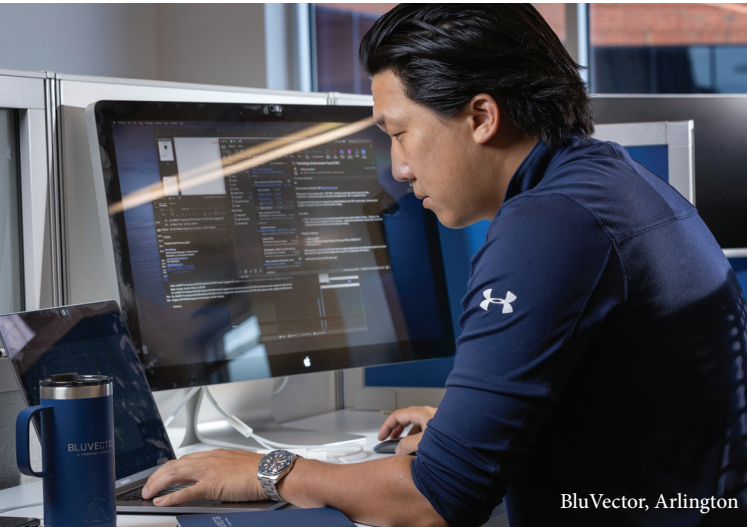




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Education
Economics

Proposed New STEM Workforce Profile for the Commonwealth of Virginia

October 2022



Table of Contents

Executive Summary	page 1 - 2
Introduction	page 3
What Historically Counts as STEM in Virginia	page 3
The Case to Broaden the Definition of the STEM Workforce in Virginia	page 4 - 5
Methodology	page 5 - 6
Limitations	page 7
Data Used to Conduct Analysis	page 7
New Expanded STEM Workforce Profile	page 7 - 8
Occupational Family (SOC Major Group) Representation	page 10 - 12
Career Clusters Representation in the STEM Workforce Profiles	page 13
Regional Perspectives on the New STEM Workforce Profile	page 14
Statewide Job Change within the STEM Workforce Profile	page 15 - 16
Summary	page 17
References	page 18
Appendix (SOC Lists by STEM Grouping)	page 19 - 36

Executive Summary

The Virginia Office of Education Economics (VOEE) at the Virginia Economic Development Partnership (VEDP) was tasked by the Virginia General Assembly in April 2022 ([HB217](#)) to review the occupational categories in the U.S. Bureau of Labor Statistics' Standard Occupational Classification (SOC) system to determine whether occupational categories should be added to the Commonwealth's Science, Technology, Engineering, and Mathematics (STEM) workforce profile. This report documents the results of analysis and provides a recommendation for a more inclusive STEM profile for the Commonwealth that expands the definition of the STEM workforce beyond traditional Science and Engineering occupations and adds occupations identified as Science and Engineering-related and the Skilled Technical Workforce. This report is accompanied by an [interactive data set](#) which includes the new taxonomy and associated labor market information and a variety of regionalized analyses.

Traditionally, in the United States and in Virginia, STEM has been identified as Science and Engineering occupations requiring a bachelor's degree or higher. However, in recent years, the [National Science Foundation](#) and others have begun to broaden their understanding of the STEM workforce to include those occupations that actively utilize a STEM skillset. This new basis for understanding a STEM worker extends the STEM profile to include Science and Engineering-Related occupations – jobs requiring science and technology expertise but

not traditionally recognized STEM jobs and the Skilled Technical Workforce, those workers employed in a STEM middle-skills occupation that do not have a four-year degree. This movement to be more inclusive in the determination of what counts as STEM has happened for a variety of reasons including the changing nature of work due to the impact of technology, labor shortages in the Skilled Technical Workforce, and the use of STEM aligned skills in these occupations (Chen and Rotermund, 2020; NSB NSF, 2021).

The STEM workforce profile produced by VOEE results in the following changes.

- The expanded STEM Workforce Profile represents a 375% increase in the number of occupations formally recognized as using a STEM skillset within Virginia.
- The expanded definition now represents approximately 43% of the total occupations defined in the BLS SOC taxonomy. This compares to the former traditional definition of STEM which represented 9% of occupations within the government SOC taxonomy.
- The expanded STEM Workforce Profile includes 342 occupations divided into three primary groups:
 - Science and Engineering: 72 Occupations
 - Science and Engineering-related: 126 Occupations
 - Skilled Technical Workforce: 144 Occupations

- In the expanded STEM Workforce Profile 17 of the 23 or 74% of the SOC Occupation Families at the 2-digit level are represented.
 - Of those, 5 of the 23 SOC Families have, or nearly have, 100% of all SOC within their families represented in the new profile. These include *Computer and Mathematical, Architecture and Engineering, Healthcare Practitioners and Technical, Life, Physical and Social Science and Healthcare Support*.
 - Including *Installation, Maintenance & Repair, and Production*, 7 out of 23 SOC Families have over 50% of all SOC within their families represented within the new profile.
- The expanded STEM Workforce Profile represents occupations across all 17 Virginia recognized career clusters.
 - The top four career clusters reporting the highest level of occupational

representation from the STEM Workforce Profile include:

- Health Science
- Science, Technology, Engineering and Mathematics
- Information Technology
- Energy

The expanded STEM Workforce Profile presented in this report represents a much broader and inclusive definition of occupations utilizing a STEM skillset in performing their job roles than previous definitions. Aligning Virginia's definition of STEM with current thinking better reflects the realities of the broader use of science infused skillsets by 21st century workers spanning multiple industries and changing work environments. For these reasons, VOEE supports adoption by Virginia of the broader workforce profile proposed in this report.



This analysis was conducted in partnership with the Virginia Science, Technology, Engineering, and Mathematics (STEM) Education Advisory Board and the STEM Occupations Subcommittee. This partnership was directed in the legislation. The VOEE team worked with selected members of the STEM Occupations Subcommittee closely throughout the summer. This group assisted VOEE in determining the methodology, connecting with stakeholders in the field to comment on the analysis, and reviewing the final analysis. VOEE presented this work at two full meetings of the STEM Education Advisory Board in Summer/Fall 2022.

As a supplement to this report, VOEE has provided an interactive spreadsheet that allows the user to filter on a variety of metrics and explore STEM workforce data by Go Virginia regions. [Download here: https://voee.org/data/](https://voee.org/data/).

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Introduction

The Virginia Office of Education Economics (VOEE) at the Virginia Economic development partnership was tasked by the Virginia General Assembly in April 2022 ([HB217](#)) to review the occupational categories in the U.S. Bureau of Labor Statistics' standard occupational classification (SOC) system to determine whether occupational categories should be added to the Commonwealth's Science, Technology, Engineering, and Mathematics (STEM) workforce profile. This report documents the results of that analysis and provides a recommendation for a more inclusive STEM profile for the Commonwealth that includes traditional Science and Engineering occupations and adds occupations identified as Science and Engineering Related (S&E related) and the Skilled Technical Workforce (STW). This report is accompanied by an interactive data set which includes the new taxonomy and associated labor market information.

The Commonwealth has defined what counts as STEM in a variety of different ways over the years. SCHEV documents STEM related programming in a published [STEM list](#). This list is akin to the traditional view of what counts as STEM. There has been interest across gubernatorial administrations and by the General Assembly in STEM over the years. A few examples are noted below. Governor Youngkin is currently developing a [College Partnership Laboratory Schools](#) initiative ([Chapter 19.1 in Virginia code](#)) with a strong focus on STEM educational and career preparation. In 2019, the Northam administration established the STEM Commission through an [Executive Order](#). This commission is tasked with creating a STEM plan and fostering collaboration between stakeholders in the state with an interest in STEM. The code of Virginia through the [Top Jobs Act of 2011](#) established a goal to, "secure a leading economic position for the Commonwealth through increased research and instruction in STEM and related fields that require qualified faculty, appropriate research facilities and equipment, public-private and intergovernmental collaboration, and sustained state support."

What Historically Counts as STEM in Virginia?

Traditionally the STEM workforce has been understood as comprising occupations specialized in Science or Engineering (S&E) and requiring at least a bachelor's degree but frequently at a masters or doctorate degree level. These occupations have predominantly fallen within one of five major occupational groups including computer and mathematical scientists, biological, agricultural, and environmental life scientists, physical scientists, social scientists, and engineers. This narrower more traditional understanding of the STEM workforce has many times precluded a wide array of roles in healthcare, technicians and technologists in multiple industries, and also the managerial and science and engineering-related roles that support the STEM world of work.

However, in recent years, the National Science Board, National Science Foundation and others have begun to broaden their understanding of the STEM workforce to include those occupations that actively utilize a STEM skill-set. (Chen and Rotermund, 2020; NSB NSF, 2021) This new basis of understanding what it means to be a STEM worker expands the STEM profile to include Science and Engineering-related occupations (S&E related) – jobs requiring science and technology expertise but not part of a traditionally recognized STEM role as well as the Skilled Technical Workforce (STW), those workers employed in STEM middle-skills occupations that do not require a four-year degree.

The Case to Broaden the Definition of the STEM Workforce in Virginia

The STEM workforce is an important part of today's technologically advanced economy. New developments and discoveries in science and technology have begun to challenge the traditional framework used to narrowly define what counts as a STEM worker. Innovative technologies like automation and artificial intelligence are changing and improving jobs and work activities and, in some cases, requiring more STEM oriented skillsets and knowledge from workers. The use of these technologies has begun to reshape traditional ideas about what it means to be identified as a STEM worker. As the types of workers using STEM knowledge and skills in their day-to-day activity changes, so must the way we define and measure the STEM workforce.

