



The Demand for STEM Occupations in Tennessee

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Introduction

The increasing demand for highly skilled employees in Science, Technology, Engineering, and Math (STEM) fields presents a great opportunity for those in the workforce who can obtain these skills. Growth and the projected number of openings in these occupations are expected to be larger than all occupations on average. Additionally, the salary of these occupations as a group is currently higher than the average occupation in Tennessee.

The U.S. Office of Management and Budget determined which standardized occupations are STEM or STEM related jobs. For the purposes of this report, STEM occupations will be analyzed either as a whole or in two divisions, healthcare STEM and core STEM occupations. Healthcare STEM occupations are those belonging to the healthcare practitioners and technical occupational group; core STEM occupations are those belonging to all other occupational groups. Table 1 provides a complete list of STEM occupations in Tennessee by occupational group.

Table 1: STEM occupations, by occupational group

Management	Drafters, All Other	Materials Engineers
Architectural and Engineering Managers	Electrical and Electronics Drafters	Mechanical Drafters
Computer and Information Systems Managers	Electrical and Electronics Engineering Technicians	Mechanical Engineering Technicians
Medical and Health Services Managers	Electrical Engineers	Mechanical Engineers
Natural Sciences Managers	Electro-Mechanical Technicians	Mining and Geological Engineers, Including Mining Safety Engineers
Architecture and Engineering	Electronics Engineers, Except Computer	Nuclear Engineers
Aerospace Engineering and Operations Technicians	Engineering Technicians, Except Drafters, All Other	Petroleum Engineers
Aerospace Engineers	Engineers, All Other	Surveying and Mapping Technicians
Agricultural Engineers	Environmental Engineering Technicians	Surveyors
Architects, Except Landscape and Naval	Environmental Engineers	Computer and Mathematical
Architectural and Civil Drafters	Health and Safety Engineers, Except Mining Safety Engineers and Inspectors	Actuaries
Biomedical Engineers	Industrial Engineering Technicians	Computer and Information Research Scientists
Cartographers and Photogrammetrists	Industrial Engineers	Computer Network Architects
Chemical Engineers	Landscape Architects	Computer Occupations, All Other
Civil Engineering Technicians	Marine Engineers and Naval Architects	Computer Programmers
Civil Engineers		Computer Support Specialists
Computer Hardware Engineers		Computer Systems Analysts

Computer User Support Specialists
Database Administrators
Mathematical Science Occupations, All Other
Mathematical Technicians
Mathematicians
Network and Computer Systems Administrators
Operations Research Analysts
Software Developers, Applications
Software Developers, Systems Software
Statisticians
Web Developers
Education, Training, and Library
Agricultural Sciences Teachers, Postsecondary
Anthropology and Archeology Teachers, Postsecondary
Architecture Teachers, Postsecondary
Area, Ethnic, and Cultural Studies Teachers, Postsecondary
Atmospheric, Earth, Marine, and Space Sciences Teachers, Postsecondary
Biological Science Teachers, Postsecondary
Chemistry Teachers, Postsecondary
Computer Science Teachers, Postsecondary
Economics Teachers, Postsecondary
Engineering Teachers, Postsecondary
Environmental Science Teachers, Postsecondary
Forestry and Conservation Science Teachers, Postsecondary
Geography Teachers, Postsecondary
Health Specialties Teachers, Postsecondary
Mathematical Science Teachers, Postsecondary

Nursing Instructors and Teachers, Postsecondary
Physics Teachers, Postsecondary
Political Science Teachers, Postsecondary
Psychology Teachers, Postsecondary
Social Sciences Teachers, Postsecondary, All Other
Sociology Teachers, Postsecondary
Healthcare Practitioners and Technical
Anesthesiologists
Athletic Trainers
Audiologists
Cardiovascular Technologists and Technicians
Chiropractors
Dental Hygienists
Dentists, All Other Specialists
Dentists, General
Diagnostic Medical Sonographers
Dietetic Technicians
Dietitians and Nutritionists
Emergency Medical Technicians and Paramedics
Exercise Physiology
Family and General Practitioners
Internists, General
Licensed Practical and Licensed Vocational Nurses
Medical and Clinical Laboratory Technicians
Medical and Clinical Laboratory Technologists
Medical Records and Health Information Technicians
Nuclear Medicine Technologists
Obstetricians and Gynecologists
Occupational Health and Safety Specialists
Occupational Health and Safety Technicians
Occupational Therapists

