills gaps that confront our economy. Ethnic and gender disparities in STEM academic achievement carry over into lower participation by many URM's in high-paying STEM jobs. Selected charts from the National Action Council for Minorities in Engineering, Inc.'s *2013 NACME Data Book* help illustrate the challenge. For more information on URMs in engineering education and engineering careers, visit www.nacme.org/research-publications.



Figure 1: Changing Demographics of the U.S.¹

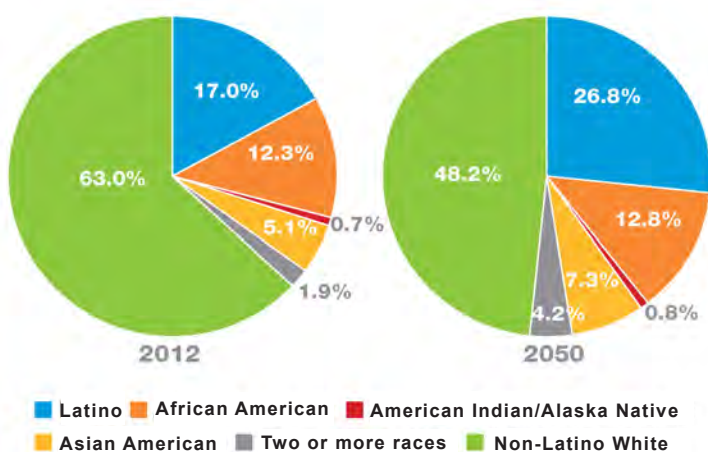


Figure 3: Percentage of Students Meeting ACT College Readiness Benchmark Scores, 2012³

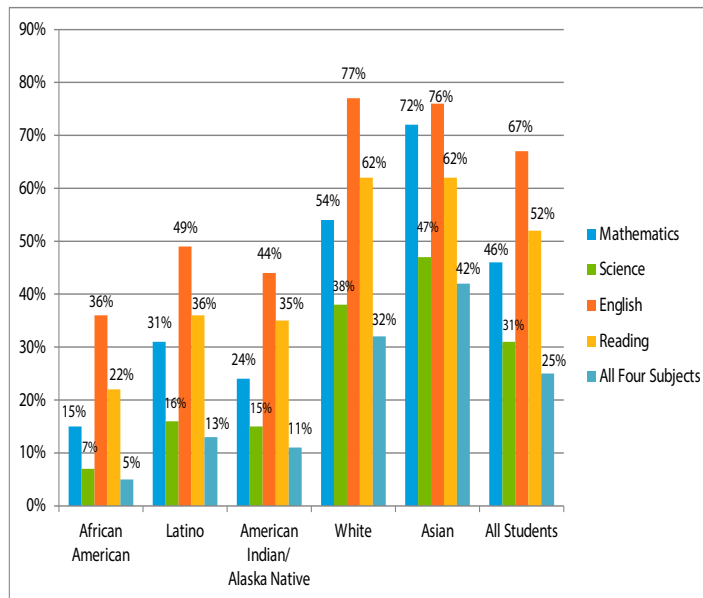


Figure 2: Percentage of Public and Private High School Graduates Taking Calculus Courses in High School, 2009²