As noted above, traditional ideas of what counts as a STEM occupation have centered on a job role that requires a bachelor's degree or higher in S&E occupations. These occupations remain important and should continue to be viewed as a part of the STEM Workforce Profile. However, in this report, we are recommending that Virginia broaden the definition of STEM workers to include those working in science and engineering related occupations (S&E Related) as well as the middle-skilled technicians and tradesmen in what is referred to as the Skilled Technical Workforce (STW). This modification in definition of the STEM workforce would add both workers with a bachelor's degree and higher and workers without a bachelor's degree that regularly use STEM knowledge and skills as they perform their job duties. The inclusion of STW in an expanded STEM workforce definition is particularly important as it recognizes the changing nature of jobs and the ability of the workforce to adapt to new technologies and processes as they change.

Support for the inclusion of STW within STEM is provided by the National Science Board (NSB) and NSF's inclusion of STW workers based a methodology initially employed by the National Academies of Sciences, Engineering, and Medicine (NASEM) to identify middle-skills occupations (NASEM 2017). This methodology emerged out of a skills-based data set of self-reported information provided by workers on the extent to which they rely on STEM knowledge domains in performing their work. In the end, workers in STW defined as STEM workers scored highly in selected STEM knowledge domains like biology, engineering and technology, and computers and electronics, among others. Of note, more than 50% of the workers responding did not have a bachelor's degree (NSB, NSF 2021).

The shift to include more workers including trades and skilled workers is in line with the national conversation around STEM. Similar proposals to expand the definition of STEM occupations have been put forward by the National Science Foundation, National Academies of Sciences, Engineering, and Medicine (NAEM), the National Science Board (NSB) and the National Center for Science Engineering and Statistics (NCSES) among others (NSB, NSF 2021; NAEM 2017; NSB 2015, 2019; NCSES, 2020).

In addition, NSF NSB's inclusion of S&E-related occupations in their new STEM taxonomy emerges from respondent data from two survey instruments: the National Center for Science and Engineering Statistics (NSES) National Survey of College Graduates (NSCG) and the Survey of Doctorate Recipients (SDR). These survey results provided detailed data validating an active use of STEM skillsets in respondents' job roles. These roles included occupations with a bachelor's degree or higher in S&E and S&E-related occupations as well as those with S&E and S&E-related degrees including those in the workforce with science, engineering, or health (SEH) research doctorates, respectively (NCSES 2021a, 2021b, 2021c).

released report on the STEM labor force presented a highly aligned STEM definition that was inclusive, current in its thinking, and strongly aligned to the STEM worker categories already identified by the subcommittee in its goals for the project. Because of this, the NSB/NSF occupational taxonomy was utilized as the base occupational structure from which to develop a new Virginia-centric STEM worker profile. Following the NSB/NSF grouping of all STEM workers into three major groups – science and engineering, science and engineering-related, and skilled technical workers, VOOE created an occupational list following this grouping scheme at the standard occupational classification's (SOC) six-digit level of specificity. This list was vetted with Subcommittee members and recommended individuals within K12, SCHEV and select members of the community. That process identified gaps in the NSB/NSF profile in occupational areas including commercial transportation, teaching roles within K12, healthcare clinical support jobs and conservation and funerary sciences. VOOE shared and presented this work at two full meetings of the STEM Education Advisory Board that were scheduled in Summer and Fall 2022 respectively. Table 1 provides a list of the 18 occupations recommended to be added to the NSB/NSF framework for Virginia.

Methodology

This project was guided by the STEM Education Advisory Board's position that a more modern understanding of the STEM workforce was needed for guiding future education and policy decisions within Virginia. To that end, VOOE's analysis set out to develop a new definition of Virginia STEM occupations that would be more representative of the broader array of workers that actively utilize a STEM skillset as part of the current STEM world of work. In discussions with the full Advisory Board and the Occupations Subcommittee, the following five major occupational groups were identified and determined as being part of a more inclusive STEM workforce profile.

1. The Traditionally Defined High Skilled STEM Workforce (bachelor's degree or higher)
2. Healthcare Workers (Including sub-baccalaureate)
3. STEM-related Education and Teaching Occupations (minimum of bachelor's degree)
4. Technician and Production Occupations Including Skilled Trades Apprenticeship (Predominantly associates and sub-associates' level)
5. Occupations managing and supporting the STEM ecosystem of work (All education levels)

Upon agreement on these five STEM worker categories, VOOE in partnership with the STEM Education Advisory Board's Occupations Subcommittee began a process to review other established STEM profiles that could serve as a model for this project. As part of that review process, the National Science Board (NSB) and National Science Foundation's (NSF) recently

TABLE 1. OCCUPATIONS RECOMMENDED FOR ADDITION TO NSB/NSF STEM FRAMEWORK

SOC	Major Group Name	Occupation
25-2022	Educational Instruction and Library	Middle School Teachers, Except Special and CTE
25-2031	Educational Instruction and Library	Secondary School Teachers, Except Special and CTE
25-4013	Educational Instruction and Library	Museum Technicians and Conservators
31-1121	Healthcare Support	Home Health Aides
31-1122	Healthcare Support	Personal Care Aides
31-1131	Healthcare Support	Nursing Assistants
31-1133	Healthcare Support	Psychiatric Aides
31-2011	Healthcare Support	Occupational Therapy Assistants
31-2012	Healthcare Support	Occupational Therapy Aides
31-2021	Healthcare Support	Physical Therapist Assistants
31-2022	Healthcare Support	Physical Therapist Aides
31-9011	Healthcare Support	Massage Therapists
39-4011	Personal Care and Service Operations	Embalmers
39-4012	Personal Care and Service Operations	Crematory Operators
53-2011	Transportation and Material Moving	Airline Pilots, Copilots, and Flight Engineers
53-2012	Transportation and Material Moving	Commercial Pilots
53-2021	Transportation and Material Moving	Air Traffic Controllers
53-2022	Transportation and Material Moving	Airfield Operations Specialists

Limitations

The timeline available to conduct this analysis was limited to approximately 2.5 months. The limited time factor steered the project team to rely on reviews of existing literature and emerging studies on the modern STEM workforce including a strong use of NSB/NSF reports. These references were further augmented by input from The STEM Education Advisory Board and their affiliated members throughout several project review meetings. The intent of this report and the accompanying analysis via the linked the data file is to provide an expanded baseline definition that other agencies may use to explore and further refine to better represent the STEM world of work within Virginia.

Data Used to Conduct Analysis

An initial list of STEM SOC at the detail level was created referencing Table SLBR-1 within NSB/NSF documentation (National Science Board, National Science Foundation. 2021). Labor market data and O*NET occupational attributes for detail level STEM SOC were sourced from Lightcast's 2022.3 dataset. Data sources used for analysis within Lightcast's dataset include: QCEW – 2021 Q4, OES – 2021, BLS Employment Projections – 2020-20230, Census ACS – 2020 and Census QWI – 2022 Q2.

New Expanded STEM Workforce Profile

With the addition of the 18 occupations in Table 1, along with Science and Engineering-related fields and the Skilled Technical Workforce, the proposed STEM Workforce Profile expands considerably from approximately 72 science and engineering occupations to 342 occupations categorized between Science and Engineering, Science and Engineering-related and Skilled Technical Workforce. A review of Tables 2 and 3 illustrates the significant expansion of occupations from the traditional STEM definition and the expanded definition in the new STEM Workforce Profile.

TABLE 2.

Previous Traditional STEM Understanding and SOC Family Representation	
Traditional STEM (S&E) as % of Total SOC Families	21%
Traditional STEM (S&E) as % of Total SOC	9%

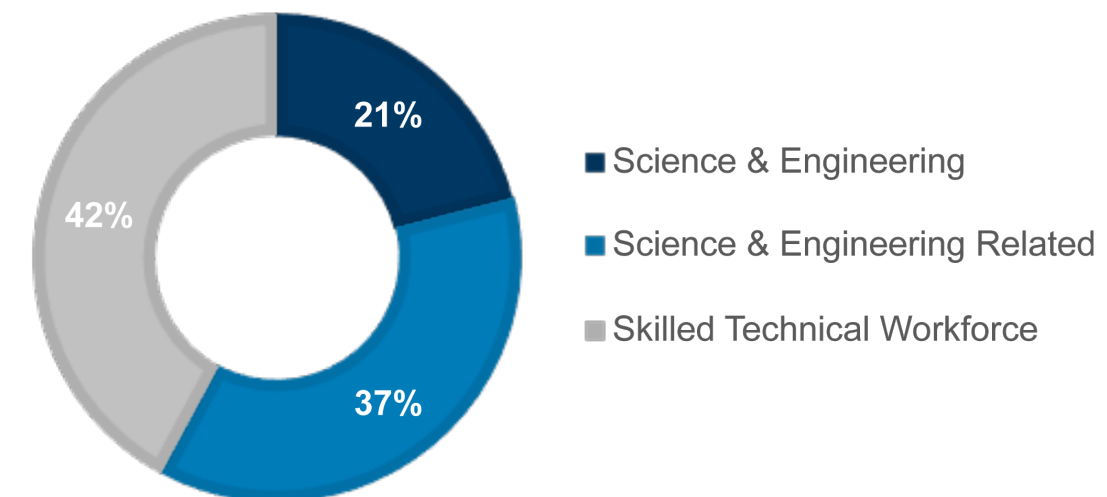
TABLE 3. NEW STEM WORKFORCE PROFILE COMPARED TO ALL OCCUPATIONS

SOC Groupings	SOC Count	% of Total SOC	New STEM Workforce Profile
S&E Related	126	16%	
STW	144	18%	
S&E	72	9%	
Non-STEM aligned	456	57%	
Total BLS SOC*	798	100%	

*The Standard Occupation Codes used in this analysis are limited to the 798 for which data is available through Lightcast. Lightcast's SOC framework closely follows Occupational Employment and Wage Statistics. Details are available here: <https://kb.emsidata.com/methodology/emsi-soc/>

The proposed STEM Workforce Profile in Table 3 represents 43% of BLS SOC occupations within the Virginia workforce. This expansion represents a 375% growth in occupations contained in the new profile compared to the previous traditional definition which represented only 9% of occupations in the state. Figure 1 illustrates a graphical comparison of relative size of the three new STEM Workforce Profile groupings.

