

Program of Study Justifications for Health Science

Program of Study	Page
Biotechnology Research	2
Public Health	6
Diagnostic Services	12
Health Informatics	17
Nursing Services	21
Emergency Services	27
Therapeutic Services	32
Exercise Physiology	39

Biotechnology Research

2016-17 Program of Study	Level 1	Level 2	Level 3	Level 4
Biotechnology Research	Health Science Education (5998)	Diagnostic Medicine (5994)	Anatomy and Physiology (3251 or 5991)	Biomedical Applications (5992) -and/or- Forensic Science (5996)

Description

The **Biotechnology Research** program of study (POS) is designed to prepare students to pursue careers in the fields of biotechnology research. The biotechnology industry spans different markets and includes manufacturing, services and research activities. The biotechnology industries, also known as life science or bioscience industries, includes companies in the fields of biotechnology, pharmaceuticals, biomedical technologies, life systems technologies, nutraceuticals, cosmeceuticals, food processing, environmental biology, and biomedical devices¹. By definition, the life sciences are a unique industry cluster and are constantly changing to incorporate the latest research and scientific discoveries². This POS combines advanced methods and technologies with the scientific principles that comprise today's emerging biomedical fields. Upon completion of this POS, proficient students will be able to identify careers in these fields and describe their scientific foundations, research technologies and development in all areas of healthcare, and relate how these technologies are transforming many disciplines and impacting society at large.

Job Outlook

Looking to the future, the biosciences remain positioned for strong economic growth nationwide. The U.S. Department of Labor projects that the biosciences will grow at an average annual rate of 1.5 percent between 2008 and 2018. Contrary to this positive outlook for the industry nationally, employment opportunities do not appear to be as favorable in Tennessee. In fact, of the biotechnology research careers listed below in **Figure 1**, two careers show a negative change in employment, and the other two show less than one percent annual average growth. **Figure 2** demonstrates that although biotechnology research careers are high wage, they are not high demand. **Figure 3** shows biochemist and biophysicist openings across the state. In total, there were 25 openings with 21 of those openings in Memphis, three in Knoxville, and one in Nashville.

¹ Bureau of Labor Statistics, United States Department of Labor. (2015). *Occupational Outlook Handbook: Biochemists and Biophysicists*. Retrieved from <http://www.bls.gov/ooh/life-physical-and-social-science/biochemists-and-biophysicists.htm#tab-6>

² Life Science Tennessee. (2014). *Life Science Tennessee 2014 Targeted for Growth report*, 2014. Retrieved from <http://www.lifesciencetn.org/?page=4>

Figure 1. Long term employment projections for biotechnology research careers in Tennessee³

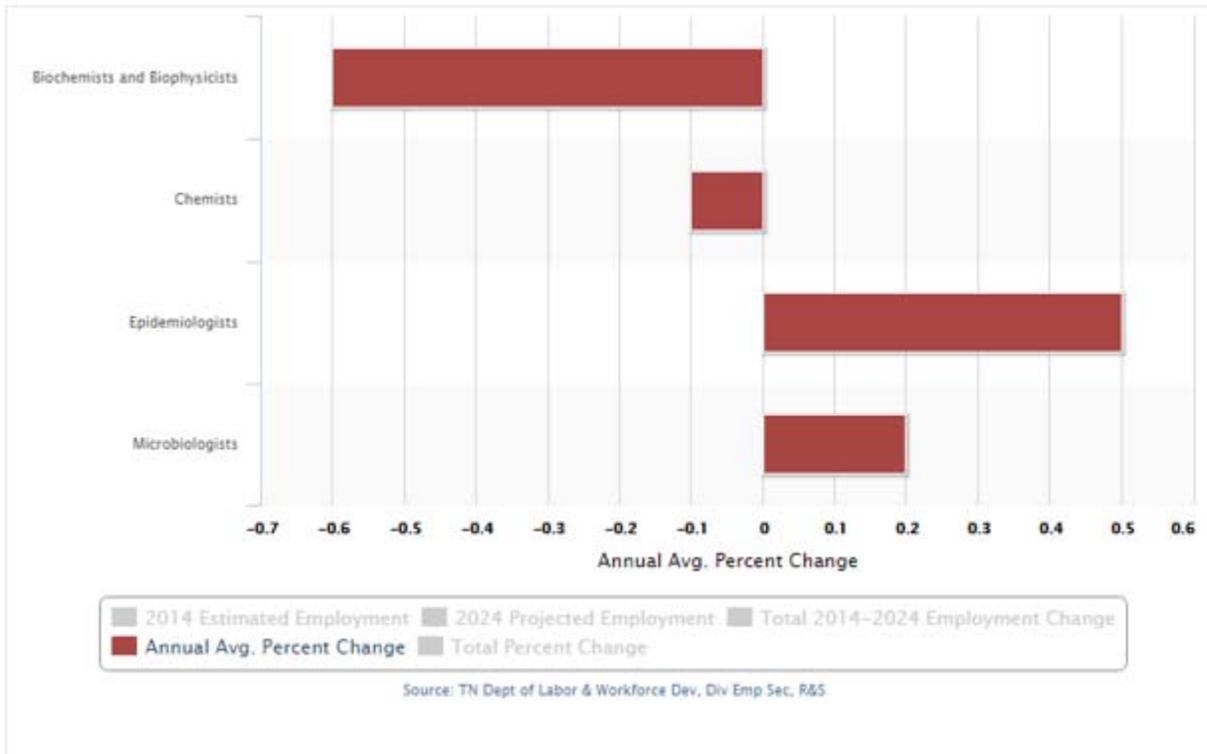


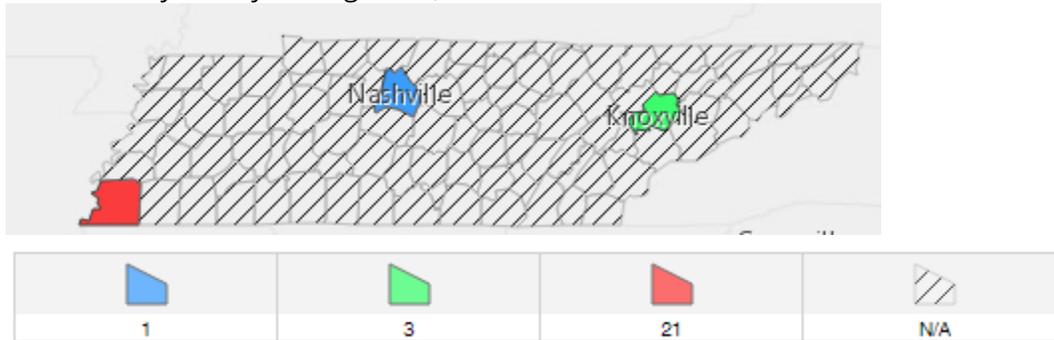
Figure 2. Tennessee employment projections for biotechnology research and related occupations for 2014-2024⁴

Occupation	Education Required	Median Salary	2024 Projected Employment	Total 2014 - 2024 Employment Change	Annual Avg. Percent Change
Biochemist and Biophysicist	Doctorate Degree	\$82,589	250	-20	-0.60%
Forensic Science Technician	Bachelor's Degree	\$52,840	240	0	0.50%
Chemist	Bachelor's Degree	\$ 38,677	960	-10	-0.10%
Microbiologist	Master's Degree	\$56,526	200	0	0.20%
Epidemiologist	Master's Degree	\$69, 739	100	0	0.50%

³ Tennessee Department of Labor and Workforce Development, Jobs4TN Online. (2016). Employment Wage and Data. Retrieved from <https://www.jobs4tn.gov>

⁴ Tennessee Department of Labor and Workforce Development, Jobs4TN Online. (2016). Occupational Projections on the internet at <https://www.jobs4tn.gov/vosnet/analyzer/results.aspx?session=ocproj>

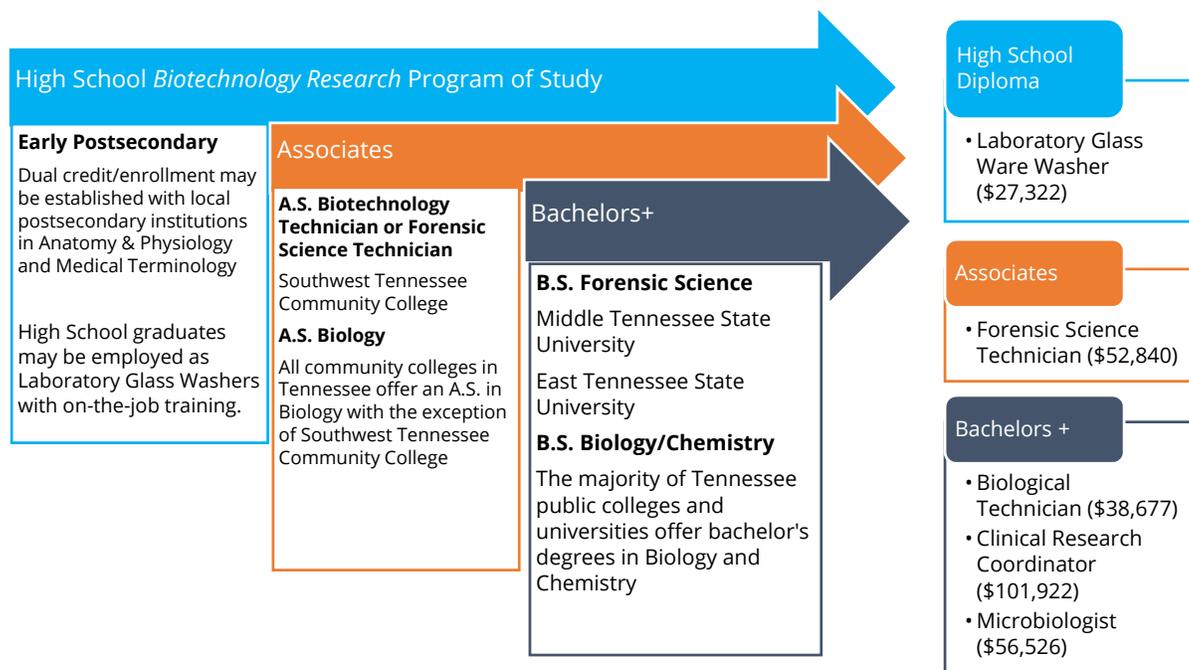
Figure 3. Distribution of the number of job openings advertised online for Biochemists and Biophysicists in Tennessee by county on August 22, 2016⁵



Postsecondary Opportunities

Figure 4 outlines the related postsecondary opportunities and training necessary for careers in biotechnology research.

Figure 4. Postsecondary Pathways



⁵Tennessee Department of Labor and Workforce Development, Jobs4TN Online. (2016). Occupational Projections on the internet at <https://www.jobs4tn.gov/vosnet/analyzer/results.aspx?session=occproj>

Current Secondary Landscape

In the 2014-15 school year, 62 schools in Tennessee offered courses in the Biotechnology Research POS. Of the 15,703 students who were enrolled in a Health Science course only 146 students were enrolled in Biomedical Applications, the Level 4 course. From the 2014-15 school year to the 2015-16 school year, there was a decrease in the number of schools offering the Biotechnology Research program of study. **Figure 5** shows the open enrollment analysis for 2014-15 and 2015-16 as well as student enrollment for 2014-15 in the Biotechnology Research POS.

Figure 5. Open enrollment figures for 2014-15

Biotechnology Research

Student Enrollment 2014-15

Health Science Education	Diagnostic Medicine	Anatomy and Physiology	Biomedical Applications	Forensic Science
15703	3526	4343	146	1815

Open Enrollment Analysis 2014-15 to 2015-16

Biomedical Technology Research	
2014-15	62
2015-16	52
	<i>Decline</i>

Recommendations

The department recommends retiring this program of study until such time that the job outlook for the biotechnology research industry in Tennessee improves. Currently the outlook for biotechnology research jobs is projected to have an average annual percent change of less than one percent. In Tennessee, the majority of the jobs in the biotechnology industry are support jobs that are included in other clusters such as Business and Marketing, STEM, and Information Technology. Furthermore, students interested in continuing in this field, where there would be industry data to support the path, would be able to do so with an elective focus in science where students could take courses such as AP biology and AP chemistry to be better prepared for postsecondary training in the related field.