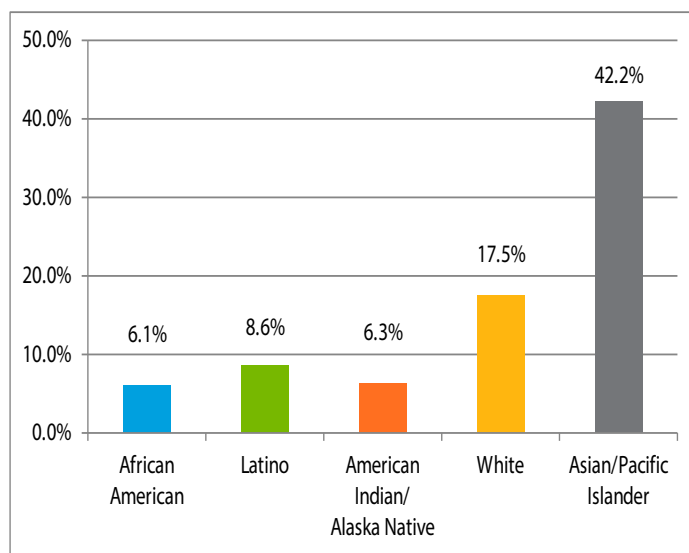
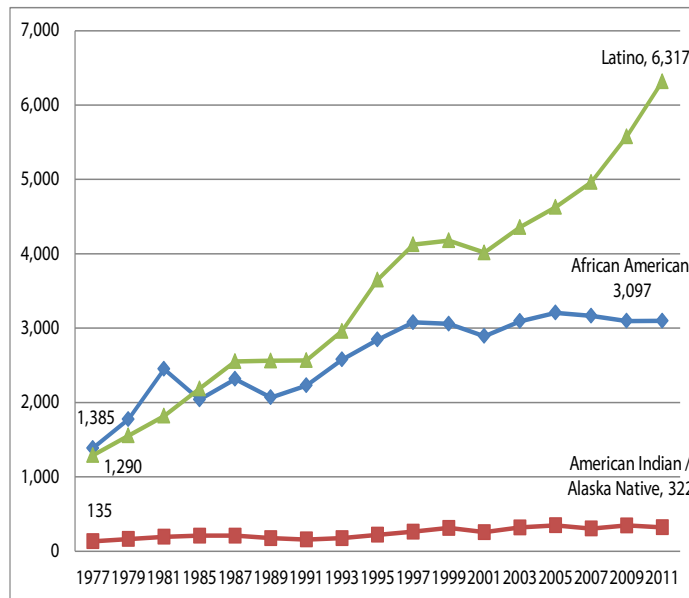


Figure 4: Engineering Bachelor's Degrees Earned, 1977-2011⁴



Endnotes

1. NACME analysis of National Population Projections from U.S. Census Bureau, 2013.
2. National Center for Education Statistics, 2012. *Digest of Education Statistics, 2011*.
3. ACT Profile Report, National (Graduating Class 2012). Accessed online at www.act.org.
4. NACME analysis of Integrated Postsecondary Education Data System (IPEDS) accessed via National Science Foundation's WebCASPAR database system, June 2013.



Focus on Diversity & Gender in Engineering

The U.S. population is becoming more diverse each year. By 2050, URM's will represent more than 40 percent of the population, and there will be no majority race. The demand for qualified STEM professionals is high, but the supply of STEM workers to fill these positions is at risk if underrepresented groups are not engaged in these fields. The figures below show that African Americans, Latinos, American Indians, Alaska Natives, and women are underrepresented in all levels of engineering education and in the engineering workforce.



