TENNESSEE DEPARTMENT OF EDUCATION
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Cardiovascular Services

Primary Career Cluster:	Health Science
Consultant:	Sheila Carlton, (615) 532-2839, sheila.carlton@tn.gov
Course Code(s):	TBD
Prerequisite(s):	*Diagnostic Medicine* and *Anatomy and Physiology*
Credit:	1
Grade Level:	11-12
Graduation Requirement Substitution:	None
Programs of Study and Sequence:	This is the fourth course in *Diagnostic Medicine* program of study
Necessary Equipment:	None
Aligned Student Organization(s):	HOSA: http://www.tennesseehosa.org Amanda Hodges, (615) 532-6270, Amanda.Hodges@tn.gov
Coordinating Work-Based Learning:	If the student wishes to qualify to take the Certified Cardiographic Technician (CCT) exam upon graduation from high school, a clinical component is required. The teacher must have completed work-based learning training to offer the students the opportunity for placement in Job Shadowing or Clinical Internship. For more information, please visit http://www.tn.gov/education/cte/wb/.
Available Student Industry Certifications:	Certified Cardiogenic Technician (CCT) after graduation
Dual Credit or Dual Enrollment Opportunities:	There are no known dual credit/dual enrollment opportunities for this course. If interested in developing, reach out to a local postsecondary institution to establish an articulation agreement.
Teacher Endorsement(s):	577
Required Teacher Certifications/Training:	None
Teacher Resources:	http://www.tn.gov/education/cte/HealthScience.shtml

Course Description

The health-related profession of cardiovascular science is concerned specifically with the diagnosis and treatment of patients with cardiac and peripheral vascular disease. *Cardiovascular Services* is the fourth-

level applied course in the *Diagnostic Services* program of study intended to prepare students with an understanding of the roles and responsibilities of those seeking employment in the cardiovascular field of healthcare. Upon completion of this course, students will be proficient in the anatomy and physiology of the heart and knowledgeable about both invasive and non-invasive cardiovascular procedures. Students will incorporate communication, goal setting, and information collection skills to be successful in the workplace. Students who complete a clinical internship in addition to this course will be eligible upon graduation to sit for the Certified Cardiographic Technician (CCT) exam; relevant standards are indicated below with (CCT). Standards in this course are aligned with Common Core English Language Arts & Literacy in Technical Subjects as well as Tennessee Anatomy and Physiology standards.*

Program of Study Application

This is the fourth course in the *Diagnostic Services* program of study. For more information on the benefits and requirements of implementing this program in full, please visit the Health Science website at http://www.tn.gov/education/cte/HealthScience.shtml.

Course Standards

Career Planning

1) Research careers within cardiovascular sciences and explain in a graphic illustration or informational artifact** the educational/credentialing requirements, scope of practice, as well as state and national compliance guidelines required of cardiovascular health care professionals. (TN CCSS Reading 2, 7, 9)

2) Analyze the range of skills, competencies, and professional traits (such as leadership, time management, and ethical responsibility) required for careers in cardiovascular sciences. Using real-time and projected labor market data, identify local and national employment opportunities and determine areas of growth. Complete a job application, resume, and cover letter for one of the jobs located in the search. (TN CCSS Reading 2; TN CCSS Writing 4, 6, 8, 9)

Legalities and Ethical Issues

3) Summarize the Health Insurance Portability and Accountability Act (HIPAA) and explain procedure and guidelines concerning receiving and verifying physician orders, identifying the patient/client, and obtaining patient's consent to perform procedures. Identify the procedures that require written permission and those that require only verbal consent. Role-play these procedures in a classroom and/or clinical setting. Explain, using domain-specific language and accurate definitions of legal concepts, how the content of these legal documents impacts patients' rights for all aspects of care. (TN CCSS Reading 1, 2, 4, 5)

4) Compare and contrast the costs of preventive medical procedures versus diagnostic medical procedures related to the cardiovascular system. Use information found in news media, professional journals, and trade magazines to help determine if preventive procedures would increase or decrease health care cost as it relates to heart health. (TN CCSS Reading 1, 9; TN CCSS Writing 2, 8, 9)