References

Bureau of Labor Statistics, United States Department of Labor. (2015). Occupational Outlook Handbook: Biochemists and Biophysicists. Retrieved from <http://www.bls.gov/ooh/life-physical-and-social-science/biochemists-and-biophysicists.htm#tab-6>

Life Science Tennessee. (2014). *Life Science Tennessee 2014 Targeted for Growth report*, 2014. Retrieved from <http://www.lifesciencetn.org/?page=4>

Tennessee Department of Labor and Workforce Development, Jobs4TN Online. (2016). Occupational Projections on the internet at <https://www.jobs4tn.gov/vosnet/analyzer/results.aspx?session=occpro>

Public Health

2016-17 Program of Study	Level 1	Level 2	Level 3	Level 4
Public Health	Health Science Education (optional) (5998)	Emergency Preparedness (6151)	Behavioral and Community Health (6130)	Global Health and Epidemiology (6132)

Description

The **Public Health** program of study (POS) is designed to place students at the intersection of health science and health policy. This program investigates the patterns, causes, and effects of diseases in a variety of populations, and how the provision of healthcare has changed in response to global needs. Successful international strategies and programs will be examined. Upon completion of this course, proficient students will be able to interpret and communicate statistical information relating to the distribution of disease and mortality/morbidity nationally and globally, determine national and international health disparities, analyze national and international health policies, and evaluate outcomes from a range of health interventions.

Job Outlook

Employment for public health workers, specifically community health workers and environmental science and protection technicians, is projected to grow an average of 16 percent from 2014-2022 with total annual average job openings projected to be 85⁶. This translates, in **Figure 1**, to total employment of 790 for community health workers and 1,120 for environmental science and protection technicians. **Figure 2** shows employment for environmental scientists and specialists concentrated in or around urban areas with not less than 31-40 in all other areas. In addition, **Figure 3** shows 2022 projected employment for environmental scientists and specialists at over 1500. Other public health occupations include occupational health and safety technicians and epidemiologists. The 2022 projected employment for these careers is 630 and 110 respectively. According to the Bureau of Labor Statistics, the number of individuals who have access to health insurance is expected to continue to increase because of federal health insurance reform. Health educators and community health workers will be needed to show patients how to get access to healthcare services, such as preventive screenings.

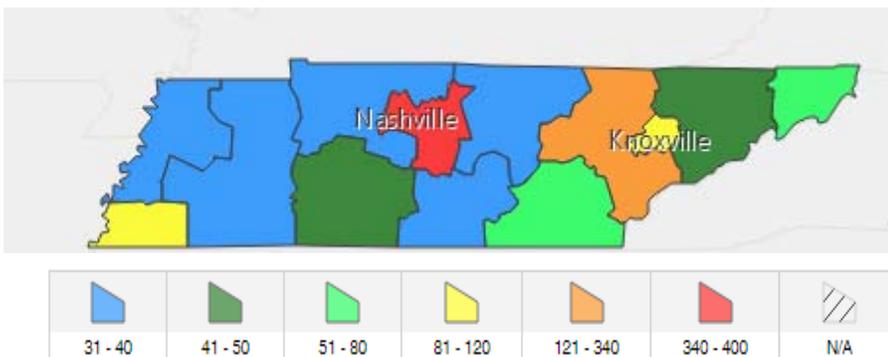
⁶ Tennessee Department of Labor and Workforce Development, Jobs4TN Online. (2016). Occupational Projections on the internet at <https://www.jobs4tn.gov/vosnet/analyzer/results.aspx?session=occpj>

In addition, health educators and community health workers might take part in state and local programs designed to treat and prevent conditions such as diabetes and obesity⁷. **Figure 4** outlines a variety of public health careers. It is interesting to note the education required for employment as an occupational health and safety technician is a high school diploma. Students with a robust portfolio will have the advantage when it comes to the application process for one of the 630 projected positions in the state. These jobs will be more concentrated in or around urban areas as demonstrated in **Figures 1 and 2**. This will be an important factor to consider when districts select programs of study for their students based on regional labor data.

Figure 1. Careersinpublichealth.net 2015 data for public health job availability⁸

CITIES WITH THE MOST JOB OPENINGS	
Nashville	265
Memphis	150
Chattanooga	115
Knoxville	80

Figure 2. The map shows the 2014 estimated employment for all Local Workforce Investment Areas (LWIA) for Environmental Scientists and Specialists, Including Health in Tennessee in the 2014-22 projection period⁹.



⁷Bureau of Labor Statistics, United States Department of Labor. (2016-17). Occupational Outlook Handbook: Health Educators and Community Health Workers. Retrieved from: <http://www.bls.gov/ooh/community-and-social-service/health-educators.htm#tab-6>

⁸ Careers In Public Health.net. (2015). Tennessee Public Health Jobs, Careers & Salary Outlook. Retrieved from <http://www.careersinpublichealth.net/states/tennessee>

⁹Tennessee Department of Labor and Workforce Development, Jobs4TN Online. (2016). Occupational Projections on the internet at <https://www.jobs4tn.gov/vosnet/analyzer/results.aspx?session=ocproj>

Figure 3. The graph shows the long term employment projections for public health services in Tennessee¹⁰.

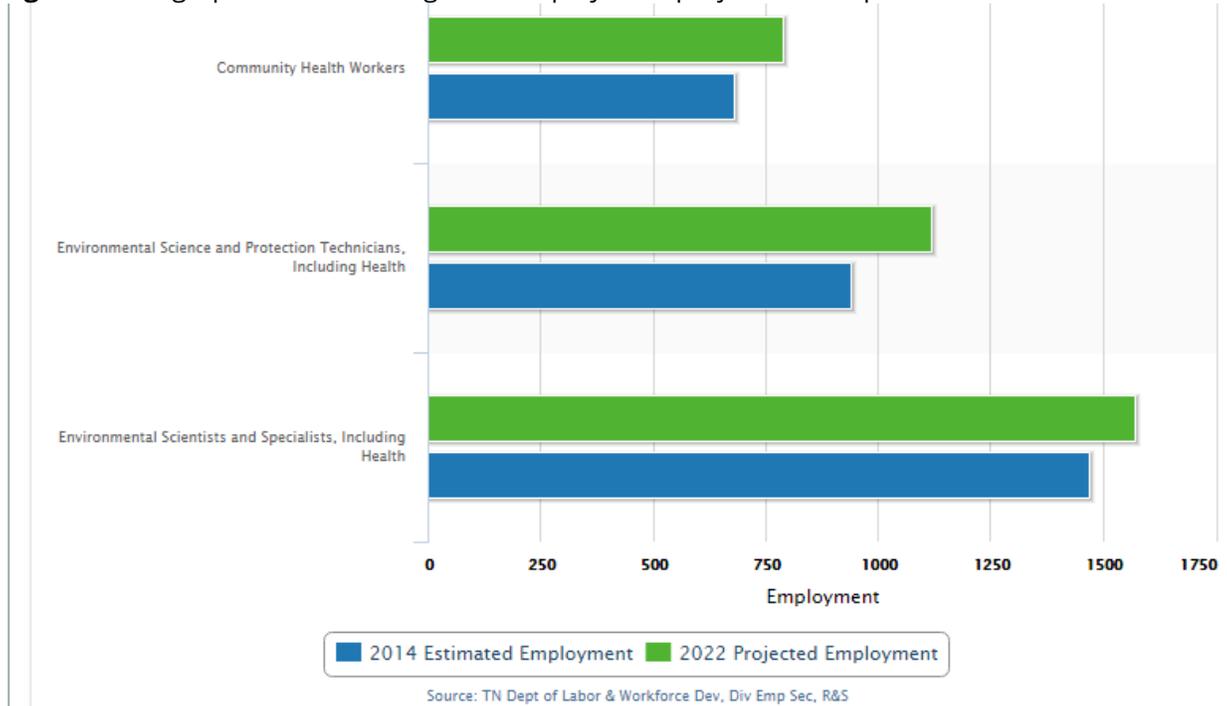


Figure 4. Tennessee employment projections for public health occupations with positive openings projected 2014-2022¹¹

Occupation	Education Required	Median Salary	2022 Projected Employment	Total 2014 - 2022 Employment Change	Annual Avg. Percent Change
Occupational Health & Safety Specialist	Bachelor's Degree	\$64,804	176	120	0.8%
Occupational Health & Safety Technician	High School Diploma	\$ 49,726	630	10	0.1%
Community Health Workers	Associate's or Bachelor's Degree	\$29,047	790	110	2.0%
Environmental Science & Protection Technician	Associate's Degree	\$40,700	1,120	180	2.2%
Health Educator	Bachelor's Degree	\$34,840	1,170	230	2.8%
Epidemiologist	Master's Degree	\$ 69,739	110	0	

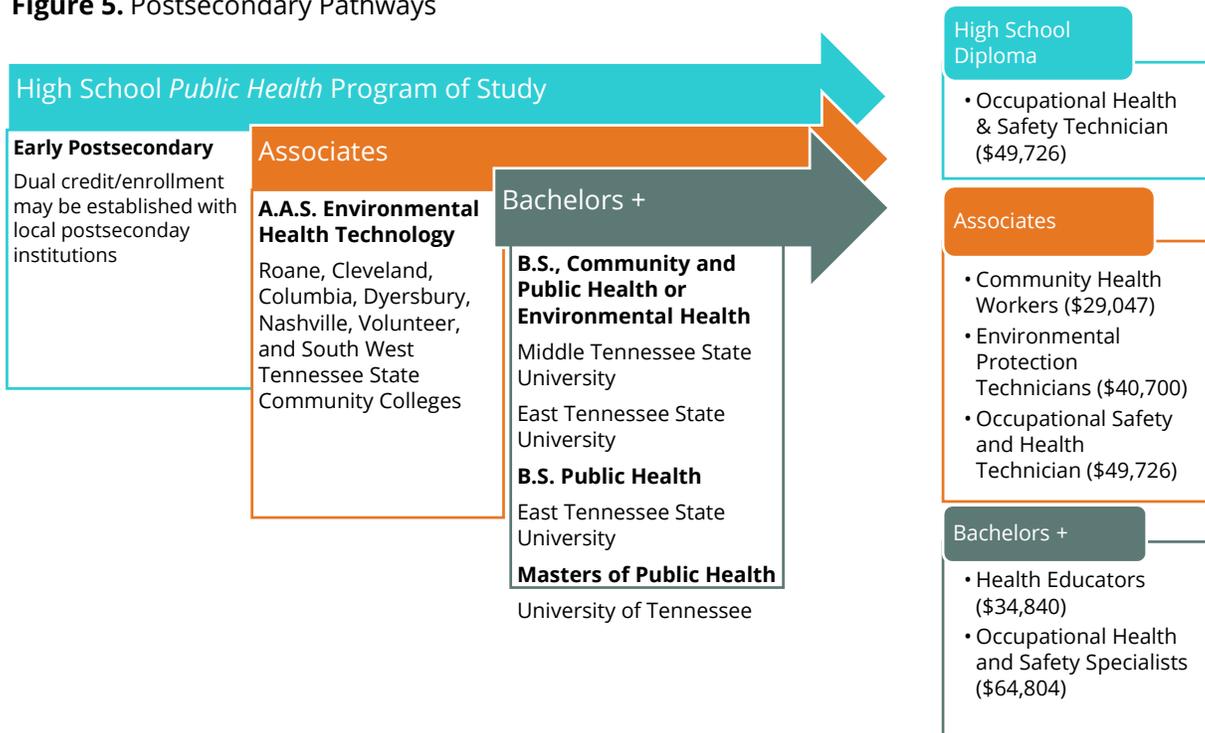
¹⁰ Tennessee Department of Labor and Workforce Development, Jobs4TN Online. (2016). Occupational Projections on the internet at <https://www.jobs4tn.gov/vosnet/analyzer/results.aspx?session=occpj>

¹¹ Tennessee Department of Labor and Workforce Development, Jobs4TN Online. (2016). Occupational Projections on the internet at <https://www.jobs4tn.gov/vosnet/analyzer/results.aspx?session=occpj>

Postsecondary Pathways

Upon completion of this POS, students will be prepared to further their training at community colleges and universities in the area of public health. **Figure 5** outlines the related postsecondary opportunities and training necessary for these careers. Students interested in a career in public health can seek on the job training and employment as an occupational health and safety technician using the robust portfolio they create in this program of study. At this time, seven community colleges across the state offer an associate’s degree in Environmental Health Technology. This degree can be the on-ramp to a bachelor’s degree in Community and Public Health, Environmental Health, or Public Health.