FIGURE 1. PERCENT BREAKDOWN OF NEW STEM WORKFORCE PROFILE BY WORKER GROUP



Occupational Family (SOC Major Group) Representation

The traditional STEM workforce definition aligns directly to science and engineering related occupations representing five major occupational families out of 23 recognized within the SOC system. The expansion of occupations within the new STEM Workforce Profile extends those five to 17 occupational families. Table 4 provides a breakdown of representation from each SOC family by the three STEM worker groups with the percent of STEM occupations represented in the proposed profile indicated.

TABLE 4. STEM WORKFORCE PROFILE % REPRESENTATION BY 2-DIGIT SOC FAMILY

SOC Family	S&E	S&E Related	STW	% SOC Family Represented in Taxonomy
15-Computer and Mathematical	90%	10%	0%	100%
17-Architecture and Engineering	50%	50%	0%	100%
29-Healthcare Practitioners and Technical	0%	100%	0%	100%
19-Life, Physical, and Social Science	69%	29%	0%	98%
31-Healthcare Support	0%	47%	47%	94%
49-Installation, Maintenance, and Repair	0%	0%	76%	76%
51-Production	0%	0%	56%	56%
47-Construction and Extraction	0%	0%	33%	33%
25-Educational Instruction and Library	0%	18%	0%	18%
11-Management	0%	11%	5%	16%
53-Transportation and Material Moving	0%	6%	10%	16%
27-Arts, Design, Entertainment, Sports, and Media	0%	0%	12%	12%
13-Business and Financial Operations	3%	0%	6%	9%
41-Sales and Related	5%	5%	0%	10%
35-Food Preparation and Serving Related	0%	0%	6%	6%
39-Personal Care and Service	0%	0%	6%	6%
33-Protective Service	0%	0%	4%	4%
21-Community and Social Service	0%	0%	0%	0%
23-Legal	0%	0%	0%	0%
37-Building and Grounds Cleaning and Maintenance	0%	0%	0%	0%
43-Office and Administrative Support	0%	0%	0%	0%
45-Farming, Fishing, and Forestry	0%	0%	0%	0%
55-Military-only occupations	0%	0%	0%	0%
99-Unclassified Occupation	0%	0%	0%	0%

**~100%
Representation**



Institute for Advanced Learning and Research (IALR), Danville

Using the US Dept. of Labor's Occupational Information Network (O*NET) database, occupations within each of the three STEM groups are aggregated below by STEM worker group and categorized as follows:

- Figure 2., education level reported as necessary to perform job tasks; and
- Figure 3., the types of on-the-job training most frequently reported as provided by employers to workers employed in these occupations.

FIGURE 2.
Typical Entry-Level Education, by Count of Occupation

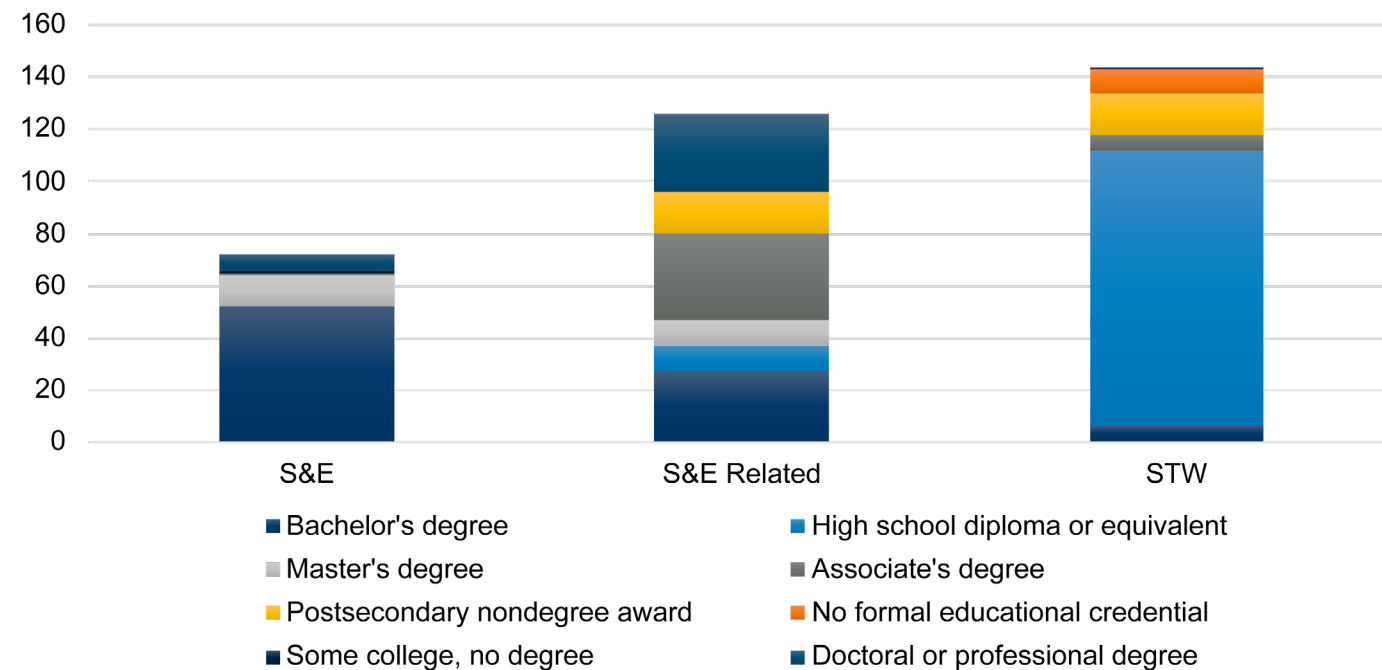
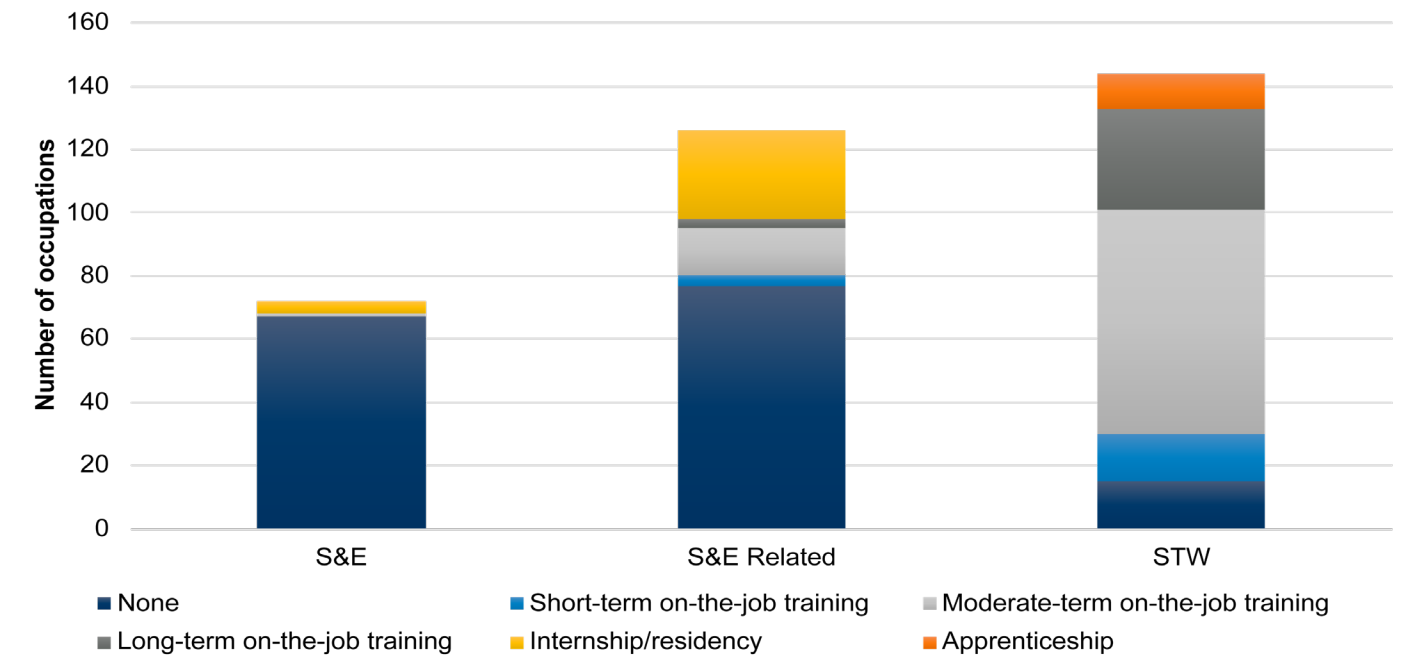


FIGURE 3.
Typical On-the-Job training, by STEM Group



Based on O*NET data, S&E occupations report some use of internships and residencies, but very little reported on the job training in comparison to STW and S&E-related workers.