Anatomy and Physiology

5) Outline the gross and cellular structure and function of cardiac, circulatory, pulmonary, and autonomic systems. Include the following areas:
    a. Electrophysiology of the heart, including definitions of waveforms
    b. Control mechanisms and cardiac cycle with normal values (CCT)
    c. Size, location, layers, chambers, valves, pressures, and blood flow of heart (CCT)
    d. Relationship of cardiac output to heart rate and stroke volume (CCT)

    (TN A&P 1, 3, 4)

6) Interpret the pathophysiology related to normal and abnormal heart sounds. Evaluate simulated heart sounds to identify normal heart sounds, murmurs, rubs, and extra heart sounds via a mannequin or digital substitute. (TN CCSS Reading 3; TN A&P 1, 3, 4)

7) Choose a disease, disorder, or emergency situation related to the cardiac, circulatory, pulmonary, or autonomic systems drawn from news media, textbooks, professional journals, or trade magazines. Develop an oral or visual presentation interpreting the scope of the disease/disorder/emergency, basic pathophysiology, affected populations, pharmacological interventions, signs and symptoms, risk factors, existing practices that target the disease/disorder, and interventions available. (TN CCSS Reading 1, 2; TN CCSS Writing 2, 8, 9; TN A&P 1, 3, 4)

8) Formulate a written and digital health education project to inform an adult and/or geriatric audience about the negative effects of complications such as electrolyte imbalance, obesity, hypertension, diabetes, or renal impairment on the heart and circulatory systems. (TN CCSS Reading 2; TN CCSS Writing 6, 8)

Diagnostics and Procedures

9) Perform the following duties and tasks related to pre-procedural activity: (CCT)
    a. Perform universal precautions (e.g., hand washing, Personal Protective Equipment)
    b. Transport the patient
    c. Prepare the patient (shaving, cleaning skin, etc., should be simulated on mannequin)
    d. Collect patient information
    e. Enter information into Electrocardiogram (ECG) machine
    f. Identify proper landmarks on mannequin
    g. Maintain patient safety throughout the pre-procedural process.

    (TN CCSS Reading 3)

10) Differentiate between bipolar, unipolar, and precordial leads. Relate their importance in performing an ECG test correctly. Include the concept of Einthoven's Triangle in the explanation. (TN CCSS Reading 1, 2, 3, 5)

11) Compare and contrast the single- and three-channel ECG machines. Demonstrate the ability to define the purpose of the equipment, and explain indications for use, expected outcomes, advantages, disadvantages, and limitations of each. (TN CCSS Reading 1, 2, 3, 5)

12) Summarize the history of the ECG machine including aspects of industry standardization and advances in technology. Use a timeline or other graphic to illustrate the major developments. (TN CCSS Reading 2, 7; TN CCSS Writing 6, 8)

13) Understand principles of and successfully perform skills related to performing a resting ECG (12 lead, 15 lead, etc.), incorporating rubrics from textbooks or clinical standards of practice for the following: (CCT)
    a. Gather supplies and equipment
    b. Educate patient on procedure expectations
    c. Apply electrodes and leads to patient
    d. Confirm equipment
    e. Perform standard ECG

    (TN CCSS Reading 1, 3, 5)

14) Obtain ECG tracing strips and perform rhythm analysis, including the following: (CCT)
    a. Analyze ECG tracing for presence of P, Q, R, S, and T waves, heart rate calculation, and axis determination and implications.
    b. Identify ECG tracings indicative of sinus, junctional, atrial, ventricular, atriaventricular, hypertrophy, chamber enlargement, and pacemaker rhythms. Include intraventricular conduction and myocardial perfusion tracings.
    c. Identify electrical interference and somatic tremor on an ECG tracing, as well as the steps to take to alleviate or prevent such artifacts.
    d. Correlate ECG finding (wavelengths, segments, intervals, etc.) with cardiac function.
    e. Correlate ECG morphology with anatomy and physiology.