Figure 5. Postsecondary Pathways



Current Secondary Landscape

In the 2014-15 school year, 4 schools in Tennessee offered courses in the Public Health program of study. Of the 15,703 students who were enrolled in a Health Science course, only 52 students were enrolled in Behavioral and Community Health, the Level 3 course. The number of schools offering a Public Health program of study increased over the past year. **Figure 6** below shows the open enrollment analysis for 2014-15 and 2015-16 as well student enrollment for 2014-15 in the Public Health POS.

Figure 6. Open enrollment figures for 2014-15

Public Health

⊕ Student Enrollment 2014-15

Health Science Education	Emergency Preparedness	Behavioral and Community Health	Global Health And Epidemiology
15703	917	52	10

Open Enrollment Analysis 2014-15 to 2015-16

Public Health	
2014-15	4
2015-16	7
	<i>Increase</i>

Recommendations

Progression through a POS requires, at minimum, three courses. Some schools may only offer the first three levels of a POS; therefore, the department recommends changing the sequence of courses to ensure students have ample time to get into deeper occupational content. The new sequence of courses in Public Health POS is recommended as follows:

2017-18 Program of Study	Level 1	Level 2	Level 3	Level 4
Public Health	Health Science Education (optional) (5998)	Behavioral and Community Health (6130)	Global Health and Epidemiology (6132) -or- Dual Enrollment Public Health (4096)	Public Health Practicum (TBD) -or- Dual Enrollment Public Health (4096)

This sequence better targets the program of study's core content, so that students who complete levels 1-3 will have a more focused, high level understanding of public health, and it gives the students who complete Level 4 the opportunity to apply their knowledge in a public health setting.

Students who complete this program of study may seek employment or postsecondary placement upon graduation. It is recommended that a portfolio be created with work examples from all four courses. Having a robust portfolio will provide students the opportunity to communicate, present, and discuss their work with postsecondary and industry representatives. A list of suggested artifacts will be added to each course within the POS.

References

Careers In Public Health.net. (2015). Tennessee Public Health Jobs, Careers & Salary Outlook. Retrieved from <http://www.careersinpublichealth.net/states/tennessee>

Bureau of Labor Statistics, United States Department of Labor. (2016-17). Occupational Outlook Handbook: Health Educators and Community Health Workers. Retrieved from: <http://www.bls.gov/ooh/community-and-social-service/health-educators.htm#tab-6>

Tennessee Department of Labor and Workforce Development, Jobs4TN Online. (2016). Occupational Projections on the internet at <https://www.jobs4tn.gov/vosnet/analyzer/results.aspx?session=occproj>

Diagnostic Services

2016-17 Program of Study	Level 1	Level 2	Level 3	Level 4
Diagnostic Services	Health Science Education (5998)	Diagnostic Medicine (5994)	Anatomy and Physiology (3251 or 5991) -and/or- Medical Terminology (5883)	Cardiovascular Services (6131) -and/or- Clinical Internship (5993)

Description

Diagnostic Services is designed to prepare students to pursue careers in the fields of radiology, medical laboratory, optometry, and other patient diagnostic procedures. Upon completion of this course, proficient students will be able to describe new and evolving diagnostic technologies, compare and contrast the features of healthcare systems, explain the legal and ethical guidelines of the healthcare setting, and begin to perform foundational healthcare skills. In addition, students will have the option to complete a clinical internship.

Job Outlook

According to the Bureau of Labor Statistics, employment in diagnostic services careers is projected to grow faster or much faster than average through 2024.¹² US News lists all diagnostic careers reviewed in their report to be in the top 25 healthcare support jobs in 2016.¹³ As shown in **Figure 1**, medical laboratory positions are projected to increase by 1,180 thru 2022. In fact, all occupations listed in **Figure 1** that require a high school diploma or an associate's degree are projected to have an over two percent annual average percent change thru 2022. An increase in the aging population is expected to lead to a greater need to diagnose medical conditions through laboratory procedures, medical imaging, and electrocardiography. All careers in Diagnostic Services are considered to have a bright outlook in Tennessee.¹⁴

¹²Bureau of Labor Statistics, U.S. Department of Labor. *Occupational Outlook Handbook, 2016-17 Edition*, Radiologic Technologist. Retrieved from <http://www.bls.gov/ooh/healthcare/radiologic-technologist.htm>

¹³ Snider, S. (2016). 25 Amazing Health Care Support Jobs for 2016. *US News and World Report*. Retrieved from <http://money.usnews.com/money/careers/slideshows/25-amazing-health-care-support-jobs-for-2016>

¹⁴ National Center for O*NET Development. 29-2055.00. O*NET OnLine. Retrieved from <http://www.onetonline.org/find/bright?b=0>

Figure 1. Tennessee employment projections for diagnostic services occupations with positive openings projected 2014-22¹⁵

Occupation	Education Required	Median Salary	2022 Projected Employment	Total 2014 - 2022 Employment Change	Annual Avg. Percent Change
Phlebotomist	Certificate	\$25, 583	3,450	500	2.0%
Medical Laboratory Technician	Associate's Degree	\$39,959	7,460	1,180	2.2%
Medical Laboratory Technologist	Bachelor's Degree	\$58,114	4,650	390	1.1%
Radiologic Technologist	Associate's or Bachelor's Degree	\$48,855	6,000	860	2.0%
Cardiovascular Technologists and Technicians	High School Diploma or Associate's Degree	\$49,517	1,140	230	2.9%
Diagnostic Medical Sonographers	Associate's Degree	\$60,618	2,110	560	3.9%
Ophthalmic Medical Technician	High School Diploma or Certificate	\$34,021	750	160	3%
Ophthalmic Medical Technologist	Associate's Degree	\$50,857	890	130	2.1%

¹⁵ Tennessee Department of Labor and Workforce Development, Jobs4TN Online. (2016). Occupational Projections on the internet at <https://www.jobs4tn.gov/vosnet/analyzer/results.aspx?session=occpj>

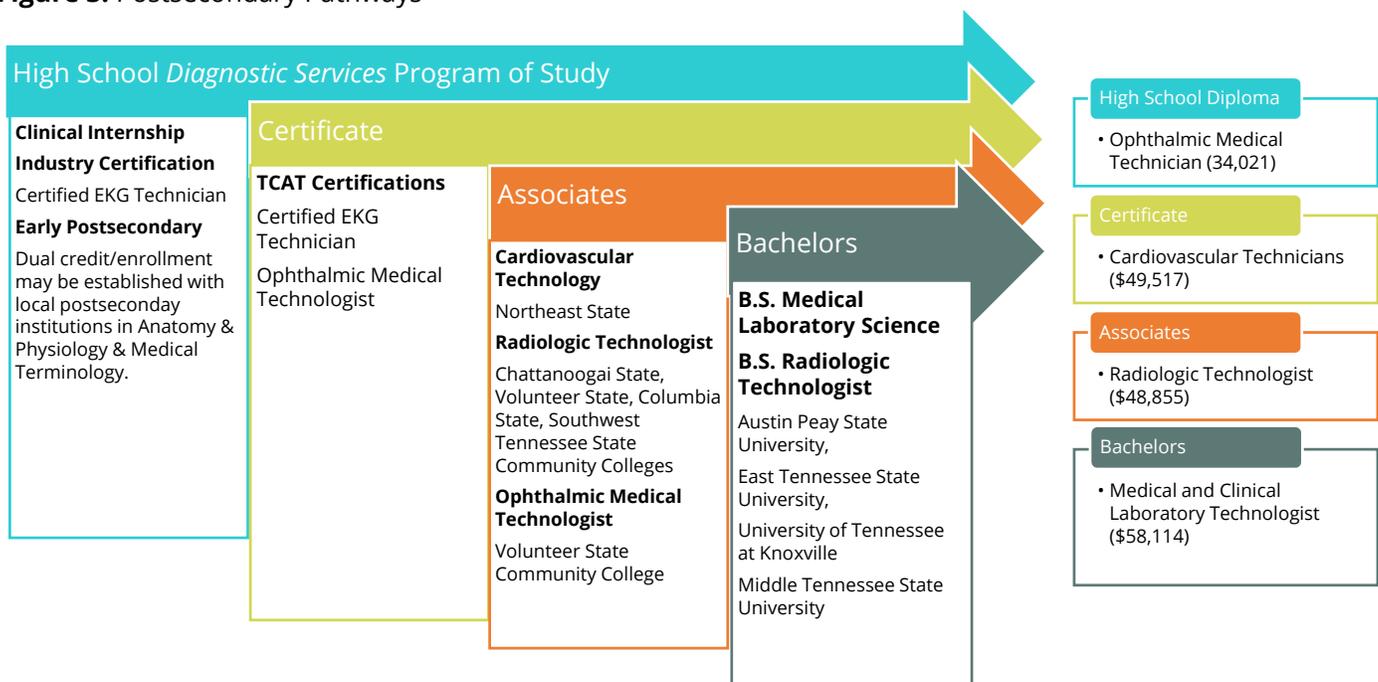
Figure 2. 2014 Estimated employment for Cardiovascular Technologists in Tennessee¹⁶



Postsecondary Opportunities

Medical Imaging is a path in Diagnostic Services that has many on-ramps. The path begins with an associate's degree in radiography. From there, a student may choose to enter the workforce or enter a certificate program in either sonography or magnetic resonance imaging. If a student prefers to continue his or her education, there are several bachelor's degree programs across the state. Another path with several on-ramps is medical laboratory science. This path begins with a certificate in Phlebotomy. While working as a phlebotomist, students can enter a medical laboratory technician program for an associate's degree then move on to a bachelor's degree to become a medical laboratory technologist.

Figure 3. Postsecondary Pathways



¹⁶ Tennessee Department of Labor and Workforce Development, Jobs4TN Online. (2016). Occupational Projections on the internet at <https://www.jobs4tn.gov/vosnet/analyzer/results.aspx?session=occpj>

In the 2015-16 school year, 81 schools in Tennessee offered courses in the Diagnostic Services POS. Of the 15,703 students enrolled in a Health Science course, 3,526 were enrolled in the Diagnostic Medicine course. **Figure 4** shows the open enrollment analysis for 2014-15 and 2015-16 school years, and although there was a small decline, the Diagnostic Services POS enrollment remains strong.

Figure 4. Open enrollment figures for 2014-15

Diagnostic Services

Student Enrollment 2014-15

Health Science Education	Diagnostic Medicine	Anatomy and Physiology	Medical Terminology	Cardiovascular Service	Clinical Internship
15703	3526	4343	1354	109	1710

Open Enrollment Analysis 2014-15 to 2015-16

Diagnostic Services	
2014-15	82
2015-16	81
	<i>Decline</i>

Recommendations

Progression through a POS requires, at minimum, three courses. Some schools may only offer the first three levels of a POS; therefore, the department recommends changing the sequence of courses to ensure students have ample time to get into deeper occupational content. The new sequence of courses in Public Health POS is recommended as follows:

2017-18 Program of Study	Level 1	Level 2	Level 3	Level 4
Diagnostic Services	Health Science Education (5998)	Anatomy and Physiology (3251 or 5991)	Diagnostic Medicine (5994) -or- Dual Enrollment Diagnostic Services (4097)	Cardiovascular Services (6131) -and/or- Clinical Internship (5993) -or- Dual Enrollment Diagnostic Services (4097)
				Industry Certification for 6131: Certified EKG Technician

This sequence better targets the program of study's core content, so that students who complete levels 1-3 will have a more focused, high level understanding of diagnostic medicine.

In addition to reordering the courses in this program of study, the department recommends adding a standard(s) to the Diagnostic Medicine course to make the pathway to the Cardiovascular Services course more seamless. Currently, the Medical Diagnostic course does not have any standards that prepare students for the Cardiovascular Services course.

Students who complete this program of study may seek employment or postsecondary placement upon graduation. It is recommended that a portfolio be created with work examples from all four courses. Having a robust portfolio will provide students the opportunity to communicate, present, and discuss their work with postsecondary and industry representatives. A list of suggested artifacts will be added to each course.