S&E-related occupations are more evenly distributed across categories of entry-level education required to perform job tasks. Most occupations in this profile range between associates to post-baccalaureate education. Internships, residencies and moderate on the job training are the primary reported forms of on-the-job-training (OJT).

Occupations within the STW workforce profile require the least formal education of the three STEM workforce groupings with most occupations requiring no more than a high school diploma to perform job tasks. OJT is the most varied out of the three STEM groups with STW workers requiring moderate to long term OJT. STW is the primary STEM worker group utilizing apprenticeships.

Career Clusters Representation in the STEM Workforce Profiles

The STEM Education Advisory Board members expressed interest in understanding how the occupations represented in the new STEM Workforce Profile relate to the recognized career cluster framework. There are 16 Career Clusters in the National Career Clusters Framework, representing 79 Career Pathways to help learners navigate their way to greater success in college and career (<https://careertech.org/career-clusters>). Virginia has augmented the 16 clusters in the framework with a 17th cluster defined around the energy jobs within the state. Table 5 categorizes the percent of SOC representation in the New STEM Workforce Profile relative to each of the 17 career clusters. All career clusters are represented in the STEM Workforce Profile. It should be noted that an individual SOC may have membership in more than one cluster. The blue highlighted rows in Table 5 represent the career clusters with the most representation from the New STEM Workforce Profile in terms of SOC.

TABLE 5. STEM WORKFORCE PROFILE OCCUPATION COUNTS (SOC) BASED ON THE NATIONAL CAREER CLUSTER FRAMEWORK

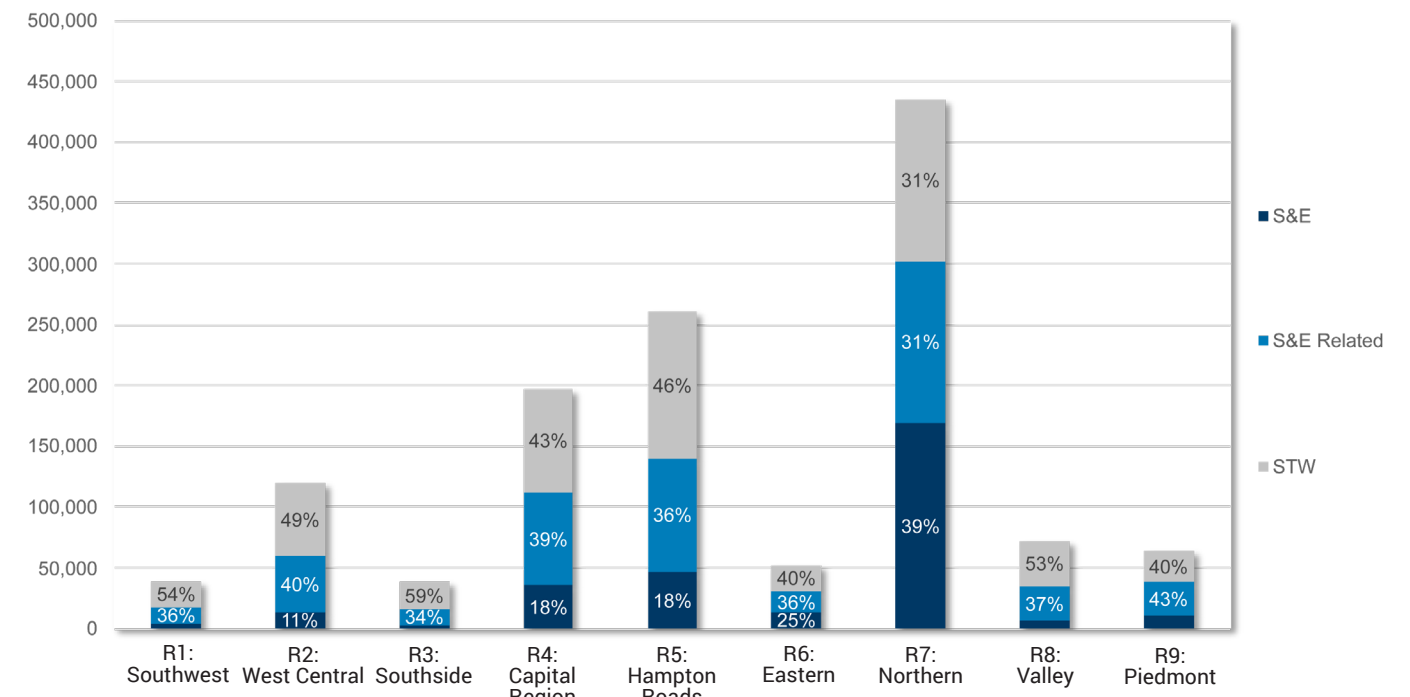
Career Cluster	Total SOC in Career Cluster	SOC in STEM Workforce Profile	Percent Representation in STEM Profile
Agriculture, Food & Natural Resources	41	20	49%
Architecture & Construction	88	35	40%
Arts, Audio/Video Technology & Communications	45	8	18%
Business Management & Administration	62	6	10%
Education & Training	36	5	14%
Energy*	12	8	67%
Finance	25	1	4%
Government & Public Administration	19	9	47%
Health Science	93	91	98%
Hospitality & Tourism	45	1	2%
Human Services	45	7	16%
Information Technology	20	18	90%
Law, Public Safety, Corrections & Security	38	4	11%
Manufacturing	133	87	65%
Marketing	29	2	7%
Science, Technology, Engineering & Mathematics	49	48	98%
Transportation, Distribution & Logistics	64	18	28%

*The Energy career cluster is a Virginia specific addition to the 16 career clusters defined within the National Career Cluster Framework.

Regional Perspectives on the New STEM Workforce Profile

VOEE conducted a comparison of each of the three STEM worker groups across the nine Go Virginia regions. Figure 4 presents a relative comparison of the new STEM Workforce Profiles by the three STEM worker groups across each Go Virginia region.

FIGURE 4. 2022 Jobs by Region, Occupational Group



As an augmentation to this report, VOEE has provided an interactive spreadsheet that allows the user to filter on a variety of metrics by Go Virginia regions. These include Virginia specific location quotient for analysis of STEM worker concentrations by region compared to state level concentrations, projected job change, and top occupational rankings by using these filters. **It is downloadable here:** <https://voee.org/data/>. Please refer to these data for further regional analysis of the STEM Workforce Profile and the accompanying PowerPoint highlighting data and analysis used to create this report.

Statewide Projected Job Change within the STEM Workforce Profile

Using Lightcast's 2022.3 dataset, VOEE analyzed projected five-year job change within each of the three STEM worker groups to rank the top 15 occupations based on the largest projected job change at the state level. Tables 6 -8 present those rankings.

TABLE 6. SCIENCE AND ENGINEERING OCCUPATIONS WITH MOST PROJECTED JOB CHANGE - STATE LEVEL

Rank	SOC	SOC Name	2022 - 2027 Change
1	15-1252	Software Developers	7,758
2	15-1212	Information Security Analysts	1,982
3	15-1232	Computer User Support Specialists	1,198
4	15-1253	Software Quality Assurance Analysts and Testers	1,041
5	13-1081	Logisticians	977
6	15-1299	Computer Occupations, All Other	964
7	15-1211	Computer Systems Analysts	606
8	15-2031	Operations Research Analysts	602
9	15-2051	Data Scientists	553
10	17-2112	Industrial Engineers	453
11	19-1042	Medical Scientists, Except Epidemiologists	264
12	15-1254	Web Developers	256
13	15-1255	Web and Digital Interface Designers	239
14	15-1221	Computer and Information Research Scientists	235
15	17-2051	Civil Engineers	228

TABLE 7. SCIENCE AND ENGINEERING-RELATED OCCUPATIONS WITH MOST PROJECTED JOBS CHANGE – STATE LEVEL

Rank	SOC	SOC Name	2022-2027 Change
1	29-1141	Registered Nurses	2,474
2	25-1099	Postsecondary Teachers	2,284
3	29-1171	Nurse Practitioners	1,632
4	31-9092	Medical Assistants	1,557
5	11-9111	Medical and Health Services Managers	1,433
6	25-2031	Secondary School Teachers, Except Special and Career/Technical Education	827
7	11-3021	Computer and Information Systems Managers	826
8	29-2061	Licensed Practical and Licensed Vocational Nurses	813
9	29-1123	Physical Therapists	604
10	29-1071	Physician Assistants	581
11	31-9091	Dental Assistants	575
12	25-2022	Middle School Teachers, Except Special and Career/Technical Education	464
13	29-1127	Speech-Language Pathologists	443
14	41-4011	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	431
15	29-2018	Clinical Laboratory Technologists and Technicians	406

TABLE 8. STW OCCUPATIONS WITH MOST PROJECTED JOB CHANGE - STATE LEVEL

Rank	SOC	SOC Name	2022-2027 Change
1	31-1128	Home Health and Personal Care Aides	11,761
2	49-9071	Maintenance and Repair Workers, General	1,551
3	47-2111	Electricians	1,285
4	31-1131	Nursing Assistants	1,100
5	49-9041	Industrial Machinery Mechanics	840
6	51-1011	First-Line Supervisors of Production and Operating Workers	568
7	31-9011	Massage Therapists	559
8	31-2021	Physical Therapist Assistants	459
9	51-2028	Electrical, Electronic, and Electromechanical Assemblers, Except Coil Winders, Tapers, and Finishers	410
10	35-1011	Chefs and Head Cooks	329
11	27-4021	Photographers	323
12	51-4041	Machinists	319
13	51-9199	Production Workers, All Other	296
14	51-4121	Welders, Cutters, Solderers, and Brazers	289
15	33-2011	Firefighters	285

Summary

The expanded STEM Workforce Profile presented in this report represents a much broader and inclusive definition of occupations utilizing a STEM skillset in performing their job roles than previous definitions. As already noted, the shift to recognize more occupations within the formal definition of the STEM workforce is aligned with the national conversation around how to better understand and recognize the broader STEM world of work. Aligning Virginia's definition of STEM with this current thinking more accurately reflects the realities of the broader use of science and engineering infused skillsets by 21st century workers spanning multiple industries and changing work environments. For these reasons, VOEE supports the adoption of the broader workforce profile proposed in this report by Virginia.