    (TN CCSS Reading 1, 3, 5, 7)

15) Role-play explanation of the cardiovascular reflex test in a mock clinical setting. Discuss at minimum the following: overview or explanation of the test, the associated risks, patient expectations before, during, and after the test, and next steps for abnormal results. (TN CCSS Reading 1, 2)

16) Summarize in a written, oral, or digital presentation the scope of a typical electrocardiograph test. Draw evidence from textbooks, professional journals, and online healthcare sites (such as Cleveland Clinic, MedLine Plus, and Mayo Clinic) to produce an overview or explanation of the test, the associated risks, and patient expectations before, during, and after testing. (TN CCSS Reading 1, 2; TN CCSS Writing 2, 4, 6, 8, 9)

17) Construct a chart or a graph that differentiates between the various types of nuclear imaging and the radiographic cardiovascular test. Include within this graph or chart an overview or explanation of the test, the mechanics of the procedure, the associated risks, and patient expectations before, during and after testing. Obtain information from textbooks, professional journals, and online healthcare sites (such as Cleveland Clinic, MedLine Plus, and Mayo Clinic). (TN CCSS Reading 1, 2; TN CCSS Writing 2, 4, 6, 8, 9)

18) Research the types of invasive diagnostic procedures. Examples might include cardiac catherization, carotid angiography, electrophysiological studies, intravascular ultrasound, or myocardial biopsy. Develop a patient education packet utilizing medical and non-medical terminology, including the following information: overview or explanation of the procedure, the

associated risks, patient expectations before, during, and after the test, and next steps for abnormal results. (TN CCSS Reading 1, 2; TN CCSS Writing 2, 4, 6, 7, 8, 9)

19) Differentiate between the various types of cardiovascular ultrasound procedures. Discuss what an ultrasound can identify that other procedures might not, in addition to the risk considerations, reliability of results, and proper interpretation of an ultrasound image. Role-play teaching another classmate about the type of procedure that has been ordered by the physician. (TN CCSS Reading 1, 2; TN CCSS Writing 2, 4, 6, 8, 9)

Invasive Treatment Procedures

20) Research treatments involving cardiac, vascular, and thoracic surgery for cardiovascular and pulmonary diseases and/or disorders. Analyze in written, oral, or digital format the implications for each, identifying trends and/or advances in available treatments over the past fifty years. (TN CCSS Reading 1, 2, 4; TN CCSS Writing 2, 6, 8, 9)

21) Identify characteristics and/or signs and symptoms of patients experiencing cardiac complications in physician offices or emergency rooms. Create a plan of action for assessment, diagnosis, and treatment of the patient. (TN CCSS Reading 1, 3; TN CCSS Writing 2, 8, 9)

Health Statistics

22) The Centers for Disease Control (CDC) suggests that the number one leading cause of deaths in the United States is heart disease, according to 2012 data. Complete a short research project to identify on the local level the 1) incidence of heart disease and disorders, 2) number of associated deaths, 3) preventive measures currently being taken, and 4) available educational programs and initiatives. Document findings in an oral, digital, or visual presentation. Information can be found from organizations such as the CDC, state and county health department websites, and interviews with public health and emergency professionals. (TN CCSS Reading 1, 2, 7; TN CCSS Writing 2, 6, 7)

23) Research the Healthy People Initiative sponsored by the U.S. Food and Drug Administration (FDA). Identify the goals and objectives, established baselines, and strategies to facilitate progress toward the initiative's goals. Then, develop a marketing campaign to inform a variety of audiences about the initiative. The campaign can include a public service announcement, community awareness project, health education project, and/or public health education project shared with local schools, leaders in the community, and the general public. (TN CCSS Reading 1, 2, 7, 9; TN CCSS Writing 2, 6, 8, 9)

Standards Alignment Notes

*References to other standards include:

- TN CCSS Reading: Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects; Reading Standards for Literacy in Science and Technical Subjects 6-12; Grades 11-12 Students (page 62).
    - Note: While not directly aligned to one specific standard, students who are engaging in activities outlined above should be able to also demonstrate fluency in Standard 10 at the conclusion of the course. Teachers are encouraged to develop extension activities to cover standards 6 and 8.
- TN CCSS Writing: Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects; Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects 6-12; Grades 11-12 Students (pages 64-66).
    - Note: While not directly aligned to one specific standard, students who are engaging in activities outlined above should be able to also demonstrate fluency in Standards 3, 5 and 10 at the conclusion of the course. Teachers are encouraged to develop extension activities to cover standard 1.
- Tennessee Science: Anatomy and Physiology

Additional Notes

**Informational artifacts include but are not limited to brochures, posters, fact sheets, narratives, essays, and presentations. Graphic illustrations include but are not limited to charts, rubrics, drawings, and models.