References

- Bureau of Labor Statistics, U.S. Department of Labor. Occupational Outlook Handbook, 2016-17 Edition, Radiologic Technologist. Retrieved from <http://www.bls.gov/ooh/healthcare/radiologic-technologist.htm>
- National Center for O*NET Development. 29-2055.00. O*NET OnLine. Retrieved from <http://www.onetonline.org/find/bright?b=0>
- Snider, S. (2016). 25 Amazing Health Care Support Jobs for 2016. US News and World Report. Retrieved from <http://money.usnews.com/money/careers/slideshows/25-amazing-health-care-support-jobs-for-2016>
- Tennessee Department of Labor and Workforce Development, Jobs4TN Online. (2016). Occupational Projections on the internet at <https://www.jobs4tn.gov/vosnet/analyzer/results.aspx?session=occproj>
- Tennessee Department of Labor and Workforce Development, Jobs4TN Online. (2016). Occupational Projections on the internet at <https://www.jobs4tn.gov/vosnet/analyzer/results.aspx?session=occproj>

Health Informatics

2016-17 Program of Study	Level 1	Level 2	Level 3	Level 4
Health Informatics	Health Science Education (5998)	Medical Terminology (5883)	Health Information Technology (5997)	Clinical Internship (5993)

Description

Health Informatics is a program of study (POS) intended to prepare students with an understanding of the changing world of health care information. With the introduction of a national system for electronic medical records, electronic billing, and electronic prescriptions, students in all healthcare professions must increasingly demonstrate competency in health information and health informatics. Upon completion of this course, proficient students will be able to differentiate among the types of health information/informatics, code and manage medical records, retrieve crucial data from health information systems and indexes, and understand the implications for careers in a range of health care fields.

Employment Outlook

Nationwide employment of health information technicians is projected to grow 15 percent from 2014 to 2024, much faster than the average for all occupations¹⁷. The timing for such a career choice could not be better: medical doctors now confront a huge procedural shift from previous methods to interaction with a standardized digital record and new electronic-based processes.¹⁸ Tennessee employment projections are favorable as well. Students can pursue employment as a medical secretary upon graduation from high school and while pursuing postsecondary programs in health information technology. As seen in **Figure 1**, medical secretaries have projected annual average openings of 245 statewide, and students with a medical transcriptionist certificate can expect annual average openings of 40. Opportunities for medical records and health information technicians is projected to have annual average openings of 245.¹⁹ **Figure 2** shows more employment opportunities for health information technologists in urban areas with the more rural areas showing no lower than 71-110 openings from 2014-22. Increases in population age, and the movement of the nation toward a national health information system is expected to increase the overall demand for health information services.

¹⁷ Bureau of Labor Statistics, United States Department of Labor. (2016-17). Occupational Outlook Handbook: Clusters, pathways, and LS: Connecting Career Information. Retrieved from [http://www.bls.gov/careeroutlook/2015/article/career-clusters.htm#Health sciences](http://www.bls.gov/careeroutlook/2015/article/career-clusters.htm#Health%20sciences)

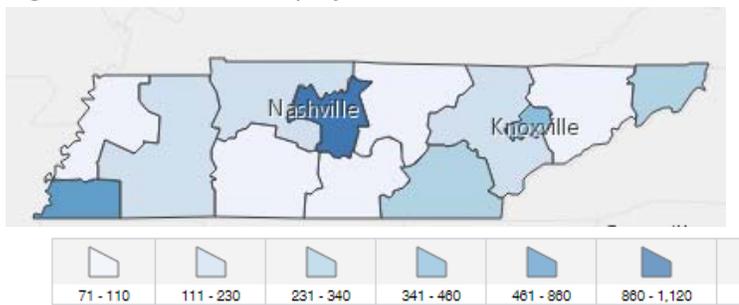
¹⁸ Innerbody.com. (2016). Health Information Technology Careers. Retrieved from <http://www.innerbody.com/careers-in-health/health-information-technology-careers.html>

¹⁹ Tennessee Department of Labor and Workforce Development, Jobs4TN Online. (2016). Employment Wage and Data. Retrieved from <https://www.jobs4tn.gov>

Figure 1. Occupational Employment & Future Employment Outlook for Tennessee²⁰

Occupation	Education Required	Median Salary	2022 Projected Employment	Total 2014 - 2022 Employment Change	Annual Avg. Percent Change
Medical Records & Health Information Technician	Associate's Degree	\$30,958	5,700	960	2.3%
Medical Transcriptionist	Certification	\$20,442	1,480	120	1.1%
Medical Secretary	High School Diploma Certificate	\$27,989	7,010	1,440	2.9%
Clinical Data Managers	Bachelor's Degree	\$53,976	500	80	2.2%

Figure 2. Estimated employment for Health Information Technicians (2014-22)²¹



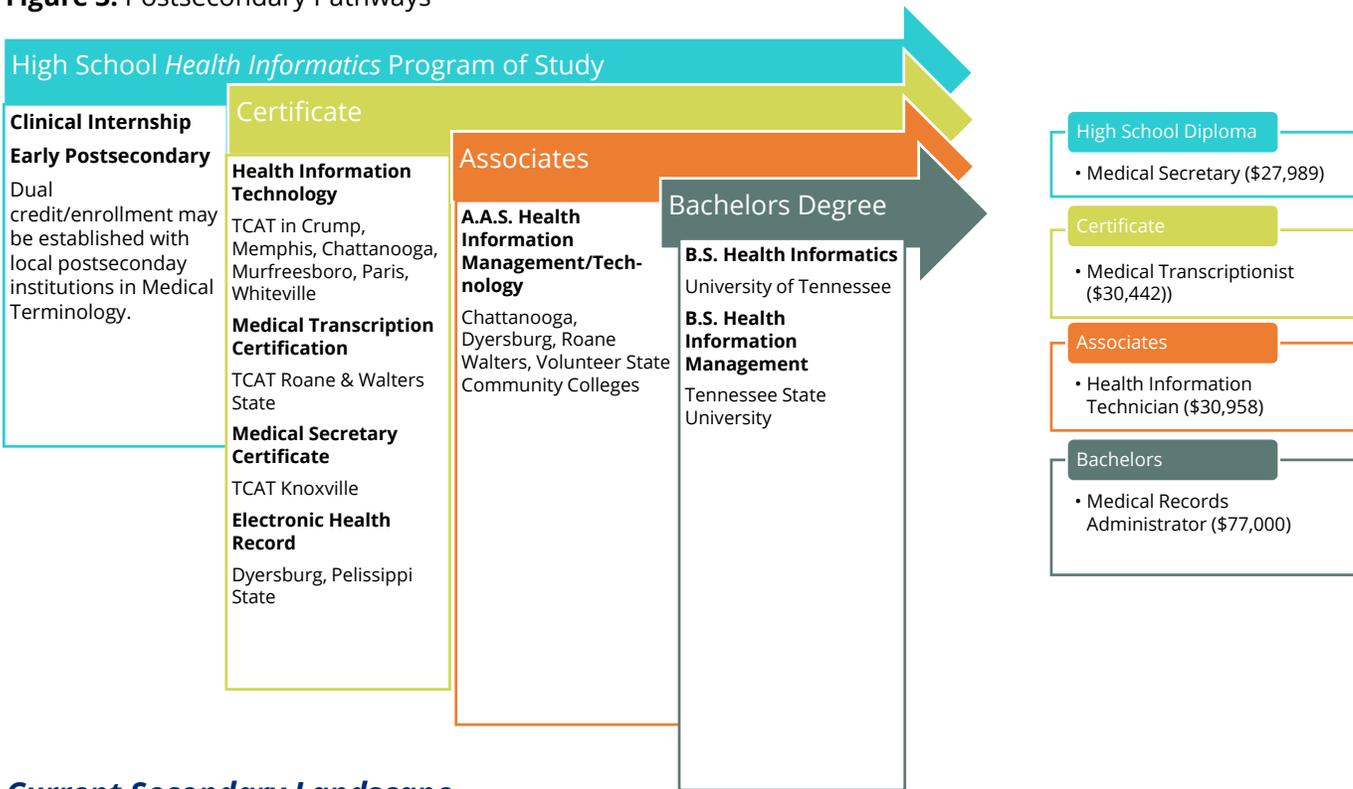
Postsecondary Opportunities

Upon completion of this POS, students will be prepared to further their training at community colleges and universities in the areas of Health Information Technology (HIT). **Figure 3** outlines the related career opportunities and training necessary for careers in HIT. Students interested in a career in HIT can seek on the job training and employment as a medical secretary using the robust portfolio they create in this program of study. At this time, six Tennessee Colleges of Applied Technology across the state offer a certificate program in Health Information Technology, and five community colleges offer an associate of applied science in Health Information Technology. This degree can be the on-ramp to a bachelor's degree in Health Informatics or Health Information Management.

²⁰ Tennessee Department of Labor and Workforce Development, Jobs4TN Online. (2016). Employment Wage and Data. Retrieved from <https://www.jobs4tn.gov>

²¹ Tennessee Department of Labor and Workforce Development, Jobs4TN Online. (2016). Employment Wage and Data. Retrieved from <https://www.jobs4tn.gov>

Figure 3. Postsecondary Pathways



Current Secondary Landscape

In the 2015-16 school year, 28 schools in Tennessee offered courses in the Health Information Technology program of study. Of the 15,703 students who enrolled in a Health Science course, only 38 students were enrolled in Health Information Technology, the Level 3 course. The number of students enrolled in the Health Information Technology POS has decreased over the past two years. **Figure 4** shows the open enrollment analysis for 2014-15 and 2015-16. The difference in the number of students enrolled compared to the number of programs in the state indicates students are concentrating in the program of study without taking Health Information Technology which is the foundational class for the POS.

Figure 4. Open enrollment for Health Informatics

Health Informatics

Student Enrollment 2014-15

Health Science Education	Medical Terminology	Health Information Technology	Clinical Internship
15703	1354	38	1710

Open Enrollment Analysis 2014-15 to 2015-16

Health Informatics	
2014-15	29
2015-16	28
Decline	

Recommendations

While there were 27 programs of study in Tennessee in 2014-15, only 38 students were enrolled in the actual Health Information Technology course indicating students are completing the program of study by taking Health Science, Medical Terminology, and then Clinical Internship. Depending on the internship experience, this may or may not prepare the student for employment or other postsecondary opportunities. Because health science students are more focused on direct patient care and the Business Management & Administration career cluster offers Health Services Administration, the department recommends merging the program of study to the Business Management & Administration career cluster within the health services administration program of study. This will better prepare students who are interested in entering into fields within Health Information Technology and support students from the Health Services Administration occupations as well.

References

- Bureau of Labor Statistics, United States Department of Labor. (2016-17). Occupational Outlook Handbook: Clusters, pathways, and LS: Connecting Career Information. Retrieved from [http://www.bls.gov/careeroutlook/2015/article/career-clusters.htm#Health sciences](http://www.bls.gov/careeroutlook/2015/article/career-clusters.htm#Health%20sciences)
- Innerbody.com. (2016). Health Information Technology Careers. Retrieved from <http://www.innerbody.com/careers-in-health/health-information-technology-careers.html>
- Tennessee Department of Labor and Workforce Development, Jobs4TN Online. (2016). Employment Wage and Data. Retrieved from <https://www.jobs4tn.gov>

Therapeutic Nursing Services

2016-17 Program of Study	Level 1	Level 2	Level 3	Level 4
Therapeutic Nursing Services	Health Science Education (5998)	Medical Therapeutics (5999)	Anatomy and Physiology (3251 or 5991) -and/or- Medical Terminology (5883)	Nursing Education (6000)

Description

The **Therapeutic Nursing Services** program of study (POS) is designed to prepare students to pursue careers in the field of nursing. Upon completion of this program, a proficient student will be able to implement communication and interpersonal skills, maintain residents’ rights and independence, provide care safely, prevent emergency situations, prevent infection through infection control, and perform the skills required of a nursing assistant. Students will log forty hours of site-based clinical work with at least 24 of those hours spent in a long-term care facility as part of the Level 4 course. Successful completion of the Nursing Education course and Certified Nursing Assistant certification exam allows to the student to seek immediate employment as a Certified Nursing Assistant or utilize this certification to continue their education within the nursing field.

Job Outlook

As seen in **Figures 1, 2, and 3**, the outlook is bright for all levels of nursing in Tennessee. According to the U.S. Bureau of Labor Statistics the number one job need for 2018 will be home health aide and/or personal care aide. Both of these occupations require the employee to be a certified nursing assistant (CNA). The number of jobs projected for 2022 in Tennessee for the two occupations is 38,340 with an increase of 1.7 percent.

Even though the CNA and home health aide professions are not high wage careers they are certainly high skill and high demand. Skills and knowledge gained in this POS will provide the students with foundational knowledge to continue their education and prepare for licensed practical nurse (LPN) and registered nurse (RN) careers.