VOEE recognizes that the proposed profile could further benefit from the creation of subcategories based on characteristics within each of the three STEM worker groups. Increasing granularity to the worker groups would serve to further refine the overall workforce profile and likely provide opportunity for additional analysis including incorporating the measurement of in-demand skills requested by regional employers for these more specific subgroups of STEM workers. The intent of this report and the accompanying analysis via the supplemental data file is to provide a baseline perspective on STEM that other interested agencies and groups within the Commonwealth may build upon and reference as part of future work and analysis related to better representing and understanding the STEM workforce and its importance to Virginia, its industries, and residents. To that end, the authors' hope this report has positively contributed.

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Appendix: SOC Lists by STEM Grouping

Download a full list of Workforce Profile STEM occupations [by clicking here:](https://voee.org/data/)

<https://voee.org/data/>

Science & Engineering (S&E)

SOC	Major Group Name	Occupation Type	Occupation
13-1081	Business and Financial Operations	Business Operations Specialists	Logisticians
15-1211	Computer and Mathematical	Computer Occupations	Computer Systems Analysts
15-1212	Computer and Mathematical	Computer Occupations	Information Security Analysts
15-1221	Computer and Mathematical	Computer Occupations	Computer and Information Research Scientists
15-1231	Computer and Mathematical	Computer Occupations	Computer Network Support Specialists
15-1232	Computer and Mathematical	Computer Occupations	Computer User Support Specialists
15-1241	Computer and Mathematical	Computer Occupations	Computer Network Architects
15-1242	Computer and Mathematical	Computer Occupations	Database Administrators
15-1243	Computer and Mathematical	Computer Occupations	Database Architects
15-1244	Computer and Mathematical	Computer Occupations	Network and Computer Systems Administrators
15-1252	Computer and Mathematical	Computer Occupations	Software Developers
15-1253	Computer and Mathematical	Computer Occupations	Software Quality Assurance Analysts and Testers
15-1254	Computer and Mathematical	Computer Occupations	Web Developers
15-1255	Computer and Mathematical	Computer Occupations	Web and Digital Interface Designers
15-1299	Computer and Mathematical	Computer Occupations	Computer Occupations, All Other
15-2021	Computer and Mathematical	Mathematical Science Occupations	Mathematicians
15-2031	Computer and Mathematical	Mathematical Science Occupations	Operations Research Analysts
15-2041	Computer and Mathematical	Mathematical Science Occupations	Statisticians
15-2051	Computer and Mathematical	Mathematical Science Occupations	Data Scientists
15-2099	Computer and Mathematical	Mathematical Science Occupations	Mathematical Science Occupations, All Other
17-2011	Architecture and Engineering	Engineers	Aerospace Engineers
17-2021	Architecture and Engineering	Engineers	Agricultural Engineers
17-2031	Architecture and Engineering	Engineers	Bioengineers and Biomedical Engineers
17-2041	Architecture and Engineering	Engineers	Chemical Engineers
17-2051	Architecture and Engineering	Engineers	Civil Engineers
17-2061	Architecture and Engineering	Engineers	Computer Hardware Engineers
17-2071	Architecture and Engineering	Engineers	Electrical Engineers
17-2072	Architecture and Engineering	Engineers	Electronics Engineers, Except Computer
17-2081	Architecture and Engineering	Engineers	Environmental Engineers
17-2111	Architecture and Engineering	Engineers	Health and Safety Engineers, Except Mining Safety Engineers and Inspectors
17-2112	Architecture and Engineering	Engineers	Industrial Engineers
17-2121	Architecture and Engineering	Engineers	Marine Engineers and Naval Architects
17-2131	Architecture and Engineering	Engineers	Materials Engineers
17-2141	Architecture and Engineering	Engineers	Mechanical Engineers
17-2151	Architecture and Engineering	Engineers	Mining and Geological Engineers, Including Mining Safety Engineers
17-2161	Architecture and Engineering	Engineers	Nuclear Engineers
17-2171	Architecture and Engineering	Engineers	Petroleum Engineers
17-2199	Architecture and Engineering	Engineers	Engineers, All Other

Science & Engineering (S&E) *continued*

SOC	Major Group Name	Occupation Type	Occupation
19-1011	Life, Physical and Social Science	Life Scientists	Animal Scientists
19-1012	Life, Physical and Social Science	Life Scientists	Food Scientists and Technologists
19-1013	Life, Physical and Social Science	Life Scientists	Soil and Plant Scientists
19-1021	Life, Physical and Social Science	Life Scientists	Biochemists and Biophysicists
19-1022	Life, Physical and Social Science	Life Scientists	Microbiologists
19-1023	Life, Physical and Social Science	Life Scientists	Zoologists and Wildlife Biologists
19-1029	Life, Physical and Social Science	Life Scientists	Biological Scientists, All Other
19-1031	Life, Physical and Social Science	Life Scientists	Conservation Scientists
19-1032	Life, Physical and Social Science	Life Scientists	Foresters
19-1041	Life, Physical and Social Science	Life Scientists	Epidemiologists
19-1042	Life, Physical and Social Science	Life Scientists	Medical Scientists, Except Epidemiologists
19-1099	Life, Physical and Social Science	Life Scientists	Life Scientists, All Other
19-2011	Life, Physical and Social Science	Physcial Scientists	Astronomers
19-2012	Life, Physical and Social Science	Physcial Scientists	Physicists
19-2021	Life, Physical and Social Science	Physcial Scientists	Atmospheric and Space Scientists
19-2031	Life, Physical and Social Science	Physcial Scientists	Chemists
19-2032	Life, Physical and Social Science	Physcial Scientists	Materials Scientists
19-2041	Life, Physical and Social Science	Physcial Scientists	Environmental Scientists and Specialists, Including Health
19-2042	Life, Physical and Social Science	Physcial Scientists	Geoscientists, Except Hydrologists and Geographers
19-2043	Life, Physical and Social Science	Physcial Scientists	Hydrologists
19-2099	Life, Physical and Social Science	Physcial Scientists	Physical Scientists, All Other
19-3011	Life, Physical and Social Science	Social Scientists and Related Workers	Economists
19-3022	Life, Physical and Social Science	Social Scientists and Related Workers	Survey Researchers
19-3032	Life, Physical and Social Science	Social Scientists and Related Workers	Industrial-Organizational Psychologists
19-3033	Life, Physical and Social Science	Social Scientists and Related Workers	Clinical and Counseling Psychologists
19-3034	Life, Physical and Social Science	Social Scientists and Related Workers	School Psychologists
19-3039	Life, Physical and Social Science	Social Scientists and Related Workers	Psychologists, All Other
19-3041	Life, Physical and Social Science	Social Scientists and Related Workers	Sociologists
19-3051	Life, Physical and Social Science	Social Scientists and Related Workers	Urban and Regional Planners
19-3091	Life, Physical and Social Science	Social Scientists and Related Workers	Anthropologists and Archeologists
19-3092	Life, Physical and Social Science	Social Scientists and Related Workers	Geographers
19-3094	Life, Physical and Social Science	Social Scientists and Related Workers	Political Scientists
19-3099	Life, Physical and Social Science	Social Scientists and Related Workers	Social Scientists and Related Workers, All Other
41-9031	Sales and Related	Sales	Sales Engineers