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Dental Science

Primary Career Cluster:	Health Science
Consultant:	Sheila Carlton, (615) 532-2839, Sheila.Carlton@tn.gov
Course Code(s):	TBD
Prerequisite(s):	*Health Science Education*
Credit:	1
Grade Level:	11-12
Graduation Requirement Substitution:	None
Programs of Study and Sequence:	This is the third course in the *Therapeutic Clinical Services* program of study.
Necessary Equipment:	See equipment list available online at http://www.tn.gov/education /cte/HealthScience.shtml
Aligned Student Organization(s):	HOSA: http://www.tennesseehosa.org Amanda Hodges, (615) 532-6270, Amanda.Hodges@tn.gov
Coordinating Work-Based Learning:	If a teacher has completed work-based learning training, he or she can offer placement in Job Shadowing or Clinical Internship. For more information, visit http://www.tn.gov/education/cte/wb/.
Available Student Industry Certifications:	None
Dual Credit or Dual Enrollment Opportunities:	There are no known dual credit/dual enrollment opportunities for this course. If interested in developing, reach out to a local postsecondary institution to establish an articulation agreement.
Teacher Endorsement(s):	577
Required Teacher Certifications/Training:	None
Teacher Resources:	http://www.tn.gov/education/cte/HealthScience.shtml

Course Description

Dental Science is an applied course in the *Therapeutic Clinical Services* program of study intended to prepare students with an understanding of the roles and responsibilities of the dental health care professional within the application of dental care. Upon completion of this course, students will be able to differentiate the many careers in dentistry, assess, monitor, evaluate, and report on the dental health of patients/clients and relate this information to overall health, apply appropriate dental terminology,

and perform clinical supportive skills. Proficient students will incorporate communication, goal setting, and critical thinking skills to be successful in the workplace. In addition, students will continue to build a health science career portfolio that will follow them throughout their chosen program of study. Standards in this course are aligned with Tennessee Common Core State Standards for English Language Arts & Literacy in Technical Subjects, as well as Tennessee Anatomy and Physiology standards.*

Program of Study Application

This is the third applied course in the Therapeutic Clinical Services program of study. For more information on the benefits and requirements of implementing this program in full, visit the Health Science website at http://www.tn.gov/education/cte/HealthScience.shtml.

Course Standards

Careers in Dental Science

1) Gather relevant information from textbooks and online searches concerning the history of dentistry, with emphasis on changes in care and prevention. Develop a visual, oral, and/or written presentation of the information that includes graphs, technology, and supporting evidence. (TN CCSS Reading 2, 7; TN CCSS Writing 6, 8)

2) Research careers within the dental sciences and explain in a graphic illustration or informational artifact** the educational/credentialing requirements, as well as state and national compliance guidelines required of health care professionals. Include other branches of dentistry such as Orthodontics and Forensic Odontology. (TN CCSS Writing 2, 7, 8, 9)

3) Analyze the range of skills, competencies, and professional traits (such as leadership, time management, and ethical responsibility) required for careers in dental sciences. Using real-time and projected labor market data, identify local and national employment opportunities and determine areas of growth. Complete a job application, resume, and cover letter for one of the jobs located in the search. (TN CCSS Reading 2, 7; TN CCSS Writing 4, 6, 8, 9)

Legalities and Ethical Issues

4) Choose an ethical issue affecting dental health professionals, such as leaving fluoride out of drinking water, the practice of dental tourism, or the affordability of dental care among vulnerable populations like the elderly. Craft arguments focused on the issue, including the development of claim(s) and counterclaim(s) justified with data and evidence. Discuss how this issue will affect or has affected the dental community. (TN CCSS Reading 1, 2, 6; TN CCSS Writing 1, 4, 9)

5) Examine the legal responsibilities of dental professionals when treating patients/clients with diseases or disorders related to infections transmitted sexually or through drug use, domestic violence, neglect, and child abuse. Construct an informational article intended to raise awareness among dental professionals. Incorporate the correct dental terminology. (TN CCSS Reading 1, 2; TN CCSS Writing 2, 9)

6) Compare and contrast the dental care and prevention customs and cultural beliefs of various populations. Examples might include soaking a cotton ball in turpentine for tooth pain relief or using bleach to whiten teeth. Develop an informative paper intended to reconcile such beliefs with advances in dental science. (TN CCSS Reading 1, 2, 9; TN CCSS Writing 2, 9)

