

# **IMPROVING THE PIPELINE FOR TENNESSEE'S WORKFORCE: ACADEMIC SUPPLY FOR OCCUPATIONAL DEMAND REPORT 2023**



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# EXECUTIVE SUMMARY

*The Improving the Pipeline for Tennessee's Workforce: Academic Supply for Occupational Demand Report* is the second joint report between the Tennessee Higher Education Commission (THEC), Tennessee Department of Labor and Workforce Development (TDLWD), Tennessee Department of Economic and Community Development (TNECD), and Tennessee Department of Education (TDOE).

[This year's report](#) maintains the Career Cluster structure, grouping occupations and aligned training programs in one place. Accompanying dashboards and data downloads are also available for readers who prefer to work with the data directly. Excitingly, this report includes a few new features, including a revised approach to measuring degree completers' employment and wages, as well as a simplification of report layout to improve readability and flow.

Multiple state agencies facilitate this report's completion and there are many audiences for this report. Each year, efforts to refine and improve the report and associated outputs will continue to ensure the report is useful in education and workforce planning.

## **THIS REPORT:**

- Identifies in-demand occupations and aligned academic programs at the postsecondary and secondary levels as well as registered apprenticeships organized across 14 career clusters.
- Includes in-demand occupations tables identifying the number of region(s) where the occupation is in-demand, entry level wages, indicators for jobs which are STEM fields and those which support TNECD's target industries, and the typical training level required for employment.
- Contains aligned academic programs tables with information about degree production and completers, matriculation into Tennessee's job market, and first-year wages for those identified in Tennessee employment data. The calculation for employment outcomes changed in this year's report.
- Spotlights select agency initiatives promoting education and workforce alignment in K12, higher education, and the workforce.
- Offers an overview of data, methods, and sources highlighting existing data use and areas for further exploration.

# IN-DEMAND OCCUPATIONS AND ALIGNED ACADEMIC PROGRAM HIGHLIGHTS

In this section, unmet need is determined in cases where there is high regional demand but few or no aligned training programs; and in cases where employment rates in aligned programs are 60 percent or higher and confer wages higher than the state median wage of \$37,700 in 2021, signaling greater labor force needs.

## Agriculture, Food, and Natural Resources

Veterinarians are **in demand** in three regions in Tennessee. The University of Tennessee, Knoxville (UTK) is the sole provider of Doctor of Veterinary Medicine (DVM) degrees in the state. In 2020-21, 86 DVMs were granted. The estimated annual wages of DVMs in the first year were \$99,844, outpacing other graduates in the agriculture, food, and natural resources cluster. However, only 30 percent of DVM graduates were found in Tennessee's employment records, which may indicate that graduates are working out of state. Occupations in-demand in more than three regions include supervisors of landscaping workers, landscaping workers, and wastewater treatment operators. **Supply:** In this cluster, the highest employment rates of graduates found in the Tennessee records were associate degree programs in veterinary technician and assistant and biotechnology. The first-year wage outcomes for biotechnology graduates are the second highest in this cluster at \$40,065. Certificate completers and high school CTE concentrators in veterinary technician/assistant and food technology and processing had higher than average employment rates. **Unmet needs:** Biotechnology will likely continue to expand; training programs for landscaping supervisors and workers were few.

## Architecture and Construction

**Demand:** Several occupations in this group are in-demand statewide, including in residential, commercial, and industrial construction. Construction managers and cost estimators typically require four-year degrees, while most other occupations in this group acquire skills through a two-year degree, postsecondary certificate, apprenticeship, or on-the-job training. Construction workers in-demand in most areas of the state include: construction supervisors, electricians, carpenters, operating engineers, painters, plumbers, and heating, ventilation, and air conditioning (HVAC) personnel. **Supply:** The bachelor's program in construction management had the highest share of graduates (of programs with 10 or more completers) found in the Tennessee job market (63 percent), with first-year wages of \$57,569. Less than one year certificate programs in plumbing place 60 percent of graduates in the Tennessee job market. Several high school CTE programs in this cluster have employment rates of 50 percent. In 2020-21, 32 electricians and 527 production machinery electricians completed apprenticeships. **Unmet Needs:** Due to high regional demand and few training options, programs in basic skills for carpenters, operating engineers, painters, plumbers, and cost estimators are needed.

## Manufacturing

**Demand:** Tennessee has done an exceptional job of growing one of the strongest specialized manufacturing workforces in the country. As Tennessee expands its manufacturing investments, there are many occupations in-demand across the state, including first line supervisors of mechanics, installers, and repairers and production workers; general maintenance and repair workers; machinists; welders; inspectors, testers, sorters, samplers, and weighers; food batchmakers; and computer numerically controlled tool operators. **Supply:** Multiple certificate programs had employment rates of 60 percent or more among completers. High school CTE programs in the Manufacturing cluster including machine shop assistant, electromechanical technologies, mechatronics, and welding had employment rates of 56 percent or more, although salaries were low. Over 600 credentials in machine tool technology were awarded by TCATs and community colleges in 2020-21. Over 2,440 welding credentials were issued, including postsecondary certificates and CTE concentrators.

## Transportation

**Demand:** Tennessee is a leading state in transportation, distribution, and logistics. The transportation cluster contains several occupations that are in-demand statewide and in every region of the state, including automotive service technicians and mechanics; bus and truck mechanics and diesel engine specialists; production, planning, and expediting clerks; heavy and tractor-trailer truck drivers; industrial truck and tractor operators; and mobile heavy equipment mechanics. **Supply:** Several TCAT programs train Tennesseans in this cluster who remain in Tennessee to work. The highest employment rates for certificate programs were logis-

tics and supply chain management at 62 percent and diesel mechanics technology at 54 percent. First-year wages for the bachelor's degree program in logistics was \$53,062, and for the master's degree, \$90,607. High school CTE concentrators in autobody collision repair and diesel mechanics were employed in Tennessee at rates of more than 60 percent. This cluster had 121 apprenticeship completers. **Unmet need:** Completers of the two-year certificate for tool and die technician and the electromechanical engineering technician associate and bachelor's degrees had employment rates of 60% or more and earnings exceeding the state median in 2021 (\$37,700). Other occupations in high demand with no aligned training programs include industrial truck and tractor operators and mobile heavy equipment mechanics. The less-than-one-year certificate program in logistics has a high employment rate (62 percent) and wages above the state median; the diesel mechanics 1-2 year-certificate and CTE programs produce graduates earning just below the state median wage.

## Business, Finance and Government Management and Support Services

**Demand:** Tennessee has experienced economic growth in headquarters, business support services, and the finance and insurance sector. Occupations in-demand in all areas of the state include financial and human resources managers and specialists; project management specialists; management analysts; accountants and auditors; healthcare managers; and support workers, including secretaries and administrative assistants and customer service representatives. Demand is observed in both the private sector and in government.

**Supply:** High rates of employment were found among healthcare business and support occupations, including rates of 60 percent or more among graduates of medical insurance coding programs, administrative assistants, in healthcare and business administration associate degree programs, accounting technicians, and medical records administration programs, as well as for post-baccalaureate certificate programs in health policy, public policy analysis, and public administration. Business statistics programs at the master's degree level also had high rates of employment. The highest first-year wages are found for master's degree graduates in nursing administration (\$123,132) and business statistics (\$78,032). **Unmet needs:** High rates of employment of medical records administrators, accounting technicians, and business statistics program completers may indicate the need for additional graduates. Data for nine regions in the state indicated a shortage of project management specialists; only one aligned academic program at the post baccalaureate level, graduating fewer than 10 graduates, addressed this need. Other programs with high employment rates and wages above the state median included the associate degree program in health care management, the international business master's degree, and the post baccalaureate and master's degrees in public administration and public policy, respectively.

## Sales and Marketing

**Demand:** Tennessee has experienced a net gain of approximately 4,600 jobs since 2019 in retail trade. Sales occupations increasingly require advanced computer skills. Occupations in-demand in five or more areas of the state include supervisors of retail sales workers, advertising sales agents, financial services sales agents, and non-technical wholesale and manufacturing sales representatives. **Supply:** 74 percent of graduates in selling skills and sales operations certificate programs were found in the Tennessee job market with entry level wages of just over \$33,000. Others employed in sales likely obtain degrees in business administration, finance, or a technical field. High school CTE programs in entrepreneurial studies had 144 concentrators. **Unmet Needs:** All regions indicated a need for more first line supervisors of retail sales workers.

## Health Sciences

**Demand:** Healthcare and social assistance is expected to be the largest industry in Tennessee by 2030, with employment of healthcare practitioners and support workers expected to increase by more than 64,000.<sup>2</sup> An important driver of this trend is the need to care for an aging population. The pandemic created additional burdens for the healthcare system in Tennessee which is experiencing increasing shortages of workers due to feelings of burnout and inadequate pay. Healthcare occupations, including registered nurses, were identified as eleven of the fifteen occupations experiencing the greatest supply gaps based on the number of job openings exceeding resumes for occupations requiring postsecondary education.<sup>3</sup> Occupations in-demand in at least seven regions include licensed practical nurses, surgical technologists, physical therapy assistants, dental assistants, medical assistants, and phlebotomists. Other occupations in demand in more than half of local workforce development areas include speech language pathologists, diagnostic medical sonographers, pharmacy technicians, and medical records specialists.

<sup>1</sup> Tennessee Department of Transportation, [Statewide Multimodal Freight Plan](#), amended 05-21-2021

<sup>2</sup> Tennessee Department of Labor and Workforce Development. Tennessee's Economy, 2021-2022, p. 16 & 19.

<sup>3</sup> Tennessee Department of Labor and Workforce Development. Tennessee's Economy, 2021-2022, p. 22.

**Supply:** Due to increasing demand, program completers in the health sciences have some of the highest employment rates of any career cluster. The highest employment rates for certificate completers paying above the median wage were for sterile processing technicians, MRI technicians, and psychiatric/mental health nurses (CPBA), and for associate degree completers, registered nurses, respiratory care therapists, medical laboratory technicians, and dental hygienists. For those with bachelor's degrees and above, they included radiographers, family practice nurses, doctors of physical therapy, and diagnostic medical sonographers. **Unmet needs:** Many of the above occupations, including respiratory therapists require additional workers. Healthcare and life sciences is a TNECD target industry. Investment in our universities and world-class research facilities associated with this sector will complement and enable the development of a capable workforce.

## Human Services

Human services occupations include those focused on societal and individual well-being. Nationally, employment in community and social occupations is projected to grow 10 percent from 2021 to 2031.<sup>4</sup> The pandemic shed new light on the need to expand behavioral health for adults and children. **Demand:** Social and human services assistants, requiring a high school degree, are in-demand in eight of the nine regions of Tennessee. Healthcare social workers are in-demand in four regions. **Supply:** School counselors with educational specialist degrees, and those with bachelor's and master's degrees in human services and social work had the highest employment rates. In 2020-21, 79 graduates completed the post-baccalaureate in social work with first-year wages of \$43,025, with employment rates similar to the 517 graduates with master's degrees in social work. **Unmet needs** continue to exist in social work and behavioral health.

## Education and Training

**Demand:** The education and training career cluster includes educators, administrators, trainers, counselors, and other learning support personnel. Successful teacher recruitment and retention are essential for a high-quality education workforce; however, teacher shortages remain a challenge. The depth of the problem cannot be measured due to a decentralized system of job postings. Preschool teachers are in demand in four areas of the state. Childcare challenges are currently impacting workforce participation in the state and the nation with labor force participation rates of parents below pre-pandemic levels. **Supply:** As a new pipeline for recruitment, Tennessee has begun a first of its kind apprenticeship program for teachers called Grow Your Own. Several institutions in Tennessee offer training aligned with becoming a teacher and more needs to be learned about licensure among non-education degree completers. **Unmet needs:** Employment rates of bachelor's degree recipients in early childhood education, secondary education, and for reading teachers, as well as math, English, and art teachers exceeded 69 percent, with earnings greater than the state median wage, indicating an elevated need for more program graduates.

## Protective Services and Law

**Demand:** The protective services and law cluster includes occupations focused on providing legal, public safety, and protective services. Occupations in-demand in three regions of the state are paralegals and legal assistants, corrections officers and jailors, and security guards. **Supply:** The paralegal certificate and the associate degree programs had 67 and 57 percent of graduates found in Tennessee employment data, respectively. The associate degree program had an even higher employment rate and first-year wage of \$68,183. **Unmet needs:** There are hundreds of vacancies for correctional officers in the state. The high school CTE corrections program may fill some of these with 1,234 concentrators in 2020-21. Paralegals are among the programs with employment rates greater than 60 percent and earnings greater than the state median wage.

## Arts and Communications

**Demand:** Tennessee is a hub of creative innovation, technology, and performing arts. Tennessee is home to nine annual film festivals, a host of dance companies, and dozens of theatre troupes. The Arts & Economic Prosperity 5 Study indicates that the nonprofit arts and culture sector is a \$1.17 billion industry in Tennessee, supporting over 38,000 full-time equivalent jobs and generating \$135 million in local and state government revenue.<sup>5</sup> This cluster includes 75 aligned academic programs in Tennessee, from a bluegrass and roots music bachelor's degree to public cinema to a master's degree in strategic communication. In-demand occupations identified in this cluster include graphic designers, printing press operators, and editors. **Supply:** Of graduates in the education and instruction technology master's degree, 61 percent were found in the Tennessee job market with a median first-year wage of \$50,980. The bachelor's degree in graphic design had 40 completers, 55 percent employed in Tennessee, and median first-year wages of \$37,296. Another popular major, journalism,

<sup>4</sup> U.S. Bureau of Labor Statistics, [Occupational Outlook Handbook, Community and Social Service Occupations](#)

<sup>5</sup> Tennessee Arts Commission, [Arts & Economic Prosperity 5](#)

had 227 bachelor's degree graduates with 55 percent of graduates found in Tennessee employment. **Unmet need:** Graphic design was in demand in seven regions of Tennessee, with one program offered at the bachelor's degree level.

## Leisure and Recreation

Tennessee is well known for its great outdoors, with 13 national parks, 56 state parks, and 84 natural areas. In Tennessee, the leisure and hospitality sector is expected to have seven percent growth from 2021 to 2023<sup>6</sup> due to rising wages in the industry and consumers shifting back to more in-person services. **Demand:** Most of the in-demand occupations in the leisure and recreation cluster require only a high school degree or the equivalent. Food service managers, supervisors of housekeeping and janitorial workers, and pest control workers are in demand in all areas of the state; chefs and head cooks and exercise trainers were in demand in seven areas. **Supply:** Culinary arts/chef training and hotel/motel administration associate degree programs had the highest employment rates in Tennessee at 68 and 70 percent, respectively. Culinary arts completers from high school CTE programs had employment rates of 53 percent. Those earning bachelor's degrees in hotel/motel administration were employed at the rate of 51 percent. This cluster includes degrees in sports and exercise science. In 2020-21, more than 900 students completed bachelor's degrees in exercise science. **Unmet Needs:** Although employment rates were high for associate degrees in culinary arts and hotel administration, the wages were below state median wages. Increased pay in these fields may entice more students into these fields. Pest control workers were needed in all nine local workforce development areas but specific training was not available.

## Information Technology

**Demand:** Information technology (IT) occupations are in-demand in both Tennessee and the nation. IT occupations are projected to grow 13 percent nationally from 2020 to 2030, faster than the average for all occupations. Tennessee's growth in the headquarters, finance, and tech industries and unique research and development facilities at St. Jude Children's Research Hospital, Oak Ridge National Laboratory, Arnold Engineering Complex, and universities are employers of computer and IT occupations. The IT occupations in demand in the most regions of the state include computer user support specialists, computer systems analysts, information security analysts, and network and computer systems administrators. **Supply:** The medical informatics associate degree program provided the highest share of its graduates (82 percent) to the Tennessee workforce. The master's degree in medical informatics had an employment rate of 58 percent and paid a first-year median wage of \$78,935. **Unmet needs:** While short term trends have shown some volatility, IT employment is expected to have strong growth long term. The computer and information systems security/auditing/information assurance certificate program of less-than-one-year had the highest employment rate (73 percent) and completers earned more than the state median wage. The associate degree in information technology also had high employment rates and pay above the median. Bachelor's and master's degree programs had high salaries but lower placement rates which could be due to individuals moving out of state.

## Engineering and Other STEM Programs

**Demand:** Engineering and related occupations play an instrumental role in Tennessee businesses. TNECD has several target industries connected to engineering, including automotive, aerospace and defense, chemical products, and electrical equipment and appliances. Tennessee has a low concentration of employees in these high-wage fields, relative to the national average. In 2021, the number of engineers in Tennessee, about 26,000, was 23 percent below the national average concentration. The occupations that are in-demand in the most regions of Tennessee are electrical and electronic engineering technologists and technicians, civil engineers, electrical engineers, and mechanical engineers. **Supply:** Engineers require a bachelor's degree, while the technologists and technicians require associate degrees. Eight aligned academic programs had 70 percent or more of graduates found in Tennessee employment data, including the mechatronics, robotics, and automation engineering bachelor's program, associate degree programs in chemical engineering technology and industrial technology, and certificate programs of engineering technology, computer engineering technology, automation engineering technology, mechanical drafting, Computer Aided Design and Computer Aided Design and Drafting (CAD/CADD), and chemical technology. The master's degree in industrial engineering paid on average \$93,896, while the doctorate paid \$171,484. **Unmet needs:** The high rates of employment and wages signal the potential for supply gaps as Tennessee expands its manufacturing base and medical and other scientific research fields. Thirteen programs including many of those listed above had placement rates of 60 percent or more and paid more than the median wage. In addition, the associate and bachelor's degrees in engineering technologies and the associate degrees in welding technology met these criteria.

<sup>6</sup> Tennessee Department of Labor and Workforce Development, WIRED, Short Term Industry Projections 2021-2023

# INTRODUCTION

This report is prepared pursuant to Tennessee Code Annotated § 49-7-112(b), which directs the Tennessee Higher Education Commission (THEC), in partnership with the Tennessee Department of Labor and Workforce Development (TDLWD), Tennessee Department of Economic and Community Development (TNECD), and Tennessee Department of Education (TDOE), to “produce an annual report regarding state workforce need projections and credential production.”

In-demand occupations and aligned academic programs — including postsecondary degrees, high school career and technical education (CTE) concentrators, and apprenticeships — are organized by career cluster in this report. Accompanying dashboards and workbooks localize this information by local workforce development area (LWDA), referred to as regions, and provide information on the aligned academic programs.

This report is developed in collaboration between THEC, TDLWD, TNECD, and TDOE which have distinct agency mission’s but connected goals in preparing Tennesseans for careers and building the talent pipeline of Tennessee’s workforce.





The Tennessee Department of Education's (TDOE) mission is to set all students on a path to success. As part of this vision, TDOE seeks to increase the number of students on-track to meet their postsecondary goals. 39.7 percent of the class of 2021 were Ready Graduates, which are the share of graduating students who demonstrate readiness for postsecondary education and/or a career after high school. There are several criteria to be a Ready Graduate, including a qualifying ACT score, participation in early postsecondary opportunities (EPSOs), among other criteria. The State Board of Education's (SBOE) Master Plan outlines the goal to **increase the share of Ready Graduates by 4 percentage points annually**.



The Tennessee Higher Education Commission (THEC) and Tennessee Student Assistance Corporation (TSAC) are *relentlessly focused on increasing the number of Tennesseans with a postsecondary credential*. **The goal is for 55 percent of Tennesseans to have a postsecondary credential by 2025**, which is informed by estimates of workforce need. To meet this goal, THEC/TSAC promotes college access, offers financial aid programs, approves academic programs offered by public colleges, funds colleges through an outcomes-based funding model, and guides local workforce alignment efforts through the Governor's Investment and Vocational Education Act (GIVE). To improve the pipeline to college, THEC/TSAC has established the Momentum Year to increase seamless college enrollment to 60 percent for the Class of 2023.



The mission of the Tennessee Department of Labor and Workforce Development (TDLWD) is to *work as a team to promote workforce and economic development and improve workplace safety and health throughout Tennessee*. TDLWD oversees several functions to promote training and employment for individuals to increase family-sustaining wages, meet employer demand, and enhance productivity and competitiveness in Tennessee. This is done through a high-quality workforce development system, aligning workforce investment, education, and economic development. TDLWD seeks to **increase the Labor Force Participation rate to 65 percent by 2025**. As of December 2022, Tennessee's Labor Force Participation rate was 58.5 percent.

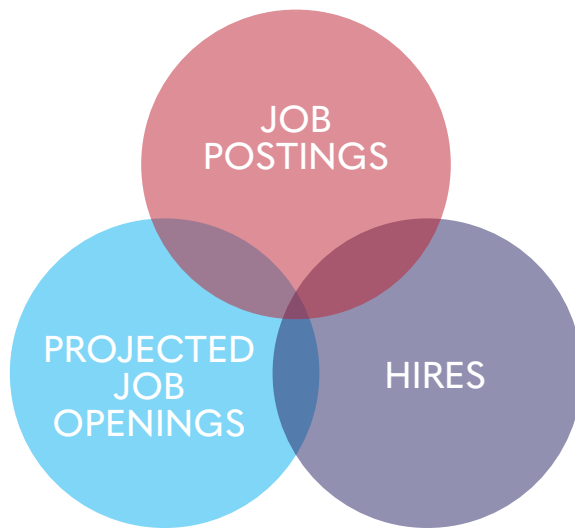


The Tennessee Department of Economic and Community Development (TNECD)'s mission is to *enhance Tennessee's competitiveness by driving job creation, generating economic growth, and facilitating community development*. As part of this mission, TNECD seeks to **be the number one state in the southeast for high quality jobs** and supports the state's efforts to attract and grow business in the state for job growth and economic vitality. A core goal to their Strategic Plan is to support companies and education stakeholders in closing workforce gaps.

# IN-DEMAND OCCUPATIONS AND ALIGNED ACADEMIC SUPPLY

This section captures the 2023 in-demand occupations across Tennessee and the aligned secondary and postsecondary academic programs. An **in-demand occupation** is a job that Tennessee employers have a high demand to fill. An occupation is measured as in-demand when two of three measures of demand (job postings, projected job openings, and hires) are above the median in those measures relative to other occupations within the region.

## MEASURES FOR IN-DEMAND OCCUPATIONAL ANALYSIS



An **aligned academic program**<sup>7</sup> is a training program preparing students for careers in an in-demand occupation. The skills and knowledge developed through completion of an aligned academic program are matched with the skills and knowledge required for success in an occupation. These matches are made by using the 2020 Classification of Instructional Programs (CIP)<sup>8</sup> to 2018 Standard Occupational Classification (SOC)<sup>9</sup> crosswalk developed in partnership between the Bureau of Labor Statistics and National Center for Education Statistics.<sup>10</sup> This portion of the analysis captures data from Tennessee’s P20 Connect Data System for public and select private postsecondary completers<sup>11</sup>, secondary concentrators<sup>12</sup>, and employment outcomes.

This year’s report captures in-demand occupations and aligned academic supply in the same section. This approach is designed to foster conversations about academic programming and how new and existing training programs can be leveraged to address workforce demands.

More information on the data sources and methodology for this analysis can be found on page 73. Details on in-demand occupations at the state and regional level and aligned academic programs reported by IPEDS can be found on [this webpage](#).

<sup>7</sup> This report includes registered apprenticeships, high school CTE completers, and postsecondary degree completers in data for aligned academic programs. There are other training initiatives, like industry certifications, that are not currently captured due to data availability.

<sup>8</sup> [The Classification of Instructional Programs \(CIP\)](#) is a taxonomic scheme that supports the accurate tracking and reporting of fields of study and program completions activity.

<sup>9</sup> [The Standard Occupational Classification \(SOC\)](#) is a federal statistical standard used by federal agencies to classify workers into occupational categories for the purpose of collecting, calculating, or disseminating data.

<sup>10</sup> More information about BLS and NCES CIP to SOC Crosswalk can be found [here](#). This year’s report reflects the updated 2020 CIP codes and 2018 SOC codes.

<sup>11</sup> Select Tennessee Independent Colleges and Universities Association (TICUA) institutions report to P20 Connect and those completers and their associated job market outcomes are included.

<sup>12</sup> For purposes of this report, high school CTE concentrators reflect a student completing two course credits within a CTE program of study.

## How to Read Tables in this Section

Occupations have been grouped throughout this report based on their career clusters, which are groupings of occupations and their connected training programs. The nationally recognized career clusters framework is used in alignment with TDOE's career and technical education (CTE) framework and TDLWD's crosswalks which organize occupations and training programs providing common pathways for prospective students to occupations (and vice versa).<sup>13,14,15</sup>

Each career cluster has a table of the in-demand occupations and tables with the aligned academic program supply.<sup>16</sup> For most career clusters, there are multiple tables showing academic program supply. The first table highlights postsecondary degree completers, a second table highlights high school CTE concentrators, and, for some clusters, a third table provides the number of students completing registered apprenticeships.<sup>17</sup>

<b>CLUSTERS OF IN-DEMAND OCCUPATIONS AND ALIGNED ACADEMIC PROGRAMS</b>
Cluster One: <a href="#">Agriculture, Food, and Natural Resources</a>
Cluster Two: <a href="#">Architecture and Construction</a>
Cluster Three: <a href="#">Manufacturing</a>
Cluster Four: <a href="#">Transportation</a>
Cluster Five: <a href="#">Business, Finance and Government Management and Support Services</a>
Cluster Six: <a href="#">Sales and Marketing</a>
Cluster Seven: <a href="#">Health Sciences</a>
Cluster Eight: <a href="#">Human Services</a>
Cluster Nine: <a href="#">Education and Training</a>
Cluster Ten: <a href="#">Protective Services and Law</a>
Cluster Eleven: <a href="#">Arts and Communication</a>
Cluster Twelve: <a href="#">Leisure and Recreation</a>
Cluster Thirteen: <a href="#">Information Technology</a>
Cluster Fourteen: <a href="#">Engineering and Other STEM</a>

<sup>13</sup> For more information see Advance CTE's website explaining the 16 National Career Clusters Framework [here](#).

<sup>14</sup> Tennessee Department of Education's Career Cluster Framework can be found [here](#).

<sup>15</sup> This year's report combines Business, Finance, Government and Support Services into one cluster and Sales and Marketing into one cluster resulting in 14 career clusters.

<sup>16</sup> For purposes of this report, each occupation is categorized into only one cluster. In practice an occupation may be relevant to additional career clusters.

<sup>17</sup> Apprenticeship data is limited to the Architecture and Construction, Manufacturing, Transportation, and Health Sciences clusters.

The report also highlights positions which comprise the workforce for TNECD’s target industry sectors.<sup>18</sup> TNECD has nine prioritized sectors for business expansion and recruitment. Resources are focused on these industries due to the state’s demonstrated strengths, concentration, and assets which allow the industries to thrive, as well as the significant economic impact and high-quality job opportunities these industries offer.

<b>TNECD TARGET INDUSTRY SECTORS</b>		
<b>Aerospace &amp; Defense</b>	<b>Automotive</b>	<b>Chemicals</b>
<b>Distribution &amp; Logistics</b>	<b>Electrical Equipment &amp; Appliances</b>	<b>Food &amp; Agriculture</b>
<b>Healthcare &amp; Life Sciences</b>	<b>HQ, Finance &amp; Tech</b>	<b>Rubber, Ceramics &amp; Glass Products</b>

The tables for in-demand occupations include columns to help the reader quickly learn more about the occupation.

**IN-DEMAND OCCUPATION TABLE LEGEND:**

- The six-digit code denotes the Standard Occupational Classification (SOC) Code for the in-demand occupation.
- Occupation is the name of the in-demand job as provided by the SOC system.
- Two columns indicate the region(s) in which the position is in-demand:
  - o In the column named “TN”, an “X” denotes that an occupation was in-demand across the Tennessee statewide region.
  - o In the column named “Total # Regions”, a number from one to nine<sup>19</sup> indicates the number of regions in which the occupation was found to be in-demand. The regions include the state’s nine Local Workforce Development Areas (LWDA).<sup>20</sup>
- The statewide entry-level wage is reported from the Occupational Employment and Wage Estimates from the Bureau of Labor Statistics.
- A “\*” denotes the occupation is important to one or more of TNECD’s target industry sectors.
- A “#” denotes the occupation is a STEM occupation.<sup>21</sup>
- The typical entry-level education requirement represents the typical education level most workers need to enter an occupation, as assigned by the U.S. Bureau of Labor Statistics.<sup>22</sup>

<sup>18</sup> More information on each target industry sector is available at <https://tnecd.com/>.