Figure 5: African Americans in Engineering

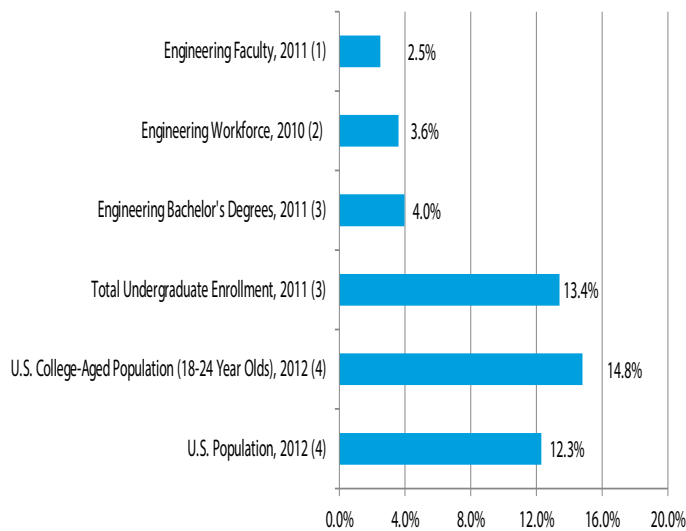


Figure 6: American Indian/Alaska Natives in Engineering

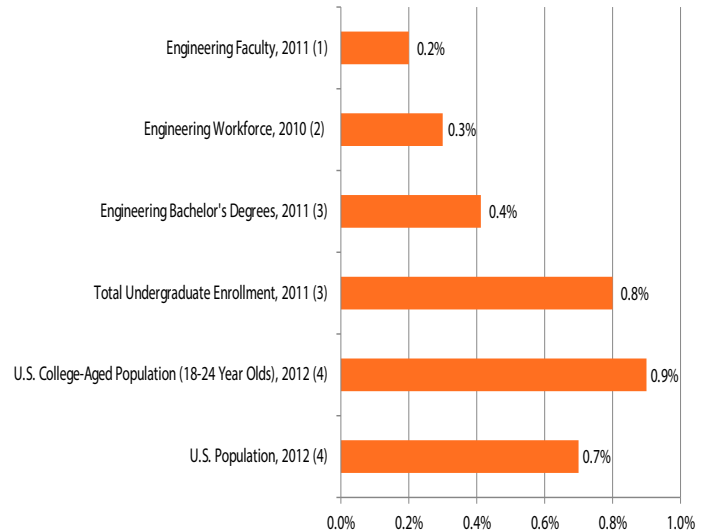


Figure 7: Latinos in Engineering

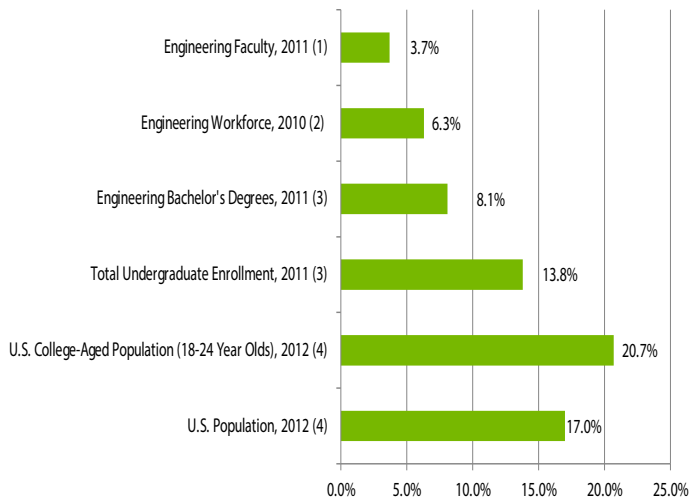
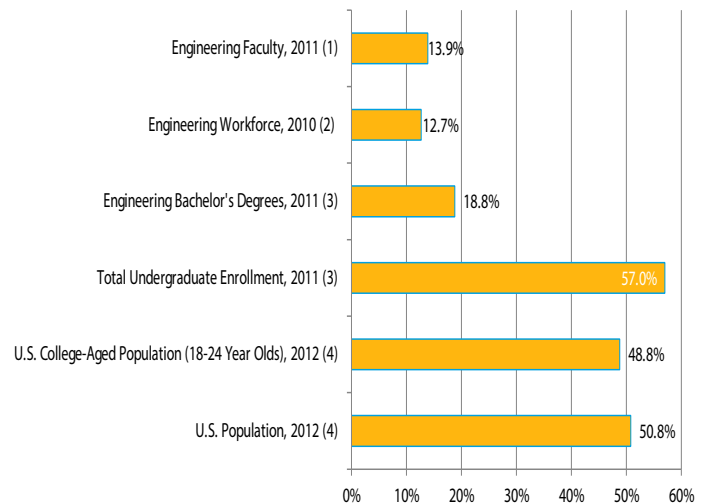


Figure 8: Women in Engineering

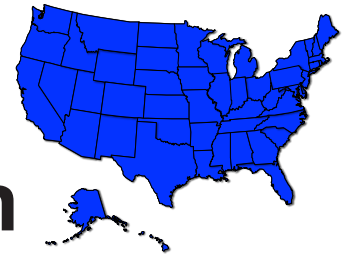


Endnotes

1. American Society for Engineering Education, 2012. Engineering by the Numbers, 2011.
2. Finamore, J., Foley, D.J., Lan, F., Milan, L.M., Proudfoot, S.L., Rivers, E.B., & Selfa, L. (2013). Employment and Educational Characteristics of Scientists and Engineers. National Center for Science and Engineering Statistics, NSF 13-311.
3. NACME Analysis of Integrated Postsecondary Education Data System (IPEDS) accessed via National Science Foundation's WebCASPAR database system, August 2013.
4. NACME Analysis of population projections from U.S. Census, 2012.