7) Compare and contrast the average cost of private dental insurance plans versus government-issued plans. Analyze the cost for both pediatric and adult patients for treatments such as a routine dental visit, a visit that requires fillings, and a visit that requires tooth extraction. Role-play therapeutic communication utilizing correct dental terminology to explain the cost with a classmate and/or family member. (TN CCSS Reading 1, 2, 9; TN CCSS Writing 2, 9)

Anatomy and Physiology

8) Outline the gross and cellular structure and function of head and neck anatomy, including bones, muscles, sinuses, salivary glands, nerves, and blood vessels. (TN CCSS Reading 2; TN A&P 1, 3, 6)

9) Choose a research topic related to embryonic development of the head, oral cavity, and teeth. Gather relevant information from print and digital medical and/or dental resources such as the American Journal of Dentistry. Complete a short research project, including editing work after peer-review, culminating in a scientific report that examines the environmental and genetic factors affecting embryonic development, using dental and medical terminology. (TN CCSS Reading 1, 5; TN CCSS Writing 2, 5, 7, 8)

10) Formulate a written and digital health education project to inform an audience about the parts and functions of teeth. Include the effects of nutrition on tooth development and continuous good health and dental prevention care. (TN CCSS Writing 2, 6)

11) Determine the meaning of the universal dental numbering system's name; then, number the teeth located in the human dentition on a model or chart. Explain the difference in each of the numbering systems as presented in text by paraphrasing them in simpler yet accurate terms. (TN CCSS Reading 2)

12) Choose a dental health disease or disorder. Examples might include dental caries in babies who drink juices from a bottle or oral cancer in smokeless tobacco users. Develop a professional report discussing the scope of the disease/disorder, affected and vulnerable populations, local incidence information as compared to state, region, and national data, existing practices that target the disease/disorder, and interventions available. (TN CCSS Reading 1, 2, 7, 8 9; TN CCSS Writing 2, 8, 9)

Microbiology, Infection Control, and Disease Prevention

13) Define the terms pathogenic and non-pathogenic microorganisms, and explain how each can cause a disease or disorder. Outline modes of transmission and prevention of the spread of these organisms. (TN CCSS Reading 2, 4; TN CCSS Writing 4)

14) Investigate oral manifestations related to pathogenic and non-pathogenic organisms. Develop an informational text to share with other health care professionals that outlines concepts of

disinfection, OSHA standards, and use of Personal Protective Equipment (PPE) to prevent spreading of disease to dental staff. (TN CCSS Reading 1, 4; TN CCSS Writing 2, 9)

15) Differentiate among toxic, corrosive, ignitable, and reactive hazardous wastes in dental facilities. Discuss the role of the Material Safety Data Sheets (MSDS) in identifying hazards associated with specific chemicals or chemical compounds by evaluating MSDS information. Develop a chart describing the characteristics of the most common chemicals and compounds found in the dental office. (TN CCSS Reading 1, 4; TN CCSS Writing 2, 9)

Dental Examinations

16) Understand principles of and successfully perform skills related to Dental Assisting, incorporating rubrics from textbooks or clinical standards of practice for the following:
    a. Operatory preparation for treatment and receiving of the patient
    b. Positioning of the patient and the clinician
    c. Radiographic process and patient/operator protection
    d. Oral prophylaxis

    (TN CCSS Reading 3, 4)

17) Identify basic dental office instrumentation and explain the purpose of each item. Role-play a scenario based in a dental office that uses at least five instruments accurately, including patient assessment, procedure for operatory preparation of the patient room, receiving and seating the patient, and providing at least one treatment.

18) Develop a patient health education plan including preventive measures, signs and symptoms of exacerbation of disease/disorder/injury, pharmacological needs, and support systems. Cite at least three medical or dental resources. (TN CCSS Reading 1; TN CCSS Writing 4, 9)

19) Summarize the signs and symptoms of impending or developing dental emergencies, citing environmental, medical, and hygienic factors that may contribute to the condition. Develop an office emergency policy and procedure that outlines the responsibilities and actions of each healthcare worker. (TN CCSS Reading 1, 2, 4; TN CCSS Writing 4, 9)

20) Complete training in American Heart Association or American Red Cross adult and child Cardiopulmonary Resuscitation (CRP). Students should be certified in either Heartsaver or BLS for Healthcare Provider CPR prior to clinical rotation. (TN CCSS Reading 3, 4)