<sup>19</sup> In last year’s report, the “Total # Regions” included both (1) the state’s nine Local Workforce Development Areas (LWDA), as well as (2) a tenth region representing the state as a whole. In this year’s report, “Total # Regions” does not include (2) a tenth region representing the state as a whole.

<sup>20</sup> There are nine LWDA’s, or regions, composed of groups of counties within Tennessee. An occupation with a “9” indicates that the occupation was found to be in-demand for each of the nine LWDA’s, or regions, within the state.

<sup>21</sup> TNECD and TDLWD use the U.S. BLS definition for Science, Technology, Engineering, and Math (STEM). More information about this definition can be found [here](#): U.S. Bureau of Labor Statistics, Additional OEWS data sets, STEM data, May 2021 (XLS)

<sup>22</sup> More information about education training levels in BLS data can be found [here](#).

## ACADEMIC SUPPLY TABLE LEGENDS:

The tables for academic supply include columns to help the reader quickly learn more about completions and outcomes for academic programs within the career cluster.

### *For Postsecondary Completers:*

- The six-digit code denotes the Classification of Instructional Program (CIP Code) for the academic program.<sup>23</sup>
- Program Title is the name of the academic program.
- Education Award Level represents the degree level completed. Degree levels include less than one-year certificates (C<1YR), one-to-two-year certificates (C1-2YR), associate (AA), bachelor's (BA), post-baccalaureate certificates (CPBA), master's (MA), education specialists (EDS), doctoral (D), and professional degrees (P).<sup>24</sup>
- The Number of Graduates from 2020-21 within that CIP code at that degree level are reported. Cells less than ten are suppressed.
- Share of Graduates Employed in Tennessee represents the percentage of graduates found in two quarters of Tennessee's Unemployment Insurance (UI) records two quarters after graduation. This excludes individuals who remain enrolled in education. ***This is an update from last year's methodology.***
- Estimated First Year Annual Wages of Graduates Employed in Tennessee denotes the estimated first year average annual wages of graduates found in UI data. Two quarters of wages are pulled two quarters after graduation and are calculated by multiplying the sum of quarterly wages by two then finding the median. ***This is an update from last year's methodology.***<sup>25</sup>

### *For High School CTE Concentrators:*

- The six-digit code denotes the Classification of Instructional Program (CIP Code) assigned to the High School CTE Program.<sup>26</sup>
- Program Title is the name of the academic program.
- Number of Grads represents the number of high school graduates who completed two or more courses in a CTE program of study (HS CTE Concentrator). This data reflects completers from 2020-21.
- Share of Graduates Employed in Tennessee represents the percentage of graduates found in two quarters of Tennessee's Unemployment Insurance (UI) records two quarters after graduation. This excludes individuals who remain enrolled in education. ***This is an update from last year's methodology.***
- Estimated First Year Annual Wages of Graduates Employed in Tennessee denotes the estimated first year-average annual wages of graduates found in UI data. Two quarters of wages are pulled two quarters after graduation and are calculated by multiplying the sum of quarterly wages by two then finding the median. ***This is an update from last year's methodology.***

### *For Federal Registered Apprenticeship Completers:*

- The six-digit code denotes the Classification of Instructional Program (CIP Code) linked to the Federally Registered Apprenticeship.
- Program Title is the name of the Registered Apprenticeship program.
- The number of Registered Apprenticeship completers in 2021.

<sup>23</sup> More information about CIP codes can be found [here](#).

<sup>24</sup> TCAT diplomas are captured within the certificate degree level.

<sup>25</sup> The methodology for calculating the share of individuals found in the Tennessee workforce and their wages was updated from last year's report. More information about this methodological update can be found in the Data Sources and Methodology section on page 73.

<sup>26</sup> High School CTE pathways **do not** have CIP codes formally assigned. TDLWD uses information about the pathways to designate the CIP code. Formally assigning CIP codes to HS CTE pathways will improve alignment efforts.

# CLUSTER ONE: AGRICULTURE, FOOD, AND NATURAL RESOURCES

## QUICK TAKEAWAYS

Veterinarians are **in demand** in three regions in Tennessee. The University of Tennessee, Knoxville (UTK) is the sole provider of Doctor of Veterinary Medicine (DVM) degrees in the state. In 2020-21, 86 DVMs were granted. The estimated annual wages of DVMs in the first year were \$99,844, outpacing other graduates in the agriculture, food, and natural resources cluster. However, only 30 percent of DVM graduates were found in Tennessee's employment records, which may indicate that graduates are working out of state. Occupations in-demand in more than three regions include supervisors of landscaping workers, landscaping workers, and wastewater treatment operators. **Supply:** In this cluster, the highest employment rates of graduates found in the Tennessee records were associate degree programs in veterinary technician and assistant and biotechnology. The first-year wage outcomes for biotechnology graduates are the second highest in this cluster at \$40,065. Certificate completers and high school CTE concentrators in veterinary technician/assistant and food technology and processing had higher than average employment rates. **Unmet needs:** Biotechnology will likely continue to expand; training programs for landscaping supervisors and workers were few.

In 2021, farming operations occupied around 40 percent of the state’s nearly 27.0 million acres of land area, according to the Boyd Center for Business and Economic Research. Farming generated \$4.4 billion in cash receipts during 2021, “with about 64 percent of this value coming from crops and 36 percent from animals and animal products.” Tennessee is home to approximately 69,500 farming operations, which ranking 8th highest among all states.<sup>27</sup>

Veterinarians and veterinary technologists and technicians provide essential services for the health and safety of Tennessee’s animals and animal products.

Tennessee has an estimated 8.5 billion live trees<sup>28</sup> and 14 million acres in forest.<sup>29</sup> Logging equipment operators supply raw materials to companies needing wood and forest products for manufacture.

SOC Code	Occupation	In-Demand		Statewide Entry-Level Wage	Typical Entry-Level Education	Key to TNECD Industry Sectors	STEM
		TN	Total # Regions				
29-1131	Veterinarians		3	\$64,589	Doctoral or professional degree		
29-2056	Veterinary Technologists and Technicians		3	\$26,563	Associate degree		
31-9096	Veterinary Assistants and Laboratory Animal Caretakers		1	\$21,893	HS diploma or equivalent		
37-1012	First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers		8	\$31,865	HS diploma or equivalent		
37-3011	Landscaping and Groundskeeping Workers		5	\$24,804	No formal educ. credential		
37-3012	Pesticide Handlers, Sprayers, and Applicators, Vegetation		1	\$27,383	HS diploma or equivalent		
37-3013	Tree Trimmers and Pruners		1	\$30,176	HS diploma or equivalent		
45-2041	Graders and Sorters, Agricultural Products		1	\$28,065	No formal educ. credential	*	
45-2091	Agricultural Equipment Operators		1	\$25,878	No formal educ. credential		
45-4022	Logging Equipment Operators		1	\$32,891	HS diploma or equivalent		
51-8031	Water and Wastewater Treatment Plant and System Operators		4	\$30,915	HS diploma or equivalent		
53-7081	Refuse and Recyclable Material Collectors		3	\$19,227	No formal educ. credential		

Employment opportunities in agriculture, food, and natural resources are expanding with an average growth of nine to 21 percent annually in Tennessee,<sup>30</sup> with approximately 50 projects announced since 2017, 6,100+ additional new jobs and \$2.1+ billion in capital investment.<sup>31</sup> University of Tennessee Extension’s Agriculture and Natural Resources Team provides educational programs and information about agriculture, natural resources, and the food system. UT Extension programs in Agriculture and Natural Resources contribute more than \$331 million in economic impact in Tennessee.<sup>32</sup> Biotechnology is also likely to expand.

<sup>27</sup> An [Economic Report to the Governor of Tennessee](#), 2023, page 45

<sup>28</sup> United States Department of Agriculture, [EVALIDator \(Data Retrieval Tool for Tree Population Estimates\)](#)

<sup>29</sup> Tennessee Department of Agriculture, [Forestry](#)

<sup>30</sup> Tennessee Department of Economic and Community Development, Food, and Natural Resources [webpage](#)

<sup>31</sup> Tennessee Department of Economic and Community Development, Food and Agriculture [webpage](#)

<sup>32</sup> University of Tennessee Extension’s Agriculture and Natural Resources [webpage](#)

Middle Tennessee State University (MTSU) offers academic programs in horse science to equip students for a variety of careers such as journalists for major horse publications, financial planning specializing in equine businesses, and licensed horse show official.<sup>33</sup> The Center of Equine Recovery for Veterans at MTSU pairs students learning about Equine Assisted Activities and Therapies with local veterans to provide therapy.

Veterinarians and veterinary technicians provide critical care for animal health and safety. Some of Tennessee’s community and technical colleges such as Chattanooga State Community College, Columbia State Community College, and Tennessee College of Applied Technology at Memphis provide course offerings to become to veterinary assistants, providing training on patient management, care, and clinical procedures assistance.

Clean, safe drinking water is vital to public health. Tennessee communities get their water from a variety of sources that need to be managed and protected. Pellissippi State Community College prepares individuals for careers in water and wastewater treatment operations with opportunities to connect with local employers and industry representatives.<sup>34</sup>

## **AGRICULTURE, FOOD, AND NATURAL RESOURCES ALIGNED ACADEMIC PROGRAMS**

### *Postsecondary Agriculture, Food, & Natural Resources Degrees, 2020-21*

<b>CIP Code</b>	<b>Program Title</b>	<b>Educ. Award Level</b>	<b>Number of Grads</b>	<b>% Employed in TN</b>	<b>Estimated First Year Annual Wages</b>
01.0101	Agricultural Business and Management, General.	BA	24	58%	\$37,508
01.0101	Agricultural Business and Management, General.	MA	*	*	*
01.0102	Agribusiness/Agricultural Business Operations.	BA	85	44%	\$35,641
26.1201	Biotechnology.	AA	10	80%	\$40,065
01.0605	Landscaping and Groundskeeping.	C < 1 YR	*	*	*
01.8001	Veterinary Medicine.	P	86	28%	\$99,844
01.0307	Horse Husbandry/Equine Science and Management.	BA	*	*	*
01.0307	Horse Husbandry/Equine Science and Management.	MA	*	*	*
01.0504	Dog/Pet/Animal Grooming.	C < 1 YR	18	78%	\$22,104
01.8301	Veterinary/Animal Health Technology/Technician and Veterinary Assistant.	C < 1 YR	*	*	*
01.8301	Veterinary/Animal Health Technology/Technician and Veterinary Assistant.	C 1-2 YR	18	56%	\$22,126
01.8301	Veterinary/Animal Health Technology/Technician and Veterinary Assistant.	AA	55	87%	\$30,152
15.0506	Water Quality and Wastewater Treatment Management and Recycling Technology/ Technician.	AA	*	*	*

Source: P20 Connect, public postsecondary and select private postsecondary completers, 2020-21 and TDLWD Unemployment Insurance (UI) employment and wage records.

In 2021 - 2022, 332 students successfully completed post-secondary programs at Tennessee’s public universities, community, and technical colleges related to agricultural business and management and healthcare and cosmetic services for animals.

Landscaping and groundskeeping workers are in demand in 5 regions of the state. Supervisors of landscaping and lawn service providers are also in-demand in 8 regions. While no formal training is required, there are few training programs for landscaping supervisors and workers.

<sup>33</sup> Middle Tennessee State University, College of Basic and Applied Sciences, [Why Horse Science?](#)

<sup>34</sup> Pellissippi State Community College, Water Quality Technology A.A.S. [webpage](#)



### High School CTE Agriculture, Food, & Natural Resources Completers, 2020-21

CIP Code	Program Title	Educ. Award Level	Number of Grads	% Employed in TN	Est. First Year Annual Wages
01.0102	Agribusiness/Agricultural Business Operations.	CTE HS	92	51%	\$19,280
01.1002	Food Technology and Processing.	CTE HS	43	58%	\$19,271
01.8301	Veterinary/Animal Health Technology/ Technician and Veterinary Assistant.	CTE HS	1168	55%	\$18,433

Source: P20 Connect, TDOE high school CTE completers 2020-21, and TDLWD unemployment insurance (UI) employment and wage records.

**STUDENTS FROM TENNESSEE  
COLLEGE OF APPLIED  
TECHNOLOGY (TCAT) CRUMP**



**GIVE**

The Governor's Investment in Vocational Education (GIVE) is designed to foster long-term regional partnerships between Tennessee Colleges of Applied Technology (TCATs), community colleges, industry, economic development/workforce agencies, and K-12 to identify and address "skills gaps" in local workforce pools. The GIVE program facilitates the alignment of local workforce and education partners through a competitive grant process with awards up to \$1 million.

One example of a successful GIVE grant project is the development and implementation of a Farming Operations Technology (FOT) program at TCAT Crump. The FOT program provides students with the skills and knowledge needed for today's agricultural operations including row crops, animal agriculture, precision agriculture, and forestry. Thus far, this program has produced 17 completers with a 100 percent job placement rate. The implementation of this program has allowed TCAT Crump to increase its dual enrollment presence to approximately 1,238 students, 837 of which are enrolled in the FOT program. Finally, TCAT Crump entered into an articulation agreement with the University of Tennessee at Martin (UTM) to award FOT graduates up to 30 credit hours into UTM's General Agriculture Bachelor's degree program.

**SPARC**

Supporting Postsecondary Access in Rural Communities (SPARC) is a targeted grant program for high school and adult learner populations with a specific focus on Career and Technical Education (CTE). This program strategically identifies economically at-risk and distressed communities and is intended to address the associated education and workforce factors that designated them as at-risk or distressed and to remove common barriers to postsecondary access.

Morgan County has partnered with Tennessee College of Applied Technology (TCAT) Oneida to offer an evening welding program within the Morgan County Career and Technical Center using a SPARC grant. This evening class allows students to work during the day and attend class after traditional work hours. This program has allowed recent high school graduates to complete training that was started while in high school, and it has allowed adults an opportunity to learn new skills or train for a new profession. At the conclusion of the 2022-2023 school year, six students will have completed the program. In addition to the evening welding program, SPARC has also assisted Morgan County in expanding dual enrollment opportunities within other CTE programs. As of the fall 2022 semester, roughly 23% of high school students were attempting post-secondary credits within the Morgan County Career and Technical Center.



**WELDING STUDENT FROM  
MORGAN COUNTY CAREER  
AND TECHNICAL CENTER**

# CLUSTER TWO: ARCHITECTURE AND CONSTRUCTION OCCUPATIONS

## QUICK TAKEAWAYS

**Demand:** Several occupations in this group are in-demand statewide, including in residential, commercial, and industrial construction. Construction managers and cost estimators typically require four-year degrees, while most other occupations in this group acquire skills through a two-year degree, postsecondary certificate, apprenticeship, or on-the-job training. Construction workers in-demand in most areas of the state include: construction supervisors, electricians, carpenters, operating engineers, painters, plumbers, and heating, ventilation, and air conditioning (HVAC) personnel. **Supply:** The bachelor's program in construction management had the highest share of graduates (of programs with 10 or more completers) found in the Tennessee job market (63 percent), with first-year wages of \$57,569. Less than one year certificate programs in plumbing place 60 percent of graduates in the Tennessee job market. Several high school CTE programs in this cluster have employment rates of 50 percent. In 2020-21, 32 electricians and 527 production machinery electricians completed apprenticeships. **Unmet Needs:** Due to high regional demand and few training options, programs in basic skills for carpenters, operating engineers, painters, plumbers, and cost estimators are needed.

Occupations in architecture and construction need skilled workers that design, plan, manage, build, and maintain structures. Construction workers are highly sought after, as construction of new homes and buildings seeks to keep up with demand from population growth in Tennessee. Future construction employment growth will also be driven by large construction projects. Tennessee’s position as a top state to do business has generated economic development successes, which in turn create jobs in architecture and construction. Among Tennessee’s recent successes are Ford Motor Company’s plans to build an electric vehicle and battery manufacturing plant at the Memphis Regional Megasite in West Tennessee.<sup>35</sup>

Several occupations in this group are in-demand statewide, and skilled workers are needed in every region or nearly every region across the state. Construction managers, cost estimators, and interior designers typically require four-year degrees, while most other occupations in this group acquire skills through a two-year degree, postsecondary certificate, apprenticeship, or on-the-job training.

Many of the in-demand occupations in the construction trades are tied to residential and commercial construction. The need to build new housing stock across the state requires skilled tradespeople to fill that workforce. This includes construction managers, carpenters, cement masons and concrete finishers, construction laborers, operating engineers and other construction equipment operators, painters, plumbers, roofers and heating, air conditioning, and refrigeration mechanics and installers.

Cost estimators are employed in a variety of construction industries. Every region in Tennessee has a lower concentration of cost estimators than the national average. Supply chain issues, increased demand for products, and inflation since the onset of the pandemic has increased the present need for cost estimators in the state.

Electricians are in-demand across Tennessee and are key to several TNECD industry sectors including the automotive and the electrical equipment and appliance sectors. Within the automotive sector, Tennessee is developing as a leader in the electric vehicle (EV) industry. Electricians will be a key component to the adoption of electric vehicles in our state.<sup>36</sup> In September 2022, the State of Tennessee’s TEVI (Tennessee Electric Vehicle Infrastructure) Plan was approved by the Federal Highway Administration. Prior to the NEVI (National Electric Vehicle Infrastructure) Program, Tennessee had already started to establish a statewide EV infrastructure.<sup>37</sup>

SOC Code	Occupation	In-Demand		Statewide Entry-Level Wage	Typical Entry-Level Education	Key to TNECD Industry Sectors	STEM
		TN	Total # Regions				
11-9021	Construction Managers		9	\$53,618	Bachelor’s degree		
13-1051	Cost Estimators	X	8	\$39,658	Bachelor’s degree	*	
27-1025	Interior Designers		1	\$30,452	Bachelor’s degree		
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers		7	\$43,263	HS diploma or equivalent		
47-2021	Brickmasons and Blockmasons	X	3	\$40,229	HS diploma or equivalent		
47-2031	Carpenters	X	8	\$32,275	HS diploma or equivalent		
47-2051	Cement Masons and Concrete Finishers	X	7	\$33,052	No formal educ. credential		
47-2061	Construction Laborers		9	\$27,398	No formal educ. credential		
47-2071	Paving, Surfacing, and Tamping Equipment Operators	X	4	\$29,787	HS diploma or equivalent		
47-2073	Operating Engineers and Other Construction Equipment Operators	X	9	\$32,960	HS diploma or equivalent	*	
47-2111	Electricians		9	\$35,416	HS diploma or equivalent	*	
47-2121	Glaziers		1	\$27,824	HS diploma or equivalent	*	

<sup>35</sup> Office of the Governor, [Press Release](#)

<sup>36</sup> According to the U.S. Bureau of Labor Statistics, “Electricians install charging stations and any other equipment needed for electric vehicles. They attach the charging stations to lines that have been installed by electrical power-line installers and ensure the chargers are working properly. When there is a problem with the charger, electricians are called to make necessary repairs.” - Source: U.S. Bureau of Labor Statistics, Careers in Electric Vehicles ([https://www.bls.gov/green/electric\\_vehicles/](https://www.bls.gov/green/electric_vehicles/)).

<sup>37</sup> Tennessee Department of Transportation, [Electric Vehicle Infrastructure Deployment Plan](#)

SOC Code	Occupation	In-Demand		Statewide Entry-Level Wage	Typical Entry-Level Education	Key to TNECD Industry Sectors	STEM
		TN	Total # Regions				
47-2141	Painters, Construction and Maintenance	X	9	\$29,305	No formal educ. credential		
47-2151	Pipelayers		2	\$31,391	No formal educ. credential		
47-2152	Plumbers, Pipefitters, and Steamfitters	X	9	\$37,399	HS diploma or equivalent	*	
47-2181	Roofers		5	\$28,832	No formal educ. credential		
47-2211	Sheet Metal Workers		5	\$32,382	HS diploma or equivalent	*	
47-2221	Structural Iron and Steel Workers		2	\$38,459	HS diploma or equivalent		
47-3012	Helpers--Carpenters		1	\$27,099	No formal educ. credential		
47-3013	Helpers--Electricians	X	6	\$27,586	HS diploma or equivalent		
47-3015	Helpers--Pipelayers, Plumbers, Pipefitters, and Steamfitters	X	5	\$25,619	HS diploma or equivalent		
47-4011	Construction and Building Inspectors	X	5	\$36,503	HS diploma or equivalent		
47-4090	Miscellaneous Construction and Related Workers	X	0	\$27,236	HS diploma or equivalent		
49-2098	Security and Fire Alarm Systems Installers	X	2	\$27,423	HS diploma or equivalent		
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers		9	\$32,593	Postsecondary nondegree award	*	
49-9051	Electrical Power-Line Installers and Repairers		2	\$43,563	HS diploma or equivalent		
49-9052	Telecommunications Line Installers and Repairers	X	2	\$36,889	HS diploma or equivalent		
49-9098	Helpers--Installation, Maintenance, and Repair Workers	X	5	\$24,292	HS diploma or equivalent		

Three public universities offer bachelor's degree in construction management. University of Tennessee, Martin (UTM) recently established a construction management program (starting fall 2022) designed for STEM students who may be interested in construction-related work. The program includes training on project-management, leading graduates to possible careers as Project Managers, General Contractors, and other construction professions.<sup>38</sup> University of Tennessee, Knoxville (UTK) and MTSU also offer this program.

The Tennessee Colleges of Applied Technology (TCATs), the state's leading providers of training in the architecture and construction fields, offer programs in plumbing; electrical, heating, ventilation, and air conditioning (HVAC); and engineering—all ranging in complexity and program length, but typically in one to two-year programs with increasing levels of experience within specialized fields. With high regional demand, more training opportunities for carpenters, operating engineers, painters, plumbers, and cost estimators are needed.

With funding from GIVE 2.0, TCAT Northwest launched their Building Construction Technology program across six counties in West Tennessee. This program utilizes dual enrollment facilities on high school campuses to streamline the transition from secondary to postsecondary institutions and equips students with the required skills and training to be proficient in the areas of carpentry, residential electrical wiring, residential plumbing, and block and brick laying.

<sup>38</sup> UTM, [Construction Management](#)

## ARCHITECTURE AND CONSTRUCTION ALIGNED ACADEMIC PROGRAMS

### Postsecondary Architecture and Construction Degrees, 2020-21

CIP Code	Program Title	Educ. Award Level	Number of Grads	% Employed in TN	Estimated First Year Annual Wages
15.0101	Architectural Engineering Technologies/Technicians.	C < 1 YR	22	27%	\$30,891
15.0101	Architectural Engineering Technologies/Technicians.	AA	10	40%	*
15.0201	Civil Engineering Technologies/Technicians.	AA	*	*	*
15.1001	Construction Engineering Technology/Technician.	C < 1 YR	*	*	*
15.1001	Construction Engineering Technology/Technician.	C 1-2 YR	*	*	*
15.1001	Construction Engineering Technology/Technician.	AA	*	*	*
52.2001	Construction Management, General.	BA	76	63%	\$57,569
50.0408	Interior Design.	AA	18	56%	\$21,829
50.0408	Interior Design.	BA	49	45%	\$39,193
50.0408	Interior Design.	MA	*	*	*
46.0301	Electrical and Power Transmission Installation/ Installer, General.	C < 1 YR	42	19%	\$45,161
46.0301	Electrical and Power Transmission Installation/ Installer, General.	C 1-2 YR	114	33%	\$34,261
46.0302	Electrician.	C < 1 YR	124	55%	\$32,239
46.0302	Electrician.	C 1-2 YR	288	54%	\$34,772
46.0101	Mason/Masonry.	C < 1 YR	*	*	*
46.0502	Pipefitting/Pipefitter and Sprinkler Fitter.	C < 1 YR	14	29%	*
46.0502	Pipefitting/Pipefitter and Sprinkler Fitter.	C 1-2 YR	24	33%	\$30,786
46.0503	Plumbing Technology/Plumber.	C < 1 YR	10	60%	\$35,006
46.0503	Plumbing Technology/Plumber.	C 1-2 YR	22	36%	\$28,972
47.0201	Heating, Air Conditioning, Ventilation and Refrigeration Maintenance Technology/Technician.	C < 1 YR	190	35%	\$26,216
47.0201	Heating, Air Conditioning, Ventilation and Refrigeration Maintenance Technology/Technician.	C 1-2 YR	502	55%	\$37,266
46.0415	Building Construction Technology/Technician.	C < 1 YR	38	26%	\$19,284
46.0415	Building Construction Technology/Technician.	C 1-2 YR	186	40%	\$32,173
46.9999	Construction Trades, Other.	C < 1 YR	36	56%	\$29,656
46.9999	Construction Trades, Other.	C 1-2 YR	24	33%	\$30,574

Source: P20 Connect, public postsecondary and select private postsecondary completers, 2020-21 and TDLWD Unemployment Insurance (UI) employment and wage records.

## High School CTE Architecture and Construction Completers, 2020-21

CIP Code	Program Title	Educ. Award Level	Number of Grads	% Employed in TN	Est. First Year Annual Wages
15.0101	Architectural Engineering Technologies/ Technicians.	CTE HS	452	55%	\$22,093
15.1702	Power Plant Technology/Technician	CTE HS	*	*	*
46.0415	Building Construction Technology/ Technician.	CTE HS	565	53%	\$23,099
46.9999	Construction Trades, Other.	CTE HS	333	54%	\$20,626

Source: P20 Connect, TDOE high school CTE completers, 2020-21 and TDLWD Unemployment Insurance (UI) employment and wage records.

## Architecture and Construction Apprenticeship Completers, 2020-21

CIP Code	Apprenticeship Title	Number of Completers, 2021
46.0302	Electrician	32
46.0303	Journeyman Line worker	9
46.0301	Line Erector (Power-Line Distribution Erector)	6
46.0301	Line Installer-Repairer	2
46.0302	Production Machinery Electrician	527
46.0902	Pipefitter (Construction)	2
46.0502	Pipefitting	1
46.0503	Plumber	2
46.0201	Carpenter	7
46.9999	Construction Craft Laborer	8
46.0414	Insulation Worker	388
46.0506	Sheet Metal Worker	10

Source: TDLWD Apprenticeship Completer Data

# CLUSTER THREE: MANUFACTURING OCCUPATIONS

## QUICK TAKEAWAYS

**Demand:** Tennessee has done an exceptional job of growing one of the strongest specialized manufacturing workforces in the country. As Tennessee expands its manufacturing investments, there are many occupations in-demand across the state, including first line supervisors of mechanics, installers, and repairers and production workers; general maintenance and repair workers; machinists; welders; inspectors, testers, sorters, samplers, and weighers; food batchmakers; and computer numerically controlled tool operators. **Supply:** Multiple certificate programs had employment rates of 60 percent or more among completers. High school CTE programs in the Manufacturing cluster including machine shop assistant, electromechanical technologies, mechatronics, and welding had employment rates of 56 percent or more, although salaries were low. Over 600 credentials in machine tool technology were awarded by TCATs and community colleges in 2020-21. Over 2,440 welding credentials were issued, including postsecondary certificates and CTE concentrators.



Manufacturing represents 15 percent of Tennessee's gross domestic product, the largest of any sector.<sup>39</sup> From December 2021 through November 2022, Tennessee exported \$38.9 billion in manufactured goods.<sup>40</sup> The largest categories of exported manufactured goods in Tennessee over the last year include chemicals; computer and electronic products; transportation equipment; miscellaneous manufactured commodities; machinery; and electrical equipment, appliances, and components.