Employment of registered nurses is projected to grow 16 percent from 2014 to 2024, much faster than the average for all occupations, and the average salary for nurses is \$68,272 (**Figure 4.**) This makes nursing a high wage, high skill, high demand job. Growth will occur for a number of reasons, including an increased emphasis on preventive care, growing rates of chronic conditions, such as diabetes and obesity, and demand for healthcare services from the baby-boom population as they live longer and more active lives.²²

²² Bureau of Labor Statistics, U.S. Department of Labor, *Occupational Outlook Handbook, 2016-17 Edition*, Registered Nurses. Retrieved from <http://www.bls.gov/ooh/healthcare/registered-nurses.htm>

Figure 1. Long term projected annual openings for Nursing Assistants in Tennessee from 2014

Occupation	Total Annual Average Openings	Annual Average Openings Due To Growth	Annual Average Openings Due To Replacement
Nursing Assistants  	1,125	550	575

 BRIGHT OUTLOOK NATIONALLY |  BRIGHT OUTLOOK STATEWIDE |  GREEN OCCUPATIONS

Figure 2. Long term projected annual openings for Licensed Practical and Licensed Vocational Nurses in Tennessee from 2014-22.

Occupation	Total Annual Average Openings	Annual Average Openings Due To Growth	Annual Average Openings Due To Replacement
Licensed Practical and Licensed Vocational Nurses  	1,025	490	535

 BRIGHT OUTLOOK NATIONALLY |  BRIGHT OUTLOOK STATEWIDE |  GREEN OCCUPATIONS

Figure 3. Long term projected annual openings for Registered Nurses in Tennessee from 2014 to 2022²³.

Occupation	Total Annual Average Openings	Annual Average Openings Due To Growth	Annual Average Openings Due To Replacement
Registered Nurses 	2,205	1,125	1,080

 BRIGHT OUTLOOK NATIONALLY |  BRIGHT OUTLOOK STATEWIDE |  GREEN OCCUPATIONS

²³ Tennessee Department of Labor and Workforce Development, Jobs4TN Online. (2016). Employment Wage and Data. Retrieved from <https://www.jobs4tn.gov>

Figure 4. Occupational Employment & Future Employment Outlook for Tennessee²⁴

Occupation	Education Required	Median Salary	2022 Projected Employment	Total 2014 - 2022 Employment Change	Annual Avg. Percent Change
Certified Nursing Assistant	Post-secondary CNA certificate	\$ 38,677	35,170	4,420	1.7%
Home Health Aide	Post-secondary CNA certificate	\$56,526	13,620	680	0.6%
Personal Care Aide	Post-secondary CNA certificate	\$69,739	24,720	2,070	1.1%
Surgical Technologist	Post-secondary Surgical Tech certificate or Associate's Degree	\$37,465	3,910	780	2.8%
Licensed Practical Nurse	Post-secondary LPN certificate	\$49,725	26,020	3,940	2.1%
Registered Nurse	66% require Associate's Degree 23% require Bachelor's Degree	\$68,272	66,560	8,890	1.8%

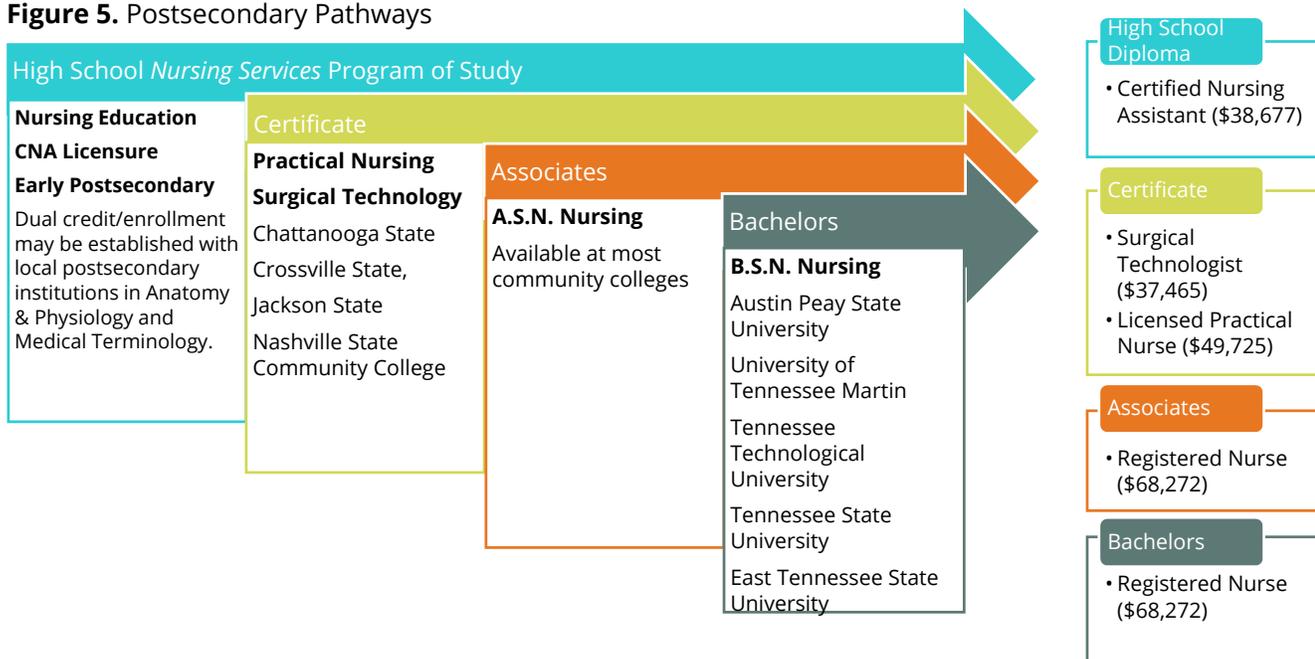
²⁴ Tennessee Department of Labor and Workforce Development, Jobs4TN Online. (2016). Employment Wage and Data. Retrieved from <https://www.jobs4tn.gov>

Postsecondary Pathways

Nursing programs at the postsecondary level are growing each year to meet the demand of replenishing a retiring and aging nursing staff. In Tennessee there are currently 43 RN associate’s degree and bachelor’s degree programs, 27 LPN programs²⁵, and 283 training programs for CNAs.

Many postsecondary RN programs in Tennessee, such as Vanderbilt and Middle Tennessee State University²⁶ now require applicants to have some experience or certification in a healthcare area for admission to their programs. Completion of the Therapeutic Nursing Services program of study and subsequent certification as a CNA allows the student to pursue this experience and prepare for nursing school admission. The number of students enrolled in Nursing Education in 2012 was 1167, in 2013 there were 1657 enrolled, and for 2014 there were 1393. Of those students, the data is not available for those who took the certification examination.

Figure 5. Postsecondary Pathways



²⁵ Deans and Directors of the Schools of Nursing in Tennessee, *Nursing Education in Tennessee, 2016*, Choosing a Program. Retrieved from <http://nursing-education-tn.org/>

²⁶ Middle Tennessee State University. School of Nursing. 2016. New School of Nursing Admission and Progression Guidelines, Retrieved from <http://w1.mtsu.edu/nursing/forms/AdmissionProgression2016.pdf>

Current Secondary Landscape

In the 2014-15 school year, 123 schools in Tennessee offered courses in the Therapeutic Nursing Services program of study. Of the 15,703 students enrolled in a Health Science course, 1392 students were enrolled in Therapeutic Nursing Services, the Level 3 course. The number of Therapeutic Nursing Services programs of study in Tennessee stayed the same from 2014-15 to 2015-16. **Figure 6** shows the open enrollment analysis for 2014-15 and 2015-16 as well student enrollment for 2014-15 in the Therapeutic Nursing Services program of study.

Figure 6. Open enrollment figures for 2014-2015

Therapeutic Nursing Services

Student Enrollment 2014-15

Health Science Education	Medical Therapeutics	Anatomy and Physiology	Medical Terminology	Nursing Education
15703	8251	4343	1354	1392

Open Enrollment Analysis 2014-15 to 2015-16

Therapeutic Nursing Services	
2014-15	123
2015-16	123
	<i>No Change</i>

Recommendations

The department recommends the courses in the Therapeutic Nursing Services POS be rearranged as follows:

2017-18 Program of Study	Level 1	Level 2	Level 3	Level 4
Nursing Services	Health Science Education (5998)	Anatomy and Physiology (3251 or 5991)	Medical Therapeutics (5999) -or- Dual Enrollment Nursing Services (4099)	Nursing Education (6000) -or- Dual Enrollment Nursing Services (4099)
				Industry Certification: Certified Nursing Assistant (CNA)

This sequence better targets the program of study's core content, so that students who complete the levels in this order will have a more focused, high level understanding of nursing services. The department also recommends changing the name of the POS to Nursing Services to avoid confusion with the Therapeutic Clinical Services POS.

Finally, the department encourages districts to explore a relationship with the Tennessee Colleges of Applied Technology (TCAT) Licensed Practical Nursing (LPN) programs to create either dual enrollment or dual credit programs to prepare students to transition into the TCAT LPN programs.

References

Bureau of Labor Statistics, U.S. Department of Labor, *Occupational Outlook Handbook, 2016-17 Edition*, Registered Nurses. Retrieved from <http://www.bls.gov/ooh/healthcare/registered-nurses.htm>

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Middle Tennessee State University. School of Nursing. 2016. *New School of Nursing Admission and Progression Guidelines*, Retrieved from <http://w1.mtsu.edu/nursing/forms/AdmissionProgression2016.pdf>

National Center for O*NET Development. 29-2055.00. O*NET OnLine. Retrieved April 5, 2016, from <http://www.onetonline.org/link/custom/29-2055.00>

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Emergency Services

2016-17 Program of Study	Level 1	Level 2	Level 3	Level 4
Emergency Services	Health Science Education (5998)	Emergency Preparedness (6151)	Anatomy and Physiology (3251 or 5991) -and/or- Medical Terminology (5883)	Emergency Medical Services (5995)

Description

The **Emergency Services** program of study is designed to prepare students to pursue careers in the fields of emergency medicine. Upon completion, proficient students will be able to identify careers and features of the Emergency Medical Services (EMS) system, define the importance of workforce safety and wellness, maintain legal and ethical guidelines, correlate anatomy and physiology concepts to the patient with a medical or traumatic injury, and perform EMS skills with a high level of proficiency. If taught with an Emergency Medical Technician (EMT) instructor, students will be given the opportunity to sit for the National Emergency Medical Responder certification. Students who wish to enter the workforce will be well prepared to begin on the job training for 911 dispatching.