What are the STEM & STEM-Related Jobs by Occupation in 2014?



SOC*	STEM or STEM-Related Job Description	2014 Jobs
13-2011	Accountants and Auditors	1,683,255
11-9199	Managers, All Other	1,681,417
25-1099	Postsecondary Teachers	1,473,473
13-1199	Business Operations Specialists, All Other	1,015,981
35-1012	First-Line Supervisors of Food Preparation and Serving Workers	939,613
49-3023	Automotive Service Technicians and Mechanics	806,563
35-2012	Cooks, Institution and Cafeteria	460,876
27-1024	Graphic Designers	418,474
11-9021	Construction Managers	469,314
11-3021	Computer and Information Systems Managers	356,688
19-3031	Clinical, Counseling, and School Psychologists	345,044
17-2051	Civil Engineers	306,325
13-1041	Compliance Officers	254,420
17-2141	Mechanical Engineers	266,738
13-2099	Financial Specialists, All Other	239,305
13-1051	Cost Estimators	224,995
17-2112	Industrial Engineers	224,600
11-9041	Architectural and Engineering Managers	198,838
11-3051	Industrial Production Managers	174,337
17-2071	Electrical Engineers	171,319
17-2199	Engineers, All Other	167,747
17-1011	Architects, Except Landscape and Naval	161,750
17-3023	Electrical and Electronics Engineering Technicians	150,678
17-2072	Electronics Engineers, Except Computer	141,902
49-3011	Aircraft Mechanics and Service Technicians	128,757
19-1042	Medical Scientists, Except Epidemiologists	104,578
19-2041	Environmental Scientists and Specialists, Including Health	96,154
29-1031	Dietitians and Nutritionists	90,707
51-3092	Food Batchmakers	101,584
17-3011	Architectural and Civil Drafters	102,771
17-2061	Computer Hardware Engineers	86,767
19-2031	Chemists	87,465
17-2011	Aerospace Engineers	83,409

SOC*	STEM or STEM-Related Job Description	2014 Jobs
15-2031	Operations Research Analysts	77,224
45-3011	Fishers and Related Fishing Workers	86,373
19-4021	Biological Technicians	75,813
17-3022	Civil Engineering Technicians	74,830
17-3029	Engineering Technicians, Except Drafters, All Other	70,678
17-3026	Industrial Engineering Technicians	69,088
19-4099	Life, Physical, and Social Science Technicians, All Other	63,511
19-4031	Chemical Technicians	62,915
19-3039	Psychologists, All Other	59,679
17-2081	Environmental Engineers	54,054
17-1022	Surveyors	50,058
51-9011	Chemical Equipment Operators and Tenders	55,986
51-2023	Electromechanical Equipment Assemblers	50,756
11-9121	Natural Sciences Managers	50,931
19-2042	Geoscientists, Except Hydrologists and Geographers	62,772
17-2171	Petroleum Engineers	43,234
17-3027	Mechanical Engineering Technicians	48,817
19-4091	Environmental Science and Protection Technicians, Including Health	35,836
19-3099	Social Scientists and Related Workers, All Other	36,711
45-4022	Logging Equipment Operators	46,587
51-8091	Chemical Plant and System Operators	38,412
19-1021	Biochemists and Biophysicists	29,999
17-2041	Chemical Engineers	33,397
19-1029	Biological Scientists, All Other	33,831
19-4093	Forest and Conservation Technicians	34,616
15-2041	Statisticians	28,055
17-2031	Biomedical Engineers	22,426
19-1031	Conservation Scientists	28,115
17-2161	Nuclear Engineers	27,010
29-2051	Dietetic Technicians	26,233
53-6051	Transportation Inspectors	26,235
15-2011	Actuaries	23,150