Opticians, Dispensing
Optometrists
Oral and Maxillofacial Surgeons
Orthodontists
Orthotists and Prosthetists
Pediatricians, General
Pharmacists
Pharmacy Technicians
Physical Therapists
Physician Assistants
Physicians and Surgeons, All Other
Podiatrists
Prosthodontists
Psychiatric Technicians
Psychiatrists
Radiation Therapists
Radiologic Technologists and Technicians
Recreational Therapists
Registered Nurses
Respiratory Therapists
Respiratory Therapy Technicians
Speech-Language Pathologists
Surgeons
Surgical Technologists
Veterinarians
Veterinary Technologists and Technicians
Life, Physical, and Social Science
Agricultural and Food Science Technicians
Animal Scientists
Anthropologists and Archeologists
Astronomers
Atmospheric and Space Scientists
Biochemists and Biophysicists
Biological Scientists, All Other
Biological Technicians
Chemical Technicians
Chemists

Clinical, Counseling, and School Psychologists	Geological and Petroleum Technicians	Political Scientists
Conservation Scientists	Geoscientists, Except Hydrologists and Geographers	Psychologists, All Other
Economists	Hydrologists	Social Science Research Assistants
Environmental Science and Protection Technicians, Including Health	Industrial-Organizational Psychologists	Social Scientists and Related Workers, All Other
Environmental Scientists and Specialists, Including Health	Life Scientists, All Other	Sociologists
Epidemiologists	Life, Physical, and Social Science Technicians, All Other	Soil and Plant Scientists
Food Scientists and Technologists	Materials Scientists	Survey Researchers
Forensic Science Technicians	Medical Scientists, Except Epidemiologists	Urban and Regional Planners
Forest and Conservation Technicians	Microbiologists	Zoologists and Wildlife Biologists
Foresters	Nuclear Technicians	Sales and Related
Geographers	Physical Scientists, All Other	Sales Engineers
	Physicists	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products

High Growth

Tennessee will experience a robust growth of STEM occupations over the next several years. In 2012 there were 252,000 STEM employees. This level will increase to 295,000 in 2022. The 43,000 additional STEM jobs will account for 11% of the jobs added in the state through 2022. Additionally, STEM occupations are projected to increase at a more rapid rate than for all occupations in Tennessee. New STEM jobs as a whole are expected to grow at an annual rate of 1.6%, whereas on average all new jobs are expected to increase at an annual rate of 1.2%. Even more, healthcare STEM employment will increase by approximately 2% annually.

The majority of additional STEM jobs will be healthcare and computer and mathematics occupations. STEM occupations in the occupational group Healthcare Practitioners and Technical will account for over half of Tennessee’s additional STEM jobs. Of core STEM occupations, nearly 40% of job growth will come from the Computer and Mathematical occupational group.

Established by an Executive Order of the Governor, the [Tennessee STEM Innovation Network](#) is a unique public-private collaboration designed to promote and expand the teaching and learning of science, technology, engineering, and mathematics education in K-12 public schools across Tennessee.

Table 2: Selected core STEM occupations with fast employment growth, projected 2012-22

Occupation	Employment growth, projected 2012-22 (percent)	Employment 2012	Employment 2022	Median annual wage, 2013	Typical entry-level education
Operations Research Analysts	33%	1,100	1,460	\$62,750	Master's degree
Nursing Instructors and Teachers, Postsecondary	31	1,790	2,350	54,920	Doctor's degree
Health Specialties Teachers, Postsecondary	27	4,970	6,320	66,740	Master's degree
Civil Engineers	26	3,720	4,690	84,850	Bachelor's degree
Architects, Except Landscape and Naval	25	1,140	1,420	69,600	Bachelor's degree
Computer Systems Analysts	24	8,810	10,890	75,430	Bachelor's degree
Surveying and Mapping Technicians	21	1,150	1,390	37,000	Moderate-term on-the-job training
Computer Network Architects	22	1,380	1,680	94,360	Bachelor's degree
Software Developers, Systems Software	21	2,380	2,880	83,780	Bachelor's degree
Software Developers, Applications	21	4,480	5,420	80,850	Bachelor's degree
Environmental Engineers	21	990	1,200	83,910	Bachelor's degree

Table 3: Selected healthcare STEM occupations with fast employment growth, projected 2012-22