Job outlook

Employment of emergency medical technicians (EMTs) and paramedics is projected to grow 24 percent from 2014 to 2024, much faster than the average for all occupations. Emergencies, such as car crashes, natural disasters, and acts of violence, will continue to create demand for EMTs and paramedics. An increasing call volume due to the country's aging population is expected to keep job prospects high for EMTs and paramedics.²⁷ **Figure 1** shows overall job prospects for dispatchers to be favorable, because the work of a dispatcher remains stressful and demanding, leading some applicants to seek other types of work. Students who have completed the emergency medicine program of study and have a robust portfolio will make excellent candidates for on the job training as a dispatcher. The majority of positions in emergency medicine will come from the need to replace the large number of dispatchers expected to transfer to other occupations or leave the labor force. Those with good communication skills and experience using computers should have the best job prospects.²⁸

²⁷ US News and World Report, Careers. (2016). *Best Health Care Support Jobs*. Retrieved from <http://money.usnews.com/careers/best-jobs/emergency-medical-technician-and-paramedic>

²⁸ United States Department of Labor, Employment and Training Administration. (2016). *Occupational Outlook Handbook*. Retrieved from <http://www.bls.gov/ooh/office-and-administrative-support/police-fire-and-ambulance-dispatchers.htm#tab-6>

Figure 1. Occupational Employment & Future Employment Outlook for Tennessee²⁹

Occupation	Education Required	Median Salary	2022 Projected Employment	Total 2014 - 2022 Employment Change	Annual Avg. Percent Change
Emergency Medical Responder	EMR certificate	\$21,579	490	140	4%
EMT or EMT Basic	EMT certificate	\$32,073	8,940	1,470	2.3%
Advanced EMT Or EMT Intermediate	AEMT certificate	\$32,073	*	*	*
EMT Paramedic	Paramedic certificate or Associate of Applied Science Paramedicine	\$39,853	*	*	*
Police, Fire, Ambulance Dispatcher	High school diploma with on the job training	\$30,816	3200	280	1.2%
Emergency Management Director	Bachelor of Science	\$64,360 *national data		700 *national data	6% * national data

*Note: Jobs4tn.gov groups all EMTs and Paramedics together to report employment projections

²⁹ Tennessee Department of Labor and Workforce Development, Jobs4TN Online. (2016). Employment Wage and Data. Retrieved from <https://www.jobs4tn.gov>

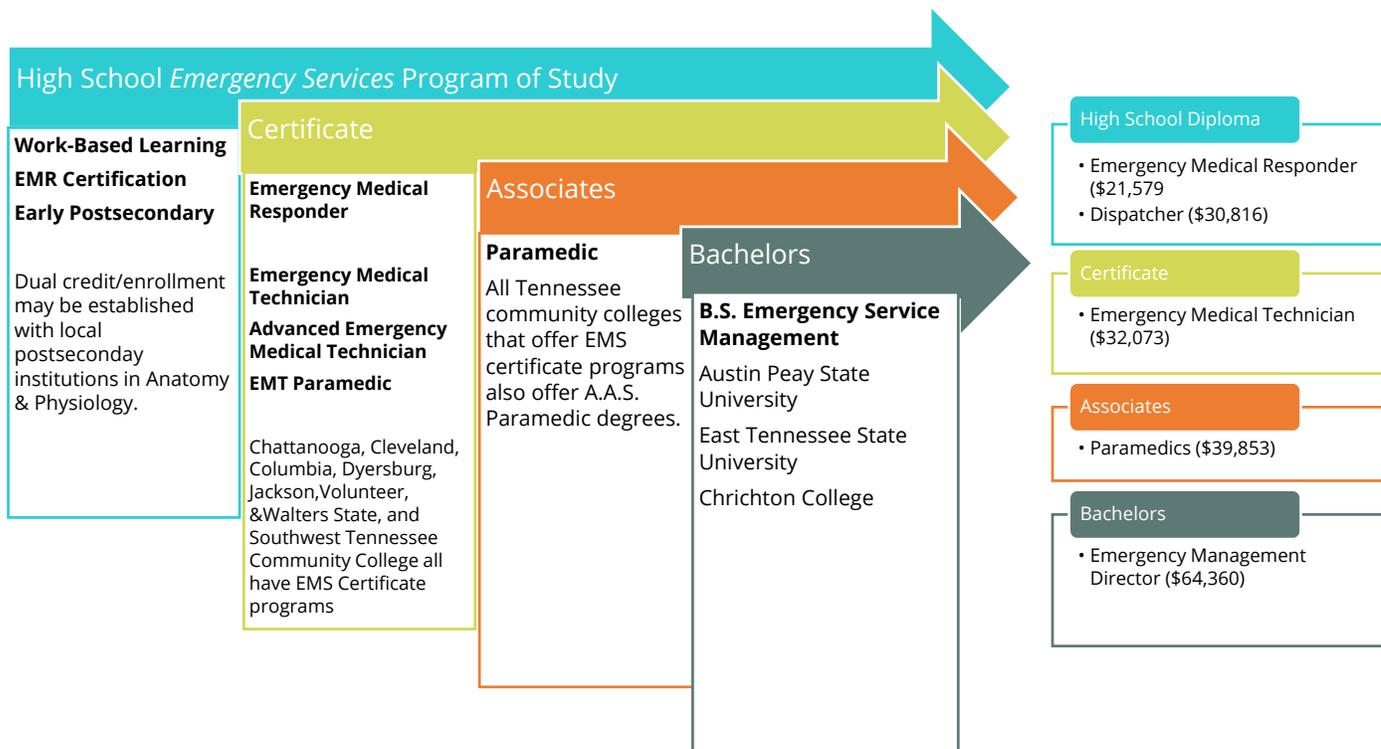
Postsecondary Opportunities

Eight of the 13 community colleges in Tennessee offer EMS training for EMT, Advanced EMT, and EMT paramedic. These programs are all offered as certificate programs, but paramedics may complete additional course work to earn an associate of applied science degree. Upon completion of the chosen certificate program, students must take and pass a certification exam.

The National Registry of Emergency Medical Technicians (NREMT) certifies EMTs and paramedics. All levels of NREMT certification require completing a certified education program and passing the national exam. The national exam has both written and practical parts.³⁰

As shown in **Figure 2**, students wishing to pursue education beyond the level of paramedic may pursue a B.S. in Emergency Service Management. Nationally, employment opportunities for emergency service managers is projected to improve by eight percent.

Figure 2. Postsecondary Pathways



³⁰ National Registry of Emergency Medical Technicians. (2016). About NREMT Examinations. Retrieved from https://www.nremt.org/nremt/about/about_exams.asp

Current Secondary Landscape

In the 2014-15 school year, 77 schools in Tennessee offered courses in the Emergency Services POS. Of the 15,703 students enrolled in the Health Science course, 2012 students were enrolled in Emergency Services, the Level 4 course. The number of students enrolled in an Emergency Medical Services course has declined in the past two years. **Figure 3** shows the open enrollment analysis for 2014-15 and 2015-16 as well student enrollment for 2014-15 in the Emergency Services program of study.

Figure 3. Emergency Services Open Enrollment Analysis

Emergency Services

Student Enrollment 2014-15

Health Science Education	Emergency Preparedness	Anatomy and Physiology	Medical Terminology	Emergency Medical Services
15703	917	17	1354	2012

Open Enrollment Analysis 2014-15 to 2015-16

Emergency Services	
2014-15	89
2015-16	77
	<i>Decline</i>

Recommendations

Progression through a POS requires at minimum three courses, and some schools may only offer the first three levels of a POS; therefore, the department recommends changing the sequence of courses within the POS. The recommended courses in the Emergency Services POS should be rearranged as follows:

2017-18 Program of Study	Level 1	Level 2	Level 3	Level 4
Emergency Services	Health Science Education (5998)	Anatomy and Physiology ² (3251 or 5991)	Emergency Medical Services ¹ (5995) -or- Dual Enrollment Emergency Services (4100)	Emergency Medical Services Practicum (TBD) -or- Clinical Internship (5993) -or- Dual Enrollment Emergency Services (4100)
				Industry Certification: Emergency Medical Responder (First Responder)

This sequence better targets the program of study's core content, so that students who complete levels 1-3 will have a more focused, high level understanding of emergency medicine.

Based on supply and demand data from jobs4tn.gov, Emergency Medicine careers are expected to be in demand; see **Figure 1. Figure 3** shows a decrease in enrollment data for the 2015-16 school year by a total of 12 programs. Because of projected growth and the decrease in programs, more schools should be considering or reconsidering implementing this POS.

As students who complete this POS will be seeking employment in the workforce or postsecondary placement upon graduation, it is recommended that a portfolio be created with work examples from all four courses for those students not choosing to become a certified medical responder. Standards should be modified or added to define and outline the portfolio creation process.

References

National Registry of Emergency Medical Technicians. (2016). About NREMT Examinations. Retrieved from https://www.nremt.org/nremt/about/about_exams.asp

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US News and World Report, Careers. (2016). Best Health Care Support Jobs. Retrieved from <http://money.usnews.com/careers/best-jobs/emergency-medical-technician-and-paramedic>

Therapeutic Clinical Services

2016-17 Program of Study	Level 1	Level 2	Level 3	Level 4
Therapeutic Clinical Services	Health Science Education (5998)	Medical Therapeutics (5999)	Rehabilitation Careers (5990) -or- Dental Science (6134) -or- Pharmacological Science (6133) -or- Nutrition Science and Diet Therapy (6007)	Clinical Internship (5993)

Description

Therapeutic Clinical Services is designed to prepare students to pursue careers in fields of dentistry, pharmacology, nutrition, or rehabilitation. Upon completion of this POS, a proficient student will be able to identify careers in therapeutic clinical services; assess, monitor, evaluate, and report patient/client health status; and identify the purpose and components of treatments. Students have the option to take part in a clinical internship at the end of this program of study.

Job Outlook

As a cluster, therapeutic careers is projected to have a total annual average number of openings of over 2,200 and estimated employment of over 63,150 by 2022. The Bureau of Labor Statistics projects most of the job openings in occupations assigned to the health sciences cluster to be in the therapeutic services pathway.³¹ The therapeutic careers can be further broken down into groups of related occupations; i.e., rehabilitation such as physical and respiratory therapies, dental, pharmacological, and nutritional services³². Each of these areas have projected positive growth from 2014-2022 with medical assistants, dental assistants, and pharmacy technicians projected to have the largest number of openings³³, see **Figures 1 and 3**. This is especially important, because students can enter these areas with a certificate obtained in either secondary or postsecondary settings. Also, each of these entry

³¹ Bureau of Labor Statistics, United States Department of Labor. (2016-17). Occupational Outlook Handbook: Clusters, pathways, and LS: Connecting Career Information. Retrieved from [http://www.bls.gov/careeroutlook/2015/article/career-clusters.htm#Health sciences](http://www.bls.gov/careeroutlook/2015/article/career-clusters.htm#Health%20sciences)

³² CAREERwise Education. (2016). *Therapeutic Services Pathway*. Retrieved from <http://www.iseek.org/careers/therapeutic-services-pathway.html>

³³ Tennessee Department of Labor and Workforce Development, Jobs4TN Online. (2016). Employment Wage and Data. Retrieved from <https://www.jobs4tn.gov>

level positions can serve as on-ramps to associate’s and bachelor’s degree programs in each of the three areas.³⁴ Regarding salary, dental hygienists, physical therapy assistants, and occupational therapy assistants all have an annual median salary of over \$50,000 with an associate’s degree. The projected total annual average openings for these careers is 185, 105, and 35 respectively. **Figure 2** shows therapeutic career employment concentrated in and around urban areas with no region showing employment lower than 21-40.

Figure 1. Occupational Employment & Future Employment Outlook for Tennessee35

Occupation	Education Required	Median Salary	2022 Projected Employment	Total 2014 - 2022 Employment Change	Annual Avg. Percent Change
Massage Therapist	Massage Therapy Certificate	\$35,321	2,280	330	1.9%
Physical Therapy Aide	High School Diploma	\$22,249	1,470	220	2.1%
Physical Therapy Assistant	Associate’s Degree	\$54,324	2,700	470	2.4%
Occupational Therapy Assistant	Associate’s Degree	\$58,788	750	160	3.0%
Occupational Therapy Aide	High School Diploma	\$24,902	140	10	1.6%
Dental Assistant	Certification	\$34,606	7,100	990	1.9%
Dental Hygienist	Associate’s or Bachelor’s Degree	\$61,223	4,320	790	2.5%
Food Server, non-restaurant	High School Diploma	\$18,481	4,460	350	1.0%
Dietetic Technician	High School Diploma	\$21,267	900	100	1.4%
Registered Dietician	Bachelor’s Degree	\$52,265	1320	170	1.7%
Pharmacy Technician	Certification	\$28,641	15,050	2,880	2.7%
Medical Assistant	Certification	\$28,045	17,590	3,120	2.7%

³⁴ Tennessee Department of Labor and Workforce Development, Jobs4TN Online. (2016). Employment Wage and Data. Retrieved from <https://www.jobs4tn.gov>

³⁵ Tennessee Department of Labor and Workforce Development, Jobs4TN Online. (2016). Employment Wage and Data. Retrieved from <https://www.jobs4tn.gov>

Figure 2. Estimated employment for therapeutic careers such as dietitians and nutritionists in Tennessee in the 2014-22 projection period.³⁶