Dental Procedures and Specialties

21) Follow medical procedures precisely when performing patient/client skills in a classroom or clinical setting related to the role of the Dental Assistant, including:
    a. Complete health/dental history
    b. Perform vital signs
    c. Coronal polishing
    d. Fluoride treatment
    e. Preparation of restorative materials
    f. Preparing and alginate impression
    g. Cleaning and sterilizing equipment

h. Patient and/or community education on oral health
i. Document findings and procedure in a recognized format for a dental facility using correct dental terminology

(TN CCSS Reading 3; TN CCSS Writing 4)

22) Incorporate medical/dental language in the development of a detailed dental treatment plan for a case study or live patient, describing goals and objectives, medications, and/or alternative treatment and coping mechanisms, and incorporating applicable assessment information following interview/assessment of a patient or family member. (TN CCSS Reading 9; TN CCSS Writing 2, 9)

23) Research emerging dental technologies related to dental and oral health, including but not limited to procedures, equipment, and diagnostics tools. Synthesize information into a coherent understanding and develop a written or verbal presentation. Draw evidence from informational text to support research. (TN CCSS Reading 9; TN CCSS Writing 6, 8, 9)

24) Research a dental specialty procedure (such as oral surgery, prosthetic dentistry, or gingivoplasty), then develop a written or verbal explanation of the procedure using correct dental terminology. Include at minimum the purpose of the procedure, average cost, documented benefits and potential side effects, and profile of the dental professional that performs the procedure. (TN CCSS Reading 1,2; TN CCSS Writing 2, 8, 9)

Standards Alignment Notes

*References to other standards include:

- TN CCSS Reading: Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects; Reading Standards for Literacy in Science and Technical Subjects 6-12; Grades 11-12 Students (page 62).
    - Note: While not directly aligned to one specific standard, students who are engaging in activities outlined above should be able to also demonstrate fluency in Standard 10 at the conclusion of the course.
- TN CCSS Writing: Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects; Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects 6-12; Grades 11-12 Students (pages 64-66).
    - Note: While not directly aligned to one specific standard, students who are engaging in activities outlined above should be able to also demonstrate fluency in Standards 3, 5 and 10 at the conclusion of the course.
- TN A&P: Tennessee Science Anatomy and Physiology: Standards 1, 3, and 6

Additional Notes

**Informational artifacts include, but are not limited to, brochures, posters, fact sheets, narratives, essays, and presentations. Graphic illustrations include, but are not limited to, charts, graphs, rubrics, drawings, and images.

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Global Health and Epidemiology

Primary Career Cluster:	Health Science
Consultant:	Sheila Carlton, (615) 532-2839, Sheila.Carlton@tn.gov
Course Code:	TBD
Prerequisite(s):	*Behavioral and Community Health*
Credit:	1
Grade Level:	11-12
Graduation Requirement Substitution:	None
Programs of Study and Sequence:	This is the third course in the *Public Health* program of study. *Health Science Education* may be used as an optional foundational course. In that case, this will be the fourth course in the program of study.
Necessary Equipment:	None
Aligned Student Organization(s):	HOSA: http://www.tennesseehosa.org Amanda Hodges, (615) 532-6270, Amanda.Hodges@tn.gov
Coordinating Work-Based Learning:	If a teacher has completed work-based learning training, he or she can offer placement in Job Shadowing or Clinical Internship. For more information, please visit http://www.tn.gov/education/cte/wb/.
Available Student Industry Certifications:	None
Dual Credit or Dual Enrollment Opportunities:	There are no known dual credit/dual enrollment opportunities for this course. If interested in developing, reach out to a local postsecondary institution to establish an articulation agreement.
Teacher Endorsement(s):	577, 722
Required Teacher Certifications/Training:	None
Teacher Resources:	http://www.tn.gov/education/cte/HealthScience.shtml

Course Description

Epidemiology and Global Health is a comprehensive applied course in the Public Health program of study that places students at the intersection of health science and health policy. This course 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, students will be able to interpret and

communicate statistical information relating to the distribution of disease and mortality/morbidity in the United States and globally, determine national and international health disparities, analyze national and international health policies, and evaluate outcomes from a range of health interventions. Standards in this course are aligned with Tennessee Common Core State Standards for English Language Arts & Literacy in Technical Subjects, Tennessee Common Core State Standards in Mathematics, and Tennessee state standards in Anatomy and Physiology.*

Program of Study Application

This is the third course in the *Public Health* program of study. For more information on the benefits and requirements of implementing this program in full, please visit the Health Science website at http://www.tn.gov/education/cte/HealthScience.shtml.