Occupation	Employment growth, projected 2012-22 (percent)	Employment 2012	Employment 2022	Median annual wage, 2013	Typical entry-level education
Physician Assistants	45%	1,300	1,880	\$89,150	Bachelor's degree
Diagnostic Medical Sonographers	42	1,450	2,060	59,950	Associate degree
Veterinary Technologists and Technicians	39	1,620	2,250	27,610	Associate degree
Surgeons	32	1,150	1,520	187,330	First professional degree
Physicians and Surgeons, All Other	27	6,730	8,570	187,300	First professional degree
Pharmacy Technicians	26	11,940	15,080	28,280	Moderate-term on-the-job training
Surgical Technologists	26	3,170	4,000	37,290	Post-secondary vocational training
Cardiovascular Technologists and Technicians	25	950	1,190	46,320	Associate degree
Physical Therapists	24	4,520	5,610	80,460	Master's degree
Emergency Medical Technicians and Paramedics	24	7,950	9,840	29,290	Post-secondary vocational training
Medical Records and Health Information Technicians	23	4,030	4,960	31,100	Associate degree
Veterinarians	21	1,210	1,470	79,110	First professional degree

Many Openings

On average, it currently takes longer for an employer to fill a STEM job opening than other types of job openings. A recent report by the Brookings Institution found that Nashville ranked sixty out of one hundred U.S. metropolitan areas in the duration of STEM openings.¹ The number of job openings for STEM occupations is expected to increase through 2022. Computer occupations are the largest share of projected core STEM job openings. Specifically, computer systems analysts and computer user support specialists will have the most job openings of core STEM occupations. Incidentally, the Brookings report found that computer skills had the longest advertisement time of any occupational group. Licensed practical nurses and pharmacy technicians rank at the top of healthcare STEM occupations by projected job openings.

Table 4: Selected core STEM occupations with many job openings, projected 2012-22

Occupation	Job Openings, Projected 2012- 22	Employment		Median annual wage, 2013	Typical entry-level education
		2012	2022		
Computer Systems Analysts	2,080	8,810	10,890	\$75,430	Bachelor's degree
Computer User Support Specialists	1,450	6,940	8,390	41,190	Associate degree
Medical and Health Services Managers	1,360	7,360	8,730	80,030	Work experience, plus bachelor's degree
Health Specialties Teachers, Postsecondary	1,350	4,970	6,320	66,740	Master's degree
Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	1,200	10,360	11,560	68,460	Moderate-term on-the- job training
Civil Engineers	970	3,720	4,690	84,850	Bachelor's degree
Network and Computer Systems Administrators	950	5,700	6,650	62,960	Bachelor's degree
Software Developers, Applications	950	4,480	5,420	80,850	Bachelor's degree
Computer and Information Systems Managers	930	5,140	6,060	102,040	Work experience, plus bachelor's degree
Industrial Engineers	620	4,900	5,510	80,260	Bachelor's degree

¹ <http://www.tennessean.com/story/money/tech/2014/07/02/report-stem-jobs-hardest-fill-nashville/12113683/>

Table 5: Selected healthcare STEM occupations many job openings, projected 2012-22

Occupation	Job Openings, Projected 2012-22	Employment		Median annual wage, 2013	Typical entry-level education
		2012	2022		
Licensed Practical and Licensed Vocational Nurses	4,310	22,730	27,040	\$35,820	Post-secondary vocational training
Pharmacy Technicians	3,140	11,940	15,080	28,280	Moderate-term on-the-job training
Emergency Medical Technicians and Paramedics	1,890	7,950	9,840	29,290	Post-secondary vocational training
Medical and Clinical Laboratory Technicians	1,350	6,540	7,880	35,070	Associate degree
Pharmacists	1,130	7,370	8,500	122,480	First professional degree
Physical Therapists	1,090	4,520	5,610	80,460	Master's degree
Dental Hygienists	990	3,460	4,450	64,220	Associate degree
Medical Records and Health Information Technicians	940	4,030	4,960	31,100	Associate degree
Surgical Technologists	830	3,170	4,000	37,290	Post-secondary vocational training
Veterinary Technologists and Technicians	640	1,620	2,250	27,610	Associate degree

STEM Scouts, a Boy Scouts of America affiliated group, is a coed scouting program for 3rd through 12th grade students. It is currently in the pilot stage, which runs through summer 2015 in Knoxville, Oak Ridge, Claiborne County, and Clayton-Bradley STEM Academy in Blount County, TN.

High Wages

The median salary of Tennesseans employed in STEM occupations is more than twice the median salary for all occupations (\$31,000). The median salary of STEM occupations is \$63,000.² Tables 6 and 7 list the highest salaried STEM occupations in Tennessee.