SOC*	STEM or STEM-Related Job Description	2014 Jobs
51-4012	Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic	24,495
17-2111	Health and Safety Engineers, Except Mining Safety Engineers and Inspectors	24,618
17-2131	Materials Engineers	23,395
17-3025	Environmental Engineering Technicians	20,400
29-2033	Nuclear Medicine Technologists	21,355
19-1022	Microbiologists	20,456
19-1023	Zoologists and Wildlife Biologists	21,026
19-4011	Agricultural and Food Science Technicians	21,071
19-1013	Soil and Plant Scientists	19,338
19-2012	Physicists	19,223
19-1012	Food Scientists and Technologists	17,292
45-4011	Forest and Conservation Workers	16,374
25-9021	Farm and Home Management Advisors	15,180
43-9111	Statistical Assistants	15,502
19-2021	Atmospheric and Space Scientists	10,988
19-1032	Foresters	11,364
17-3021	Aerospace Engineering and Operations Technicians	10,124
19-4051	Nuclear Technicians	8,505
17-2151	Mining and Geological Engineers, Including Mining Safety Engineers	8,535
19-2043	Hydrologists	8,169
17-2121	Marine Engineers and Naval Architects	8,014
19-2032	Materials Scientists	8,100
45-4021	Fallers	10,348
33-3031	Fish and Game Wardens	6,651
19-1041	Epidemiologists	5,429
19-3032	Industrial-Organizational Psychologists	5,534
15-2021	Mathematicians	4,151
45-2021	Animal Breeders	4,155
45-4023	Log Graders and Scalers	3,721
17-2021	Agricultural Engineers	2,892
19-2011	Astronomers	2,563
15-2091	Mathematical Technicians	1,449
Total (including unlisted categories) = 15,143,595		

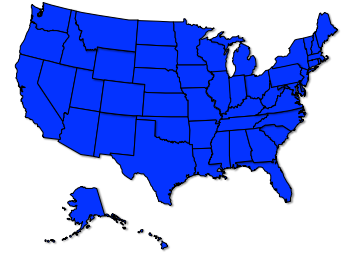
*SOC = Standard Occupational Classification

Source: ASTRA Global STEM & Innovation Data Project and EMSI occupation employment data are based on final EMSI industry data and final EMSI staffing patterns 2/01/14



**Highest
Paying STEM
Jobs — 2014**

What are the 70 Highest Paying STEM & STEM-Related Jobs in 2014?