Science & Engineering-related

SOC	Major Grp Name	Occupation Types	Occupation
11-3021	Management	Operations Specialties Managers	Computer and Information Systems Managers
11-9041	Management	Other Management Occupations	Architectural and Engineering Managers
11-9111	Management	Other Management Occupations	Medical and Health Services Managers
11-9121	Management	Other Management Occupations	Natural Sciences Managers
15-1251	Computer and Mathematical	Computer Occupations	Computer Programmers
15-2011	Computer and Mathematical	Mathematical Science Occupations	Actuaries
17-1011	Architecture and Engineering	Architects, Surveyors and Cartographers	Architects, Except Landscape and Naval
17-1012	Architecture and Engineering	Architects, Surveyors and Cartographers	Landscape Architects
17-1021	Architecture and Engineering	Architects, Surveyors and Cartographers	Cartographers and Photogrammetrists
17-1022	Architecture and Engineering	Architects, Surveyors and Cartographers	Surveyors
17-3011	Architecture and Engineering	Drafters, Engineering Technicians, and Mapping Technicians	Architectural and Civil Drafters
17-3012	Architecture and Engineering	Drafters, Engineering Technicians, and Mapping Technicians	Electrical and Electronics Drafters
17-3013	Architecture and Engineering	Drafters, Engineering Technicians, and Mapping Technicians	Mechanical Drafters
17-3019	Architecture and Engineering	Drafters, Engineering Technicians, and Mapping Technicians	Drafters, All Other
17-3021	Architecture and Engineering	Drafters, Engineering Technicians, and Mapping Technicians	Aerospace Engineering and Operations Technologists and Technicians
17-3022	Architecture and Engineering	Drafters, Engineering Technicians, and Mapping Technicians	Civil Engineering Technologists and Technicians
17-3023	Architecture and Engineering	Drafters, Engineering Technicians, and Mapping Technicians	Electrical and Electronic Engineering Technologists and Technicians
17-3024	Architecture and Engineering	Drafters, Engineering Technicians, and Mapping Technicians	Electro-Mechanical and Mechatronics Technologists and Technicians
17-3025	Architecture and Engineering	Drafters, Engineering Technicians, and Mapping Technicians	Environmental Engineering Technologists and Technicians
17-3026	Architecture and Engineering	Drafters, Engineering Technicians, and Mapping Technicians	Industrial Engineering Technologists and Technicians
17-3027	Architecture and Engineering	Drafters, Engineering Technicians, and Mapping Technicians	Mechanical Engineering Technologists and Technicians
17-3028	Architecture and Engineering	Drafters, Engineering Technicians, and Mapping Technicians	Calibration Technologists and Technicians
17-3029	Architecture and Engineering	Drafters, Engineering Technicians, and Mapping Technicians	Engineering Technologists and Technicians, Except Drafters, All Other
17-3031	Architecture and Engineering	Drafters, Engineering Technicians, and Mapping Technicians	Surveying and Mapping Technicians
19-4012	Life, Physical and Social Science	Life, Physical, and Social Science Technicians	Agricultural Technicians
19-4013	Life, Physical and Social Science	Life, Physical, and Social Science Technicians	Food Science Technicians
19-4021	Life, Physical and Social Science	Life, Physical, and Social Science Technicians	Biological Technicians
19-4031	Life, Physical and Social Science	Life, Physical, and Social Science Technicians	Chemical Technicians
19-4042	Life, Physical and Social Science	Life, Physical, and Social Science Technicians	Environmental Science and Protection Technicians, Including Health
19-4043	Life, Physical and Social Science	Life, Physical, and Social Science Technicians	Geological Technicians, Except Hydrologic Technicians
19-4044	Life, Physical and Social Science	Life, Physical, and Social Science Technicians	Hydrologic Technicians
19-4051	Life, Physical and Social Science	Life, Physical, and Social Science Technicians	Nuclear Technicians
19-4061	Life, Physical and Social Science	Life, Physical, and Social Science Technicians	Social Science Research Assistants
19-4071	Life, Physical and Social Science	Life, Physical, and Social Science Technicians	Forest and Conservation Technicians
19-4092	Life, Physical and Social Science	Life, Physical, and Social Science Technicians	Forensic Science Technicians
19-4099	Life, Physical and Social Science	Life, Physical, and Social Science Technicians	Life, Physical, and Social Science Technicians, All Other
19-5011	Life, Physical and Social Science	Occupational Health and Safety Specialists and Technicians	Occupational Health and Safety Specialists
19-5012	Life, Physical and Social Science	Occupational Health and Safety Specialists and Technicians	Occupational Health and Safety Technicians
25-1099	Educational Instruction and Library	Postsecondary Teaching	Postsecondary Teachers

Science & Engineering-related *continued*

SOC	Major Grp Name	Occupation Types	Occupation
25-2022	Educational Instruction and Library	Preschool, Elementary, Middle, Secondary, and Special Education Teachers	Middle School Teachers, Except Special and Career/Technical Education
25-2031	Educational Instruction and Library	Preschool, Elementary, Middle, Secondary, and Special Education Teachers	Secondary School Teachers, Except Special and Career/Technical Education
25-2032	Educational Instruction and Library	Preschool, Elementary, Middle, Secondary, and Special Education Teachers	Career/Technical Education Teachers, Secondary School
25-4013	Educational Instruction and Library	Librarians, Curators, and Archivists	Museum Technicians and Conservators
29-1011	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	Chiropractors
29-1021	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	Dentists, General
29-1022	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	Oral and Maxillofacial Surgeons
29-1023	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	Orthodontists
29-1024	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	Prosthodontists
29-1029	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	Dentists, All Other Specialists
29-1031	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	Dietitians and Nutritionists
29-1041	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	Optometrists
29-1051	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	Pharmacists
29-1071	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	Physician Assistants
29-1081	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	Podiatrists
29-1122	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	Occupational Therapists
29-1123	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	Physical Therapists
29-1124	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	Radiation Therapists
29-1125	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	Recreational Therapists
29-1126	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	Respiratory Therapists
29-1127	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	Speech-Language Pathologists
29-1128	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	Exercise Physiologists
29-1129	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	Therapists, All Other
29-1131	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	Veterinarians
29-1141	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	Registered Nurses
29-1151	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	Nurse Anesthetists
29-1161	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	Nurse Midwives
29-1171	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	Nurse Practitioners
29-1181	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	Audiologists

Science & Engineering-related *continued*

SOC	Major Grp Name	Occupation Types	Occupation
29-1211	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	Anesthesiologists
29-1212	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	Cardiologists
29-1213	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	Dermatologists
29-1214	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	Emergency Medicine Physicians
29-1215	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	Family Medicine Physicians
29-1216	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	General Internal Medicine Physicians
29-1217	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	Neurologists
29-1218	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	Obstetricians and Gynecologists
29-1221	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	Pediatricians, General
29-1222	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	Physicians, Pathologists
29-1223	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	Psychiatrists
29-1224	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	Radiologists
29-1229	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	Physicians, All Other
29-1241	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	Ophthalmologists, Except Pediatric
29-1242	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	Orthopedic Surgeons, Except Pediatric
29-1243	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	Pediatric Surgeons
29-1249	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	Surgeons, All Other
29-1291	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	Acupuncturists
29-1292	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	Dental Hygienists
29-1299	Healthcare Practitioners and Technical	Healthcare Diagnosing or Treating Practitioners	Healthcare Diagnosing or Treating Practitioners, All Other
29-2018	Healthcare Practitioners and Technical	Health Technologists and Technicians	Clinical Laboratory Technologists and Technicians
29-2031	Healthcare Practitioners and Technical	Health Technologists and Technicians	Cardiovascular Technologists and Technicians
29-2032	Healthcare Practitioners and Technical	Health Technologists and Technicians	Diagnostic Medical Sonographers
29-2033	Healthcare Practitioners and Technical	Health Technologists and Technicians	Nuclear Medicine Technologists
29-2034	Healthcare Practitioners and Technical	Health Technologists and Technicians	Radiologic Technologists and Technicians
29-2035	Healthcare Practitioners and Technical	Health Technologists and Technicians	Magnetic Resonance Imaging Technologists
29-2036	Healthcare Practitioners and Technical	Health Technologists and Technicians	Medical Dosimetrists
29-2042	Healthcare Practitioners and Technical	Health Technologists and Technicians	Emergency Medical Technicians
29-2043	Healthcare Practitioners and Technical	Health Technologists and Technicians	Paramedics
29-2051	Healthcare Practitioners and Technical	Health Technologists and Technicians	Dietetic Technicians
29-2052	Healthcare Practitioners and Technical	Health Technologists and Technicians	Pharmacy Technicians

Science & Engineering-related *continued*

SOC	Major Grp Name	Occupation Types	Occupation
29-2053	Healthcare Practitioners and Technical	Health Technologists and Technicians	Psychiatric Technicians
29-2055	Healthcare Practitioners and Technical	Health Technologists and Technicians	Surgical Technologists
29-2056	Healthcare Practitioners and Technical	Health Technologists and Technicians	Veterinary Technologists and Technicians
29-2057	Healthcare Practitioners and Technical	Health Technologists and Technicians	Ophthalmic Medical Technicians
29-2061	Healthcare Practitioners and Technical	Health Technologists and Technicians	Licensed Practical and Licensed Vocational Nurses
29-2072	Healthcare Practitioners and Technical	Health Technologists and Technicians	Medical Records Specialists
29-2081	Healthcare Practitioners and Technical	Health Technologists and Technicians	Opticians, Dispensing
29-2091	Healthcare Practitioners and Technical	Health Technologists and Technicians	Orthotists and Prosthetists
29-2092	Healthcare Practitioners and Technical	Health Technologists and Technicians	Hearing Aid Specialists
29-2099	Healthcare Practitioners and Technical	Health Technologists and Technicians	Health Technologists and Technicians, All Other
29-9021	Healthcare Practitioners and Technical	Other Healthcare Practitioners and Technical Occupations	Health Information Technologists and Medical Registrars
29-9091	Healthcare Practitioners and Technical	Other Healthcare Practitioners and Technical Occupations	Athletic Trainers
29-9092	Healthcare Practitioners and Technical	Other Healthcare Practitioners and Technical Occupations	Genetic Counselors
29-9093	Healthcare Practitioners and Technical	Other Healthcare Practitioners and Technical Occupations	Surgical Assistants
29-9099	Healthcare Practitioners and Technical	Other Healthcare Practitioners and Technical Occupations	Healthcare Practitioners and Technical Workers, All Other
31-9091	Healthcare Support	Other Healthcare Support Occupations	Dental Assistants
31-9092	Healthcare Support	Other Healthcare Support Occupations	Medical Assistants
31-9093	Healthcare Support	Other Healthcare Support Occupations	Medical Equipment Preparers
31-9094	Healthcare Support	Other Healthcare Support Occupations	Medical Transcriptionists
31-9095	Healthcare Support	Other Healthcare Support Occupations	Pharmacy Aides
31-9096	Healthcare Support	Other Healthcare Support Occupations	Veterinary Assistants and Laboratory Animal Caretakers
31-9097	Healthcare Support	Other Healthcare Support Occupations	Phlebotomists
31-9099	Healthcare Support	Other Healthcare Support Occupations	Healthcare Support Workers, All Other
41-4011	Sales and Related	Sales	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products
53-2011	Transportation and Material Moving Occupations	Air Transportation Workers	Airline Pilots, Copilots, and Flight Engineers
53-2012	Transportation and Material Moving Occupations	Air Transportation Workers	Commercial Pilots
53-2021	Transportation and Material Moving Occupations	Air Transportation Workers	Air Traffic Controllers