Course Standards

Introduction to Epidemiology and Global Health

1) Define epidemiology and global health, discussing in detail why these fields should be studied, the principles and goals of each, and the concept of health citizenship in the context of disease prevention and health management. Determine the differences between field, clinical, and chronic epidemiology. (TN CCSS Reading 4, 9)

2) Research the various agencies and organizations, including transnational and non-governmental organizations (NGOs), involved in the study of global health and epidemiology.** Examine their roles as they relate to policymaking, research, program implementation, and/or monitoring and evaluation work. Organize the information into a visual, oral, and/or written presentation, citing examples of these actors' impact on global health initiatives drawn from reports, legislation, press releases, or other public documents. (TN CCSS Reading 1, 5, 7; TN CCSS Writing 4, 6, 8, 9)

3) Investigate careers within the fields of epidemiology and global health. Outline the educational requirements for each career as well as state and national guidelines governing practicing professionals (such as licensing, certifications, training, and compliance). Create and maintain a document detailing potential training programs, schools, and examinations suitable for obtaining required credentials for a specific occupation. (TN CCSS Writing 2, 7, 8, 9)

4) Research and summarize the range of skills, competencies, and professional traits required for careers in the epidemiology and global health fields. Compare findings to current individual strengths and identify opportunities for personal development. Translate real-time and projected labor market data into narratives to identify local and national employment opportunities and determine areas of growth within epidemiology and global health fields. (TN CCSS Reading 2, 7; TN CCSS Writing 4, 8, 9)

5) Gather relevant information from professional journals, news media, and trade magazines (in both print and digital formats) concerning the history of global health and epidemiology. Develop a visual, oral, and/or written presentation describing notable historical figures and pioneers who have made significant contributions in disease recognition, treatment, and prevention. (TN CCSS Reading 1, 7, 9; TN CCSS Writing 4, 6, 8, 9)

6) Define the terms endemic, epidemic, and pandemic. Analyze the factors involved in the spread of disease, such as the increase in world travel among socially mobile populations. Research global initiatives currently in place to prevent the spread of diseases/disorders such as influenza, Pertussis, or HIV/AIDS. (TN CCSS Reading 4, 9)

Biostatistics

7) Public health surveillance is a mechanism that public health agencies use to monitor the health of communities. Describe the types of data commonly collected by global health organizations and government agencies, including the key parameters (i.e., fertility, life expectancy, infant mortality rates) most often reported in the analysis of public health. Demonstrate the ability to interpret and communicate results from public health surveillance analyses, applying basic statistical concepts such as measurements of central tendency (mean, median, mode), measurements of spread (range, variance, standard deviation), and changes over time. (TN CCSS Reading 1, 2, 4, 8, 9; TN CCSS Writing 2, 4, 9; TN CCSS Mathematics S-ID)

8) Relate how biostatistical data is used to identify global health priorities, disparities, and epidemiological transitions, and discuss how advances in public health surveillance have changed the delivery of key healthcare services (such as the need for family planning, vaccinations, or disease treatment). Furnish examples of data-driven policy changes informed by the collection and analysis of health surveillance data. For example, examine a case study of how the World Health Organization responded to the global SARS outbreak of 2004. (TN CCSS Reading 1, 2, 9; TN CCSS Writing 2, 9)

9) Compare and contrast the average cost of healthcare in the United States with that of other countries, according to indices compiled by the Organization for Economic Cooperation and Development (OECD). Drawing on a range of public health surveillance data, examine the correlations between average cost and key parameters such as government involvement, availability of insurance, per capita spending, hospital admission rates for chronic diseases, and mortality rates for cervical and colorectal cancer, for example. (TN CCSS Reading 1, 4, 7, 9; TN CCSS Writing 4, 7, 8, 9; TN CCSS Mathematics N-Q, S-ID, S-IC)

10) Citing research, news media, and scholarly commentary, discuss the factors that may contribute to the relationship between the cost of care and health of communities. (TN CCSS Reading 1, 2, 7, 9; TN CCSS Writing 4, 7, 8, 9; TN CCSS Mathematics N-Q, S-ID, S-IC)