Tennessee has excelled in growing one of the strongest specialized manufacturing workforces in the country. Tennessee's manufacturing employment is 36 percent more concentrated than the national average.<sup>41</sup>

Nearly every in-demand occupation in the manufacturing career cluster is key to the success of TNECD's target industry sectors. This is especially true for the Automotive; Rubber, Ceramics, & Glass; Electrical Equipment & Appliances; and Aerospace and Defense sectors.

Since 2019, TNECD has announced over 270 manufacturing projects with over 41,000 new job commitments. Manufacturing jobs represent over half the new job commitments generated through TNECD's projects since 2019. The largest manufacturing job announcement in the state's history occurred in 2021 with Ford Motor Company. Ford announced its once-in-a-generation investment to create a 3,600-acre mega campus called Blue Oval City on the Memphis Regional Megasite to produce all-electric F-Series trucks beginning in 2025.<sup>42</sup> In 2022, LG Chem announced its plan to invest approximately \$3.2 billion to establish a new cathode manufacturing facility in Clarksville, Tennessee, which will support the electric vehicle battery value-chain in the U.S.<sup>43</sup>

Metal and plastics workers, like welders and machinists, are in-demand across different regions of the state, with each of the nine regions having a slightly different specialized need for these occupations. Welders are the most in-demand occupation of the metal and plastic workers across the state. Over 1,600 <1YR and 1-2YR certificates, and TCAT diplomas, were completed at TCATs and community colleges in 2020-21, preparing individuals along the pipeline to become welders.

Welders in Tennessee work in industries such as motor vehicle parts manufacturing, motor vehicle body and trailer manufacturing, or machine shops.<sup>44</sup>

Inspectors, testers, sorters, samplers, and weighers are in-demand across the state as well. This occupation works in a variety of manufacturing industries, including motor vehicle parts manufacturing, rubber product manufacturing, plastics product manufacturing, medical equipment and supplies manufacturing, electrical equipment manufacturing, and foundries. This occupation may use precision measuring instruments and complex test equipment to detect deviations from specifications in manufactured parts and products.

<sup>39</sup> U.S. Bureau of Economic Analysis, Gross Domestic Product by State, 2022 Quarter 3

<sup>40</sup> U.S. Census Bureau, USA Trade Online, State Export Data, Commodities (31,32,33), December 2021 – November 2022

<sup>41</sup> U.S. Bureau of Labor Statistics, QCEW, Employment Location Quotient, June 2022

<sup>42</sup> TNECD [Press Release](#)

<sup>43</sup> TNECD [Press Release](#)

<sup>44</sup> Tennessee Department of Labor, [Jobs4TN.gov](#)

SOC Code	Occupation	In-Demand		Statewide Entry-Level Wage	Typical Entry-Level Education	Key to TNECD Industry Sectors	STEM
		TN	Total # Regions				
43-5111	Weighers, Measurers, Checkers, and Samplers, Recordkeeping		1	\$28,870	HS diploma or equivalent	*	
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	X	8	\$43,117	HS diploma or equivalent	*	
49-2011	Computer, Automated Teller, and Office Machine Repairers	X	2	\$25,417	Some college, no degree	*	
49-2022	Telecommunications Equipment Installers and Repairers, Except Line Installers		5	\$38,512	Postsecondary nondegree award	*	
49-2094	Electrical and Electronics Repairers, Commercial and Industrial Equipment	X	5	\$40,184	Postsecondary nondegree award	*	
49-9041	Industrial Machinery Mechanics		4	\$39,553	HS diploma or equivalent	*	
49-9043	Maintenance Workers, Machinery		1	\$36,132	HS diploma or equivalent	*	
49-9044	Millwrights		2	\$34,042	HS diploma or equivalent	*	
49-9071	Maintenance and Repair Workers, General		8	\$28,314	HS diploma or equivalent	*	
49-9099	Installation, Maintenance, and Repair Workers, All Other		9	\$27,932	HS diploma or equivalent		
51-1011	First-Line Supervisors of Production and Operating Workers		9	\$40,666	HS diploma or equivalent	*	
51-2041	Structural Metal Fabricators and Fitters		1	\$34,876	HS diploma or equivalent	*	
51-2051	Fiberglass Laminators and Fabricators		1	\$32,194	HS diploma or equivalent	*	
51-3021	Butchers and Meat Cutters		4	\$27,207	No formal educ. credential	*	
51-3022	Meat, Poultry, and Fish Cutters and Trimmers		1	\$21,368	No formal educ. credential	*	
51-3092	Food Batchmakers		6	\$29,584	HS diploma or equivalent	*	
51-3099	Food Processing Workers, All Other		2	\$26,469	No formal educ. credential	*	
51-4021	Extruding and Drawing Machine Setters, Operators, and Tenders, Metal and Plastic		2	\$27,934	HS diploma or equivalent	*	
51-4022	Forging Machine Setters, Operators, and Tenders, Metal and Plastic		1	\$33,153	HS diploma or equivalent	*	
51-4031	Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic		3	\$28,512	HS diploma or equivalent	*	
51-4033	Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators, and Tenders, Metal and Plastic		3	\$27,720	HS diploma or equivalent	*	
51-4041	Machinists		8	\$31,686	HS diploma or equivalent	*	
51-4071	Foundry Mold and Coremakers		1	\$30,062	HS diploma or equivalent	*	
51-4072	Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic		3	\$26,651	HS diploma or equivalent	*	
51-4081	Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic		4	\$31,013	HS diploma or equivalent	*	

SOC Code	Occupation	In-Demand		Statewide Entry-Level Wage	Typical Entry-Level Education	Key to TNECD Industry Sectors	STEM
		TN	Total # Regions				
51-4111	Tool and Die Makers		1	\$36,719	Postsecondary nondegree award	*	
51-4121	Welders, Cutters, Solderers, and Brazers	X	9	\$34,693	HS diploma or equivalent	*	
51-4122	Welding, Soldering, and Brazing Machine Setters, Operators, and Tenders		3	\$29,343	HS diploma or equivalent	*	
51-4191	Heat Treating Equipment Setters, Operators, and Tenders, Metal and Plastic		2	\$32,562	HS diploma or equivalent	*	
51-4199	Metal Workers and Plastic Workers, All Other		4	\$27,439	HS diploma or equivalent	*	
51-6031	Sewing Machine Operators		1	\$19,198	No formal educ. credential	*	
51-6091	Extruding and Forming Machine Setters, Operators, and Tenders, Synthetic and Glass Fibers		1	\$33,326	HS diploma or equivalent	*	
51-6093	Upholsterers		1	\$25,470	HS diploma or equivalent	*	
51-7011	Cabinetmakers and Bench Carpenters		2	\$26,378	HS diploma or equivalent		
51-7041	Sawing Machine Setters, Operators, and Tenders, Wood		6	\$26,570	HS diploma or equivalent		
51-7042	Woodworking Machine Setters, Operators, and Tenders, Except Sawing		1	\$22,261	HS diploma or equivalent		
51-7099	Woodworkers, All Other		1	\$22,969	HS diploma or equivalent		
51-8013	Power Plant Operators		3	\$64,867	HS diploma or equivalent		
51-9021	Crushing, Grinding, and Polishing Machine Setters, Operators, and Tenders		1	\$28,887	HS diploma or equivalent	*	
51-9023	Mixing and Blending Machine Setters, Operators, and Tenders		4	\$28,762	HS diploma or equivalent	*	
51-9032	Cutting and Slicing Machine Setters, Operators, and Tenders	X	4	\$28,231	HS diploma or equivalent	*	
51-9041	Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders		1	\$27,047	HS diploma or equivalent	*	
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	X	9	\$27,573	HS diploma or equivalent	*	
51-9111	Packaging and Filling Machine Operators and Tenders	X	4	\$25,060	HS diploma or equivalent	*	
51-9124	Coating, Painting, and Spraying Machine Setters, Operators, and Tenders	X	6	\$29,217	HS diploma or equivalent	*	
51-9161	Computer Numerically Controlled Tool Operators	X	6	\$31,859	HS diploma or equivalent	*	
51-9198	Helpers--Production Workers		4	\$23,066	HS diploma or equivalent	*	
51-9199	Production Workers, All Other	X	8	\$24,234	HS diploma or equivalent	*	
53-7011	Conveyor Operators and Tenders		1	\$28,220	No formal educ. credential	*	
53-7063	Machine Feeders and Offbearers	X	3	\$30,376	No formal educ. credential	*	

TCATs offer programs in welding, machine tool technology, industrial maintenance, mechatronics, and more to train individuals for employment in manufacturing roles. Over 600 credentials in Machine Tool Technology were granted by TCATs and community colleges in 2020-21. Programs in Machine Tool Technology prepare students to apply technical knowledge and skills in the planning, creating, assembling, and repairing of materials which are manufactured in various forms.<sup>45</sup> Completers of the 1-2YR certificate for tool and die technician were found at high rates in TN's job market (88%) and earned wages exceeding \$50,000. Graduates of the electromechanical engineering technician associate and bachelor's degree programs had high employment rates (60% or more) and earnings exceeding the state median wage.

With funding from GIVE 2.0, Walters State Community College (WSCC) launched the Training Industrial Manufacturing Excellence (TIME) Program in six high schools and implemented a new pre-apprenticeship program in collaboration with a local manufacturing company and Greene County Schools. WSCC has also extended the program to the Claiborne County Detention Center offering opportunities for students enrolled in the detention center with plans to expand in June 2023.

## MANUFACTURING ALIGNED ACADEMIC PROGRAMS

### Postsecondary Manufacturing Degrees, 2020-21

CIP Code	Program Title	Educ. Award Level	Number of Grads	% Employed in TN	Estimated First Year Annual Wages
48.0501	Machine Tool Technology/Machinist.	C < 1 YR	94	38%	\$32,797
48.0501	Machine Tool Technology/Machinist.	C 1-2 YR	504	51%	\$37,953
48.0503	Machine Shop Technology/Assistant.	C < 1 YR	*	*	*
48.0503	Machine Shop Technology/Assistant.	C 1-2 YR	16	75%	\$27,745
48.0507	Tool and Die Technology/Technician.	C < 1 YR	*	*	*
48.0507	Tool and Die Technology/Technician.	C 1-2 YR	32	88%	\$51,626
48.0510	Computer Numerically Controlled (CNC) Machinist Technology/CNC Machinist.	C < 1 YR	*	*	*
48.0510	Computer Numerically Controlled (CNC) Machinist Technology/CNC Machinist.	C 1-2 YR	*	*	*
15.0403	Electromechanical/Electromechanical Engineering Technology/Technician.	C < 1 YR	194	54%	\$53,105
15.0403	Electromechanical/Electromechanical Engineering Technology/Technician.	C 1-2 YR	*	*	*
15.0403	Electromechanical/Electromechanical Engineering Technology/Technician.	AA	112	72%	\$49,614
15.0403	Electromechanical/Electromechanical Engineering Technology/Technician.	BA	10	60%	\$68,067
15.0702	Quality Control Technology/Technician.	C < 1 YR	*	*	*
41.0303	Chemical Process Technology.	C < 1 YR	*	*	*
41.0303	Chemical Process Technology.	C 1-2 YR	12	33%	*
47.0303	Industrial Mechanics and Maintenance Technology/Technician.	C < 1 YR	266	51%	\$35,951
47.0303	Industrial Mechanics and Maintenance Technology/Technician.	C 1-2 YR	874	51%	\$47,870
47.0303	Industrial Mechanics and Maintenance Technology/Technician.	AA	*	*	*
47.9999	Mechanic and Repair Technologies/Technicians, Other.	C < 1 YR	*	*	*
52.0205	Operations Management and Supervision.	C < 1 YR	54	56%	\$27,255

<sup>45</sup> NCES, Classification of Instructional Programs, [48.0501](#)

CIP Code	Program Title	Educ. Award Level	Number of Grads	% Employed in TN	Estimated First Year Annual Wages
47.0101	Electrical/Electronics Equipment Installation and Repair Technology/Technician, General.	AA	*	*	*
47.0105	Industrial Electronics Technology/Technician.	C 1-2 YR	28	64%	\$36,888
48.0508	Welding Technology/Welder.	C < 1 YR	492	44%	\$34,222
48.0508	Welding Technology/Welder.	C 1-2 YR	1172	34%	\$35,521

Source: P20 Connect, public postsecondary and select private postsecondary completers, 2020-21 and TDLWD Unemployment Insurance (UI) employment and wage records.

### High School CTE Manufacturing Completers, 2020-21

CIP Code	Program Title	Educ. Award Level	Number of Grads	% Employed in TN	Est. First Year Annual Wages
48.0503	Machine Shop Technology/Assistant.	CTE HS	254	57%	\$23,702
48.0703	Cabinetmaking and Millwork.	CTE HS	11	45%	\$13,263
15.0499	Electromechanical Technologies/Technicians, Other.	CTE HS	99	64%	\$23,907
15.0407	Mechatronics, Robotics, and Automation Engineering Technology/Technician.	CTE HS	210	58%	\$22,104
47.0105	Industrial Electronics Technology/Technician.	CTE HS	*	*	*
48.0508	Welding Technology/Welder.	CTE HS	798	56%	\$24,325

Source: P20 Connect, TDOE high school CTE completers, 2020-21 and TDLWD Unemployment Insurance (UI) employment and wage records.

### Manufacturing Apprenticeship Completers, 2020-21

CIP Code	Apprenticeship Title	Number of Completers 2021
48.0801	Boilermaker 1	48
48.0507	Tool and Die Maker	5
47.0303	Industrial Maintenance Mechanic	2
48.9999	Industrial Sewing Machine Operator	61
47.0303	Maintenance Repairer, Industrial	1
47.0303	Millwright	4

Source: TDLWD Apprenticeship Data

Manufacturing programs with employment rates of more than 70 percent include the tool and die technology/technician certificate programs and associate degree in electromechanical technology. Several high school CTE programs also have large shares of completers found in Tennessee employment data.

# CLUSTER FOUR: TRANSPORTATION

## QUICK TAKEAWAYS

**Demand:** Tennessee is a leading state in transportation, distribution, and logistics. The transportation cluster contains several occupations that are in-demand statewide and in every region of the state, including automotive service technicians and mechanics; bus and truck mechanics and diesel engine specialists; production, planning, and expediting clerks; heavy and tractor-trailer truck drivers; industrial truck and tractor operators; and mobile heavy equipment mechanics. **Supply:** Several TCAT programs train Tennesseans in this cluster who remain in Tennessee to work. The highest employment rates for certificate programs were logistics and supply chain management at 62 percent and diesel mechanics technology at 54 percent. First-year wages for the bachelor's degree program in logistics was \$53,062, and for the master's degree, \$90,607. High school CTE concentrators in autobody collision repair and diesel mechanics were employed in Tennessee at rates of more than 60 percent. This cluster had 121 apprenticeship completers. **Unmet need:** Completers of the two-year certificate for tool and die technician and the electromechanical engineering technician associate and bachelor's degrees had employment rates of 60% or more and earnings exceeding the state median in 2021 (\$37,700). Other occupations in high demand with no aligned training programs include industrial truck and tractor operators and mobile heavy equipment mechanics. The less-than-one-year certificate program in logistics has a high employment rate (62 percent) and wages above the state median; the diesel mechanics 1-2 year-certificate and CTE programs produce graduates earning just below the state median wage.

Tennessee is a leading state in transportation, distribution, and logistics. Tennessee's geographic location is central to a large consumer base in the Southeastern United States and offers immediate access to eight interstate highways reaching 60 percent of the U.S. population within an 11-hour drive. The state has six Class I railroads, six commercial airports, and more than 970 main channel miles of commercially navigable waterways. Tennessee also boasts the busiest cargo airport in the Western hemisphere—the FedEx World Hub in Memphis, which covers over 880 acres and is the largest sorting facility in the world. These are among the characteristics of Tennessee that attract companies which rely on transportation positions.

E-commerce as a share of retail sales is still hovering at a historically high 15-16 percent per month, despite a slight moderation due to consumers shifting back towards in-person services since the pandemic peak.<sup>46</sup> Companies in the e-commerce, distribution, and logistics industries employ occupations in this cluster. This includes companies such as Amazon and FedEx, which have a large presence in the state, as well as distribution centers for retailers like Nike (Memphis), Academy Sports + Outdoors (Cookeville), the Gap (Gallatin), and Under Armour (Mount Juliet).

According to the Tennessee Department of Transportation (TDOT)<sup>47</sup> Tennessee's industries relying on freight have been growing due to increased production and consumption of commodities, however there is a decline in the number of truck drivers to move the increasing freight. TDOT's statewide freight plan identifies "a need for workforce development to recruit and train new drivers." Heavy and tractor-trailer truck drivers and industrial truck and tractor operators are in-demand in every region of the state and are both key to TNECD's target industry sectors.

Tennessee is leading the way in mobility technology. The CIRCLES Consortium in coordination with Nissan North America and the Tennessee Department of Transportation<sup>48</sup> concluded a first-of-its-kind five-day open-track experiment in November 2022, in which researchers tested an AI-powered cruise control system designed to increase fuel savings and ease traffic using 100 specially equipped Nissan Rogue Vehicles.<sup>49</sup>

TDOT is also currently developing the Interstate 24 SMART Corridor Project<sup>50</sup> in partnership with Vanderbilt<sup>51</sup> which will integrate freeway and arterial roadway elements, along with physical, technological and operational improvements, to provide drivers with accurate, real-time information to actively manage traffic. Mobility technological improvements in Tennessee will drive future job growth in transportation, distribution, and logistics.

The transportation cluster contains several occupations that are in-demand statewide and in every region of the state, including automotive service technicians, heavy and tractor-trailer truck drivers, and industrial truck and tractor operators. Several TCAT programs train individuals for these occupations, yielding a sizeable share of graduates who remain in Tennessee to work.

<sup>46</sup> An [Economic Report to the Governor of Tennessee](#), 2023

<sup>47</sup> Tennessee Department of Transportation, [Statewide Multimodal Freight Plan](#), amended 05-21-2021

<sup>48</sup> Tennessee Department of Transportation, [1-24 Motion](#)

<sup>49</sup> [1-24 Motion](#)

<sup>50</sup> Tennessee Department of Transportation, <https://www.tn.gov/tdot/projects/region-3/i-24-smart-corridor.html>

<sup>51</sup> [Vanderbilt 1-25 SMART Corridor](#)

SOC Code	Occupation	In-Demand		Statewide Entry-Level Wage	Typical Entry-Level Education	Key to TNECD Industry Sectors	STEM
		TN	Total # Regions				
13-1081	Logisticians	X	6	\$42,062	Bachelor's degree	*	
43-5061	Production, Planning, and Expediting Clerks	X	9	\$32,208	HS diploma or equivalent	*	
43-5071	Shipping, Receiving, and Inventory Clerks		7	\$27,393	HS diploma or equivalent	*	
49-3021	Automotive Body and Related Repairers	X	8	\$29,969	HS diploma or equivalent		
49-3023	Automotive Service Technicians and Mechanics	X	9	\$28,556	Postsecondary nondegree award	*	
49-3031	Bus and Truck Mechanics and Diesel Engine Specialists		9	\$34,957	HS diploma or equivalent	*	
49-3042	Mobile Heavy Equipment Mechanics, Except Engines	X	7	\$36,922	HS diploma or equivalent	*	
49-3053	Outdoor Power Equipment and Other Small Engine Mechanics		1	\$24,401	HS diploma or equivalent		
53-3032	Heavy and Tractor-Trailer Truck Drivers	X	9	\$34,338	Postsecondary nondegree award	*	
53-3033	Light Truck Drivers		2	\$25,589	HS diploma or equivalent	*	
53-3052	Bus Drivers, Transit and Intercity		2	\$27,852	HS diploma or equivalent		
53-3099	Motor Vehicle Operators, All Other	X	2	\$22,240	No formal educ. credential		
53-5021	Captains, Mates, and Pilots of Water Vessels		1	\$45,421	Postsecondary nondegree award		
53-7051	Industrial Truck and Tractor Operators	X	9	\$28,863	No formal educ. credential	*	
53-7062	Laborers and Freight, Stock, and Material Movers, Hand		5	\$24,914	No formal educ. credential	*	
53-7064	Packers and Packagers, Hand		2	\$22,075	No formal educ. credential	*	

Tennessee's colleges offer an array of degree programs designed to prepare Tennesseans for work in transportation. TCATs offer diplomas in automotive technology, collision repair, and diesel-powered equipment, among others. While many of these occupations do not necessarily require a formal credential, Tennessee's colleges are poised to support the workforce through training. Over 2,000 <1YR and 1-2YR certificates were produced in 2020-21 to address in-demand transportation occupations, including certificates in Truck and Bus Driving, Automotive Mechanics, and Diesel Mechanics. Diesel mechanics programs, including the 1 - 2YR certificate and CTE programs, have employment rates just below 60%. Given high demand across the state and in many LWDA's, opportunities exist to expand training for industrial truck and tractor operators and mobile heavy equipment mechanics.

With funding from GIVE 1.0, TCAT Livingston developed a Diesel Maintenance pathway beginning with middle school students and culminating at the Diesel Technology program at TCAT Livingston. This pathway exposes students to the diesel maintenance industry through career awareness and work-based learning activities. The program offers dual enrollment opportunities to high school students and teacher externship opportunities for high school teachers to learn more about the program. The program was developed to alleviate the gap for diesel mechanics in the Upper Cumberland. The <1YR certificate program in logistics has a high employment rate (62 percent) and wages above the state median.



## TRANSPORTATION ALIGNED ACADEMIC PROGRAMS

### Postsecondary Transportation Degrees, 2020-21

CIP Code	Program Title	Educ. Award Level	Number of Grads	% Employed in TN	Estimated First Year Annual Wages
52.0203	Logistics, Materials, and Supply Chain Management.	C < 1 YR	58	62%	\$48,182
52.0203	Logistics, Materials, and Supply Chain Management.	BA	378	45%	\$53,062
52.0203	Logistics, Materials, and Supply Chain Management.	CPBA	*	*	*
52.0203	Logistics, Materials, and Supply Chain Management.	MA	36	28%	\$90,607
49.0205	Truck and Bus Driver/Commercial Vehicle Operator and Instructor.	C < 1 YR	608	40%	\$44,863
47.0302	Heavy Equipment Maintenance Technology/Technician.	C 1-2 YR	*	*	*
47.0604	Automobile/Automotive Mechanics Technology/Technician.	C < 1 YR	308	44%	\$30,438
47.0604	Automobile/Automotive Mechanics Technology/Technician.	C 1-2 YR	388	44%	\$32,906
47.0604	Automobile/Automotive Mechanics Technology/Technician.	AA	*	*	*
47.0603	Autobody/Collision and Repair Technology/Technician.	C < 1 YR	58	28%	\$30,607
47.0603	Autobody/Collision and Repair Technology/Technician.	C 1-2 YR	252	48%	\$31,451
47.0605	Diesel Mechanics Technology/Technician.	C < 1 YR	86	37%	\$29,316
47.0605	Diesel Mechanics Technology/Technician.	C 1-2 YR	276	54%	\$40,767
47.0606	Small Engine Mechanics and Repair Technology/Technician.	C 1-2 YR	*	*	*
47.0611	Motorcycle Maintenance and Repair Technology/Technician.	C < 1 YR	36	39%	\$30,775
47.0611	Motorcycle Maintenance and Repair Technology/Technician.	C 1-2 YR	34	24%	\$22,539

Source: P20 Connect, public postsecondary and select private postsecondary completers, 2020-21 and TDLWD Unemployment Insurance (UI) employment and wage records.

### High School CTE Transportation Completers, 2020-21

CIP Code	Program Title	Educ. Award Level	Number of Grads	% Employed in TN	Est. First Year Annual Wages
52.0203	Logistics, Materials, and Supply Chain Management.	CTE HS	34	56%	\$19,126
51.0810	Emergency Care Attendant (EMT Ambulance).	CTE HS	226	54%	\$16,698
47.0604	Automobile/Automotive Mechanics Technology/Technician.	CTE HS	1078	54%	\$23,126
47.0603	Autobody/Collision and Repair Technology/Technician.	CTE HS	197	60%	\$20,197
47.0605	Diesel Mechanics Technology/Technician.	CTE HS	13	62%	\$36,797

Source: P20 Connect, TDOE high school CTE completers, 2020-21 and TDLWD Unemployment Insurance (UI) employment and wage records.

### Transportation Apprenticeship Completers, 2020-21

CIP Code	Apprenticeship Title	Number of Completers
49.0205	Truck Driver, Heavy	11

Source: TDLWD Apprenticeship Completer Data

# CLUSTER FIVE: BUSINESS, FINANCE, GOVERNMENT MANAGEMENT, AND SUPPORT SERVICES OCCUPATIONS

## QUICK TAKEAWAYS

**Demand:** Tennessee has experienced economic growth in headquarters, business support services, and the finance and insurance sector. Occupations in-demand in all areas of the state include financial and human resources managers and specialists; project management specialists; management analysts; accountants and auditors; healthcare managers; and support workers, including secretaries and administrative assistants and customer service representatives. Demand is observed in both the private sector and in government.

**Supply:** High rates of employment were found among healthcare business and support occupations, including rates of 60 percent or more among graduates of medical insurance coding programs, administrative assistants, in healthcare and business administration associate degree programs, accounting technicians, and medical records administration programs, as well as for post-baccalaureate certificate programs in health policy, public policy analysis, and public administration. Business statistics programs at the master's degree level also had high rates of employment. The highest first-year wages are found for master's degree graduates in nursing administration (\$123,132) and business statistics (\$78,032). **Unmet needs:** High rates of employment of medical records administrators, accounting technicians, and business statistics program completers may indicate the need for additional graduates. Data for nine regions in the state indicated a shortage of project management specialists; only one aligned academic program at the post baccalaureate level, graduating fewer than 10 graduates, addressed this need. Other programs with high employment rates and wages above the state median included the associate degree program in health care management, the international business master's degree, and the post baccalaureate and master's degrees in public administration and public policy, respectively.

Tennessee has seen growth in the recent years in headquarters and other business support services,<sup>52</sup> as well as the finance and insurance sector.<sup>53</sup> The headquarters industry alone has grown by over 10,200 net new jobs (25 percent) in Tennessee over the last five years, which ranks 6th highest in the nation.<sup>54</sup> The finance and insurance industry's employment grew by 11 percent or 11,900 net new jobs—the 7th highest net new jobs in the nation—over the last five years.<sup>55</sup>

The Business, Finance and Government Management and Support Services occupations include managerial and professional occupations, which can be found in every sector of the economy but are especially present in headquarters and back-office operations. Tennessee is home to many global companies which require these in-demand jobs. This includes ten Fortune500 companies based in Tennessee.<sup>56</sup> Skills required for these occupations include organization, time management, customer service, and communication.

Management analysts, who study and design efficient and effective procedures and operations, are an in-demand occupation that will be key to successful strategies for recruitment and retention of workers as well as other challenges businesses may be facing. Online job postings for management analysts seek candidates with SQL, MS Office, Jitterbit, GitHub, and Tableau skills.<sup>57</sup>

Project management specialists, who develop detailed project plans, manage information technology projects or system activities, and collaborate with others to resolve information technology issues, are an in-demand occupation that is and will be key for companies that have increased their use of technology across the board. Nationally, the top industries for this occupation include computer systems design and related services; architectural, engineering, and related services; management, scientific, and technical consulting services; nonresidential building construction; and management of companies and enterprises.<sup>58</sup>

Human resource managers and specialists are in demand across the state. Human resource managers plan, direct, or coordinate activities and staff of an organization. Skills required for human resource managers include judgment and decision making, interpersonal skills, conflict management, and problem solving. Most online job postings found on Jobs4TN require a bachelor's degree or higher.