Rank	SOC	Description	# 2014 Jobs	Median Hourly Earnings
1	17-2171	Petroleum Engineers	43,234	\$63.59
2	11-9041	Architectural and Engineering Managers	198,838	\$59.55
3	11-3021	Computer and Information Systems Managers	356,688	\$55.91
4	11-9121	Natural Sciences Managers	50,931	\$55.64
5	19-2012	Physicists	19,223	\$51.37
6	17-2011	Aerospace Engineers	83,409	\$49.87
7	15-2021	Mathematicians	4,151	\$48.73
8	17-2061	Computer Hardware Engineers	86,767	\$47.64
9	17-2161	Nuclear Engineers	27,010	\$46.53
10	19-2011	Astronomers	2,563	\$46.37
11	17-2041	Chemical Engineers	33,397	\$45.36
12	15-2011	Actuaries	23,150	\$45.04
13	19-2042	Geoscientists, Except Hydrologists and Geographers	62,772	\$44.59
14	17-2072	Electronics Engineers, Except Computer	141,902	\$44.07
15	19-2021	Atmospheric and Space Scientists	10,988	\$42.91
16	19-2032	Materials Scientists	8,100	\$42.81
17	19-3032	Industrial-Organizational Psychologists	5,534	\$42.39
18	17-2121	Marine Engineers and Naval Architects	8,014	\$42.36
19	17-2071	Electrical Engineers	171,319	\$42.15
20	11-3051	Industrial Production Managers	174,337	\$42.00
21	17-2031	Biomedical Engineers	22,426	\$41.81
22	17-2131	Materials Engineers	23,395	\$40.94
23	17-2199	Engineers, All Other	167,747	\$40.66
24	17-2151	Mining and Geological Engineers, Including Mining Safety Engineers	8,535	\$40.39
25	19-1021	Biochemists and Biophysicists	29,999	\$39.07
26	17-2081	Environmental Engineers	54,054	\$38.89
27	17-2141	Mechanical Engineers	266,738	\$38.59
28	19-3039	Psychologists, All Other	59,679	\$38.48
29	17-2112	Industrial Engineers	224,600	\$37.95
30	19-1042	Medical Scientists, Except Epidemiologists	104,578	\$37.22
31	17-2111	Health and Safety Engineers, Except Mining Safety Engineers and Inspectors	24,618	\$36.97
32	17-2051	Civil Engineers	306,325	\$36.75
33	19-3099	Social Scientists and Related Workers, All Other	36,711	\$36.65
34	15-2041	Statisticians	28,055	\$36.33
35	19-2043	Hydrologists	8,169	\$36.24
36	17-2021	Agricultural Engineers	2,892	\$35.58

Rank	SOC	Description	# 2014 Jobs	Median Hourly Earnings
37	19-1029	Biological Scientists, All Other	33,831	\$34.86
38	15-2031	Operations Research Analysts	77,224	\$34.58
39	19-2031	Chemists	87,465	\$34.52
40	29-2033	Nuclear Medicine Technologists	21,355	\$33.98
41	19-4051	Nuclear Technicians	8,505	\$33.23
42	19-1022	Microbiologists	20,456	\$31.79
43	19-3031	Clinical, Counseling, and School Psychologists	345,044	\$31.64
44	19-1041	Epidemiologists	5,429	\$31.51
45	13-1199	Business Operations Specialists, All Other	1,015,981	\$31.24
46	25-1099	Postsecondary Teachers	1,473,473	\$30.98
47	53-6051	Transportation Inspectors	26,235	\$30.62
48	19-2041	Environmental Scientists and Specialists, Including Health	96,154	\$30.54
49	13-1041	Compliance Officers	254,420	\$29.95
50	17-3021	Aerospace Engineering and Operations Technicians	10,124	\$29.60
51	17-1011	Architects, Except Landscape and Naval	161,750	\$29.31
52	13-2011	Accountants and Auditors	1,683,255	\$29.16
53	17-3029	Engineering Technicians, Except Drafters, All Other	70,678	\$28.70
54	17-3023	Electrical and Electronics Engineering Technicians	150,678	\$27.84
55	29-1031	Dietitians and Nutritionists	90,707	\$27.75
56	13-1051	Cost Estimators	224,995	\$27.56
57	19-1023	Zoologists and Wildlife Biologists	21,026	\$27.56
58	15-2091	Mathematical Technicians	1,449	\$27.32
59	19-1012	Food Scientists and Technologists	17,292	\$27.07
60	11-9021	Construction Managers	469,314	\$26.75
61	17-1022	Surveyors	50,058	\$26.75
62	19-1031	Conservation Scientists	28,115	\$26.39
63	49-3011	Aircraft Mechanics and Service Technicians	128,757	\$26.24
64	51-8091	Chemical Plant and System Operators	38,412	\$26.15
65	19-1013	Soil and Plant Scientists	19,338	\$26.13
66	19-1032	Foresters	11,364	\$26.05
67	13-2099	Financial Specialists, All Other	239,305	\$25.15
68	17-3027	Mechanical Engineering Technicians	48,817	\$25.04
69	17-3026	Industrial Engineering Technicians	69,088	\$24.56
70	11-9199	Managers in STEM and STEM-related Occupations, All Other	1,681,417	\$23.47
Total U.S. STEM & STEM-Related Jobs			15,143,595	\$28.48