Skilled Technical Workforce (STW)

SOC	Major Grp Name	Occupation Types	Occupation
11-3051	Management	Operations Specialties Managers	Industrial Production Manager
11-9013	Management	Other Management Occupations	Farmers, Ranchers, and Other Agricultural Managers
13-2028	Business and Financial Operations Occupations	Financial Specialists	Property Appraisers and Assessors
13-2081	Business and Financial Operations Occupations	Financial Specialists	Tax Examiners and Collectors, and Revenue Agents
27-3042	Arts, Design, Entertainment, Sports, and Media Occupations	Media and Communication Workers	Technical Writers
27-4021	Arts, Design, Entertainment, Sports, and Media Occupations	Media and Communication Equipment Workers	Photographers
27-4031	Arts, Design, Entertainment, Sports, and Media Occupations	Media and Communication Equipment Workers	Camera Operators, Television, Video, and Film
27-4032	Arts, Design, Entertainment, Sports, and Media Occupations	Media and Communication Equipment Workers	Film and Video Editors
27-4099	Arts, Design, Entertainment, Sports, and Media Occupations	Media and Communication Workers	Media and Communication Equipment Workers, All Other
31-1128	Healthcare Support	Home Health and Personal Care Aides; and Nursing Assistants, Orderlies, and Psychiatric Aides	Home Health and Personal Care Aides
31-1131	Healthcare Support	Home Health and Personal Care Aides; and Nursing Assistants, Orderlies, and Psychiatric Aides	Nursing Assistants
31-1133	Healthcare Support	Home Health and Personal Care Aides; and Nursing Assistants, Orderlies, and Psychiatric Aides	Psychiatric Aides
31-2011	Healthcare Support	Occupational Therapy and Physical Therapist Assistants and Aides	Occupational Therapy Assistants
31-2012	Healthcare Support	Occupational Therapy and Physical Therapist Assistants and Aides	Occupational Therapy Aides
31-2021	Healthcare Support	Occupational Therapy and Physical Therapist Assistants and Aides	Physical Therapist Assistants
31-2022	Healthcare Support	Occupational Therapy and Physical Therapist Assistants and Aides	Physical Therapist Aides
31-9011	Healthcare Support	Occupational Therapy and Physical Therapist Assistants and Aides	Massage Therapists
33-2011	Protective Service Occupations	Firefighting and Prevention Workers	Firefighters
35-1011	Food Preparation and Serving Related Occupations	Supervisors of Food Preparation and Serving Workers	Chefs and Head Cooks
39-4011	Personal Care and Service Operations	Funeral Service Workers	Embalmers
39-4012	Personal Care and Service Operations	Funeral Service Workers	Crematory Operators
47-1011	Construction and Extraction	Supervisors of Construction and Extraction Workers	First-Line Supervisors of Construction Trades and Extraction Workers
47-2011	Construction and Extraction	Construction Trades Workers	Boilermakers
47-2021	Construction and Extraction	Construction Trades Workers	Brickmasons and Blockmasons
47-2022	Construction and Extraction	Construction Trades Workers	Stonemasons
47-2031	Construction and Extraction	Construction Trades Workers	Carpenters
47-2081	Construction and Extraction	Construction Trades Workers	Drywall and Ceiling Tile Installers
47-2111	Construction and Extraction	Construction Trades Workers	Electricians
47-2121	Construction and Extraction	Construction Trades Workers	Glaziers
47-2151	Construction and Extraction	Construction Trades Workers	Pipelayers
47-2152	Construction and Extraction	Construction Trades Workers	Plumbers, Pipefitters, and Steamfitters
47-2181	Construction and Extraction	Construction Trades Workers	Roofers
47-2221	Construction and Extraction	Construction Trades Workers	Structural Iron and Steel Workers
47-2231	Construction and Extraction	Construction Trades Workers	Solar Photovoltaic Installers
47-4011	Construction and Extraction	Other Construction Related Workers	Construction and Building Inspectors
47-4021	Construction and Extraction	Other Construction Related Workers	Elevator and Escalator Installers and Repairers
47-5011	Construction and Extraction	Extraction Workers	Derrick Operators, Oil and Gas
47-5012	Construction and Extraction	Extraction Workers	Rotary Drill Operators, Oil and Gas
47-5013	Construction and Extraction	Extraction Workers	Service Unit Operators, Oil and Gas
47-5022	Construction and Extraction	Extraction Workers	Excavating and Loading Machine and Dragline Operators, Surface Mining
47-5023	Construction and Extraction	Extraction Workers	Earth Drillers, Except Oil and Gas
49-1011	Installation, Maintenance and Repair	Supervisors of Installation, Maintenance, and Repair Workers	First-Line Supervisors of Mechanics, Installers, and Repairers
49-2011	Installation, Maintenance and Repair	Electrical and Electronic Equipment Mechanics, Installers, and Repairers	Computer, Automated Teller, and Office Machine Repairers
49-2021	Installation, Maintenance and Repair	Electrical and Electronic Equipment Mechanics, Installers, and Repairers	Radio, Cellular, and Tower Equipment Installers and Repairers
49-2022	Installation, Maintenance and Repair	Electrical and Electronic Equipment Mechanics, Installers, and Repairers	Telecommunications Equipment Installers and Repairers, Except Line Installers
49-2091	Installation, Maintenance and Repair	Electrical and Electronic Equipment Mechanics, Installers, and Repairers	Avionics Technicians
49-2092	Installation, Maintenance and Repair	Electrical and Electronic Equipment Mechanics, Installers, and Repairers	Electric Motor, Power Tool, and Related Repairers
49-2093	Installation, Maintenance and Repair	Electrical and Electronic Equipment Mechanics, Installers, and Repairers	Electrical and Electronics Installers and Repairers, Transportation Equipment
49-2094	Installation, Maintenance and Repair	Electrical and Electronic Equipment Mechanics, Installers, and Repairers	Electrical and Electronics Repairers, Commercial and Industrial Equipment
49-2095	Installation, Maintenance and Repair	Electrical and Electronic Equipment Mechanics, Installers, and Repairers	Electrical and Electronics Repairers, Powerhouse, Substation, and Relay
49-2096	Installation, Maintenance and Repair	Electrical and Electronic Equipment Mechanics, Installers, and Repairers	Electronic Equipment Installers and Repairers, Motor Vehicles