Accountants and auditors are in demand across Tennessee. These positions typically require a bachelor's degree or higher. Nearly 650 of the online job postings for accountants include seeking a candidate with an American Institute of CPAs (AICPA) certification.<sup>59</sup>

Financial managers are in demand and typically make over \$115,000 in Tennessee. Financial managers make up 8 percent of the total annual projected job openings in management occupations. Industries in which they typically work include accounting, tax preparation, bookkeeping and payroll services; headquarters operations; or nondepository credit intermediation. Many of the online job postings are looking for candidates with an American Institute of CPAs (AICPA) certification.<sup>60</sup>

Market research analysts and marketing specialists primarily work in the management, scientific, and technical consulting services industry and headquarters operations. Approximately 77 percent of the current online job postings for market research analysts and marketing specialists require a bachelor's or master's degree. Job skills that candidates need for this occupation include attention to detail, problem solving, identifying trends, decision making, and customer service.<sup>61</sup>

<sup>52</sup> North American Industry Classification System (NAICS) – 551114 Corporate, Subsidiary, and Regional Managing Offices

<sup>53</sup> North American Industry Classification System (NAICS) - 52 Finance and Insurance

<sup>54</sup> U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, 2016 - 2021

<sup>55</sup> U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, 2016 - 2021

<sup>56</sup> [Fortune500](#), 2022

<sup>57</sup> Jobs4TN.gov, Occupation Data, Occupation Summary

<sup>58</sup> U.S. Bureau of Labor Statistics, Occupational Employment and Wage Statistics, May 2021

<sup>59</sup> Jobs4TN.gov, Occupation Data, Occupation Summary

<sup>60</sup> Jobs4TN.gov, Occupation Data, Occupation Summary

<sup>61</sup> Jobs4TN.gov, Occupation Data, Occupation Summary

SOC Code	Occupation	In-Demand		Statewide Entry-Level Wage	Typical Entry-Level Education	Key to TNECD Industry Sectors	STEM
		TN	Total # Regions				
11-3012	Administrative Services Managers		2	\$69,412	Bachelor's degree	*	
11-3013	Facilities Managers	X	2	\$54,912	Bachelor's degree		
11-3031	Financial Managers		9	\$73,483	Bachelor's degree	*	
11-3051	Industrial Production Managers		2	\$63,505	Bachelor's degree	*	
11-3061	Purchasing Managers		4	\$70,724	Bachelor's degree	*	
11-3071	Transportation, Storage, and Distribution Managers		4	\$56,602	HS diploma or equivalent	*	
11-3121	Human Resources Managers		9	\$62,729	Bachelor's degree	*	
11-3131	Training and Development Managers		1	\$63,986	Bachelor's degree	*	
11-9041	Architectural and Engineering Managers		3	\$92,649	Bachelor's degree	*	#
11-9111	Medical and Health Services Managers		8	\$63,480	Bachelor's degree	*	
11-9141	Property, Real Estate, and Community Association Managers		8	\$34,550	HS diploma or equivalent		
11-1011	Chief Executives	X	6	\$36,682	Bachelor's degree	*	
11-1021	General and Operations Managers		7	\$53,892	Bachelor's degree	*	
13-1020	Buyers and Purchasing Agents		8	\$36,854	Bachelor's degree	*	
13-1031	Claims Adjusters, Examiners, and Investigators		4	\$43,553	HS diploma or equivalent		
13-1041	Compliance Officers		1	\$38,701	Bachelor's degree	*	
13-1071	Human Resources Specialists	X	9	\$35,942	Bachelor's degree	*	
13-1082	Project Management Specialists	X	9	\$49,503	Bachelor's degree	*	
13-1111	Management Analysts	X	9	\$54,045	Bachelor's degree	*	
13-1141	Compensation, Benefits, and Job Analysis Specialists		2	\$42,693	Bachelor's degree	*	
13-1151	Training and Development Specialists		7	\$33,501	Bachelor's degree	*	
13-1161	Market Research Analysts and Marketing Specialists	X	9	\$37,299	Bachelor's degree	*	
13-2011	Accountants and Auditors		9	\$46,920	Bachelor's degree	*	
13-2041	Credit Analysts	X	0	\$50,563	Bachelor's degree	*	
13-2051	Financial and Investment Analysts		8	\$52,189	Bachelor's degree	*	
13-2052	Personal Financial Advisors		4	\$41,521	Bachelor's degree		
13-2054	Financial Risk Specialists	X	1	\$42,025	Bachelor's degree		
13-2072	Loan Officers		3	\$37,871	Bachelor's degree	*	
13-2082	Tax Preparers		1	\$23,698	HS diploma or equivalent	*	
15-2031	Operations Research Analysts	X	3	\$35,412	Bachelor's degree	*	#
27-3031	Public Relations Specialists	X	6	\$34,932	Bachelor's degree	*	
41-3021	Insurance Sales Agents		8	\$31,641	HS diploma or equivalent		
43-1011	First-Line Supervisors of Office and Administrative Support Workers		3	\$36,749	HS diploma or equivalent	*	
43-3011	Bill and Account Collectors	X	6	\$27,920	HS diploma or equivalent	*	
43-3021	Billing and Posting Clerks		6	\$30,070	HS diploma or equivalent	*	

SOC Code	Occupation	In-Demand		Statewide Entry-Level Wage	Typical Entry-Level Education	Key to TNECD Industry Sectors	STEM
		TN	Total # Regions				
43-3031	Bookkeeping, Accounting, and Auditing Clerks		8	\$28,402	Some college, no degree	*	
43-3051	Payroll and Timekeeping Clerks	X	8	\$28,699	HS diploma or equivalent		
43-3061	Procurement Clerks	X	0	\$29,023	HS diploma or equivalent		
43-3071	Tellers		1	\$26,367	HS diploma or equivalent		
43-4051	Customer Service Representatives	X	9	\$24,611	HS diploma or equivalent	*	
43-4071	File Clerks	X	2	\$25,884	HS diploma or equivalent		
43-4111	Interviewers, Except Eligibility and Loan	X	6	\$26,364	HS diploma or equivalent		
43-4131	Loan Interviewers and Clerks	X	5	\$31,386	HS diploma or equivalent		
43-4141	New Accounts Clerks		1	\$34,008	HS diploma or equivalent		
43-4151	Order Clerks	X	3	\$24,313	Some college, no degree	*	
43-4161	Human Resources Assistants, Except Payroll and Timekeeping	X	8	\$31,734	Associate degree		
43-4199	Information and Record Clerks, All Other	X	2	\$21,464	HS diploma or equivalent		
43-5011	Cargo and Freight Agents		1	\$33,346	HS diploma or equivalent	*	
43-5032	Dispatchers, Except Police, Fire, and Ambulance	X	8	\$27,098	HS diploma or equivalent	*	
43-5051	Postal Service Clerks		2	\$43,414	HS diploma or equivalent		
43-5052	Postal Service Mail Carriers		1	\$39,568	HS diploma or equivalent		
43-6011	Executive Secretaries and Executive Administrative Assistants	X	9	\$40,026	HS diploma or equivalent	*	
43-6013	Medical Secretaries and Administrative Assistants		1	\$26,972	HS diploma or equivalent		
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive		9	\$25,701	HS diploma or equivalent	*	
43-9021	Data Entry Keyers	X	8	\$27,531	HS diploma or equivalent	*	
43-9061	Office Clerks, General		8	\$22,324	HS diploma or equivalent	*	
43-9199	Office and Administrative Support Workers, All Other		2	\$19,814	HS diploma or equivalent		

Many of Tennessee's institutions offer academic programs aligned with in-demand Business, Finance and Government Management and Support Services occupations. UTK and MTSU offer baccalaureate programs designed to prepare individuals for occupations in this cluster.

In fall 2022, UTK was approved to offer an International Business degree. This program educates students in the ways global trade affects business and to familiarize them to the complex interaction of cross-border political, legal, economic, social, and financial issues. The program requires students to double major in another Haslam College of Business program, complete a nine-credit hour collateral, or concentration, in advanced foreign language, study abroad for one semester, and complete twelve credit hours of international business coursework. This program will prepare students to meet the demands of the rapidly growing global business environment in Tennessee.<sup>62</sup>

MTSU offers a Bachelor of Science in Recording Industry with concentrations in Music Business and Commercial Songwriting. The program has received recognition from several national media outlets, including Rolling Stone, Mix Magazine, and the NBC Nightly News for the quality and affordability of its program.<sup>63</sup> Most program graduates are employed in Tennessee.

<sup>62</sup> UTK, [International Business](#)

<sup>63</sup> MTSU, [Department of Recording Industry](#)

## BUSINESS, FINANCE, AND GOVERNMENT MANAGEMENT AND SUPPORT SERVICES ALIGNED ACADEMIC PROGRAMS

### Postsecondary Management and Support Services Degrees, 2020-21

CIP Code	Program Title	Educ. Award Level	Number of Grads	% Employed in TN	Estimated First Year Annual Wages
15.1501	Engineering/Industrial Management.	BA	93	44%	\$58,254
15.1501	Engineering/Industrial Management.	CPBA	*	*	*
15.1501	Engineering/Industrial Management.	MA	43	33%	\$80,496
46.0401	Building/Property Maintenance.	C < 1 YR	*	*	*
46.0401	Building/Property Maintenance.	C 1-2 YR	16	13%	*
50.1001	Arts, Entertainment, and Media Management, General.	BA	*	*	*
50.1002	Fine and Studio Arts Management.	BA	*	*	*
50.1003	Music Management.	BA	140	57%	\$29,832
50.1004	Theatre/Theatre Arts Management.	BA	*	*	*
51.0701	Health/Health Care Administration/Management.	AA	19	63%	\$45,969
51.0701	Health/Health Care Administration/Management.	BA	117	38%	\$37,687
51.0701	Health/Health Care Administration/Management.	CPBA	*	*	*
51.0701	Health/Health Care Administration/Management.	MA	117	22%	\$55,220
51.0702	Hospital and Health Care Facilities Administration/Management.	MA	21	48%	\$65,871
51.0706	Health Information/Medical Records Administration/Administrator.	BA	14	71%	\$42,259
51.0706	Health Information/Medical Records Administration/Administrator.	CPBA	13	8%	*
51.0706	Health Information/Medical Records Administration/Administrator.	MA	26	31%	\$69,840
51.0719	Clinical Research Coordinator.	CPBA	*	*	*
51.3802	Nursing Administration.	MA	17	41%	\$123,132
51.3802	Nursing Administration.	D	*	*	*
52.0101	Business/Commerce, General.	BA	65	40%	\$41,488
52.0101	Business/Commerce, General.	MA	101	40%	\$56,968
52.0201	Business Administration and Management, General.	BA	1934	49%	\$40,200
52.0201	Business Administration and Management, General.	CPBA	*	*	*
52.0201	Business Administration and Management, General.	MA	1402	42%	\$67,468
52.0201	Business Administration and Management, General.	D	13	8%	*
52.0209	Transportation/Mobility Management.	C < 1 YR	58	17%	\$70,991
52.0210	Research and Development Management.	CPBA	*	*	*
52.0211	Project Management.	CPBA	*	*	*
52.0213	Organizational Leadership.	BA	245	35%	\$50,578
52.0213	Organizational Leadership.	CPBA	35	51%	\$69,087
52.0213	Organizational Leadership.	MA	92	30%	\$53,334
52.0213	Organizational Leadership.	D	24	29%	\$64,728
52.0299	Business Administration, Management and Operations, Other.	AA	*	*	*
52.0299	Business Administration, Management and Operations, Other.	MA	61	34%	\$52,526
52.0701	Entrepreneurship/Entrepreneurial Studies.	C < 1 YR	38	42%	\$32,189
52.0701	Entrepreneurship/Entrepreneurial Studies.	BA	19	37%	\$30,490

CIP Code	Program Title	Educ. Award Level	Number of Grads	% Employed in TN	Estimated First Year Annual Wages
52.0701	Entrepreneurship/Entrepreneurial Studies.	CPBA	*	*	*
52.0703	Small Business Administration/Management.	BA	*	*	*
52.1001	Human Resources Management/Personnel Administration, General.	BA	45	56%	\$37,030
52.1001	Human Resources Management/Personnel Administration, General.	CPBA	*	*	*
52.1001	Human Resources Management/Personnel Administration, General.	MA	13	0%	*
52.1101	International Business/Trade/Commerce.	BA	35	40%	\$40,033
52.1101	International Business/Trade/Commerce.	MA	10	60%	\$44,121
52.1206	Information Resources Management.	BA	*	*	*
52.1301	Management Science.	BA	12	50%	\$35,116
52.1301	Management Science.	CPBA	46	30%	\$71,195
52.9999	Business, Management, Marketing, and Related Support Services, Other.	C < 1 YR	38	0%	*
42.2804	Industrial and Organizational Psychology.	MA	18	39%	\$67,500
52.1005	Human Resources Development.	CPBA	*	43%	*
52.1005	Human Resources Development.	MA	31	45%	\$51,877
52.1207	Knowledge Management.	CPBA	*	*	*
52.1302	Business Statistics.	BA	133	31%	\$53,462
52.1302	Business Statistics.	MA	35	74%	\$78,032
09.0901	Organizational Communication, General.	BA	*	*	*
09.0902	Public Relations/Image Management.	BA	145	46%	\$36,487
09.0907	International and Intercultural Communication.	BA	*	*	*
09.0909	Communication Management and Strategic Communications.	MA	*	*	*
09.0999	Public Relations, Advertising, and Applied Communication, Other.	BA	*	*	*
52.0501	Business/Corporate Communications, General.	BA	*	*	*
51.0710	Medical Office Assistant/Specialist.	C < 1 YR	12	50%	\$20,550
51.0710	Medical Office Assistant/Specialist.	C 1-2 YR	46	39%	\$20,011
51.0713	Medical Insurance Coding Specialist/Coder.	C < 1 YR	40	45%	\$22,671
51.0713	Medical Insurance Coding Specialist/Coder.	C 1-2 YR	*	*	*
52.0204	Office Management and Supervision.	BA	15	53%	\$46,431
52.0207	Customer Service Management.	C < 1 YR	52	58%	\$33,198
52.0207	Customer Service Management.	AA	*	*	*
52.0401	Administrative Assistant and Secretarial Science, General.	C 1-2 YR	68	68%	\$32,516
52.0401	Administrative Assistant and Secretarial Science, General.	AA	65	58%	\$30,270
52.0402	Executive Assistant/Executive Secretary.	C < 1 YR	158	34%	\$19,611
52.0402	Executive Assistant/Executive Secretary.	C 1-2 YR	426	36%	\$22,397
52.0407	Business/Office Automation/Technology/Data Entry.	C < 1 YR	66	52%	\$29,037
52.0407	Business/Office Automation/Technology/Data Entry.	C 1-2 YR	46	13%	\$23,766
01.0103	Agricultural Economics.	MA	*	*	*
45.0601	Economics, General.	BA	80	24%	\$34,870
45.0601	Economics, General.	D	*	*	*
45.0603	Econometrics and Quantitative Economics.	BA	*	*	*

CIP Code	Program Title	Educ. Award Level	Number of Grads	% Employed in TN	Estimated First Year Annual Wages
45.0603	Econometrics and Quantitative Economics.	MA	*	*	*
45.0605	International Economics.	BA	*	*	*
45.0699	Economics, Other.	BA	*	*	*
52.0601	Business/Managerial Economics.	BA	85	47%	\$35,670
52.0601	Business/Managerial Economics.	D	*	*	*
52.0803	Banking and Financial Support Services.	BA	*	*	*
52.0803	Banking and Financial Support Services.	CPBA	*	*	*
52.0101	Business/Commerce, General.	AA	59	24%	\$37,054
52.0201	Business Administration and Management, General.	C < 1 YR	174	55%	\$39,739
52.0201	Business Administration and Management, General.	C 1-2 YR	*	*	*
52.0201	Business Administration and Management, General.	AA	619	61%	\$34,646
52.0301	Accounting.	BA	505	54%	\$44,981
52.0301	Accounting.	CPBA	*	*	*
52.0301	Accounting.	MA	258	29%	\$57,754
52.0304	Accounting and Finance.	BA	*	*	*
52.0305	Accounting and Business/Management.	BA	*	*	*
52.0302	Accounting Technology/Technician and Bookkeeping.	C < 1 YR	36	50%	\$35,661
52.0302	Accounting Technology/Technician and Bookkeeping.	C 1-2 YR	28	71%	\$33,164
52.0302	Accounting Technology/Technician and Bookkeeping.	AA	27	74%	\$43,370
43.0302	Crisis/Emergency/Disaster Management.	BA	43	40%	\$59,371
44.0401	Public Administration.	BA	*	*	*
44.0401	Public Administration.	CPBA	24	63%	\$60,063
44.0401	Public Administration.	MA	57	44%	\$54,563
44.0401	Public Administration.	D	*	*	*
44.0501	Public Policy Analysis, General.	BA	*	*	*
44.0501	Public Policy Analysis, General.	CPBA	*	*	*
44.0501	Public Policy Analysis, General.	MA	20	60%	\$54,315
44.0503	Health Policy Analysis.	CPBA	*	*	*
44.9999	Public Administration and Social Service Professions, Other.	AA	*	*	*
44.9999	Public Administration and Social Service Professions, Other.	BA	*	*	*
45.1001	Political Science and Government, General.	BA	463	38%	\$28,650
45.1002	American Government and Politics (United States).	CPBA	*	*	*
45.1004	Political Economy.	BA	*	*	*
45.1201	Urban Studies/Affairs.	BA	17	18%	*
52.0206	Non-Profit/Public/Organizational Management.	BA	17	29%	\$41,122
52.0206	Non-Profit/Public/Organizational Management.	CPBA	15	53%	\$62,427
52.0206	Non-Profit/Public/Organizational Management.	MA	*	*	*

Source: P20 Connect, public postsecondary and select private postsecondary completers, 2020-21 and TDLWD Unemployment Insurance (UI) employment and wage records.





# Tennessee Office of Reentry

The Office of Reentry (OOR) at the Tennessee Department of Labor and Workforce Development is a statewide comprehensive source for reentry information, direction, and planning, and is the first in the nation not tied to a Department of Correction. Inspired by Governor Bill Lee's vision, the OOR was created in July of 2021 to provide comprehensive workforce services to support Justice Involved Individuals (JII's) who are reentering society, via the Department's statewide network of American Job Centers (AJC's). Reentry is defined as the transition from incarceration-life in prison, jail, or juvenile justice facilities-to life in the community. The OOR's work has three key objectives: improve data tracking of JII, expand staff capacity, and increase statewide awareness of employing and retaining JII individuals. OOR's two grants include:

**The Justice Involved Individual Grant:** Starting last year (2022), the Justice Involved Individual Grant has the goal of providing funding to our Local Workforce Development Boards (LWDBs) with work initiatives that focus on JII's and in partnership with local Department of Labor and Workforce Adult Education providers.

LWDBs must provide Workforce Innovation and Opportunity Act (WIOA) work-based learning opportunities, job readiness, and employment services specific to JII's, within local in-demand industry sectors and in partnership with one of the following: a local jail, prison, diversionary court, Day Reporting Center, or Community Corrections, to recruit JII's for program participation. The grants will promote stronger partnerships with potential employers, state agencies, and other community organizations in the reentry space.

**The Justice Assistant Grant:** The Justice Assistant Grant's intended outcomes center on reducing the recidivism (returning to incarceration) rates for JII's that participate in our reentry workforce programs and improve employment outcomes. Listening tours are being carried out across the state, including providing more information on second chance hiring concerns. The goals are to collaborate with employers to better understand the concerns and workforce needs surrounding the employment of JII's as well as provide existing resources that can help address them.

**For more information** please visit our website at [tn.gov/workforce/reentrytn](https://tn.gov/workforce/reentrytn) or contact us at [reentry@tn.gov](mailto:reentry@tn.gov).



Academic programs in the Business, Finance, and Government Management and Support Services cluster range in degree level, from short term certificates to professional and doctoral programs. Among short-term programs, 75 percent of associate degrees in accounting and 80 percent of 1-2YR certificate completers in accounting are found in the Tennessee employment records two quarters after graduating, indicating a high share of short-term accounting credential recipients staying in Tennessee. TCATs offer a diploma in Administrative Office Technology contributing to the more than 400 Executive Assistant credentials produced in 2020-21. Among post-baccalaureate programs, there are also high shares of bachelor's degree completers in medical records administration and master's degree completers in business statistics which may indicate a need for additional graduates. Other programs with high employment rates and wages above the state median included the associate degree program in health care management, the international business master's degree, and the post baccalaureate and master's degrees in public administration and public policy, respectively.

The University of Tennessee System, Locally Governed Institutions, and select TICUA institutions offer several baccalaureate and above programs, such as business administration, accounting, and political science, each producing over 500 bachelor's degrees in 2020-21. Tennessee State University (TSU) offers a Bachelor of Science in Health Care Administration and Planning, designed to prepare students for leadership roles in health care. The program includes a 12-week summer field placement. Data for nine regions in the state indicated a shortage of project management specialists; only one program at the post baccalaureate level with fewer than 10 graduates addressed this need.

### **High School CTE Management and Support Services Completers, 2020-21**

<b>CIP Code</b>	<b>Program Title</b>	<b>Educ. Award Level</b>	<b>Number of Grads</b>	<b>% Employed in TN</b>	<b>Est. First Year Annual Wages</b>
52.1005	Human Resources Management	CTE HS	*	*	*
51.2211	Health Services Administration.	CTE HS	16	56%	\$12,263
52.0204	Office Management and Supervision.	CTE HS	677	53%	\$18,163
52.0201	Business Administration and Management, General.	CTE HS	490	57%	\$18,315
52.0803	Banking and Financial Support Services.	CTE HS	76	58%	\$20,599
52.0302	Accounting Technology/Technician and Book-keeping.	CTE HS	103	50%	\$20,541
44.0499	Public Administration, Other	CTE HS	29	69%	\$17,532

Source: P20 Connect, TDOE high school CTE completers, 2020-21 and TDLWD Unemployment Insurance (UI) employment and wage records.

# CLUSTER SIX: SALES AND MARKETING OCCUPATIONS

## QUICK TAKEAWAYS

**Demand:** Tennessee has experienced a net gain of approximately 4,600 jobs since 2019 in retail trade. Sales occupations increasingly require advanced computer skills. Occupations in-demand in five or more areas of the state include supervisors of retail sales workers, advertising sales agents, financial services sales agents, and non-technical wholesale and manufacturing sales representatives. **Supply:** 74 percent of graduates in selling skills and sales operations certificate programs were found in the Tennessee job market with entry level wages of just over \$33,000. Others employed in sales likely obtain degrees in business administration, finance, or a technical field. High school CTE programs in entrepreneurial studies had 144 concentrators. **Unmet Needs:** All regions indicated a need for more first line supervisors of retail sales workers.

The sales and marketing career cluster includes occupations that plan, manage, and perform marketing activities or are otherwise responsible for sales of goods and services to consumers.

Tennessee’s retail trade industry employs 337,800 people, which reflects a net gain of approximately 4,600 jobs (1.4 percent) since 2019.<sup>64</sup> Only 21 states have a net jobs gain in this industry due to pandemic losses.

Sales occupations are increasingly requiring skills with data analysis software, database querying software, enterprise planning software, and customer relationship management software. After the onset of the pandemic, many retail operations in Tennessee began offering pick-up and delivery of products at unprecedented rates, and these two occupations likely needed to upskill quickly to adapt to the changing marketplace. Buy online, pick up in store (BOPIS), also known as click-and-collect, is the process of a consumer ordering an item online and picking it up later that day or in the following days.

Another new trend in retail is that consumers may buy less but be more invested in understanding the product life cycle. REI, the nation’s largest consumer co-op, has pre-loved outdoor gear for sale. REI announced in January 2022 that its fourth distribution center in the country will be in Tennessee, situated on 41 acres in Wilson County.<sup>65</sup>

First-line supervisors of retail sales workers are in-demand in every region of Tennessee. First-line supervisors of retail sales workers will likely continue to be on the forefront of managing the buy online, pick up in store (BOPIS) and/or click-and-collect processes in Tennessee.

This career cluster prepares students for marketing and sales positions which are prevalent in a vast array of other industries outside of retail sales. Marketing managers and sales managers, for example, often gain employment in headquarters operations or consulting firms.

SOC Code	Occupation	In-Demand		Statewide Entry-Level Wage	Typical Entry-Level Education	Key to TNECD Industry Sectors	STEM
		TN	Total # Regions				
11-2021	Marketing Managers		2	\$67,541	Bachelor’s degree	*	
11-2022	Sales Managers		1	\$69,008	Bachelor’s degree	*	
13-2052	Personal Financial Advisors		4	\$41,521	Bachelor’s degree		
27-1026	Merchandise Displayers and Window Trimmers		4	\$26,104	HS diploma or equivalent	*	
41-1011	First-Line Supervisors of Retail Sales Workers	X	9	\$27,959	HS diploma or equivalent		
41-1012	First-Line Supervisors of Non-Retail Sales Workers		1	\$48,379	HS diploma or equivalent	*	
41-2022	Parts Salespersons		1	\$20,986	No formal educ. credential	*	
41-3011	Advertising Sales Agents	X	5	\$26,424	HS diploma or equivalent		
41-3031	Securities, Commodities, and Financial Services Sales Agents		5	\$42,763	Bachelor’s degree		
41-3091	Sales Representatives of Services, Except Advertising, Insurance, Financial Services, and Travel		3	\$31,731	HS diploma or equivalent	*	
41-4011	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products		3	\$38,009	Bachelor’s degree	*	#
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products		6	\$30,128	HS diploma or equivalent	*	
41-9022	Real Estate Sales Agents	X	4	\$22,716	HS diploma or equivalent		

<sup>64</sup> U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, NAICS 44-45 Retail Trade, June 2019 - June 2022

<sup>65</sup> TNECD [Press Release](#)

The programs captured in the Sales and Marketing career cluster prepare students with the skills necessary for the commercial buying and selling of goods. Example programs include the Master of Science in Digital Marketing at East Tennessee State University (ETSU) and certificate programs for professional selling and customer service at MTSU and Northeast State Community College (NeSCC). While baccalaureate programs in fashion merchandising are not currently offered at public institutions of higher education in Tennessee, example programs are offered through Lipscomb University, Carson-Newman University, and Belmont University.

## **SALES AND MARKETING ALIGNED ACADEMIC PROGRAMS**

### ***Postsecondary Sales and Marketing Degrees, 2020-21***

<b>CIP Code</b>	<b>Program Title</b>	<b>Educ. Award Level</b>	<b>Number of Grads</b>	<b>% Employed in TN</b>	<b>Estimated First Year Annual Wages</b>
09.0903	Advertising.	BA	90	48%	\$37,988
09.0903	Advertising.	MA	*	*	*
52.1401	Marketing/Marketing Management, General.	BA	693	53%	\$39,469
52.0208	E-Commerce/Electronic Commerce.	MA	*	*	*
52.1804	Selling Skills and Sales Operations.	C < 1 YR	38	74%	\$33,239
52.1902	Fashion Merchandising.	BA	*	*	*

Source: P20 Connect, public postsecondary and select private postsecondary completers, 2020-21 and TDLWD Unemployment Insurance (UI) employment and wage records.

### ***High School CTE Sales and Marketing Completers, 2020-21***

<b>CIP Code</b>	<b>Program Title</b>	<b>Educ. Award Level</b>	<b>Number of Grads</b>	<b>% Employed in TN</b>	<b>Est. First Year Annual Wages</b>
52.0701	Entrepreneurship/Entrepreneurial Studies.	CTE HS	144	53%	\$17,244

Source: P20 Connect, TDOE high school CTE completers, 2020-21 and TDLWD Unemployment Insurance (UI) employment and wage records.

# CLUSTER SEVEN: HEALTH SCIENCES

## QUICK TAKEAWAYS

**Demand:** Healthcare and social assistance is expected to be the largest industry in Tennessee by 2030, with employment of healthcare practitioners and support workers expected to increase by more than 64,000.<sup>2</sup> An important driver of this trend is the need to care for an aging population. The pandemic created additional burdens for the healthcare system in Tennessee which is experiencing increasing shortages of workers due to feelings of burnout and inadequate pay. Healthcare occupations, including registered nurses, were identified as eleven of the fifteen occupations experiencing the greatest supply gaps based on the number of job openings exceeding resumes for occupations requiring postsecondary education.<sup>3</sup> Occupations in-demand in at least seven regions include licensed practical nurses, surgical technologists, physical therapy assistants, dental assistants, medical assistants, and phlebotomists. Other occupations in demand in more than half of local workforce development areas include speech language pathologists, diagnostic medical sonographers, pharmacy technicians, and medical records specialists.