Table 6: Median annual wages in selected core STEM occupations, 2013

Occupation	Median annual wage, 2013	Employment		Typical entry-level education
		2012	2022	
Nuclear Engineers	\$118,430	1,730	2,070	Bachelor's degree
Architectural and Engineering Managers	105,690	2,490	2,810	Work experience, plus bachelor's degree
Computer and Information Systems Managers	102,040	5,140	6,060	Work experience, plus bachelor's degree
Computer Network Architects	94,360	1,380	1,680	Bachelor's degree
Electrical Engineers	85,150	2,440	2,660	Bachelor's degree
Civil Engineers	84,850	3,720	4,690	Bachelor's degree
Environmental Engineers	83,910	990	1,200	Bachelor's degree
Software Developers, Systems Software	83,780	2,380	2,880	Bachelor's degree
Electronics Engineers, Except Computer	82,490	1,120	1,310	Bachelor's degree
Software Developers, Applications	80,850	4,480	5,420	Bachelor's degree

Table 7: Median annual wages in selected healthcare STEM occupations, 2013

Occupation	Median annual wage, 2013	Employment		Typical entry-level education
		2012	2022	
Surgeons	\$187,330	1,150	1,520	First professional degree
Physicians and Surgeons, All Other	187,300	6,730	8,570	First professional degree
Dentists, General	180,240	1,460	1,650	No category defined
Family and General Practitioners	145,190	1,400	1,610	First professional degree
Pharmacists	122,480	7,370	8,500	First professional degree
Physician Assistants	89,150	1,300	1,880	Bachelor's degree
Physical Therapists	80,460	4,520	5,610	Master's degree

² The median salary of STEM occupations was calculated as the median of the known 2013 median annual wages of STEM occupations.

Medical and Health Services Managers	80,030	7,360	8,730	Work experience, plus bachelor's degree
Veterinarians	79,110	1,210	1,470	First professional degree
Occupational Therapists	77,140	1,820	2,160	Bachelor's degree
Health Specialties Teachers, Postsecondary	66,740	4,970	6,320	Master's degree
Clinical, Counseling, and School Psychologists	61,280	1,840	2,080	Doctor's degree
Speech-Language Pathologists	60,820	2,330	2,700	Master's degree

Skills, Knowledge, and Work Activities

Tables 8, 9, and 10 display the top projected STEM occupational openings by skills, knowledge, and work activities for individual occupations. The number of STEM openings for each SKA is a fraction of the total number of openings of each SKA projected. For example, the average ratio of the top ten work activities in STEM occupations to the total number of openings of the work activity is 28%.

Table 8: Projected STEM openings by occupational skills

Skills	Job Openings Projected 2012-22	Percent of Total Openings Projected		
Reading Comprehension	38,800	38%	Judgment and Decision Making	8,400 27
Active Listening	38,670	21	Complex Problem Solving	6,130 38
Critical Thinking	30,740	45	Active Learning	4,200 53
Monitoring	9,370	42	Mathematics	3,400 98
Coordination	8,630	32	Science	2,870 40
Time Management	8,630	60	Programming	1,550 76
			Systems Evaluation	760 24
			Operations Analysis	680 100

Table 9: Projected STEM openings by occupational knowledge required

Knowledge	Job Openings Projected 2012-22	Percent of Total Openings Projected		
English Language	40,660	23%	Mathematics	9,830 58
Medicine and Dentistry	31,000	48	Engineering and Technology	8,750 75
Computers and Electronics	19,210	76	Therapy and Counseling	7,090 47
Psychology	15,810	29	Design	6,650 80
Biology	12,720	75	Chemistry	4,160 76
			Public Safety and Security	3,770 27
			Physics	1,520 100
			Production and Processing	1,240 26

Table 10: Projected STEM openings by work activities

Work Activity	Job Openings Projected 2012-22	Percent of Total Openings Projected
Updating and Using Relevant Knowledge	70,860	36%
Making Decisions and Solving Problems	69,090	23
Identifying Objects, Actions, and Events	50,720	25
Documenting/Recording Information	49,080	26
Establishing and Maintaining Interpersonal Relationships	37,650	21
Processing Information	37,550	32
Assisting and Caring for Others	34,760	22
Evaluating Information to Determine Compliance with Standards	33,330	25
Monitor Processes, Materials, or Surroundings	30,400	28
Analyzing Data or Information	26,250	36
Thinking Creatively	17,570	20
Drafting, Laying Out, and Specifying Technical Devices, Parts, and Equipment	5,590	90
Provide Consultation and Advice to Others	5,150	35