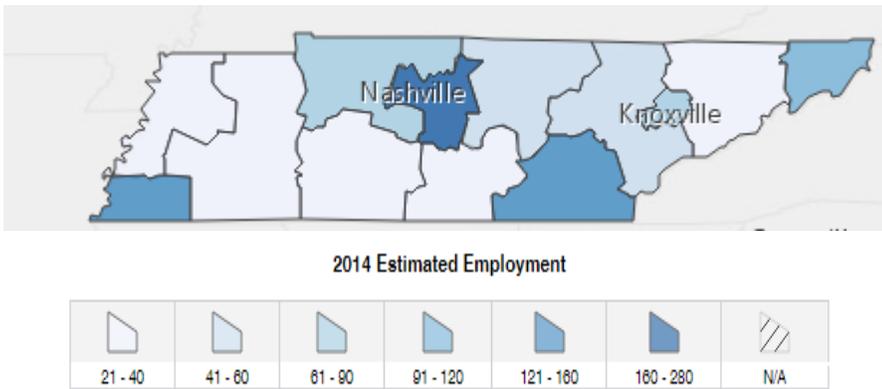
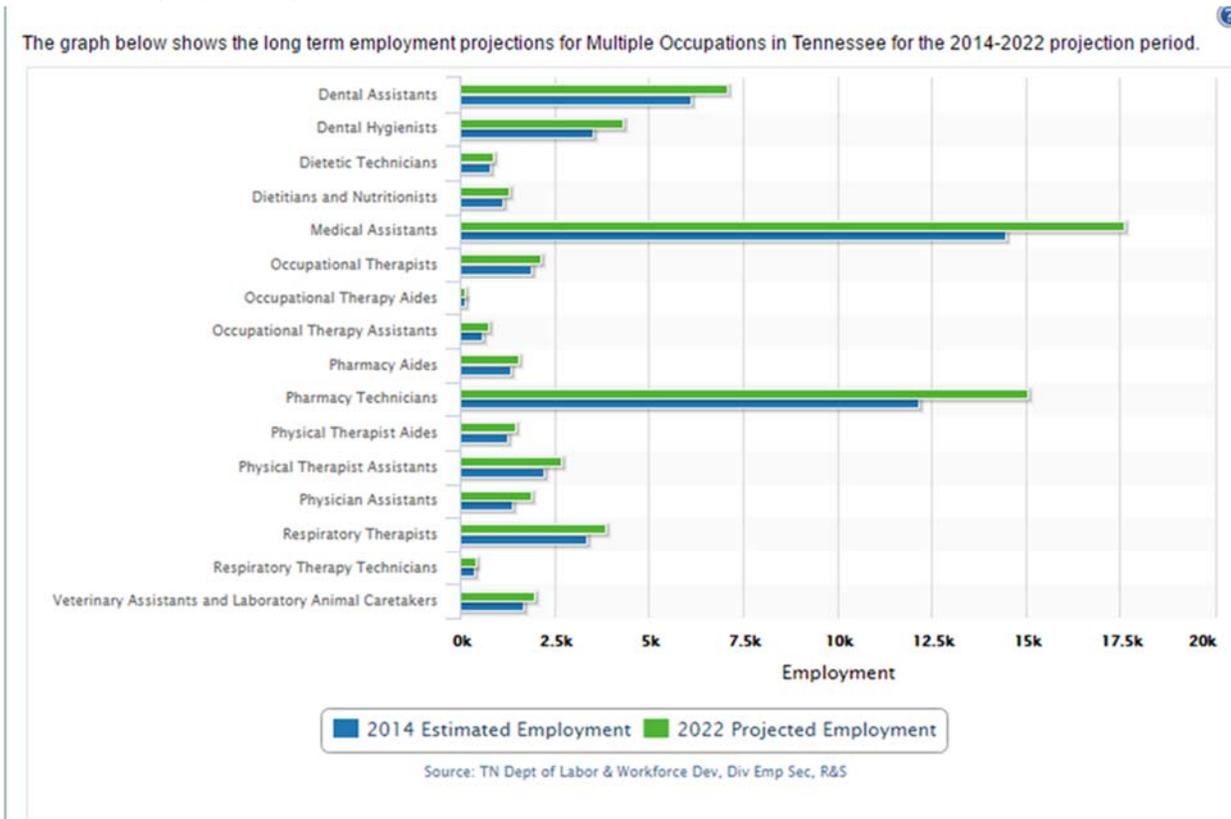


Figure 3. The graph below shows the long term employment projections for Multiple Occupations in Tennessee for the 2014-22 projection period.³⁷



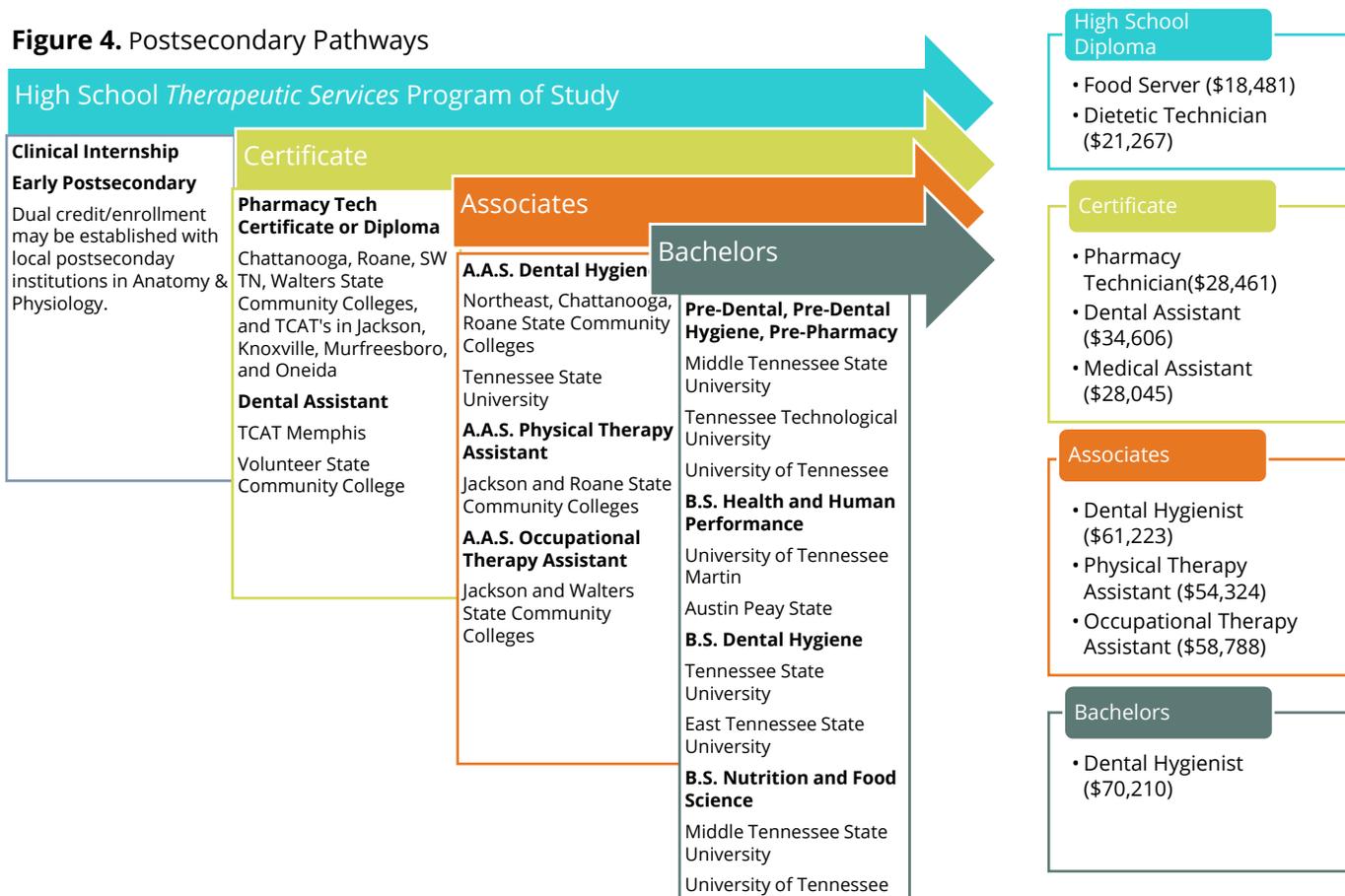
³⁶ Tennessee Department of Labor and Workforce Development, Jobs4TN Online. (2016). Employment Wage and Data. Retrieved from <https://www.jobs4tn.gov>

³⁷ Tennessee Department of Labor and Workforce Development, Jobs4TN Online. (2016). Employment Wage and Data. Retrieved from <https://www.jobs4tn.gov>

Postsecondary Pathways

For students interested in a therapeutic career, education paths are seamless as shown in **Figure 4**. A pharmacy tech certificate offered in high school can lead to a pre-pharmacy program at Middle and East Tennessee State Universities as well as the University of Tennessee at Knoxville. Dental assistants who receive on the job training can enter a dental assisting or dental hygiene program at Northeast State Community College or Middle Tennessee State University. Following high school graduation, a student can be trained on the job to be a dietary aide while pursuing a bachelor's degree in Nutrition. Students interested in physical/occupational therapy can be trained on the job to be a physical or occupational therapy aide, complete an associate's degree in physical or occupational therapy assisting, complete a bachelor's degree in pre-physical therapy or an occupational therapy fast track program.

Figure 4. Postsecondary Pathways



Current Secondary Landscape

In the 2014-15 school year, 110 schools in Tennessee offered courses in the Therapeutic Clinical Services program of study. Of the 15,703 students who were enrolled in a Health Science course, 12,615 students were enrolled in one of the Level 3 courses. The number of schools offering the Therapeutic Clinical Services program of study increased from 2014-15 to 2015-16. **Figure 5** shows the open enrollment analysis for 2014-15 and 2015-16 as well student enrollment for 2014-15 in the Therapeutic Clinical Services program of study.

Figure 5. Open enrollment figures for 2014-2015

Therapeutic Clinical Services

Student Enrollment 2014-15

Health Science Education	Medical Therapeutics	Rehabilitation Careers	Dental Science	Pharmacological Science	Nutrition Science & Diet Therapy	Anatomy & Physiology	Clinical Internship
15703	8251	2693	73	262	1336	4343	1710

Open Enrollment Analysis 2014-15 to 2015-16

Therapeutic Clinical Services	
2014-15	110
2015-16	116
	<i>Increase</i>

Recommendations

Progression through a POS requires at minimum three courses, and some schools may only offer the first three levels of a POS; therefore, the department recommends making revisions to the sequence of courses within this POS. This recommended sequence better targets the core content in the POS, so that students who complete Levels 1-3 will have a more focused, high level understanding of therapeutic medicine.

The department also recommends removing Rehabilitative Therapy from this POS. It is the Level 3 course for Clinical Exercise Physiology. Students interested in physical therapy and/or exercise physiology should follow the Clinical Exercise Physiology POS.

Finally, the department recommends changing the POS name to Therapeutic Services to avoid confusion with Clinical services

The courses in the POS be rearranged as follows:

2017-18 Program of Study	Level 1	Level 2	Level 3	Level 4
Therapeutic Services	Health Science Education (5998)	Anatomy and Physiology ² (3251 or 5991)	Dental Science (6134) -or- Pharmacological Science (6133) -or- Nutrition Science and Diet Therapy ² (6007) -or- Medical Therapeutics (5999) -or- Dual Enrollment Therapeutic Services (4101)	Clinical Internship (5993) -or- Dual Enrollment Therapeutic Services (4101)
			Industry Certification following 6133 AND 5993: Certified Pharmacy Technician	Industry Certification following 5999 AND 5993: Certified Clinical Medical Assistant

An additional recommendation is the revision of the Medical Therapeutics course standards to make the course more supportive of the Clinical Internship that follows. The revision of the standards would provide a more seamless pathway for students who are interested in therapeutic careers.

The department encourages districts to explore a relationship with Tennessee Colleges of Applied Technology's (TCAT) Medical Assisting program to either create dual enrollment or dual credit programs to prepare students to transition into the TCAT Medical Assisting program.

Students who complete this POS may seek employment or postsecondary placement upon graduation. It is recommended that a portfolio be created with work examples from all four courses. Having a robust portfolio will provide students the opportunity to communicate, present, and discuss their work with postsecondary and industry representatives. A list of suggested artifacts will be added to each course.

References

Bureau of Labor Statistics, United States Department of Labor. (2016-17). Occupational Outlook Handbook: Clusters, pathways, and LS: Connecting Career Information. Retrieved from [http://www.bls.gov/careeroutlook/2015/article/career-clusters.htm#Health sciences](http://www.bls.gov/careeroutlook/2015/article/career-clusters.htm#Health%20sciences)

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Clinical Exercise Physiology

2016-17 Program of Study	Level 1	Level 2	Level 3	Level 4
Clinical Exercise Physiology	Health Science Education (5998)	Rehabilitation Careers (5990)	Exercise Science (6170)	Anatomy and Physiology (3251 or 5991) -and/or- Clinical Internship (5993)

Description

Clinical Exercise Physiology is designed to prepare students to pursue careers in kinesiology and exercise physiology services. Upon completion, proficient students will be able to apply concepts of anatomy and physiology, physics, chemistry, bioenergetics, and kinesiology to specific exercise science contexts. Through these connections students will understand the importance that exercise, nutrition, and rehabilitation play in athletes or patients with debilitating or acute metabolic, orthopedic, neurological, psychological, and cardiovascular disorders. In addition, students have the opportunity to incorporate communication, goal setting, and information collection skills in their course work in preparation for future success in the workplace. Students will have the option to participate in a clinical internship at the end of the program.