**Supply:** Due to increasing demand, program completers in the health sciences have some of the highest employment rates of any career cluster. The highest employment rates for certificate completers paying above the median wage were for sterile processing technicians, MRI technicians, and psychiatric/mental health nurses (CPBA), and for associate degree completers, registered nurses, respiratory care therapists, medical laboratory technicians, and dental hygienists. For those with bachelor's degrees and above, they included radiographers, family practice nurses, doctors of physical therapy, and diagnostic medical sonographers. **Unmet needs:** Many of the above occupations, including respiratory therapists require additional workers. Healthcare and life sciences is a TNECD target industry. Investment in our universities and world-class research facilities associated with this sector will complement and enable the development of a capable workforce.

Nationally, employment in healthcare occupations is projected to grow 13 percent from 2021 to 2031, primarily due to the need to care for an aging population.<sup>66,67</sup> Tennessee’s, and the nation’s, aging population will continue to generate demand for healthcare. The aging population also puts new strains on the workforce in other sectors, as the Baby Boomer generation continues to retire and the slowdown in population growth will make it difficult to replace those retiring.<sup>68</sup>

Most of Tennessee’s in-demand health sciences occupations are in local healthcare services industries, such as hospitals, clinics, doctor’s offices, nursing homes, and ambulatory services. These occupations will typically require a degree, certificate, and many a license to practice. Allied health is a growing need in Tennessee—these are healthcare professionals that do not autonomously practice medicine, nursing, pharmacy, or dentistry. Respiratory therapists are also in-demand statewide and in four regions, requiring additional workers.

Growing expertise in healthcare fields also supports research and development activity in physical, engineering and life sciences, which encompasses nearly all types of life sciences research except for nanotechnology and biotechnology. Life sciences research includes various branches of medical research, such as genetics, human biology, dental, bacteriological, and veterinary.

TNECD’s life sciences target industry sector includes four key industry segments: biosciences logistics and distribution; medical devices and equipment; drugs and pharmaceuticals; and research, testing, and medical labs. Tennessee has a robust presence of healthcare companies in the manufacturing, distribution and logistics, headquarters, and business services industries. While the life sciences target sector excludes local healthcare services, which are prevalent in this career cluster, all the healthcare industries and associated workforce complement one another due to shared assets and expertise. The assets which lend to the strength of all life sciences industries in Tennessee include our universities, world-class research facilities, and capable workforce.

SOC Code	Occupation	In-Demand		Statewide Entry-Level Wage	Typical Entry-Level Education	Key to TNECD Industry Sectors	STEM
		TN	Total # Regions				
19-1042	Medical Scientists, Except Epidemiologists	X	1	\$55,043	Doctoral or professional degree	*	#
19-5011	Occupational Health and Safety Specialists		1	\$49,067	Bachelor’s degree	*	
29-1031	Dietitians and Nutritionists		2	\$32,010	Bachelor’s degree		
29-1071	Physician Assistants		5	\$79,798	Master’s degree		
29-1122	Occupational Therapists		2	\$64,766	Master’s degree		
29-1123	Physical Therapists		3	\$67,297	Doctoral or professional degree		
29-1126	Respiratory Therapists	X	4	\$44,724	Associate degree		
29-1127	Speech-Language Pathologists	X	6	\$50,368	Master’s degree		
29-1141	Registered Nurses		1	\$51,067	Bachelor’s degree		
29-1151	Nurse Anesthetists		1	\$139,348	Master’s degree		
29-1171	Nurse Practitioners		3	\$59,493	Master’s degree		
29-1229	Physicians, All Other		1	\$71,350	Doctoral or professional degree		
29-1292	Dental Hygienists		4	\$49,582	Associate degree		
29-2010	Clinical Laboratory Technologists and Technicians		5	\$34,228	Bachelor’s degree		
29-2032	Diagnostic Medical Sonographers		6	\$53,358	Associate degree		

<sup>66</sup> U.S. Bureau of Labor Statistics, [Occupational Outlook Handbook, Healthcare Occupations](#)

<sup>67</sup> Much of the state’s population increase is driven by domestic net migration gains—more people moving into the state than moving out. -- Tennessee State Data Center [TN 2022 Population Gains Pushed by Record Domestic Net Migration](#)

<sup>68</sup> An [Economic Report to the Governor of Tennessee](#), 2023

SOC Code	Occupation	In-Demand		Statewide Entry-Level Wage	Typical Entry-Level Education	Key to TNECD Industry Sectors	STEM
		TN	Total # Regions				
29-2034	Radiologic Technologists and Technicians		1	\$40,528	Associate degree		
29-2042	Emergency Medical Technicians		4	\$26,766	Postsecondary nondegree award		
29-2052	Pharmacy Technicians		5	\$27,829	HS diploma or equivalent		
29-2055	Surgical Technologists		7	\$35,241	Postsecondary nondegree award		
29-2057	Ophthalmic Medical Technicians		1	\$27,744	Postsecondary nondegree award		
29-2061	Licensed Practical and Licensed Vocational Nurses		9	\$35,135	Postsecondary nondegree award		
29-2072	Medical Records Specialists	X	5	\$29,493	Postsecondary nondegree award		
29-2081	Opticians, Dispensing		2	\$28,583	HS diploma or equivalent		
29-2099	Health Technologists and Technicians, All Other		1	\$31,511	Postsecondary nondegree award		
31-2011	Occupational Therapy Assistants		4	\$45,400	Associate degree		
31-2021	Physical Therapist Assistants	X	9	\$44,705	Associate degree		
31-9011	Massage Therapists	X	4	\$25,901	Postsecondary nondegree award		
31-9091	Dental Assistants	X	9	\$30,696	Postsecondary nondegree award		
31-9092	Medical Assistants	X	9	\$28,169	Postsecondary nondegree award		
31-9093	Medical Equipment Preparers	X	1	\$27,258	HS diploma or equivalent		
31-9097	Phlebotomists	X	8	\$27,647	Postsecondary nondegree award		
31-9099	Healthcare Support Workers, All Other		3	\$24,093	HS diploma or equivalent		



Institutions across Tennessee offer academic programs in the health sciences that provide completers with general and specialized training to fulfill in-demand occupations in the state. Dental Assisting and Licensed Practical Nursing are two programs offered by TCATs yielding many graduates in 2020-21. Chattanooga State Community College (ChSCC) offers a Magnetic Resonance Imaging certificate. Degree completers in Magnetic Resonance Imaging (MRI) Technology/Technician earned over \$60,000 in their first year.

THEC's academic approval process yielded several baccalaureate and above programs from public universities over the past year. While these programs are not yet contributing degrees to the aligned academic program tables, the programs will produce future graduates to meet the many in-demand occupations in the Health Sciences cluster.

In July 2022, a new Bachelor of Science in Public Health with a concentration in Population Health Sciences was approved at UTK. Students in the program are required to complete an experience that integrates and applies knowledge from program courses and learning opportunities and that demonstrates mastery of foundational and concentration skills. The concentration in Population Health Sciences will train graduates to employ systems thinking, population health indicators, and evidence-based solutions to solve and explain complex problems in community and public health.<sup>69</sup>

ETSU has a Doctor of Occupational Therapy (approved in May 2021) that provides didactic and laboratory coursework, utilizing a problem-based learning approach to prepare practitioner-scholars who empower and improve the lives of their clients and communities. The University of Memphis (UoM) master's in Biostatistics, approved in 2018, includes an optional concentration in Data Science in Public Health. The program provides training in biostatistical analytics tools and prepares students for careers in population and health research.<sup>70</sup> It is the only free-standing Biostatistics program in the state.

In July 2022, the Pathologists' Assistant program, MHS, at the University of Tennessee, Health Science Center (UTHSC) is designed to educate individuals to become Pathologists' Assistants that provide surgical, autopsy, and forensic pathology professional services under the guidance of a board-certified pathologist.<sup>71</sup> The program will prepare students to complete the American Society for Clinical Pathology Board of Certification examination for Pathologists' Assistant. The Pathologists' Assistant program is the first of its kind in the state and is one of few in the country.

<sup>69</sup> UTK, Public Health, [Population Health Sciences Concentration](#)

<sup>70</sup> UoM, Biostatistics, [Data Science in Public Health](#)

<sup>71</sup> UTHSC, [Pathologists' Assistant Program](#)

# HEALTH SCIENCES ALIGNED ACADEMIC PROGRAMS

## Postsecondary Health Sciences Degrees, 2020-21

CIP Code	Program Title	Educ. Award Level	Number of Grads	% Employed in TN	Estimated First Year Annual Wages
51.3804	Nurse Anesthetist.	CPBA	*	*	*
51.3804	Nurse Anesthetist.	D	25	0%	*
51.3818	Nursing Practice.	BA	*	*	*
51.3818	Nursing Practice.	D	106	59%	\$95,847
51.3801	Registered Nursing/Registered Nurse.	AA	905	83%	\$62,861
51.3801	Registered Nursing/Registered Nurse.	BA	2,431	62%	\$63,236
51.3801	Registered Nursing/Registered Nurse.	CPBA	*	*	*
51.3801	Registered Nursing/Registered Nurse.	MA	456	50%	\$77,968
51.3805	Family Practice Nurse/Nursing.	CPBA	14	29%	*
51.3805	Family Practice Nurse/Nursing.	MA	101	62%	\$80,117
51.3805	Family Practice Nurse/Nursing.	EDS	*	*	*
51.3805	Family Practice Nurse/Nursing.	D	31	29%	\$115,127
51.3808	Nursing Science.	D	14	43%	\$78,589
51.3809	Pediatric Nurse/Nursing.	CPBA	*	*	*
51.3809	Pediatric Nurse/Nursing.	MA	*	*	*
51.3810	Psychiatric/Mental Health Nurse/Nursing.	CPBA	20	60%	\$99,187
51.3810	Psychiatric/Mental Health Nurse/Nursing.	MA	*	*	*
51.3810	Psychiatric/Mental Health Nurse/Nursing.	EDS	*	*	*
51.0803	Occupational Therapist Assistant.	AA	77	84%	\$31,078
51.0806	Physical Therapy Assistant.	AA	100	53%	\$40,904
51.3901	Licensed Practical/Vocational Nurse Training.	C < 1 YR	228	32%	\$23,048
51.3901	Licensed Practical/Vocational Nurse Training.	C 1-2 YR	2,116	35%	\$39,160
19.0501	Foods, Nutrition, and Wellness Studies, General.	BA	42	43%	\$33,224
19.0504	Human Nutrition.	CPBA	*	*	*
30.1901	Nutrition Sciences.	BA	16	25%	*
30.1901	Nutrition Sciences.	CPBA	*	*	*
30.1901	Nutrition Sciences.	MA	11	18%	*
30.1901	Nutrition Sciences.	D	*	*	*
51.3101	Dietetics/Dietitian.	BA	11	27%	*
51.3101	Dietetics/Dietitian.	CPBA	15	47%	\$39,884
51.3102	Clinical Nutrition/Nutritionist.	MA	33	52%	\$44,703
51.2306	Occupational Therapy/Therapist.	MA	128	37%	\$60,324
51.2306	Occupational Therapy/Therapist.	D	22	45%	\$60,619
51.2308	Physical Therapy/Therapist.	D	165	61%	\$68,578
51.0909	Surgical Technology/Technologist.	C 1-2 YR	236	50%	\$41,697
51.0909	Surgical Technology/Technologist.	AA	52	63%	\$39,014
51.0908	Respiratory Care Therapy/Therapist.	AA	63	73%	\$57,220
51.0908	Respiratory Care Therapy/Therapist.	BA	50	48%	\$63,518
51.3501	Massage Therapy/Therapeutic Massage.	C < 1 YR	38	21%	\$26,788
51.3501	Massage Therapy/Therapeutic Massage.	C 1-2 YR	10	0%	*
51.0809	Anesthesiologist Assistant.	AA	*	*	*
51.0912	Physician Associate/Assistant.	MA	210	10%	\$79,898

CIP Code	Program Title	Educ. Award Level	Number of Grads	% Employed in TN	Estimated First Year Annual Wages
51.0202	Audiology/Audiologist.	D	35	31%	\$65,830
51.0203	Speech-Language Pathology/Pathologist.	MA	54	56%	\$50,547
51.0204	Audiology/Audiologist and Speech-Language Pathology/Pathologist.	MA	118	30%	\$54,000
51.0204	Audiology/Audiologist and Speech-Language Pathology/Pathologist.	D	*	*	*
51.0299	Communication Disorders Sciences and Services, Other.	CPBA	19	37%	\$63,271
51.0805	Pharmacy Technician/Assistant.	C < 1 YR	26	38%	\$25,311
51.0805	Pharmacy Technician/Assistant.	C 1-2 YR	208	33%	\$28,060
51.0601	Dental Assisting/Assistant.	C 1-2 YR	256	8%	\$23,989
51.0601	Dental Assisting/Assistant.	AA	14	0%	*
51.0602	Dental Hygiene/Hygienist.	AA	45	82%	\$51,704
51.0602	Dental Hygiene/Hygienist.	BA	73	71%	\$51,136
51.0910	Diagnostic Medical Sonography/Sonographer and Ultrasound Technician.	C 1-2 YR	44	59%	\$53,431
51.0910	Diagnostic Medical Sonography/Sonographer and Ultrasound Technician.	BA	11	73%	\$73,449
51.0911	Radiologic Technology/Science - Radiographer.	BA	88	64%	\$47,732
51.0919	Mammography Technology/Technician.	C < 1 YR	24	42%	\$36,714
51.0920	Magnetic Resonance Imaging (MRI) Technology/Technician.	C < 1 YR	22	73%	\$61,413
51.1002	Cytotechnology/Cytotechnologist.	MA	*	*	*
51.1004	Clinical/Medical Laboratory Technician.	AA	76	71%	\$48,965
51.1005	Clinical Laboratory Science/Medical Technology/Technologist.	BA	88	26%	\$61,559
51.1005	Clinical Laboratory Science/Medical Technology/Technologist.	MA	*	*	*
51.1099	Clinical/Medical Laboratory Science and Allied Professions, Other.	C 1-2 YR	28	71%	\$27,425
51.1801	Opticianry/Ophthalmic Dispensing Optician.	AA	*	*	*
51.0001	Health and Wellness, General.	BA	18	22%	*
51.2201	Public Health, General.	BA	52	44%	\$35,900
51.2201	Public Health, General.	CPBA	*	*	*
51.2201	Public Health, General.	MA	118	41%	\$45,084
51.2201	Public Health, General.	D	11	18%	*
51.2207	Public Health Education and Promotion.	BA	24	58%	\$26,441
51.2208	Community Health and Preventive Medicine.	CPBA	*	*	*
51.2210	International Public Health/International Health.	CPBA	*	*	*
51.2299	Public Health, Other.	CPBA	*	*	*
51.2299	Public Health, Other.	MA	11	27%	*
51.2202	Environmental Health	AA	12	83%	\$35,254
51.2202	Environmental Health	BA	*	*	*
51.0801	Medical/Clinical Assistant.	C < 1 YR	40	60%	\$28,024
51.0801	Medical/Clinical Assistant.	C 1-2 YR	180	42%	\$19,180
51.0801	Medical/Clinical Assistant.	AA	11	64%	\$29,231
51.1001	Blood Bank Technology Specialist.	C < 1 YR	46	48%	\$38,322
51.1009	Phlebotomy Technician/Phlebotomist.	C < 1 YR	76	47%	\$24,897
51.1012	Sterile Processing Technology/Technician.	C < 1 YR	26	85%	\$41,602

<b>CIP Code</b>	<b>Program Title</b>	<b>Educ. Award Level</b>	<b>Number of Grads</b>	<b>% Employed in TN</b>	<b>Estimated First Year Annual Wages</b>
51.1803	Ophthalmic Technician/Technologist.	AA	12	0%	*
51.0707	Health Information/Medical Records Technology/Technician.	C < 1 YR	54	44%	\$32,385
51.0707	Health Information/Medical Records Technology/Technician.	C 1-2 YR	172	63%	\$29,029
51.0905	Nuclear Medical Technology/Technologist.	C < 1 YR	18	44%	\$37,980
51.0905	Nuclear Medical Technology/Technologist.	C 1-2 YR	26	0%	*
51.1012	Sterile Processing Technology/Technician.	C 1-2 YR	24	83%	\$34,548

Source: P20 Connect, public postsecondary and select private postsecondary completers, 2020-21 and TDLWD Unemployment Insurance (UI) employment and wage records.

Notes: Information is not available on completers of internship/residency programs.

## Workforce Investment Premium

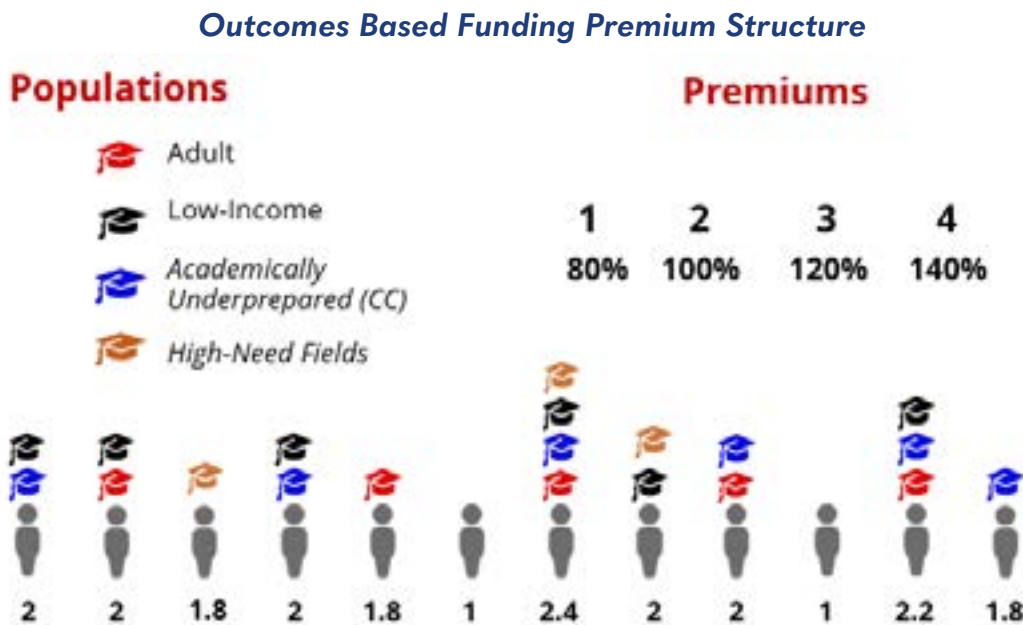
To meet the needs of Tennessee’s economy, THEC recognizes that higher education must be intentional in preparing its graduates for high-demand jobs.\*\* Based on these economic realities, the Governor’s office and institutions expressed interest in further aligning [the outcomes-based funding \(OBF\)](#) formula with workforce demands, specifically recognizing undergraduate awards in high-need fields in the OBF formula.

Using long-term occupational data projections from the Department of Labor and Workforce Development, THEC staff worked to identify the careers in Tennessee that are expected to grow in the coming years and matched those jobs with training pathways that align best with the skills needed to be successful. THEC also worked to ensure these training pathways aligned with the high need fields as defined by [the Quality Assurance Funding](#) council.

THEC staff created a workforce investment premium in the formula which provides greater outcome points to students completing an undergraduate award in one of ten high-need fields (classified at the two-digit CIP code level (see table below). The workforce investment premium was approved by the Commission and included in the 2023-24 outcomes-based funding formula.

Chief Policy Officer at the Tennessee Higher Education Commission, on the workforce investment premium, says “[The WIP] capitalizes on the existing funding formula structure to create further incentives for our higher education institutions. This new premium represents an important step taken by our Formula Review Committee and the Commission to elevate and reward those credentials that we know the Tennessee economy of tomorrow will most need, and it creates a very real alignment between workforce demand, academic supply, and Tennessee higher education funding.”

The workforce investment premium is one of four focus population premiums in the OBF formula. Low-income, adult, and—at the community colleges only—academically underprepared students are the other focus populations that garner additional points when a student reaches the progression and undergraduate award benchmarks. Success for a student in one focus population group is worth an additional 80 percent premium, two groups is worth an additional 100 percent premium, three groups is worth an additional 120 percent premium, and all four groups garners 140 percent premium the figure below illustrates how these premiums affect outcome points.



\*\* THEC Master Plan. (2019). Retrieved from <https://www.tn.gov/thecc/about-thecc-tsac/master-plan/master-plan.html>

The table below lists academic programs eligible for the WIP. Programs are identified at the two-digit Classification of Instructional Program (CIP) code.

***Academic Programs Eligible for the Workforce Investment Premium***

<b>Two Digit CIP Code</b>	<b>Program Title</b>
01	Agriculture, Agriculture Operations, & Related Sciences
03	Natural Resources and Conservation
11	Computer and Information Sciences and Support Services
14	Engineering
15	Engineering Technologies/Technicians
26	Biological and Biomedical Sciences
27	Mathematics and Statistics
40	Physical Sciences
51	Health Professions and Related Clinical Sciences

# CLUSTER EIGHT: HUMAN SERVICES

## QUICK TAKEAWAYS

Human services occupations include those focused on societal and individual well-being. Nationally, employment in community and social occupations is projected to grow 10 percent from 2021 to 2031.<sup>4</sup> The pandemic shed new light on the need to expand behavioral health for adults and children. **Demand:** Social and human services assistants, requiring a high school degree, are in-demand in eight of the nine regions of Tennessee. Healthcare social workers are in-demand in four regions. **Supply:** School counselors with educational specialist degrees, and those with bachelor's and master's degrees in human services and social work had the highest employment rates. In 2020-21, 79 graduates completed the post-baccalaureate in social work with first-year wages of \$43,025, with employment rates similar to the 517 graduates with master's degrees in social work. **Unmet needs** continue to exist in social work and behavioral health.

Human services occupations include those focused on societal and individual well-being. Nationally, employment in community and social occupations is projected to grow 10 percent from 2021 to 2031.<sup>72</sup> As our society grows and changes, demand for occupations focusing on nutritional, behavioral, and mental health will likely increase.

The pandemic shed new light on behavior and mental health services, needs, and access in Tennessee for both adults and children. The 2022 Needs Assessment<sup>73</sup> from the Tennessee Department of Mental Health and Substance Abuse Services identified several workforce development needs including “expand workforce development within the behavioral health field with a focus on outpatient clinical mental health providers who serve both adults and children.” According to the 2022 State of the Child in Tennessee report, half of all mental health conditions begin by age 14.<sup>74</sup>

In 2021, Governor Bill Lee renewed the proposal for the Mental Health Trust Fund to assist K-12 families facing significant mental health issues in the wake of COVID-19.<sup>75</sup> The Mental Health Trust Fund received an investment of \$250 million.<sup>76</sup> Several in-demand occupations attend to the mental health of Tennessee children, including educational, guidance, and career counselors and advisors; and child, family, and school social workers.

SOC Code	Occupation	In-Demand		Statewide Entry-Level Wage	Typical Entry-Level Education	Key to TNECD Industry Sectors	STEM
		TN	Total # Regions				
11-9151	Social and Community Service Managers		4	\$44,155	Bachelor's degree		
21-1012	Educational, Guidance, and Career Counselors and Advisors	X	8	\$36,581	Master's degree		
21-1013	Marriage and Family Therapists	X	1	\$33,351	Master's degree		
21-1019	Counselors, All Other		1	\$30,342	Master's degree		
21-1021	Child, Family, and School Social Workers		2	\$35,052	Bachelor's degree		
21-1022	Healthcare Social Workers		4	\$34,837	Master's degree		
21-1023	Mental Health and Substance Abuse Social Workers		1	\$27,449	Master's degree		
21-1091	Health Education Specialists		1	\$29,296	Bachelor's degree		
21-1093	Social and Human Service Assistants	X	8	\$23,969	HS diploma or equivalent		
39-1022	First-Line Supervisors of Personal Service Workers	X	7	\$28,092	HS diploma or equivalent		
39-5012	Hairdressers, Hairstylists, and Cosmetologists		1	\$19,102	Postsecondary nondegree award		

TCATs, community colleges, and universities offer a diverse selection of awards and programs that feed into in-demand occupations in human services. Southwest Tennessee Community College (SWTCC) and UoM offer a Substance Abuse Counseling Technical Certificate and a Substance Abuse Graduate Certificate, respectively. These are the only substance abuse-specific certificates within the state. UoM also offers a Bachelor of Professional Studies with a concentration in Alcohol and Drug Abuse Services.

MTSU's Industrial Organization Psychology is unique as it is the only baccalaureate program in the state. The program is designed to prepare students for entry-level positions in personnel departments of business and industries and provides a background for graduate work in Psychology, Industrial Organization Psychology, and other related fields. Offered solely in-person, this degree at MTSU is approved for the Academic Common Market (ACM) allowing residents from other states to qualify for in-state tuition. ACM allows students across the southern region, as defined by the Southern Regional Education Board (SREB), to participate as an in-state student in programs not offered in their home state.<sup>77</sup>

<sup>72</sup> U.S. Bureau of Labor Statistics, [Occupational Outlook Handbook, Community and Social Service Occupations](#).

<sup>73</sup> Tennessee Department of Mental Health and Substance Abuse, [Needs Assessment](#).

<sup>74</sup> Tennessee Commission on Children and Youth, [State of the Child in Tennessee](#).

<sup>75</sup> Office of the Governor, [Press Release](#).

<sup>76</sup> Office of the Governor, [Press Release](#).

<sup>77</sup> More information about the ACM can be found [here](#).



# HUMAN SERVICES ALIGNED ACADEMIC PROGRAMS

## Postsecondary Human Services Degrees, 2020-21

CIP Code	Program Title	Educ. Award Level	Number of Grads	% Employed in TN	Estimated First Year Annual Wages
13.1101	Counselor Education/School Counseling and Guidance Services.	CPBA	*	*	*
13.1101	Counselor Education/School Counseling and Guidance Services.	MA	152	50%	\$44,564
13.1101	Counselor Education/School Counseling and Guidance Services.	EDS	16	69%	\$37,492
13.1102	College Student Counseling and Personnel Services.	MA	15	47%	\$42,750
13.1102	College Student Counseling and Personnel Services.	D	14	36%	\$50,801
42.2703	Developmental and Child Psychology.	BA	*	*	*
42.2799	Research and Experimental Psychology, Other.	BA	283	51%	\$27,299
42.2799	Research and Experimental Psychology, Other.	MA	*	*	*
42.2799	Research and Experimental Psychology, Other.	D	16	0%	*
42.2803	Counseling Psychology.	BA	10	50%	\$31,876
42.2803	Counseling Psychology.	CPBA	13	31%	*
42.2804	Industrial and Organizational Psychology.	BA	20	55%	\$33,729
42.2806	Educational Psychology.	CPBA	*	*	*
42.2813	Applied Psychology.	BA	14	50%	\$38,632
44.0000	Human Services, General.	BA	62	65%	\$26,842
44.0000	Human Services, General.	MA	*	*	*
44.0201	Community Organization and Advocacy.	AA	*	*	*
44.0701	Social Work.	BA	398	59%	\$32,531
51.1501	Substance Abuse/Addiction Counseling.	C < 1 YR	62	10%	\$25,818
51.1504	Community Health Services/Liaison/Counseling.	BA	*	*	*
51.1508	Mental Health Counseling/Counselor.	CPBA	*	*	*
51.1508	Mental Health Counseling/Counselor.	MA	73	27%	\$42,471
51.2314	Rehabilitation Science.	BA	14	36%	\$22,209
19.0707	Family and Community Services.	BA	*	*	*
19.0707	Family and Community Services.	CPBA	*	*	*
44.0701	Social Work.	MA	517	58%	\$43,226
44.0701	Social Work.	D	22	23%	\$14,720
44.0799	Social Work, Other.	CPBA	79	52%	\$43,025
51.1505	Marriage and Family Therapy/Counseling.	MA	72	17%	\$43,783
12.0401	Cosmetology/Cosmetologist, General.	C < 1 YR	150	36%	\$18,028
12.0401	Cosmetology/Cosmetologist, General.	C 1-2 YR	720	45%	\$18,587
12.0402	Barbering/Barber.	C < 1 YR	*	*	*
12.0402	Barbering/Barber.	C 1-2 YR	88	39%	\$28,674
12.0409	Aesthetician/Esthetician and Skin Care Specialist.	C < 1 YR	62	42%	\$15,684
12.0410	Nail Technician/Specialist and Manicurist.	C < 1 YR	*	*	*
12.0413	Cosmetology, Barber/Styling, and Nail Instructor.	C < 1 YR	*	*	*
12.0499	Cosmetology and Related Personal Grooming Arts, Other.	C < 1 YR	54	63%	\$20,985
12.0499	Cosmetology and Related Personal Grooming Arts, Other.	C 1-2 YR	*	*	*

Source: P20 Connect, public postsecondary and select private postsecondary completers, 2020-21 and TDLWD Unemployment Insurance (UI) employment and wage records.