Skilled Technical Workforce (STW) *continued*

SOC	Major Grp Name	Occupation Types	Occupation
49-2097	Installation, Maintenance and Repair	Electrical and Electronic Equipment Mechanics, Installers, and Repairers	Audiovisual Equipment Installers and Repairers
49-2098	Installation, Maintenance and Repair	Electrical and Electronic Equipment Mechanics, Installers, and Repairers	Security and Fire Alarm Systems Installers
49-3011	Installation, Maintenance and Repair	Vehicle and Mobile Equipment Mechanics, Installers, and Repairers	Aircraft Mechanics and Service Technicians
49-3023	Installation, Maintenance and Repair	Vehicle and Mobile Equipment Mechanics, Installers, and Repairers	Automotive Service Technicians and Mechanics
49-3031	Installation, Maintenance and Repair	Vehicle and Mobile Equipment Mechanics, Installers, and Repairers	Bus and Truck Mechanics and Diesel Engine Specialists
49-3041	Installation, Maintenance and Repair	Vehicle and Mobile Equipment Mechanics, Installers, and Repairers	Farm Equipment Mechanics and Service Technicians
49-3042	Installation, Maintenance and Repair	Vehicle and Mobile Equipment Mechanics, Installers, and Repairers	Mobile Heavy Equipment Mechanics, Except Engines
49-3043	Installation, Maintenance and Repair	Vehicle and Mobile Equipment Mechanics, Installers, and Repairers	Rail Car Repairers
49-3051	Installation, Maintenance and Repair	Vehicle and Mobile Equipment Mechanics, Installers, and Repairers	Motorboat Mechanics and Service Technicians
49-3052	Installation, Maintenance and Repair	Vehicle and Mobile Equipment Mechanics, Installers, and Repairers	Motorcycle Mechanics
49-3053	Installation, Maintenance and Repair	Vehicle and Mobile Equipment Mechanics, Installers, and Repairers	Outdoor Power Equipment and Other Small Engine Mechanics
49-9012	Installation, Maintenance and Repair	Other Installation, Maintenance, and Repair Occupations	Control and Valve Installers and Repairers, Except Mechanical Door
49-9021	Installation, Maintenance and Repair	Other Installation, Maintenance, and Repair Occupations	Heating, Air Conditioning, and Refrigeration Mechanics and Installers
49-9041	Installation, Maintenance and Repair	Other Installation, Maintenance, and Repair Occupations	Industrial Machinery Mechanics
49-9043	Installation, Maintenance and Repair	Other Installation, Maintenance, and Repair Occupations	Maintenance Workers, Machinery
49-9044	Installation, Maintenance and Repair	Other Installation, Maintenance, and Repair Occupations	Millwrights
49-9045	Installation, Maintenance and Repair	Other Installation, Maintenance, and Repair Occupations	Refractory Materials Repairers, Except Brickmasons
49-9051	Installation, Maintenance and Repair	Other Installation, Maintenance, and Repair Occupations	Electrical Power -Line Installers and Repairers
49-9052	Installation, Maintenance and Repair	Other Installation, Maintenance, and Repair Occupations	Telecommunications Line Installers and Repairers
49-9061	Installation, Maintenance and Repair	Other Installation, Maintenance, and Repair Occupations	Camera and Photographic Equipment Repairers
49-9062	Installation, Maintenance and Repair	Other Installation, Maintenance, and Repair Occupations	Medical Equipment Repairers
49-9063	Installation, Maintenance and Repair	Other Installation, Maintenance, and Repair Occupations	Musical Instrument Repairers and Tuners
49-9064	Installation, Maintenance and Repair	Other Installation, Maintenance, and Repair Occupations	Watch and Clock Repairers
49-9069	Installation, Maintenance and Repair	Other Installation, Maintenance, and Repair Occupations	Precision Instrument and Equipment Repairers, All Other
49-9071	Installation, Maintenance and Repair	Other Installation, Maintenance, and Repair Occupations	Maintenance Workers, General
49-9081	Installation, Maintenance and Repair	Other Installation, Maintenance, and Repair Occupations	Wind Turbine Service Technicians
49-9094	Installation, Maintenance and Repair	Other Installation, Maintenance, and Repair Occupations	Locksmiths and Safe Repairers
49-9096	Installation, Maintenance and Repair	Miscellaneous Installation, Maintenance, and Repair Workers	Riggers
49-9099	Installation, Maintenance and Repair	Miscellaneous Installation, Maintenance, and Repair Workers	Installation, Maintenance and Repair, All Other
51-1011	Production Occupations	Supervisors of Production Workers	First-Line Supervisors of Production and Operating Workers
51-2011	Production Occupations	Assemblers and Fabricators	Aircraft Structure, Surfaces, Rigging, and Systems Assemblers
51-2021	Production Occupations	Assemblers and Fabricators	Coil Winders, Tapers, and Finishers
51-2028	Production Occupations	Assemblers and Fabricators	Electrical, Electronic, and Electromechanical Assemblers, Except Coil Winders, Tapers, and Finishers
51-2031	Production Occupations	Assemblers and Fabricators	Engine and Other Machine Assemblers
51-2041	Production Occupations	Assemblers and Fabricators	Structural Metal Fabricators and Fitters
51-2051	Production Occupations	Assemblers and Fabricators	Fiberglass Laminators and Fabricators
51-2061	Production Occupations	Assemblers and Fabricators	Timing Device Assemblers and Adjusters
51-2098	Production Occupations	Assemblers and Fabricators	Miscellaneous Assemblers and Fabricators
51-3021	Production Occupations	Food Processing Workers	Butchers and Meat Cutters
51-3022	Production Occupations	Food Processing Workers	Meat, Poultry, and Fish Cutters and Trimmers
51-3023	Production Occupations	Food Processing Workers	Slaughterers and Meat Packers
51-4021	Production Occupations	Metal and Plastic Workers	Extruding and Drawing Machine Setters, Operators, and Tenders, Metal and Plastic
51-4022	Production Occupations	Metal and Plastic Workers	Forging Machine Setters, Operators, and Tenders, Metal and Plastic
51-4023	Production Occupations	Metal and Plastic Workers	Rolling Machine Setters, Operators, and Tenders, Metal and Plastic
51-4031	Production Occupations	Metal and Plastic Workers	Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic
51-4032	Production Occupations	Metal and Plastic Workers	Drilling and Boring Machine Tool Setters, Operators, and Tenders, Metal and Plastic
51-4033	Production Occupations	Metal and Plastic Workers	Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators, and Tenders, Metal and Plastic
51-4034	Production Occupations	Metal and Plastic Workers	Lathe and Turning Machine Tool Setters, Operators, and Tenders, Metal and Plastic
51-4035	Production Occupations	Metal and Plastic Workers	Milling and Planing Machine Setters, Operators, and Tenders, Metal and Plastic
51-4041	Production Occupations	Metal and Plastic Workers	Machinists
51-4051	Production Occupations	Metal and Plastic Workers	Metal-Refining Furnace Operators and Tenders

Skilled Technical Workforce (STW) *continued*

SOC	Major Grp Name	Occupation Types	Occupation
51-4052	Production Occupations	Metal and Plastic Workers	Pourers and Casters, Metal
51-4061	Production Occupations	Metal and Plastic Workers	Model Makers, Metal and Plastic
51-4062	Production Occupations	Metal and Plastic Workers	Patternmakers, Metal and Plastic
51-4071	Production Occupations	Metal and Plastic Workers	Foundry Mold and Coremakers
51-4072	Production Occupations	Metal and Plastic Workers	Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic
51-4081	Production Occupations	Metal and Plastic Workers	Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic
51-4111	Production Occupations	Metal and Plastic Workers	Tool and Die Makers
51-4121	Production Occupations	Metal and Plastic Workers	Welders, Cutters, Solderers, and Brazers
51-4122	Production Occupations	Metal and Plastic Workers	Welding, Soldering, and Brazing Machine Setters, Operators, and Tenders
51-4191	Production Occupations	Metal and Plastic Workers	Heat Treating Equipment Setters, Operators, and Tenders, Metal and Plastic
51-4192	Production Occupations	Metal and Plastic Workers	Layout Workers, Metal and Plastic
51-4193	Production Occupations	Metal and Plastic Workers	Plating Machine Setters, Operators, and Tenders, Metal and Plastic
51-5111	Production Occupations	Printing Workers	Prepress Technicians and Workers
51-8011	Production Occupations	Power Plant Operators, Distributors, and Dispatchers	Nuclear Power Reactor Operators
51-8012	Production Occupations	Power Plant Operators, Distributors, and Dispatchers	Power Distributors and Dispatchers
51-8013	Production Occupations	Power Plant Operators, Distributors, and Dispatchers	Power Plant Operators
51-8021	Production Occupations	Plant and System Operators	Stationary Engineers and Boiler Operators
51-8031	Production Occupations	Power Plant Operators, Distributors, and Dispatchers	Water and Wastewater Treatment Plant and System Operators
51-8091	Production Occupations	Power Plant Operators, Distributors, and Dispatchers	Chemical Plant and System Operators
51-8092	Production Occupations	Power Plant Operators, Distributors, and Dispatchers	Gas Plant Operators
51-8093	Production Occupations	Power Plant Operators, Distributors, and Dispatchers	Petroleum Pump System Operators, Refinery Operators, and Gaugers
51-8099	Production Occupations	Power Plant Operators, Distributors, and Dispatchers	Plant and System Operators, All Other
51-9011	Production Occupations	Other Production Occupations	Chemical Equipment Operators and Tenders
51-9081	Production Occupations	Dental and Ophthalmic Laboratory Technicians and Medical Appliance Technicians	Dental Laboratory Technicians
51-9082	Production Occupations	Dental and Ophthalmic Laboratory Technicians and Medical Appliance Technicians	Medical Appliance Technicians
51-9083	Production Occupations	Dental and Ophthalmic Laboratory Technicians and Medical Appliance Technicians	Ophthalmic Laboratory Technicians
51-9141	Production Occupations	Semiconductor Processing Technicians	Semiconductor Processing Technicians
51-9161	Production Occupations	Metal and Plastic Workers	Computer Numerically Controlled Tool Operators
51-9162	Production Occupations	Metal and Plastic Workers	Computer Numerically Controlled Tool Programmers
51-9191	Production Occupations	Other Production Occupations	Adhesive Bonding Machine Operators and Tenders
51-9192	Production Occupations	Other Production Occupations	Cleaning, Washing, and Metal Pickling Equipment Operators and Tenders
51-9193	Production Occupations	Other Production Occupations	Cooling and Freezing Equipment Operators and Tenders
51-9194	Production Occupations	Other Production Occupations	Etchers and Engravers
51-9195	Production Occupations	Other Production Occupations	Molders, Shapers, and Casters, Except Metal and Plastic
51-9196	Production Occupations	Other Production Occupations	Paper Goods Machine Setters, Operators, and Tenders
51-9197	Production Occupations	Other Production Occupations	Tire Builders
51-9199	Production Occupations	Other Production Occupations	Production Workers, All Other
53-2022	Transportation and Material Moving Occupations	Air Transportation Workers	Airfield Operations Specialists
53-6041	Transportation and Material Moving Occupations	Other Transportation Workers	Transportation Inspectors
53-7071	Transportation and Material Moving Occupations	Pumping Station Operators	Gas Compressor and Gas Pumping Station Operators
53-7072	Transportation and Material Moving Occupations	Pumping Station Operators	Pump Operators, Except Wellhead Pumpers
53-7073	Transportation and Material Moving Occupations	Pumping Station Operators	Wellhead Pumpers



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