Clinical exercise physiologists offer medically-supervised exercise programs for several different chronic diseases, the most common treat patients with heart or lung diseases. Although some of these programs are separate (heart and lung diseases), many programs are combined, so it is prudent for a clinical exercise professional to have the ability to prescribe exercise for both cardiac and pulmonary patients. In addition, the number of exercise programs available to treat cancer patients is growing, so this is becoming a potential area of employment for clinical exercise professionals. While people who are overweight or mild-to-moderately obese may obtain sufficient help in fitness facilities designed for apparently healthy individuals, medically-supervised weight-loss programs are available for the severely obese. Also, more and more exercise programs for senior citizens are becoming available in settings ranging from community exercise facilities to nursing homes. While exercise programs for the elderly are not always medically supervised, working with this population still requires the knowledge of clinical conditions and medications typically required in clinical exercise settings.

Clinical exercise positions nearly always require a bachelor’s degree and often require a master’s. Even when a master’s degree is not required for an entry-level position, it usually results in a higher salary and may be very helpful in terms of advancing to a supervisory position. In addition to the coursework mentioned above, clinical exercise professionals need a working knowledge of pathophysiology, medications, and exercise testing and prescription for chronically-diseased individuals.³⁸

Although Clinical Exercise Physiology is a POS focusing on one career, students who complete this POS will be well prepared to enter the workforce as a Physical Therapy Aide or seek other postsecondary programs related to exercise/physical training or physical therapy.

Job Outlook

Employment of exercise physiologists is projected to grow 11 percent from 2014 to 2024, faster than the average for all occupations. Demand may rise as hospitals emphasize exercise and preventive care as part of their treatment and long-term rehabilitation from chronic diseases, such as cardiovascular and pulmonary diseases.³⁹

Figure 1 shows Tennessee data for occupations that may support the exercise physiologist, and **Figure 2** shows physical therapy assistant job distribution in Tennessee, while **Figure 3** displays national data.

Figure 1. Tennessee employment projections for clinical exercise physiology and related occupations with positive openings projected 2014-2022⁴⁰

Occupation	Education Required	Median Salary	2022 Projected Employment	Total 2014 - 2022 Employment Change	Annual Avg. Percent Change
Massage Therapist	Massage Therapy Certificate	\$35,321	2,280	330	1.9%
Physical Therapy Assistant	Associate’s Degree	\$41,640	2,700	470	2.4%
Physical Therapy Aides	High School Diploma	\$22,249	1,470	220	2.1%

³⁸Davis, P. (2015). Careers in Exercise Physiology. *American Kinesiology Association*. Retrieved from <http://www.americankinesiology.org/featured-careers/featured-careers/exercise-physiology>

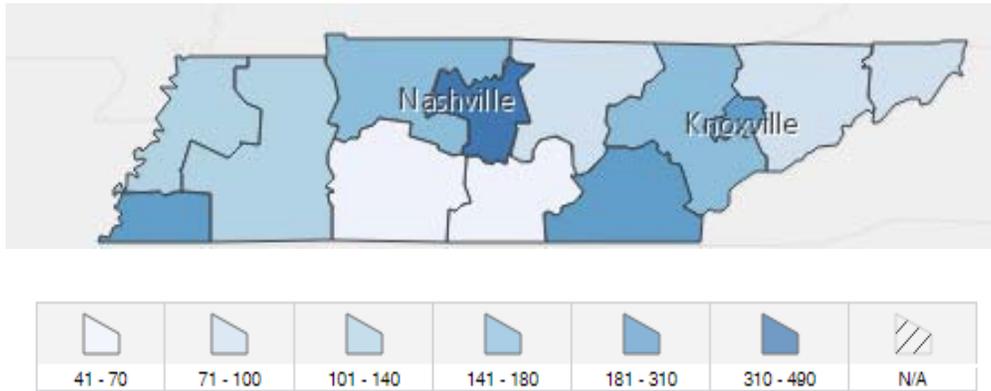
³⁹Bureau of Labor Statistics, U.S. Department of Labor. *Occupational Outlook Handbook, 2016-17 Edition*, Clinical Exercise Physiology. Retrieved from <http://www.bls.gov/ooh/healthcare/exercise-physiologists.htm>

⁴⁰ Tennessee Department of Labor and Workforce Development, Jobs4TN Online. (2016). Occupational Projections on the internet at <https://www.jobs4tn.gov/vosnet/analyzer/results.aspx?session=occproj>

Figure 2. 2014 Estimated employment for Physical Therapy Assistants in Tennessee⁴¹

Occupation	Education Required	Median Salary	Number of Jobs in 2014	Employment Change 2014-2024	Job Outlook 2014-2024
Exercise Physiologist	Bachelor's Degree	\$46,270	14,500	1,500	11% Faster than average

Figure 3. National employment projections for clinical exercise physiology and related occupations with positive openings projected 2014-22⁴²



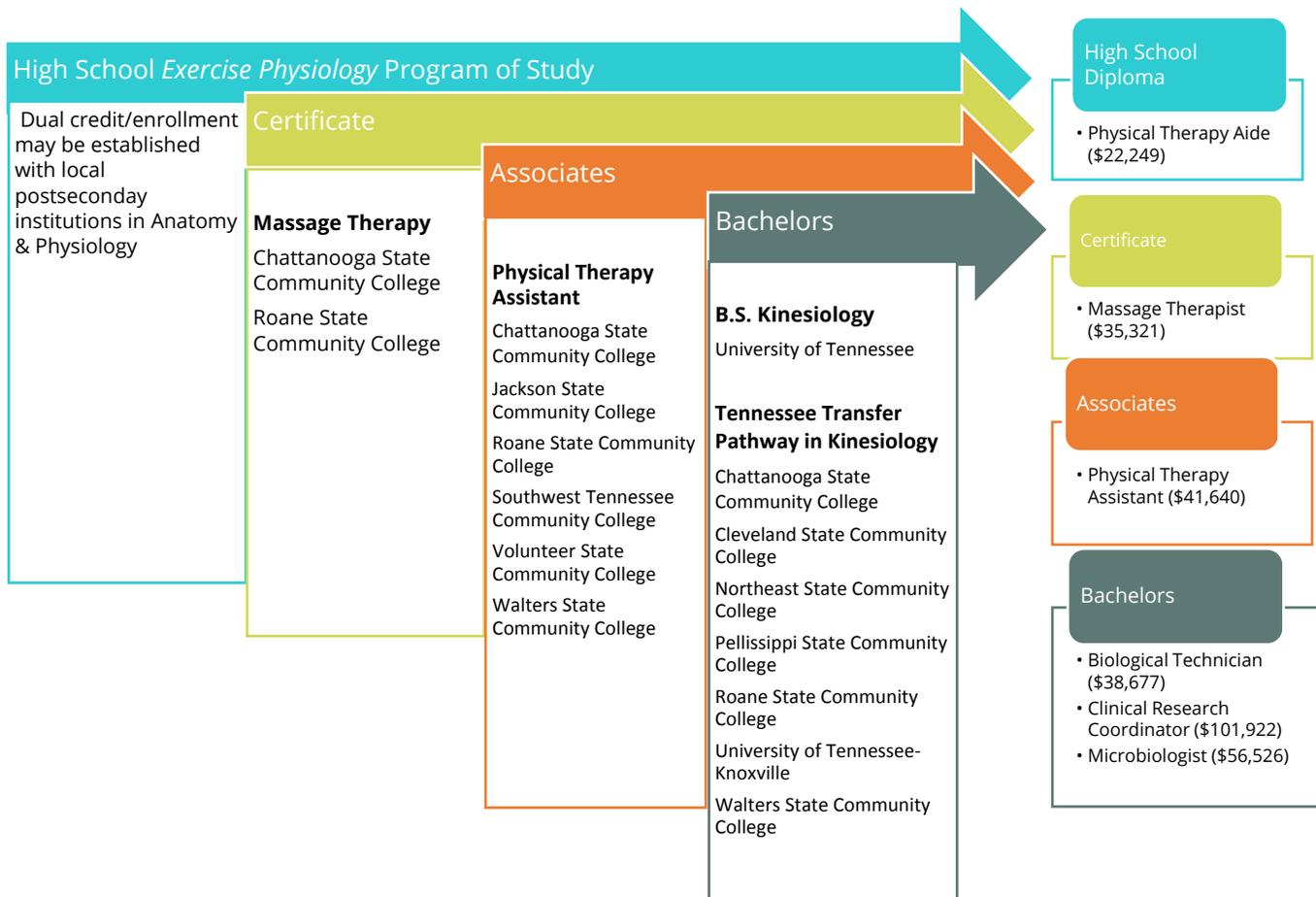
⁴¹ Tennessee Department of Labor and Workforce Development, Jobs4TN Online. (2016). Occupational Projections on the internet at <https://www.jobs4tn.gov/vosnet/analyzer/results.aspx?session=occproj>

⁴² Bureau of Labor Statistics, U.S. Department of Labor. Occupational Outlook Handbook, 2016-17 Edition, Registered Nurses. Retrieved from <http://www.bls.gov/ooh/healthcare/exercise-physiologist.htm>

Postsecondary Opportunities

Upon completion of this POS, students will be prepared to further their training at community colleges and universities in the area of clinical exercise physiology. **Figure 4** outlines the related career opportunities and the training necessary for each. While clinical exercise physiologists require a minimum of a bachelor's degree, physical therapy assistants require an associate's degree, massage therapists require a certification, and physical therapy aides can be trained on the job. The student's portfolio can be used to add credibility to a postsecondary application and would especially helpful should a student choose to enter the workforce upon graduation from high school.

Figure 4. Postsecondary Pathways



Current Secondary Landscape

In the 2015-16 school year, Clinical Exercise Physiology was a new program of study, so enrollment data for the Exercise Science course is unavailable. **Figure 5** shows the open enrollment analysis for 2014-15 and 2015-16 school years along with enrollment figures for the other courses in the Clinical Exercise Physiology POS.

Figure 5. Open enrollment figures for 2014-15

Clinical Exercise Physiology

Student Enrollment 2014-15

Health Science Education	Rehabilitation Careers	Exercise Science	Anatomy & Physiology	Clinical Internship
15703	2693	<u>n.d.</u>	4343	1710

Open Enrollment Analysis 2014-15 to 2015-16

Clinical Exercise Physiology	
2014-15	<u>n.d.</u>
2015-16	13
	<i>Increase</i>

Recommendations

Progression through a POS requires at minimum three courses, and some schools may only offer the first three levels of a POS; therefore, the department recommends changing the sequence of courses. The courses in the Clinical Exercise Physiology POS be rearranged as follows:

2017-18 Program of Study	Level 1	Level 2	Level 3	Level 4
Exercise Physiology	Health Science Education (5998)	Anatomy and Physiology ² (3251 or 5991)	Rehabilitation Careers (5990) -or- Dual Enrollment Exercise Physiology (4102)	Exercise Science (6170) -or- Clinical Internship (5993) -or- Dual Enrollment Exercise Physiology (4102)
				Industry Certification following 6170 AND 5993: Certified Personal Trainer

This sequence better targets the program of study's core content, so that students who complete Levels 1-3 will have a more focused, high level understanding of rehabilitation medicine.

National Exercise Trainers Association (NETA) offers a certification in personal training. The department recommends offering this certification along with the Exercise Science course that has embedded topics that would prepare students to take and pass the Certified Personal Trainer exam.

Students who complete this POS may seek employment or postsecondary placement upon graduation. It is recommended that a portfolio be created with work examples from all four courses. Having a robust portfolio will provide students the opportunity to communicate, present, and discuss their work with postsecondary and industry representatives. A list of suggested artifacts will be added to each course.

Finally, the department recommends changing the name of the POS to Exercise Physiology to avoid confusion with Therapeutic Clinical Services.

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