**High School CTE Human Services Completers, 2020-21**

<b>CIP Code</b>	<b>Program Title</b>	<b>Educ. Award Level</b>	<b>Number of Grads</b>	<b>% Employed in TN</b>	<b>Est. First Year Annual Wages</b>
19.0799	Human Development, Family Studies, and Related Services, Other.	CTE HS	703	54%	\$15,642
12.0401	Cosmetology/Cosmetologist, General.	CTE HS	841	61%	\$14,990
12.0402	Barbering/Barber.	CTE HS	32	50%	\$22,227

Source: P20 Connect, TDOE high school CTE completers, 2020-21 and TDLWD Unemployment Insurance (UI) employment and wage records.

# CLUSTER NINE: EDUCATION AND TRAINING

## QUICK TAKEAWAYS

**Demand:** The education and training career cluster includes educators, administrators, trainers, counselors, and other learning support personnel. Successful teacher recruitment and retention are essential for a high-quality education workforce; however, teacher shortages remain a challenge. The depth of the problem cannot be measured due to a decentralized system of job postings. Preschool teachers are in demand in four areas of the state. Childcare challenges are currently impacting workforce participation in the state and the nation with labor force participation rates of parents below pre-pandemic levels. **Supply:** As a new pipeline for recruitment, Tennessee has begun a first of its kind apprenticeship program for teachers called Grow Your Own. Several institutions in Tennessee offer training aligned with becoming a teacher and more needs to be learned about licensure among non-education degree completers. **Unmet needs:** Employment rates of bachelor's degree recipients in early childhood education, secondary education, and for reading teachers, as well as math, English, and art teachers exceeded 69 percent, with earnings greater than the state median wage, indicating an elevated need for more program graduates.

The education and training career cluster includes educators, administrators, trainers, counselors, and other learning support services. Recruitment and retention are critical for a high-quality and consistent teaching workforce. Across the nation and in Tennessee, teacher shortages and retention are a topic of concern. The Tennessee Department of Education (TDOE) conducts an annual survey, the Tennessee Educator Survey (TES), to understand the experience of educators across Tennessee. The results from the 2022 TES indicated that 77 percent of survey respondents plan to continue teaching in their current school next year, down from 82 percent in 2021.<sup>78</sup>

According to TDOE, even before the pandemic, “after five years, only six out of ten teachers were teaching in the same school.”<sup>79</sup> While the sector has relatively average growth projections,<sup>80</sup> there has been tremendous churn in the education workforce that has generated employer demand.

Tennessee is pioneering new ways to develop teacher pipelines. Tennessee is the first state approved by the U.S. Department of Labor to establish the first registered apprenticeship program for teaching in the country. Tennessee’s teacher apprenticeship program aligns with leading practices in teacher preparation and development with the rigors and funding of the national registered apprenticeship process.<sup>81</sup> Tennessee has 9 approved Education Preparation Providers (EPP) offering apprenticeships to 30+ districts and serving 200+ candidates.<sup>82</sup> Local school districts are also developing ways to prepare new teachers. Rutherford County Schools created [Rutherford Teach Now!](#) which provides professional development to individuals with an existing bachelor’s degree to become teachers. To increase exposure and interest in the teaching profession, a Statewide Dual Credit opportunity was developed to introduce students to skills in lesson planning and instruction.<sup>83</sup> Finally, the State Board of Education (SBOE) recognizes EPPs that graduate students who receive endorsements in high need areas, including English as a Second Language, Secondary Math, Secondary Science, Spanish, and Special Education.<sup>84</sup> Of the newly licensed teachers, 28 percent from the 2018, 2019, and 2020 graduating cohorts are endorsed in a high-demand area.<sup>85</sup>

In Governor Lee’s 2023 State of the State, he proposed \$350 million in additional funding to local education agencies through Tennessee Investment in Student Achievement (TISA), including \$125 million for teacher pay raises.<sup>86</sup> Tennessee increased the teacher salary component of the Basic Education Program (BEP) by 4 percent in 2021.<sup>87</sup>

Childcare challenges are currently impacting workforce participation nationwide, as parents of young children struggle to find options for childcare. Labor force participation rates of parents have not bounced back to pre-pandemic levels.<sup>88</sup> The Tennessee Child Care Task Force released an interim progress report in July of 2022, which noted that childcare is critical to workforce participation and productivity within Tennessee’s economy and that childcare is hard to find.<sup>89</sup> Preschool teachers are in-demand in four of the 9 regions in Tennessee. The usual training for this occupation is an associate degree.

<sup>78</sup> Tennessee Department of Education, [2022 Tennessee Educator Survey](#).

<sup>79</sup> Tennessee Department of Education, [Teacher Retention in Tennessee](#).

<sup>80</sup> Nationally, employment in education, training, and library occupations is projected to grow about as fast as the average for all occupations. -- U.S. Bureau of Labor Statistics, [Occupational Outlook Handbook, Education, Training and Library Occupations](#).

<sup>81</sup> Tennessee Department of Education, [Grow Your Own](#).

<sup>82</sup> Tennessee Department of Education, [Press Release](#).

<sup>83</sup> Tennessee Board of Regents, [Early Postsecondary Opportunities](#), Statewide Dual Credit.

<sup>84</sup> State Board of Education, [Educator Licensure Policy 5.502 \(7/22/2022\)](#).

<sup>85</sup> More information about the State Board of Education High-Demand Endorsement can be found [on the Candidate Profile](#) for the Educator Preparation Provider report card.

<sup>86</sup> Office of the Governor, [2023 State of the State](#).

<sup>87</sup> Office of the Governor, [Press Release](#).

<sup>88</sup> U.S. Bureau of Labor Statistics, [LFPR of Parents](#).

<sup>89</sup> Tennessee Child Care Task Force, [Interim Progress Report \(July 2022\)](#).

SOC Code	Occupation	In-Demand		Statewide Entry-Level Wage	Typical Entry-Level Education	Key to TNECD Industry Sectors	STEM
		TN	Total # Regions				
11-9033	Education Administrators, Postsecondary		5	\$59,540	Master's degree		
25-1194	Career/Technical Education Teachers, Postsecondary		2	\$38,903	Bachelor's degree		
25-2011	Preschool Teachers, Except Special Education		4	\$20,194	Associate degree		
25-3021	Self-Enrichment Teachers		2	\$20,531	HS diploma or equivalent		
25-4022	Librarians and Media Collections Specialists		6	\$41,145	Master's degree		

Last year's report documented the lack of centralized educator job postings data. This data limitation has implications for whether various types of educators are identified as in-demand (more information can be found on page 75). This year's report added postsecondary CTE teachers and librarians to the in-demand occupations list. While this analysis does not show elementary and secondary educator types as in-demand, other reporting indicate shortages of educators across Tennessee and the nation.<sup>90</sup>

The innovation of the programs like Grow Your Own and Rutherford County Teach Now! recognize that there is no one pathway to becoming a teacher in Tennessee. An education degree is not required to be a teacher in Tennessee. Individuals must have a four-year degree from an accredited institution and receive teacher training,<sup>91</sup> but the successful passage of state licensure exams determines the subjects an individual can teach and at what grade levels.<sup>92</sup> For example, a graduate with a Bachelor's in Elementary Education with instruction in special education may earn a license to teach in grades kindergarten through fifth grade and be licensed as a special education teacher. This individual would appear with a BS in Elementary Education in completers data but be an appropriate hire for multiple roles in a school, not just strictly a K-5 teacher.

Early childhood workers are not licensed by the state; rather it is the early childhood agency or facility that is regulated by the state. While licensure data may be useful in assessing the elementary and secondary school educator pipeline, additional considerations need to be made for assessing the early childhood worker pipeline.

The challenge of measuring supply and demand for educators in Tennessee warrants further exploration. THEC/TSAC is exploring opportunities to gather more information about shortages and teacher supply in collaboration with partners at SBOE.

## EDUCATION AND TRAINING ALIGNED ACADEMIC PROGRAMS

### Postsecondary Education Degrees, 2020-21

CIP Code	Program Title	Educ. Award Level	Number of Grads	% Employed in TN	Estimated First Year Annual Wages
13.0401	Educational Leadership and Administration, General.	CPBA	19	42%	\$62,001
13.0401	Educational Leadership and Administration, General.	MA	388	58%	\$59,604
13.0401	Educational Leadership and Administration, General.	EDS	47	60%	\$66,423
13.0401	Educational Leadership and Administration, General.	D	152	66%	\$80,177
13.0402	Administration of Special Education.	MA	*	*	*
13.0406	Higher Education/Higher Education Administration.	MA	*	*	*
13.0406	Higher Education/Higher Education Administration.	D	17	47%	\$70,684
13.0411	Superintendency and Educational System Administration.	EDS	*	*	*

<sup>90</sup> Knox News, University of Tennessee partners with the state on a \$20 million plan to fix a teacher shortage, May 17, 2022; Nguyen, Lam, & Bruno, Is there a national teacher shortage? A systematic examination of reports of teacher shortages in the United States (August 2022)

<sup>91</sup> State Board of Education, [Educator Licensure Policy 5.502 \(7/22/2022\)](#)

<sup>92</sup> More information about Teacher Licensure can be found on the Tennessee Department of Education's website under [Licensure Resources](#).

<b>CIP Code</b>	<b>Program Title</b>	<b>Educ. Award Level</b>	<b>Number of Grads</b>	<b>% Employed in TN</b>	<b>Estimated First Year Annual Wages</b>
13.0499	Educational Administration and Supervision, Other.	CPBA	13	8%	*
13.0499	Educational Administration and Supervision, Other.	D	135	38%	\$78,588
13.1334	School Librarian/School Library Media Specialist.	CPBA	*	*	*
25.0101	Library and Information Science.	CPBA	*	*	*
25.0101	Library and Information Science.	MA	148	45%	\$47,299
13.1502	Adult Literacy Tutor/Instructor.	CPBA	*	*	*
13.1203	Junior High/Intermediate/Middle School Education and Teaching.	BA	74	55%	\$39,360
13.1203	Junior High/Intermediate/Middle School Education and Teaching.	MA	*	*	*
13.1205	Secondary Education and Teaching.	BA	61	69%	\$39,848
13.1205	Secondary Education and Teaching.	MA	59	39%	\$52,587
13.1206	Teacher Education, Multiple Levels.	BA	287	71%	\$40,991
13.1302	Art Teacher Education.	BA	15	73%	\$37,782
13.1303	Business and Innovation/Entrepreneurship Teacher Education.	BA	*	*	*
13.1303	Business and Innovation/Entrepreneurship Teacher Education.	MA	*	*	*
13.1305	English/Language Arts Teacher Education.	BA	13	69%	\$45,103
13.1305	English/Language Arts Teacher Education.	MA	*	*	*
13.1306	Foreign Language Teacher Education.	MA	*	*	*
13.1307	Health Teacher Education.	BA	*	*	*
13.1311	Mathematics Teacher Education.	BA	17	71%	\$45,673
13.1311	Mathematics Teacher Education.	CPBA	*	*	*
13.1311	Mathematics Teacher Education.	MA	*	*	*
13.1312	Music Teacher Education.	BA	26	38%	\$42,047
13.1312	Music Teacher Education.	MA	*	*	*
13.1314	Physical Education Teaching and Coaching.	BA	30	40%	\$37,611
13.1314	Physical Education Teaching and Coaching.	MA	*	*	*
13.1315	Reading Teacher Education.	CPBA	*	*	*
13.1315	Reading Teacher Education.	MA	40	75%	\$50,115
13.1315	Reading Teacher Education.	D	*	*	*
13.1321	Computer Teacher Education.	CPBA	*	*	*
13.1321	Computer Teacher Education.	MA	*	*	*
13.1322	Biology Teacher Education.	BA	*	*	*
13.1322	Biology Teacher Education.	MA	*	*	*
13.1323	Chemistry Teacher Education.	BA	*	*	*
13.1324	Drama and Dance Teacher Education.	BA	*	*	*
13.1328	History Teacher Education.	BA	12	33%	*
13.1328	History Teacher Education.	MA	*	*	*
13.1330	Spanish Language Teacher Education.	BA	*	*	*
13.1331	Speech Teacher Education.	BA	*	*	*
13.1399	Teacher Education and Professional Development, Specific Subject Areas, Other.	CPBA	*	*	*
13.1399	Teacher Education and Professional Development, Specific Subject Areas, Other.	MA	128	45%	\$47,124

CIP Code	Program Title	Educ. Award Level	Number of Grads	% Employed in TN	Estimated First Year Annual Wages
13.1399	Teacher Education and Professional Development, Specific Subject Areas, Other.	EDS	*	*	*
13.1401	Teaching English as a Second or Foreign Language/ESL Language Instructor.	BA	*	*	*
13.1401	Teaching English as a Second or Foreign Language/ESL Language Instructor.	CPBA	56	29%	\$59,374
13.1401	Teaching English as a Second or Foreign Language/ESL Language Instructor.	MA	54	46%	\$53,050
13.9999	Education, Other.	BA	21	29%	\$30,368
16.1299	Classics and Classical Languages, Literatures, and Linguistics, Other.	BA	*	*	*
19.0101	Family and Consumer Sciences/Human Sciences, General.	BA	93	53%	\$27,746
19.0101	Family and Consumer Sciences/Human Sciences, General.	MA	13	69%	\$51,955
19.0401	Family Resource Management Studies, General.	BA	67	51%	\$31,803
19.0402	Consumer Economics.	BA	31	48%	\$40,887
19.0701	Human Development and Family Studies, General.	BA	51	45%	\$32,646
19.0701	Human Development and Family Studies, General.	CPBA	*	*	*
19.0701	Human Development and Family Studies, General.	MA	38	37%	\$46,527
19.0701	Human Development and Family Studies, General.	D	*	*	*
19.0704	Family Systems.	BA	*	*	*
19.0901	Apparel and Textiles, General.	BA	19	68%	\$34,548
50.0912	Music Pedagogy.	C < 1 YR	*	*	*
50.0912	Music Pedagogy.	CPBA	*	*	*
13.1210	Early Childhood Education and Teaching.	AA	*	*	*
13.1210	Early Childhood Education and Teaching.	BA	134	72%	\$40,772
13.1210	Early Childhood Education and Teaching.	CPBA	*	*	*
13.1210	Early Childhood Education and Teaching.	MA	11	45%	\$51,400
13.1210	Early Childhood Education and Teaching.	D	*	*	*

Source: P20 Connect, public postsecondary and select private postsecondary completers, 2020-21 and TDLWD Unemployment Insurance (UI) employment and wage records.

# CLUSTER TEN: PROTECTIVE SERVICES AND LAW

## QUICK TAKEAWAYS

**Demand:** The protective services and law cluster includes occupations focused on providing legal, public safety, and protective services. Occupations in-demand in three regions of the state are paralegals and legal assistants, corrections officers and jailors, and security guards. **Supply:** The paralegal certificate and the associate degree programs had 67 and 57 percent of graduates found in Tennessee employment data, respectively. The associate degree program had an even higher employment rate and first-year wage of \$68,183. **Unmet needs:** There are hundreds of vacancies for correctional officers in the state. The high school CTE corrections program may fill some of these with 1,234 concentrators in 2020-21. Paralegals are among the programs with employment rates greater than 60 percent and earnings greater than the state median wage.



The protective services and law career cluster includes occupations focused on providing legal, public safety, and protective services.

Paralegals and legal assistants, which are in-demand in three regions of the state, support lawyers through activities such as preparation of legal documents and researching legal precedent. Most paralegals and legal assistants work in legal services but are employed in other industries as well, such as headquarters or business support services industries. Online job postings in Tennessee seek candidates with skills in Microsoft Office, including Word or PowerPoint, and skills in maintaining calendars.<sup>93</sup>

Security guards represent 43 percent of the total annual projected job openings within protective service occupations and are in-demand in three regions. Security guards typically work in the investigation and security services industry but can also work directly for colleges and universities and other public institutions.<sup>94</sup> Security guards are represented in the workforce of TNECD's aerospace & defense industry sector. This sector contains companies specializing in the production of everything from aerospace parts and helicopters to handguns and uranium for nuclear weapons, necessitating personnel for onsite security and protection.

SOC Code	Occupation	In-Demand		Statewide Entry-Level Wage	Typical Entry-Level Education	Key to TNECD Industry Sectors	STEM
		TN	Total # Regions				
21-1092	Probation Officers and Correctional Treatment Specialists		1	\$30,952	Bachelor's degree		
23-1011	Lawyers		2	\$62,280	Doctoral or professional degree	*	
23-2011	Paralegals and Legal Assistants		3	\$32,416	Associate degree	*	
33-1021	First-Line Supervisors of Firefighting and Prevention Workers		2	\$42,318	Postsecondary nondegree award		
33-1091	First-Line Supervisors of Security Workers	X	2	\$29,418	HS diploma or equivalent		
33-3012	Correctional Officers and Jailers		3	\$31,441	HS diploma or equivalent		
33-9032	Security Guards		3	\$21,894	HS diploma or equivalent	*	
33-9091	Crossing Guards and Flaggers		3	\$26,856	No formal educ. credential		
33-9094	School Bus Monitors		1	\$20,733	HS diploma or equivalent		
33-9099	Protective Service Workers, All Other	X	4	\$34,305	HS diploma or equivalent		

There are 10 in-demand occupations in the protective services and law career cluster with four occupations typically requiring some form of postsecondary training. Tennessee institutions offer sub-baccalaureate programs for legal assistants and fire science.

Lawyers are in-demand in two of nine regions in Tennessee. Over 233 individuals completed law degrees at Tennessee public and TICUA reporting institutions, with about half of those graduates found in the Tennessee job market. Juris doctorate programs prepare graduates in the theory and practice of the legal system, including the statutory, administrative, and judicial components of civil and criminal law.<sup>95</sup> To practice law in Tennessee, graduates must also successfully pass the bar exam.<sup>96</sup>

<sup>93</sup> Jobs4TN.gov, Occupation Data, Occupation Summary

<sup>94</sup> Jobs4TN.gov, Occupation Data, Occupation Summary

<sup>95</sup> NCES, Classification of Instructional Programs, [22.0101](#)

<sup>96</sup> Tennessee Board of Law Examiners, [Admission by Examination Score](#)

## PROTECTIVE SERVICES AND LAW ALIGNED ACADEMIC PROGRAMS

### Postsecondary Protective Services and Law Degrees, 2020-21

CIP Code	Program Title	Educ. Award Level	Number of Grads	% Employed in TN	Estimated First Year Annual Wages
43.0199	Corrections and Criminal Justice, Other.	C < 1 YR	*	*	*
43.0199	Corrections and Criminal Justice, Other.	AA	*	*	*
19.0403	Consumer Services and Advocacy.	BA	*	*	*
22.0000	Legal Studies.	BA	14	36%	\$35,010
22.0302	Legal Assistant/Paralegal.	C < 1 YR	18	67%	\$38,710
22.0302	Legal Assistant/Paralegal.	C 1-2 YR	*	*	*
22.0302	Legal Assistant/Paralegal.	AA	53	57%	\$37,478
30.0501	Peace Studies and Conflict Resolution.	MA	*	*	*
22.0101	Law.	P	230	50%	\$61,956
43.0203	Fire Science/Fire-fighting.	C 1-2 YR	54	81%	\$70,931
43.0203	Fire Science/Fire-fighting.	AA	43	91%	\$68,183

Source: P20 Connect, public postsecondary and select private postsecondary completers, 2020-21 and TDLWD Unemployment Insurance (UI) employment and wage records.

### High School CTE Protective Services and Law Completers, 2020-21

CIP Code	Program Title	Educ. Award Level	Number of Grads	% Employed in TN	Est. First Year Annual Wages
43.0102	Corrections.	CTE HS	1234	55%	\$19,110
43.0202	Fire Services Administration.	CTE HS	11	55%	\$14,751

Source: P20 Connect, TDOE high school CTE completers, 2020-21 and TDLWD Unemployment Insurance (UI) employment and wage records.

There are hundreds of vacancies for correctional officers exist in the state. The high school CTE corrections program may fill some of these with 1,234 concentrators in 2020-21.

# CLUSTER ELEVEN: ARTS AND COMMUNICATION

## QUICK TAKEAWAYS

**Demand:** Tennessee is a hub of creative innovation, technology, and performing arts. Tennessee is home to nine annual film festivals, a host of dance companies, and dozens of theatre troupes. The Arts & Economic Prosperity 5 Study indicates that the nonprofit arts and culture sector is a \$1.17 billion industry in Tennessee, supporting over 38,000 full-time equivalent jobs and generating \$135 million in local and state government revenue.<sup>5</sup> This cluster includes 75 aligned academic programs in Tennessee, from a bluegrass and roots music bachelor's degree to public cinema to a master's degree in strategic communication. In-demand occupations identified in this cluster include graphic designers, printing press operators, and editors. **Supply:** Of graduates in the education and instruction technology master's degree, 61 percent were found in the Tennessee job market with a median first-year wage of \$50,980. The bachelor's degree in graphic design had 40 completers, 55 percent employed in Tennessee, and median first-year wages of \$37,296. Another popular major, journalism, had 227 bachelor's degree graduates with 55 percent of graduates found in Tennessee employment. **Unmet need:** Graphic design was in demand in seven regions of Tennessee, with one program offered at the bachelor's degree level.

Tennessee’s music and arts pedigree is unlike any other. Tennessee is the birthplace of country and rock ‘n’ roll music, the home of the blues, and the starting point of soul. Tennessee is a hub of creative innovation, technology and performing arts—a playground for big names and bigger ideas.

Tennessee is home to nine annual film festivals, a host of dance companies, and dozens of theatre troupes. Our museums showcase stunning works in every medium and from many cultures. World-renowned attractions in Tennessee include Elvis Presley’s Graceland, Sun Studio, Memphis Rock ‘n’ Soul Museum, Stax Museum of American Soul Music, Grand Ole Opry, Ryman Auditorium, Country Music Hall of Fame and Museum, Schermerhorn Symphony Center, Brooks Museum of Art, Cheekwood Botanical Gardens and Museum of Art, Frist Center for the Visual Arts, The Parthenon, Hunter Museum of Art, Knoxville Museum of Art, and International Storytelling Center.

The Arts & Economic Prosperity 5 study indicates that the nonprofits arts and culture sector is a \$1.17 billion industry in Tennessee, supporting over 38,000 full-time equivalent jobs and generating \$135.9 million in local and state government revenue.<sup>97</sup>

Musicians and singers are identified as an in-demand occupation in the Northern Middle region. Musicians and singers are employed not only by musical groups and artists, but also by religious organizations, dance and theater companies, music publishers, the motion picture and video industry, and in education institutions of all levels. Demand for this occupation was primarily identified through hires and projected openings, rather than through job postings.

Nationally, it is expected that workers will be needed to meet demand for animation and visual effects in video games, movies, television, and on smartphones. In addition, arts and design workers are expected to create visually appealing and effective layouts of websites and other media platforms.<sup>98</sup>

Graphic designers are in-demand in Tennessee in seven regions. Employers seek candidates with skills in Adobe Creative Cloud software (including Illustrator, Photoshop, and InDesign), Microsoft Office, HTML, and JavaScript. Graphic designers are employed across many different industries, including printing and related support activities; specialized design services; advertising, public relations, and related services; management, scientific, and technical consulting services; and converted paper product manufacturing.

SOC Code	Occupation	In-Demand		Statewide Entry-Level Wage	Typical Entry-Level Education	Key to TNECD Industry Sectors	STEM
		TN	Total # Regions				
27-1011	Art Directors		1	\$47,697	Bachelor’s degree		
27-1024	Graphic Designers	X	7	\$32,762	Bachelor’s degree	*	
27-2012	Producers and Directors		1	\$39,264	Bachelor’s degree		
27-2042	Musicians and Singers		1	\$0	No formal educ. credential		
27-3041	Editors	X	2	\$33,608	Bachelor’s degree		
27-4011	Audio and Video Technicians		1	\$30,222	Postsecondary nondegree award		
51-5111	Prepress Technicians and Workers		1	\$25,553	Postsecondary nondegree award		
51-5112	Printing Press Operators		4	\$28,055	HS diploma or equivalent		
51-5113	Print Binding and Finishing Workers		1	\$25,758	HS diploma or equivalent		

The arts and communications cluster has 75 aligned academic programs in Tennessee ranging from the certificate level to doctoral programs. One such program is the Bluegrass, Old-Time and Roots Music Studies bachelor’s degree at ETSU. The first program of its kind at a four-year university, alumni of this program

<sup>97</sup> Tennessee Arts Commission, [Arts & Prosperity 5](#)

<sup>98</sup> U.S. Bureau of Labor Statistics, [Occupational Outlook Handbook, Arts and Design Occupations](#)

include both professional musicians and skilled researchers. In 2020-21, just under half (46.2%) of completers of musicology and ethnomusicology programs, like the one at ETSU, were employed in the state of Tennessee.

The University of Tennessee, Martin offers a master's degree in Strategic Communication. This program is aimed at students who are interested in professional careers that shape public opinion, build consensus, and convey information. Coursework in this program covers strategic planning and message creation; communication management and leadership; theory, research, and evaluation; global influences; and professional ethics.

The University of Tennessee, Knoxville offers the only public Cinema Studies program in the state. Students in this program study the history and aesthetics of movies and produce their own films. Coursework includes the study of Middle Eastern, German, Brazilian, French, and Italian cinema, among other coursework. Faculty in the program are internationally recognized scholars, and student work in the program has won numerous awards.

University of Tennessee campuses at Chattanooga, Knoxville, and Martin offer aligned academic programs in music at the bachelor's and master's level. In total, 618 completers earned awards in aligned academic programs in music across the state in 2020-21, with estimated first year annual wages for those completers ranging from \$14k-\$32.5k.

## ARTS AND COMMUNICATION ALIGNED ACADEMIC PROGRAMS

### Postsecondary Arts and Communications Degrees, 2020-21

CIP Code	Program Title	Educ. Award Level	Number of Grads	% Employed in TN	Estimated First Year Annual Wages
10.0203	Recording Arts Technology/Technician.	C < 1 YR	*	*	*
10.0203	Recording Arts Technology/Technician.	C 1-2 YR	12	50%	\$13,143
10.0203	Recording Arts Technology/Technician.	AA	*	*	*
10.0203	Recording Arts Technology/Technician.	BA	*	*	*
10.0203	Recording Arts Technology/Technician.	MA	*	*	*
13.0501	Educational/Instructional Technology.	CPBA	18	50%	\$58,666
13.0501	Educational/Instructional Technology.	MA	31	61%	\$50,980
30.1401	Museology/Museum Studies.	BA	*	*	*
30.1401	Museology/Museum Studies.	CPBA	*	*	*
50.0701	Art/Art Studies, General.	BA	242	52%	\$26,930
50.0701	Art/Art Studies, General.	MA	*	*	*
50.0702	Fine/Studio Arts, General.	BA	104	43%	\$31,928
50.0702	Fine/Studio Arts, General.	MA	11	27%	*
50.0703	Art History, Criticism and Conservation.	BA	*	*	*
50.0703	Art History, Criticism and Conservation.	MA	*	*	*
50.0708	Painting.	BA	*	*	*
50.0102	Digital Arts.	AA	15	60%	\$29,621
50.0102	Digital Arts.	BA	*	*	*
50.0401	Design and Visual Communications, General.	BA	*	*	*
50.0402	Commercial and Advertising Art.	C < 1 YR	32	31%	\$22,064
50.0402	Commercial and Advertising Art.	C 1-2 YR	76	21%	\$23,454
50.0402	Commercial and Advertising Art.	AA	52	58%	\$27,034
50.0409	Graphic Design.	BA	40	55%	\$37,296
50.0101	Visual and Performing Arts, General.	BA	27	63%	\$22,578
50.0501	Drama and Dramatics/Theatre Arts, General.	BA	118	43%	\$22,701
50.0501	Drama and Dramatics/Theatre Arts, General.	MA	10	30%	*
50.0506	Acting.	C < 1 YR	*	*	*

CIP Code	Program Title	Educ. Award Level	Number of Grads	% Employed in TN	Estimated First Year Annual Wages
50.0506	Acting.	BA	*	*	*
50.0507	Directing and Theatrical Production.	BA	*	*	*
50.0599	Dramatic/Theatre Arts and Stagecraft, Other.	BA	*	*	*
50.0601	Film/Cinema/Media Studies.	BA	12	42%	\$29,188
50.0602	Cinematography and Film/Video Production.	C < 1 YR	*	*	*
50.0602	Cinematography and Film/Video Production.	BA	92	55%	\$28,220
50.0602	Cinematography and Film/Video Production.	MA	16	13%	*
39.0501	Religious/Sacred Music.	C 1-2 YR	*	*	*
39.0501	Religious/Sacred Music.	BA	*	*	*
50.0509	Musical Theatre.	BA	*	*	*
50.0901	Music, General.	AA	*	*	*
50.0901	Music, General.	BA	239	52%	\$32,082
50.0901	Music, General.	MA	73	32%	\$29,155
50.0901	Music, General.	D	11	0%	*
50.0903	Music Performance, General.	AA	51	37%	\$17,721
50.0903	Music Performance, General.	BA	15	20%	*
50.0903	Music Performance, General.	MA	*	*	*
50.0904	Music Theory and Composition.	BA	*	*	*
50.0905	Musicology and Ethnomusicology.	BA	12	42%	\$16,181
50.0906	Conducting.	MA	*	*	*
50.0907	Keyboard Instruments.	BA	*	*	*
50.0913	Music Technology.	BA	79	52%	\$20,238
50.0999	Music, Other.	C 1-2 YR	20	60%	\$26,078
50.0999	Music, Other.	BA	60	45%	\$18,012
09.0100	Communication, General.	BA	195	48%	\$28,997
09.0100	Communication, General.	MA	*	*	*
09.0101	Speech Communication and Rhetoric.	BA	238	41%	\$37,865
09.0102	Mass Communication/Media Studies.	BA	317	49%	\$27,378
09.0102	Mass Communication/Media Studies.	MA	69	59%	\$38,000
09.0102	Mass Communication/Media Studies.	D	*	*	*
09.0199	Communication and Media Studies, Other.	BA	18	39%	\$29,126
09.0401	Journalism.	BA	227	55%	\$31,988
09.0401	Journalism.	MA	11	36%	*
09.0402	Broadcast Journalism.	BA	*	*	*
09.0499	Journalism, Other.	BA	*	*	*
09.0702	Digital Communication and Media/Multimedia.	BA	36	33%	\$32,328
09.9999	Communication, Journalism, and Related Programs, Other.	BA	24	46%	\$36,354
10.0105	Communications Technology/Technician.	AA	81	60%	\$23,926
23.1302	Creative Writing.	BA	13	31%	*
23.1303	Professional, Technical, Business, and Scientific Writing.	BA	*	*	*
23.1304	Rhetoric and Composition.	BA	14	57%	\$25,987

Source: P20 Connect, public postsecondary and select private postsecondary completers, 2020-21 and TDLWD Unemployment Insurance (UI) employment and wage records.

## High School CTE Arts and Communications Completers, 2020-21

CIP Code	Program Title	Educ. Award Level	Number of Grads	% Employed in TN	Est. First Year Annual Wages
10.0203	Recording Arts Technology/Technician.	CTE HS	37	51%	\$16,929
10.0299	Audiovisual Communications Technologies/Technicians, Other.	CTE HS	370	53%	\$17,379
09.0702	Digital Communication and Media/Multimedia.	CTE HS	483	52%	\$18,670

Source: P20 Connect, TDOE high school CTE completers, 2020-21 and TDLWD Unemployment Insurance (UI) employment and wage records.

# CLUSTER TWELVE: LEISURE AND RECREATION

## QUICK TAKEAWAYS

Tennessee is well known for its great outdoors, with 13 national parks, 56 state parks, and 84 natural areas. In Tennessee, the leisure and hospitality sector is expected to have seven percent growth from 2021 to 2023<sup>6</sup> due to rising wages in the industry and consumers shifting back to more in-person services. **Demand:** Most of the in-demand occupations in the leisure and recreation cluster require only a high school degree or the equivalent. Food service managers, supervisors of housekeeping and janitorial workers, and pest control workers are in demand in all areas of the state; chefs and head cooks and exercise trainers were in demand in seven areas. **Supply:** Culinary arts/chef training and hotel/motel administration associate degree programs had the highest employment rates in Tennessee at 68 and 70 percent, respectively. Culinary arts completers from high school CTE programs had employment rates of 53 percent. Those earning bachelor's degrees in hotel/motel administration were employed at the rate of 51 percent. This cluster includes degrees in sports and exercise science. In 2020-21, more than 900 students completed bachelor's degrees in exercise science. **Unmet Needs:** Although employment rates were high for associate degrees in culinary arts and hotel administration, the wages were below state median wages. Increased pay in these fields may entice more students into these fields. Pest control workers were needed in all nine local workforce development areas but specific training was not available.



Tennessee is well-known for its great outdoors. There are 13 national parks in Tennessee, including the Great Smoky Mountains National Park, receiving over 14.1 million visitors in 2021.<sup>99</sup> The Great Smoky Mountains National Park is one of the most visited national parks in the country.<sup>100</sup> There are also 57 state parks<sup>101</sup> and 84 natural areas<sup>102</sup> across Tennessee.

In the last five years, Tennessee’s Leisure and Hospitality industry has grown by 7.3 percent, the fastest job growth in the Southeast and the 5th fastest in the nation.<sup>103</sup>

Most of the in-demand occupations in the leisure and recreation career cluster require only a high school diploma or equivalent. Food service managers, lodging managers, chefs and head cooks, supervisors of food-preparation and serving workers, supervisors of housekeeping and janitorial workers, pest control workers, and exercise trainers and group fitness workers are all in-demand in statewide and, for some of these, in nearly all regions in the state. Pest control workers typically require a HS diploma or equivalent only but are needed statewide and in all nine local workforce development areas, which may indicate a need for training opportunities.

SOC Code	Occupation	In-Demand		Statewide Entry-Level Wage	Typical Entry-Level Education	Key to TNECD Industry Sectors	STEM
		TN	Total # Regions				
11-9051	Food Service Managers	X	9	\$33,686	HS diploma or equivalent		
11-9081	Lodging Managers	X	3	\$34,425	HS diploma or equivalent		
13-1121	Meeting, Convention, and Event Planners		2	\$29,312	Bachelor's degree		
35-1011	Chefs and Head Cooks	X	7	\$35,844	HS diploma or equivalent		
35-1012	First-Line Supervisors of Food Preparation and Serving Workers	X	4	\$24,227	HS diploma or equivalent		
37-1011	First-Line Supervisors of Housekeeping and Janitorial Workers	X	9	\$27,872	HS diploma or equivalent		
37-2021	Pest Control Workers	X	9	\$27,251	HS diploma or equivalent		
39-9031	Exercise Trainers and Group Fitness Instructors	X	7	\$23,552	HS diploma or equivalent		
43-4181	Reservation and Transportation Ticket Agents and Travel Clerks		1	\$25,975	HS diploma or equivalent		
51-3011	Bakers		2	\$21,784	No formal educ. credential	*	

Institutions across Tennessee offer programs in hospitality and tourism management as well as programs in health and fitness studies. MTSU’s Bachelor of Science in Tourism and Hospitality Management is the only degree program of its kind at a public institution in the state and offers specializations in tourism management, hospitality management, and event planning. In partnership with industry in the middle Tennessee region, all students in the program gain at least six credit hours of work experience while completing their degree.<sup>104</sup>

Several community colleges and TCATs across the state offer one-to-two-year programs in culinary arts, which prepare individuals to provide professional chef services in restaurants and other commercial food establishments. Instruction in these programs includes lessons on recipe and menu planning, supervising, and training kitchen assistance, management of food supplies and resources, and a wide variety of culinary techniques.<sup>105</sup> Although employment rates are high for completers in culinary arts and hotel administration, wages are below the state median. Increased pay in these fields may entice more students.

ETSU offers a range of programs in the Sport and Fitness Administration sector, including a Sport and Recreation Management bachelor’s degree, master’s degree, and several graduate certificates, such as Athletic Administration and eSports Management. The eSports Management certificate is the first of its kind in the

<sup>99</sup> [National Park Services, Annual Park Recreation Visits Stats Report Viewer](#)

<sup>100</sup> USA Today, [America’s most-visited national parks](#)

<sup>101</sup> Tennessee State Parks, [Find a Park](#)

<sup>102</sup> Tennessee Department of Environment & Conservation, [List of Natural Areas](#)

<sup>103</sup> U.S. Bureau of Labor Statistics, Current Employment Statistics, Leisure and Hospitality, December 2017 - December 2022

<sup>104</sup> MTSU, [Tourism and Hospitality Management Requirements](#)

<sup>105</sup> NCES, CIP Code [12.0503](#)

state and offers a customizable curriculum for students interested in learning more about eSports marketing, facilities management, administration, and communications/public relations. Students can apply the hours earned through the certificate toward a Master of Science program as well.<sup>106</sup>

## LEISURE AND RECREATION ALIGNED ACADEMIC PROGRAMS

### Postsecondary Leisure and Recreation Degrees, 2020-21

CIP Code	Program Title	Educ. Award Level	Number of Grads	% Employed in TN	Estimated First Year Annual Wages
12.0500	Cooking and Related Culinary Arts, General.	C < 1 YR	32	56%	\$24,165
12.0503	Culinary Arts/Chef Training.	C < 1 YR	*	*	*
12.0503	Culinary Arts/Chef Training.	C 1-2 YR	58	55%	\$31,274
12.0503	Culinary Arts/Chef Training.	AA	19	68%	\$30,192
52.0901	Hospitality Administration/Management, General.	BA	56	48%	\$34,370
52.0901	Hospitality Administration/Management, General.	D	*	*	*
52.0904	Hotel/Motel Administration/Management.	C < 1 YR	14	43%	\$20,830
52.0904	Hotel/Motel Administration/Management.	C 1-2 YR	10	40%	*
52.0904	Hotel/Motel Administration/Management.	AA	27	70%	\$24,746
52.0904	Hotel/Motel Administration/Management.	BA	35	51%	\$35,924
52.0904	Hotel/Motel Administration/Management.	CPBA	*	*	*
31.0101	Parks, Recreation, and Leisure Studies.	BA	*	*	*
31.0301	Parks, Recreation, and Leisure Facilities Management, General.	BA	47	43%	\$21,481
31.0501	Sports, Kinesiology, and Physical Education/Fitness, General.	BA	472	47%	\$23,449
31.0501	Sports, Kinesiology, and Physical Education/Fitness, General.	MA	39	46%	\$30,696
31.0501	Sports, Kinesiology, and Physical Education/Fitness, General.	D	11	18%	*
31.0504	Sport and Fitness Administration/Management.	BA	242	35%	\$32,678
31.0504	Sport and Fitness Administration/Management.	CPBA	*	*	*
31.0504	Sport and Fitness Administration/Management.	MA	115	37%	\$39,980
31.0505	Exercise Science and Kinesiology.	BA	918	45%	\$27,032
31.0507	Physical Fitness Technician.	BA	*	*	*
31.0508	Sports Studies.	BA	*	*	*
31.0508	Sports Studies.	MA	*	*	*
31.0599	Sports, Kinesiology, and Physical Education/Fitness, Other.	BA	*	*	*
31.9999	Parks, Recreation, Leisure, Fitness, and Kinesiology, Other.	BA	*	*	*

Source: P20 Connect, public postsecondary and select private postsecondary completers, 2020-21 and TDLWD Unemployment Insurance (UI) employment and wage records.

<sup>106</sup> ETSU, [Esport Management Certificate](#)

## High School CTE Leisure and Recreation Completers, 2020-21

CIP Code	Program Title	Educ. Award Level	Number of Grads	% Employed in TN	Est. First Year Annual Wages
12.0503	Culinary Arts/Chef Training.	CTE HS	879	53%	\$17,185
52.0901	Hospitality Administration/Management, General.	CTE HS	45	44%	\$17,677
31.0507	Physical Fitness Technician.	CTE HS	344	54%	\$15,393

Source: P20 Connect, TDOE high school CTE completers, 2020-21 and TDLWD Unemployment Insurance (UI) employment and wage records.

# CLUSTER THIRTEEN: INFORMATION TECHNOLOGY

## QUICK TAKEAWAYS

**Demand:** Information technology (IT) occupations are in-demand in both Tennessee and the nation. IT occupations are projected to grow 13 percent nationally from 2020 to 2030, faster than the average for all occupations. Tennessee's growth in the headquarters, finance, and tech industries and unique research and development facilities at St. Jude Children's Research Hospital, Oak Ridge National Laboratory, Arnold Engineering Complex, and universities are employers of computer and IT occupations. The IT occupations in demand in the most regions of the state include computer user support specialists, computer systems analysts, information security analysts, and network and computer systems administrators. **Supply:** The medical informatics associate degree program provided the highest share of its graduates (82 percent) to the Tennessee workforce. The master's degree in medical informatics had an employment rate of 58 percent and paid a first-year median wage of \$78,935. **Unmet needs:** While short term trends have shown some volatility, IT employment is expected to have strong growth long term. The computer and information systems security/auditing/information assurance certificate program of less-than-one-year had the highest employment rate (73 percent) and completers earned more than the state median wage. The associate degree in information technology also had high employment rates and pay above the median. Bachelor's and master's degree programs had high salaries but lower placement rates which could be due to individuals moving out of state.

Computer and information technology occupations typically have high median wages in Tennessee. Computer network architects, software developers and database administrators typically make above 2.5 times the median wage of all occupations. Information security analysts and computer programmers typically make more than 2.1 times the median wage of all occupations.

Many workers now prefer remote work and are searching for work-from-home opportunities. The availability of broadband, especially in rural areas of the state, is key to connecting workers to remote work job opportunities. The need for IT infrastructure, support, and security will continue. Occupations like information security analysts and computer user support specialists are key to the success of companies worldwide that have increased their technology needs in recent years, and there is a great opportunity for Tennesseans to fulfill that workforce need.

Information security analysts ensure appropriate security controls are in place to safeguard files and infrastructure from accidental or unauthorized modification, destruction, or disclosure. Online job postings for information security analysts are seeking candidates with skills using Python, SQL, PowerShell, UNIX, and VMWare. Information security analysts in Tennessee work in industries such as technical consulting services or headquarters operations.

Computer user support specialists provide technical assistance to computer users about software or hardware operation to resolve problems. Job skills necessary include customer service, problem solving, and conflict management.

Tennessee has a strong and growing industry sector of Headquarters, Finance & Tech<sup>107</sup> that frequently employ information technology occupations. Tennessee also has unique research and development (R&D) assets and facilities, like St. Jude Children’s Research Hospital, Vanderbilt University, Oak Ridge National Laboratory (ORNL), U.S. Airforce Arnold Engineering Development Complex, and the University of Tennessee, that provide world-changing technologies to businesses. These assets and facilities also frequently employ information technology occupations. This clustering of industry, R&D, and education drives the need for IT specialization in our state. While short term trends have shown some volatility, IT employment is expected to have strong growth long term.

SOC Code	Occupation	In-Demand		Statewide Entry-Level Wage	Typical Entry-Level Education	Key to TNECD Industry Sectors	STEM
		TN	Total # Regions				
11-3021	Computer and Information Systems Managers		3	\$79,611	Bachelor’s degree	*	#
15-1211	Computer Systems Analysts		7	\$54,294	Bachelor’s degree	*	#
15-1212	Information Security Analysts	X	5	\$60,043	Bachelor’s degree	*	#
15-1231	Computer Network Support Specialists		1	\$38,629	Associate degree	*	#
15-1232	Computer User Support Specialists	X	9	\$33,492	Some college, no degree	*	#
15-1241	Computer Network Architects	X	4	\$63,787	Bachelor’s degree	*	#
15-1242	Database Administrators	X	3	\$51,828	Bachelor’s degree	*	#
15-1244	Network and Computer Systems Administrators		5	\$53,101	Bachelor’s degree	*	#
15-1251	Computer Programmers	X	3	\$53,336	Bachelor’s degree	*	#
15-1252	Software Developers	X	4	\$63,152	Bachelor’s degree	*	#
15-1253	Software Quality Assurance Analysts and Testers		2	\$53,346	Bachelor’s degree	*	#
15-1254	Web Developers	X	0	\$32,278	Bachelor’s degree	*	#
15-1299	Computer Occupations, All Other		1	\$33,900	Bachelor’s degree	*	#

TCATs, community colleges, and universities offer a variety of programs ranging from short-term certificates to graduate degrees that prepare students for careers in information systems and information technology.

Some of the most popular certificate and associate programs at TCATs and community colleges include computer support specialist, computer systems networking, and information technology. Medical Informatics programs at several TBR community colleges, including Cleveland State, Columbia State, and Roane State offer a flexible curriculum that includes critical topics, such as Medical Terminology and Computer Applications, but also breadth across courses in Accounting, Coding and Computer Programming, and Psychology.

Universities offer undergraduate and graduate programs aligned to occupations in the Information Technology cluster. The Information Assurance and Security Executive Certificate program at Austin Peay State University (APSU) provides hands-on and applicable experiences with “security of organizational structure design and management, policy and governance, risk management, legal and compliance issues, incident response and forensic team formation, training, financial management, and outsourcing.” Designed for working professionals with a degree seeking advanced training and continuing education, the 18-hour certificate complements an undergraduate Computer Information Systems bachelor’s degree with a concentration in Information Assurance and Security.<sup>108</sup> Two University of Tennessee System schools recently created new degree programs in Cybersecurity. UTM’s Cybersecurity was approved by THEC in July of 2021, while University of Tennessee, Chattanooga’s (UTC) Information Technology in Cybersecurity was approved in November of 2022. The UTM program was the first accredited program at a public university in Tennessee. The UTC program was built to serve transfer and adult students and offers an accelerated curriculum with hands-learning through internships with local partners. Lower shares of bachelor and master's degree completers employed in TN may be indicative of individuals with these credentials moving out of state.

## INFORMATION TECHNOLOGY ALIGNED ACADEMIC PROGRAMS

### Postsecondary Information Technology Degrees, 2020-21

CIP Code	Program Title	Educ. Award Level	Number of Grads	% Employed in TN	Estimated First Year Annual Wages
11.0901	Computer Systems Networking and Telecommunications.	C < 1 YR	76	37%	\$27,920
11.0901	Computer Systems Networking and Telecommunications.	C 1-2 YR	56	36%	\$25,603
11.1002	System, Networking, and LAN/WAN Management/ Manager.	C < 1 YR	34	41%	\$37,244
11.1002	System, Networking, and LAN/WAN Management/ Manager.	C 1-2 YR	84	64%	\$33,937
11.1003	Computer and Information Systems Security/Auditing/ Information Assurance.	C < 1 YR	30	73%	\$46,154
11.1003	Computer and Information Systems Security/Auditing/ Information Assurance.	C 1-2 YR	12	67%	\$34,912
11.1003	Computer and Information Systems Security/Auditing/ Information Assurance.	BA	*	*	*
11.0103	Information Technology.	C < 1 YR	110	60%	\$32,732
11.0103	Information Technology.	C 1-2 YR	*	*	*
11.0202	Computer Programming, Specific Applications.	C 1-2 YR	*	*	*
11.1006	Computer Support Specialist.	C < 1 YR	280	41%	\$20,910
11.1006	Computer Support Specialist.	C 1-2 YR	244	47%	\$32,280
11.0101	Computer and Information Sciences, General.	BA	86	55%	\$44,000
11.0101	Computer and Information Sciences, General.	MA	45	18%	\$63,952
11.0103	Information Technology.	AA	340	63%	\$39,502
11.0103	Information Technology.	BA	93	35%	\$39,016
11.0103	Information Technology.	MA	109	51%	\$70,208
11.0104	Informatics.	MA	*	*	*
11.0401	Information Science/Studies.	BA	*	*	*

<sup>108</sup> APSU, [Information Assurance and Security Executive Certificate](#)

CIP Code	Program Title	Educ. Award Level	Number of Grads	% Employed in TN	Estimated First Year Annual Wages
11.0501	Computer Systems Analysis/Analyst.	BA	35	40%	\$51,307
11.0701	Computer Science.	BA	409	55%	\$60,153
11.0701	Computer Science.	CPBA	*	*	*
11.0701	Computer Science.	MA	83	31%	\$76,246
11.0701	Computer Science.	D	13	8%	*
11.0802	Data Modeling/Warehousing and Database Administration.	CPBA	*	*	*
11.0802	Data Modeling/Warehousing and Database Administration.	MA	63	33%	\$61,637
11.0804	Modeling, Virtual Environments and Simulation.	BA	*	*	*
11.1005	Information Technology Project Management.	CPBA	18	33%	\$71,195
11.1099	Computer/Information Technology Services Administration and Management, Other.	MA	*	*	*
11.9999	Computer and Information Sciences and Support Services, Other.	MA	*	*	*
14.0903	Computer Software Engineering.	BA	*	*	*
14.0903	Computer Software Engineering.	MA	*	*	*
51.2706	Medical Informatics.	AA	11	82%	\$29,648
51.2706	Medical Informatics.	BA	*	*	*
51.2706	Medical Informatics.	CPBA	20	35%	\$71,241
51.2706	Medical Informatics.	MA	12	58%	\$78,935
52.1201	Management Information Systems, General.	BA	135	54%	\$42,080

Source: P20 Connect, public postsecondary and select private postsecondary completers, 2020-21 and TDLWD Unemployment Insurance (UI) employment and wage records.

### High School CTE Information Technology Completers, 2020-21

CIP Code	Program Title	Educ. Award Level	Number of Grads	% Employed in TN	Est. First Year Annual Wages
11.1002	System, Networking, and LAN/WAN Management/Manager.	CTE HS	192	52%	\$21,098
11.1003	Computer and Information Systems Security/Auditing/Information Assurance.	CTE HS	101	52%	\$19,422
11.0201	Computer Programming/Programmer, General.	CTE HS	327	51%	\$18,767

Source: P20 Connect, TDOE high school CTE completers, 2020-21 and TDLWD Unemployment Insurance (UI) employment and wage records.

## ***Tennessee Broadband Accessibility***

The availability of broadband reduces workforce gaps by providing opportunities for student learning and training and by connecting jobseekers with potential employers. TNECD's Broadband grant programs are a critical part of Tennessee's plan to address broadband gaps. The goal of the programs is to facilitate broadband access to all Tennesseans while promoting practices that increase deployment and encourage adoption. The broadband accessibility grant program is designed to offset the capital expenses in the deployment of broadband in unserved areas. Funds are targeted to areas that are unlikely to receive broadband service without grant funding. TNECD has also been able to utilize federal stimulus funding allocated by the Fiscal Stimulus Accountability Group to further close the digital divide with the Tennessee Emergency Broadband Fund (TEBF). To date, the infrastructure programs have awarded grants to serve over 283,000 Tennesseans. The TEBF programming will continue with \$50M of digital opportunity funding to encourage adoption, digital skills training, workforce development programs, and outreach to underserved populations. Additional federal funding through the Infrastructure Investment and Jobs Act will provide further funding for infrastructure and digital opportunity programs over the next 5-10 years.





# CLUSTER FOURTEEN: ENGINEERING AND OTHER STEM

## QUICK TAKEAWAYS

**Demand:** Engineering and related occupations play an instrumental role in Tennessee businesses. TNECD has several target industries connected to engineering, including automotive, aerospace and defense, chemical products, and electrical equipment and appliances. Tennessee has a low concentration of employees in these high-wage fields, relative to the national average. In 2021, the number of engineers in Tennessee, about 26,000, was 23 percent below the national average concentration. The occupations that are in-demand in the most regions of Tennessee are electrical and electronic engineering technologists and technicians, civil engineers, electrical engineers, and mechanical engineers. **Supply:** Engineers require a bachelor's degree, while the technologists and technicians require associate degrees. Eight aligned academic programs had 70 percent or more of graduates found in Tennessee employment data, including the mechatronics, robotics, and automation engineering bachelor's program, associate degree programs in chemical engineering technology and industrial technology, and certificate programs of engineering technology, computer engineering technology, automation engineering technology, mechanical drafting, Computer Aided Design and Computer Aided Design and Drafting (CAD/CADD), and chemical technology. The master's degree in industrial engineering paid on average \$93,896, while the doctorate paid \$171,484. **Unmet needs:** The high rates of employment and wages signal the potential for supply gaps as Tennessee expands its manufacturing base and medical and other scientific research fields. Thirteen programs including many of those listed above had placement rates of 60 percent or more and paid more than the median wage. In addition, the associate and bachelor's degrees in engineering technologies and the associate degrees in welding technology met these criteria.

Engineering and engineering-related occupations play an instrumental role for Tennessee businesses. These positions provide critical functions in the design, building, and testing of products. Engineers and related positions are in high demand for several TNECD’s target industries, including automotive, aerospace and defense, chemical products, and electrical equipment and appliances.

Tennessee has a low concentration of employees in these high-wage fields, relative to the national average. In 2021, approximately 26,000 engineers were employed in Tennessee, which is 23 percent below the national average concentration. Median wages for engineers in Tennessee range from \$36.85 (2.0 times the median wage for all occupations) to \$60.71 (3.3 times the median wage for all occupations) an hour, depending on the type of engineer.<sup>109</sup>

Governor Bill Lee, in the 2023 State of the State said, “No other state in the country comes close to Tennessee’s legacy, resources and potential to be a leader in nuclear energy.” He is proposing \$50 million in a Nuclear Fast Track fund to recruit companies to our state that will establish a nuclear development and manufacturing ecosystem. This report does not currently identify nuclear engineering as in-demand. Tennessee’s concentration of nuclear engineers is 3.12x the national average concentration, the 5th highest in the nation.<sup>110</sup> Tennessee has the 3rd most nuclear engineering jobs in the nation at 840.<sup>111</sup> Tennessee’s strong nuclear engineering foundation will support further growth in nuclear energy in Tennessee.

Tennessee also has a major engineering asset in the Arnold Engineering Development Complex (AEDC), an Air Force military facility in Tullahoma, that operates more than 68 aerodynamic and propulsion wind tunnels, rocket and turbine engine test cells, environmental chambers, arc heaters, ballistic ranges, sled tracks, centrifuges, and other specialized units.

The occupations that are in-demand in the most regions of Tennessee are electrical and electronic engineering technologists and technicians (7 regions), civil engineers (5 regions), electrical engineers (5 regions), and mechanical engineers (5 regions). The engineers require a bachelor’s degree, while the technologists and technicians require associate degrees.

Tennessee is seeking to grow its pipeline of STEM workforce through its Future Workforce Initiative, which seeks to increase STEM training in K-12 schools.<sup>112</sup> There are currently 88 STEM and STE(A)M Designated Schools in Tennessee.<sup>113</sup> The Tennessee STEM Innovation Network, in partnership with Vanderbilt, is currently studying the impact of STEM school designation, and they will release a final impact report in March of 2023.<sup>114</sup> Their initial key findings suggest that the requirements within the designation rubric support schools in establishing their STEM culture and community.

SOC Code	Occupation	In-Demand		Statewide Entry-Level Wage	Typical Entry-Level Education	Key to TNECD Industry Sectors	STEM
		TN	Total # Regions				
17-2051	Civil Engineers	X	5	\$60,963	Bachelor’s degree	*	#
17-2071	Electrical Engineers	X	5	\$69,449	Bachelor’s degree	*	#
17-2112	Industrial Engineers		4	\$61,295	Bachelor’s degree	*	#
17-2141	Mechanical Engineers		5	\$63,144	Bachelor’s degree	*	#
17-2199	Engineers, All Other	X	3	\$61,948	Bachelor’s degree	*	#
17-3011	Architectural and Civil Drafters		3	\$38,356	Associate degree	*	#
17-3023	Electrical and Electronic Engineering Technologists and Technicians	X	7	\$41,105	Associate degree	*	#
17-3026	Industrial Engineering Technologists and Technicians		2	\$32,421	Associate degree	*	#

<sup>109</sup> TNECD analysis of employment data from U.S. Bureau of Labor Statistics, OEWS.

<sup>110</sup> TNECD analysis of employment data from U.S. Bureau of Labor Statistics, OEWS.

<sup>111</sup> TNECD analysis of employment data from U.S. Bureau of Labor Statistics, OEWS.

<sup>112</sup> Office of the Governor, [Press Release](#)

<sup>113</sup> Tennessee STEM Innovation Network, [STEM and STE\(A\)M Designated Schools](#)

<sup>114</sup> Tennessee STEM Innovation Network, [Vanderbilt and TSIN STEM School Designation Impact Report](#)

SOC Code	Occupation	In-Demand		Statewide Entry-Level Wage	Typical Entry-Level Education	Key to TNECD Industry Sectors	STEM
		TN	Total # Regions				
17-3029	Engineering Technologists and Technicians, Except Drafters, All Other	X	3	\$34,173	Associate degree	*	#
17-3031	Surveying and Mapping Technicians		1	\$29,849	HS diploma or equivalent		#
19-2031	Chemists	X	2	\$44,006	Bachelor's degree	*	#
19-4031	Chemical Technicians		1	\$35,528	Associate degree	*	#
19-4099	Life, Physical, and Social Science Technicians, All Other		2	\$31,152	Associate degree	*	#

This field is of special interest to the growth and development of Tennessee's workforce. As such, nearly all award levels are accessible, and all postsecondary institutions in Tennessee offer at least one academic program related to in-demand occupations within the engineering and other STEM cluster.

Tennessee Tech University's (TTU) Computer Science Department will participate in an international National Science Foundation and National Institute of Information and Communications Technology of Japan grant to address blockages in 6G mobile networks. Assistant Professor Muhammad Ismail, working with PhD and undergraduate students, will use machine learning and artificial intelligence to predict and avoid common blockages offering students valuable experience to apply in future careers.

MTSU offers a Bachelor of Science in Mechatronics Engineering that provides training in cutting edge robotics and automated systems used in today's advanced manufacturing environment. Similarly, UTC offers a Bachelor of Applied Science in Mechatronics Engineering Technology preparing students for systems integration, project management, technical communication, device networking, and industrial safety aspects of the automated manufacturing ecosystem. This program is a 2+2 program, designed with local college partners to support transfer into UTC's bachelor's program.<sup>115</sup>

UTK established a Geographic Information Science and Technology, BS in May 2021, complementing the GIS AAS and certificate at Roane State Community College (RSCC). Graduate certificates in GIS are also offered at TSU and the UoM. Graduates from these programs learn skills with a wide range of application areas, including transportation logistics, network analysis, emergency management, urban planning, public health, resource and environmental management, location intelligence, and energy analytics.

The high rates of employment and wages for graduates in this cluster signal the potential for supply gaps as Tennessee expands its manufacturing base and medical and other scientific research fields. Thirteen programs have placement rates of 60 percent or more and paid more than the median wage.

## ENGINEERING AND OTHER STEM ALIGNED ACADEMIC PROGRAMS

### Postsecondary Engineering and Other STEM Degrees, 2020-21

CIP Code	Program Title	Educ. Award Level	Number of Grads	% Employed in TN	Estimated First Year Annual Wages
14.0801	Civil Engineering, General.	BA	204	57%	\$55,281
14.0801	Civil Engineering, General.	MA	43	49%	\$67,608
14.0801	Civil Engineering, General.	D	10	10%	*
14.0901	Computer Engineering, General.	BA	51	37%	\$58,440
14.0901	Computer Engineering, General.	MA	12	42%	\$92,198
14.0901	Computer Engineering, General.	D	*	*	*
14.1001	Electrical and Electronics Engineering.	BA	162	39%	\$65,000
14.1001	Electrical and Electronics Engineering.	MA	20	20%	*
14.1001	Electrical and Electronics Engineering.	D	10	10%	*
14.4201	Mechatronics, Robotics, and Automation Engineering.	BA	56	70%	\$59,791

<sup>115</sup> UTC, Bachelor of Applied Science, [Mechatronics](#)

CIP Code	Program Title	Educ. Award Level	Number of Grads	% Employed in TN	Estimated First Year Annual Wages
14.1901	Mechanical Engineering.	BA	448	53%	\$59,088
14.1901	Mechanical Engineering.	MA	33	30%	\$81,652
14.1901	Mechanical Engineering.	D	14	43%	\$58,022
14.3501	Industrial Engineering.	BA	38	42%	\$63,256
14.3501	Industrial Engineering.	MA	36	50%	\$93,896
14.3501	Industrial Engineering.	D	*	*	*
14.0101	Engineering, General.	BA	34	47%	\$55,748
14.0101	Engineering, General.	MA	26	19%	\$64,826
14.0101	Engineering, General.	D	26	19%	\$171,484
14.0401	Architectural Engineering.	BA	*	*	*
14.1201	Engineering Physics/Applied Physics.	BA	*	*	*
14.1301	Engineering Science.	MA	*	*	*
14.9999	Engineering, Other.	CPBA	*	*	*
14.9999	Engineering, Other.	MA	*	*	*
14.9999	Engineering, Other.	D	17	12%	*
15.0000	Engineering Technologies/Technicians, General.	C < 1 YR	124	84%	\$56,634
15.0000	Engineering Technologies/Technicians, General.	AA	128	66%	\$52,761
15.0000	Engineering Technologies/Technicians, General.	BA	217	62%	\$50,969
15.0000	Engineering Technologies/Technicians, General.	CPBA	*	*	*
15.0000	Engineering Technologies/Technicians, General.	MA	*	*	*
15.0303	Electrical, Electronic, and Communications Engineering Technology/Technician.	C < 1 YR	32	50%	\$34,067
15.0303	Electrical, Electronic, and Communications Engineering Technology/Technician.	AA	95	64%	\$39,701
15.0303	Electrical, Electronic, and Communications Engineering Technology/Technician.	BA	*	*	*
15.0305	Telecommunications Technology/Technician.	C 1-2 YR	*	*	*
15.0406	Automation Engineer Technology/Technician.	C < 1 YR	28	50%	\$53,566
15.0406	Automation Engineer Technology/Technician.	C 1-2 YR	18	78%	\$43,885
15.0612	Industrial Technology/Technician.	C < 1 YR	26	85%	\$51,918
15.0612	Industrial Technology/Technician.	AA	43	84%	\$33,123
15.0612	Industrial Technology/Technician.	MA	*	*	*
15.0613	Manufacturing Engineering Technology/Technician.	C < 1 YR	20	60%	\$28,963
15.0613	Manufacturing Engineering Technology/Technician.	C 1-2 YR	52	31%	\$28,963
15.0613	Manufacturing Engineering Technology/Technician.	AA	*	*	*
15.0614	Welding Engineering Technology/Technician.	C < 1 YR	10	60%	\$43,114
15.0614	Welding Engineering Technology/Technician.	AA	11	73%	\$38,762
15.0615	Chemical Engineering Technology/Technician.	C < 1 YR	20	100%	\$72,984
15.0615	Chemical Engineering Technology/Technician.	C 1-2 YR	*	*	*
15.0615	Chemical Engineering Technology/Technician.	AA	17	71%	\$68,462
15.0801	Aeronautical/Aerospace Engineering Technology/Technician.	BA	*	*	*
15.1201	Computer Engineering Technology/Technician.	C < 1 YR	12	83%	\$30,891
15.1201	Computer Engineering Technology/Technician.	AA	11	45%	\$34,764
15.1102	Surveying Technology/Surveying.	BA	*	*	*
45.0702	Geographic Information Science and Cartography.	C < 1 YR	10	40%	*

CIP Code	Program Title	Educ. Award Level	Number of Grads	% Employed in TN	Estimated First Year Annual Wages
45.0702	Geographic Information Science and Cartography.	AA	*	*	*
45.0702	Geographic Information Science and Cartography.	CPBA	*	*	*
45.0702	Geographic Information Science and Cartography.	MA	*	*	*
15.1301	Drafting and Design Technology/Technician, General.	C < 1 YR	60	40%	\$29,375
15.1301	Drafting and Design Technology/Technician, General.	C 1-2 YR	106	58%	\$36,589
15.1303	Architectural Drafting and Architectural CAD/CADD.	C < 1 YR	20	60%	\$31,806
15.1306	Mechanical Drafting and Mechanical Drafting CAD/CADD.	C < 1 YR	14	57%	\$32,648
15.1306	Mechanical Drafting and Mechanical Drafting CAD/CADD.	C 1-2 YR	22	100%	\$39,385
41.0301	Chemical Technology/Technician.	C 1-2 YR	16	88%	\$49,179
26.0101	Biology/Biological Sciences, General.	MA	63	30%	\$34,466
26.0101	Biology/Biological Sciences, General.	D	19	42%	\$41,688
26.0102	Biomedical Sciences, General.	BA	10	40%	*
26.0102	Biomedical Sciences, General.	MA	*	*	*
26.0102	Biomedical Sciences, General.	D	19	53%	\$55,377
26.0202	Biochemistry.	CPBA	*	*	*
26.0202	Biochemistry.	D	*	*	*
26.0204	Molecular Biology.	MA	36	31%	\$34,539
26.0204	Molecular Biology.	D	*	*	*
26.0503	Medical Microbiology and Bacteriology.	MA	*	*	*
26.0503	Medical Microbiology and Bacteriology.	D	*	*	*
26.1001	Pharmacology.	MA	*	*	*
26.1101	Biometry/Biometrics.	CPBA	*	*	*
26.1102	Biostatistics.	MA	*	*	*
26.1102	Biostatistics.	D	*	*	*
26.1199	Biomathematics, Bioinformatics, and Computational Biology, Other.	CPBA	*	*	*
26.1199	Biomathematics, Bioinformatics, and Computational Biology, Other.	MA	*	*	*
26.1301	Ecology.	MA	*	*	*
26.1301	Ecology.	D	11	9%	*
26.1309	Epidemiology.	CPBA	*	*	*
26.1309	Epidemiology.	MA	*	*	*
26.1309	Epidemiology.	D	*	*	*
26.9999	Biological and Biomedical Sciences, Other.	MA	45	36%	\$49,585
26.9999	Biological and Biomedical Sciences, Other.	D	*	*	*
30.0101	Biological and Physical Sciences.	BA	35	57%	\$34,882
30.0601	Systems Science and Theory.	D	*	*	*
30.1501	Science, Technology and Society.	MA	*	*	*
30.1701	Behavioral Sciences.	BA	16	31%	\$35,960
30.2501	Cognitive Science, General.	CPBA	*	*	*
40.0501	Chemistry, General.	BA	198	46%	\$34,936
40.0501	Chemistry, General.	MA	36	11%	*
40.0501	Chemistry, General.	D	16	25%	*

CIP Code	Program Title	Educ. Award Level	Number of Grads	% Employed in TN	Estimated First Year Annual Wages
40.0599	Chemistry, Other.	BA	*	*	*

Source: P20 Connect, public postsecondary and select private postsecondary completers, 2020-21 and TDLWD Unemployment Insurance (UI) employment and wage records.

### ***High School CTE Engineering and Other STEM Completers, 2020-21***

CIP Code	Program Title	Educ. Award Level	Number of Grads	% Employed in TN	Est. First Year Annual Wages
15.9999	Engineering/Engineering-Related Technologies/Technicians, Other.	CTE HS	291	43%	\$20,898
16.0612	Industrial Technology/Technician	CTE HS	137	48%	\$20,556
15.0303	Electrical, Electronic, and Communications Engineering Technology/Technician.	CTE HS	197	45%	\$20,080
15.1301	Drafting and Design Technology/Technician, General.	CTE HS	103	39%	\$26,937
15.0507	Environmental/Environmental Engineering Technology/Technician.	CTE HS	*	*	*

Source: P20 Connect, TDOE high school CTE completers, 2020-21 and TDLWD Unemployment Insurance (UI) employment and wage records.

# COVID-19 AND IMPLICATIONS FOR SUPPLY AND DEMAND ANALYSIS

This report and supplementary materials identify in-demand occupations in Tennessee and across Tennessee's nine Local Workforce Development Areas (LWDAs). The COVID-19 pandemic introduced a shock to the United States economy which resulted in substantial federal relief and measures to facilitate a recovery. The changing economic conditions have implications for the data used in the in-demand occupation analyses, as well as the educational pursuits of individuals. The unprecedented impact of the COVID-19 pandemic on social behavior and the workforce is critical to acknowledge in these data and analyses.

## IMPACT ON OCCUPATIONAL DEMAND

This report incorporates three indicators of employer demand: projected job openings, recent job postings, and recent hiring patterns. These data represent demand during 2021 and beyond, corresponding with the COVID-19 pandemic recovery and fluctuating trends in business, workforce, and consumer behaviors. The volatility in the labor market, changing needs and preferences, and transition in work all influence these data.

Shifts in patterns of unemployment, retirement, layoffs, quits, and hiring all happened at different rates by occupation since the onset of the pandemic. Employers have also had difficulty finding and retaining workers, and new types of jobs have been created. A recent report from the Boyd Center for Business and Economic Research highlights the challenging conditions employers have in finding workers and the tension workers are experiencing in seeking employment at more competitive wages or choosing to attend postsecondary to gain advanced skills.<sup>116</sup> These trends will have impacted this study's results on in-demand occupations.

Recently, more jobs have become remote jobs. The pivot to remote work alongside the expansion of broadband in the last two years could have altered previous patterns for employer job candidate searches. New recruitment tactics likely include expanded usage of online job postings for communicating employer demand and recruitment of workforce from regions beyond a company's traditional geographic footprint.

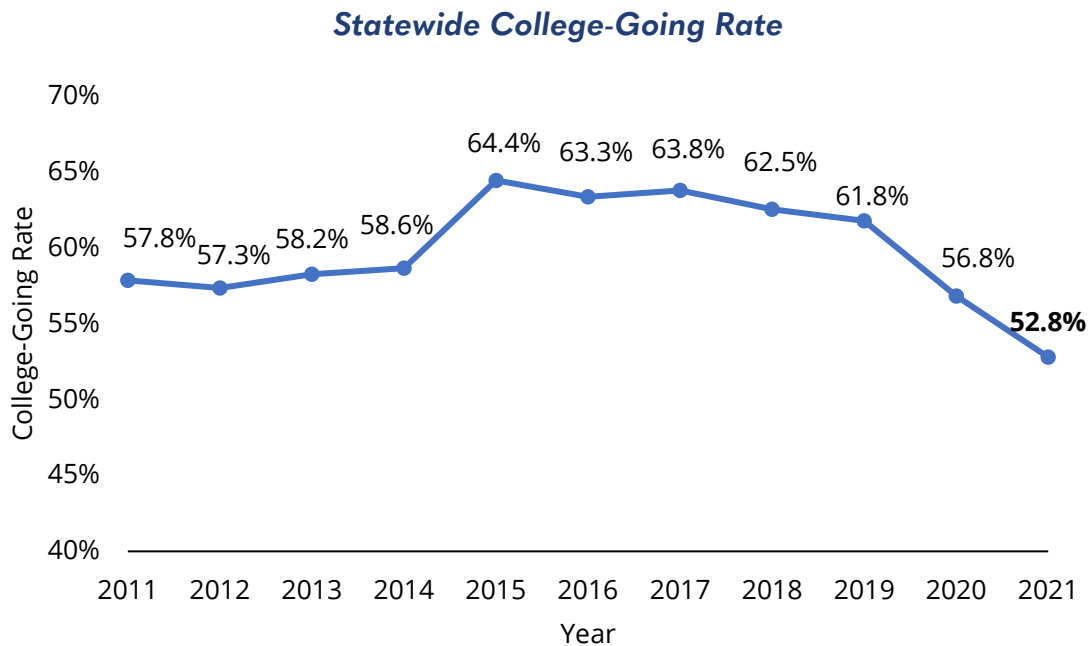
In future reports, and as new data are released, the true impact of the pandemic is expected to become more transparent.

<sup>116</sup> Carruthers, Bruce, Kessler, and Endersby, Tennessee's Post-Pandemic Workforce: Implications for the Value of Going to College, February 2023.

## IMPACT ON ACADEMIC SUPPLY

This report relies on high school graduates and postsecondary degree completers as sources of supply for in-demand occupations. The COVID-19 pandemic accelerated declines in college-going and overall postsecondary enrollment.

The college-going rate measures the seamless enrollment of recent high school graduates in postsecondary. As demonstrated in the figure below, the college-going rate peaked for the class of 2015, which coincides with the introduction of Tennessee Promise, but dropped to a ten-year low of 52.8 percent for the class of 2021. This precipitous decline in college-going has implications for the pipeline of students matriculating through postsecondary and receiving training for workforce demands. With this decline, THEC/TSAC, in collaboration with college access professionals and organizations across the state, established [the Momentum Year](#), setting the goal **to increase the college-going rate for the high school class of 2023 to at least 60 percent.**



Coinciding with this decline in college-going of recent high school graduates, overall enrollment declined across Tennessee public colleges. From fall 2019 to fall 2021, headcount dropped 7.2 percent across community colleges and universities, with a more pronounced decline at community colleges (-16.2 percent).<sup>117</sup> This declining enrollment, like college-going, has implications for student progression and completion of a degree. While not all in-demand occupations require formal postsecondary training, many do, and revitalizing the postsecondary pipeline in partnership with employers can be a win-win in achieving the State's goals, upskilling Tennesseans, and supporting employers.

<sup>117</sup> [THEC 2022 Fact Book](#), Table 2.1



## DATA SOURCES AND METHODOLOGY

This section outlines the data sources and methods for identifying in-demand occupations and aligned academic programs. This is broken down into three parts: in-demand occupations, aligned academic supply, and limitations.

### *In-Demand Occupations*

To measure jobs with high employer demand, the Center for Economic Research in Tennessee (CERT) analyzes postings, openings, and hires for an occupation relative to total number of individuals employed in the occupation. Occupations which meet at least two of these three requirements are identified to have high employer demand:

- The ratio of job postings (2021) to the number of individuals employed in an occupation is greater than or equal to the median ratio for all occupations in the region.
- The ratio of hires (2021) to the number of individuals employed in an occupation is greater than or equal to the median ratio for all occupations in the region.
- The ratio of projected annual job openings from 2018 to 2028 to employment for an occupation is greater than or equal to the median ratio for all occupations in the region.

To encourage job creation and skill development in high-quality jobs, occupations must meet a minimum wage threshold. All occupations identified as in-demand have a median wage which is at least 80 percent of the median wage for the region. This analysis is completed at the statewide level and for each of the 9 local workforce development areas (LWDA). Additionally, to prevent reporting positions with very low employment levels as in-demand, occupations must meet a minimum employment threshold of 0.04 percent of the region's total employment.

### *Data Definitions and Sources:*

**Employment:** Employment and wage data for each occupation and region are sourced primarily from the Tennessee Department of Labor and Workforce Development's May 2021 release of the Occupational Employment and Wage Estimates (OEWS). OEWS publication standards required redaction for employment figures for some occupations. In cases where OEWS has redacted information, and a 2018 employment estimate from the Tennessee Department of Labor and Workforce Development Long-Term Occupational Projections was available, the 2018 employment estimate was used in place of the redaction to fully analyze as many occupations as possible.

**Unique Job Postings:** Unique job postings denote the number of de-duplicated job advertisements listed by companies on online career sites or job boards. De-duplication is a process used to count a job posting only once even if there are listings of the same job on multiple career websites or online jobs boards. The source for this data is the Tennessee Department of Labor and Workforce Development.<sup>118</sup>

**Projected Annual Openings:** A projected annual opening is the average annual employment change over ten years from the Tennessee Department of Labor and Workforce Development's Long-Term Occupational Projections.<sup>119</sup>

**Hires:** A hire is reported by the Census Bureau's Quarterly Workforce Indicators (QWI) dataset when an individual's Social Security number appears on a company's payroll and was not there the quarter before. The QWI program produces a comprehensive tabulation of employment and wage information at the industry-level for workers covered by state unemployment insurance laws.

The hires data in this report is sourced from Economic Modeling Specialists, Intl. (EMSI). EMSI<sup>120</sup> uses the U.S. Census Bureau's QWI industry data in combination with occupation growth and occupation replacement needs from the U.S. Bureau of Labor Statistics to create a model hires figure for each occupation.

<sup>118</sup> Advertised Job Data can be found at [www.Jobs4TN.gov](http://www.Jobs4TN.gov) by following the path: Labor Market Information > LMI Home > Menu (in the top left-hand corner of the webpage) > Data Trends > Advertised Job Data > Jobs Data by Occupations > Job Openings by Occupations

<sup>119</sup> The Tennessee Department of Labor & Workforce Development's 2018 – 2028 Long-Term Occupational Projections can be found at [www.Jobs4TN.gov](http://www.Jobs4TN.gov) by following the path: Labor Market Information > LMI Home > Menu (in the top left-hand corner of the webpage) > Data Trends > Employment and Wage Data > Occupation Data > Occupation Employment and Projections (Long-Term).

<sup>120</sup> More information about EMSI's methodology for hires can be found [here](#).

## Aligned Academic Programs

An **aligned academic program**<sup>121</sup> is a training program preparing students for careers in an in-demand occupation. The skills and knowledge developed through completion of an aligned academic program are matched with the skills and knowledge required for success in an occupation using the Classification of Instructional Programs (CIP) to Standard Occupation Code (SOC) crosswalk developed in partnership between the Bureau of Labor Statistics and National Center for Education Statistics.<sup>122</sup>

This report uses Tennessee's P20 Connect statewide longitudinal data system. The P20 Connect system includes information on student outcomes at the secondary and postsecondary level and unemployment insurance (UI) employment records and wages.

Student outcome data at the postsecondary level for the 2020-21 academic year include all public colleges: the Tennessee Colleges of Applied Technology (TCATs), TBR community colleges, six locally governed institutions, and four University of TN system colleges.<sup>123</sup> Twenty-two private institutions, members of the Tennessee Independent Colleges and Universities Association (TICUA), are included. All degree levels, from less than one-year certificates through doctoral and professional degrees are included and disaggregated by the six-digit CIP code. Cells with less than 10 awards are suppressed.

Student outcome data at secondary level reflect 2020-21 high school career and technical education concentrators. For purposes of this report, concentrators reflect a student completing at least two course credits within a CTE program of study or career cluster.<sup>124</sup> Cells with less than 10 awards are suppressed.

Tennessee completers of registered apprenticeship in 2020-2021 are also included. As they are not currently in the P20 system, no wage or employment data are available. [Registered Apprenticeship programs](#) are those approved by the U.S. Department of Labor or a State Apprenticeship Agency with an employer that has an occupational objective and standards for implementation and completion of the apprenticeship.<sup>125</sup>

High school and postsecondary completers are matched to Tennessee's UI data to identify graduates who are working in Tennessee and their wages two quarters after graduation. Importantly, this measure reflects any employment and does not necessarily reflect employment in an aligned occupation.

**New this year**, graduates must be found employed in Tennessee for two quarters to be included in the share employed in Tennessee and wage outcomes. So, if a graduate was found in only one quarter, they are included in the graduates count but dropped for the measures of employed in Tennessee and wages.<sup>126</sup> The sum of two quarters of wages is multiplied by two, then a median is found to estimate an annual wage for completers. This annual wage represents a first-year wage for degree completers. Individuals who remain enrolled in an education program are excluded from these wage figures.

<sup>121</sup> This report includes registered apprenticeships, high school CTE Concentrators, and postsecondary degree completers in data for aligned academic programs. There are other training initiatives, like Industry Certifications, that are not currently captured due to data limitations.

<sup>122</sup> More information about BLS and NCES CIP to SOC Crosswalk can be found [here](#).

<sup>123</sup> This includes UT Health Science Center. UT Southern is not currently in the THEC Student Information System, so it is not a part of the P20 Connect postsecondary completions.

<sup>124</sup> CTE Concentrators have been defined by the U.S. Department of Education. As part of the Strengthening Career and Technical Education for the 21st Century Act (Perkins V), this definition changed, lessening the required course credit requirements from three to two. More detail about the changes to this definition can be found [here](#).

<sup>125</sup> More information about Registered Apprenticeships in Tennessee can be found [here](#). This analysis is limited to Federal Registered Apprenticeships.

<sup>126</sup> The methodological change in this year's report results in approximately 20 percent of graduates being dropped from the employment outcomes who may have previously been captured because of the more stringent employed in two terms (instead of employed in only one term).

## Limitations

While this report illustrates the connection between in-demand occupations and academic supply, it does not include an explicit gap analysis.<sup>127,128</sup> Reporting agencies will continue to evaluate potential data sources to enhance the comprehensiveness of Tennessee's supply for in-demand occupations.

- The Bureau of Labor Statistics' Occupational Employment and Wage Statistics (OEWS) which is a semiannual survey collecting data on wage and salary workers in nonfarm establishments excludes self-employed individuals. The exclusion of self-employed individuals may disproportionately impact select occupational areas which tend to have a high number of self-employed workers.<sup>129</sup>
- Teachers are an occupational area that is under-represented in the data on job postings, which is one of the three indicators used in this report to identify demand.<sup>130</sup> Job postings data for teachers are decentralized at the local school district level. While there is a [TN Education Job Board](#), hosted by the Tennessee Department of Education, this is not a required space to post teacher jobs and is not a comprehensive listing of all teacher vacancies. As a result, teachers are under-represented among the in-demand occupations of this report. This is just one example of an occupation impacted by data limitations on the metrics for demand.
- Currently, academic supply is measured by degree completers, CTE Concentrators, and registered apprenticeships. As noted above, this measure does not include the current workforce. Additionally, this does not include other measures of occupational readiness, like industry certifications.<sup>131</sup> Tennessee does not have a centralized collection of all industry certification test takers or completers. Future reports will seek to improve the comprehensiveness of Tennessee's supply for in-demand occupations.

<sup>127</sup> Several academic programs provide training for specific occupations, and in some cases, a single academic program can provide training for multiple occupations, resulting in many possible training opportunities for occupations.

<sup>128</sup> Occupations without any clear connected training remain in in-demand clusters.

<sup>129</sup> Bureau of Labor Statistics, Small-business options: Occupational outlook for self-employed workers (May 2018), [https://www.bls.gov/careeroutlook/2018/article/self-employment.htm?view\\_full](https://www.bls.gov/careeroutlook/2018/article/self-employment.htm?view_full)

<sup>130</sup> This occupation is used as an example and is not meant to be exhaustive. These occupations illustrate how the methodology and occupational conditions relate to the three metrics for demand, which impact whether occupations are on the in-demand occupation list.

<sup>131</sup> An industry certification is a credential recognized by business and industry at the local, state, or national level. It could be an assessment, an examination or a license that is administered and recognized by an industry third-party or governing board. Industry certificates measure competency in an occupation, and they validate the knowledge base and skills that show mastery in a particular industry or mastery of a particular competency needed in a certain industry.