11) Differentiate between descriptive epidemiology and analytical epidemiology research designs, and demonstrate the ability to recognize different methodological approaches as applied to a range of public health studies/reports. Explain the information gathered in each type of study and how that information is important when planning changes in healthcare. (TN CCSS Reading 1, 2, 5, 8; TN CCSS Writing 4, 8, 9)

Disease Causation and Control

12) Choose a communicable or non-communicable disease or disorder prevalent in the United States. Using the Centers for Disease Control and Prevention (CDC) Vital and Health Statistics report, describe the occurrence or frequency of the disease across various demographic categories such as sex, age, race/ethnicity, educational attainment, family income, poverty level,

health insurance coverage, marital status, and place of residence. Compare findings with data from a country with a similar prevalence of the disease. For example, examine the prevalence of heart disease in the United States as compared to Ireland. Compile the information into an electronic presentation. Support the interpretation of findings with graphical depictions of the data gathered. (TN CCSS Reading 1, 5, 7; TN CCSS Writing 4, 6, 8, 9)

13) An important aspect of the study of epidemiology is to identify factors that place certain populations at a higher risk for developing diseases and disorders. Compare and contrast the two primary models of disease causation: the epidemiologic triad and Rothman's causal pies. Debate the pros and cons of each in a written, oral, or electronic format. (TN CCSS Reading 2, 4, 5; TN CCSS Writing 1, 4)

14) Assess the impact that environmental factors, such as natural and unnatural disasters, can have on a range of global health issues. Discuss the implications for disease prevention, containment, and control when environmental conditions are considered. (TN CCSS Reading 2, 9; TN CCSS Writing 8, 9)

15) Examine the epidemiology, mortality, morbidity, genetic, and/or biological basis of at least one of the diseases or disorders in each of the areas listed below. Compare the prevalence of the disease/disorder across a variety of populations and countries. Drawing on skills learned in biostatistical analysis, determine the factors that contribute to higher or lower prevalence in a given population or country.
    a. Infectious Diseases
    b. HIV/AIDS
    c. Neurodevelopment disabilities
    d. Cancer
    e. Cardiovascular Disease
    f. Diabetes
    g. Dementia

    (TN CCSS Reading 1, 2, 3, 7, 8, 9; TN CCSS Writing 7, 9; TN CCSS Mathematics S-ID, S-IC, S-CP)

16) Compare and contrast the health challenges characteristic of urban and rural settings. Analyze factors such as disease management, social and behavioral interventions, nutrition, service disparities, and availability of preventive measures like screenings. Debate the key challenges to the provision of services across a variety of global settings. (TN CCSS Reading 1, 2, 9; TN CCSS Writing 9)

17) Investigate the causes of child/infant mortality within the first five years of life worldwide. Identify effective interventions for prevention of infant and childhood disorders, supporting recommendations with evidence-based medical or public health practice standards retrieved from the kinds of sources described in this course. (TN CCSS Reading 1, 2, 9; TN CCSS Writing 4, 7, 8, 9)

18) Explain the 10 steps of an outbreak investigation. As part of a group project, analyze a mock scenario in which the CDC has been called to investigate the outbreak of a foodborne, airborne, windborne, or waterborne disease in the United States or abroad. Determine the scope of the outbreak, identify the specific populations affected or endangered by it, and assign roles and responsibilities to contain and/or eradicate the disease. Drawing on resources used in this

course, make recommendations based on hypothetical findings, protocols, and policies.*** (TN CCSS Reading 2, 4, 7, 9; TN CCSS Writing 2, 4, 7, 8, 9; TN CCSS Mathematics S-ID)

Health Policy

19) Research and summarize current policies related to global health in the areas of disease prevention, treatment and control, and educational campaigns. For each of these areas, examine the involvement of relevant national and transnational actors identified in standard 2. Construct an informational or explanatory essay that describes major historical events associated with current policies, evaluates the roles of the actors involved, and interprets public opinion and industry commentary on the impact of the policies to date. (TN CCSS Reading 1, 2; TN CCSS Writing 2, 8)

20) Synthesize the standards of practice concerning health and human rights in the Universal Declaration of Human Rights and the Constitution of the World Health Organization. Compare and contrast the documents for principles related to health, human rights, and humanitarian aid. Examine case studies where human rights and public health are intertwined, such as the refugee crisis caused by the civil war in Syria dating from 2011. (TN CCSS Reading 2, 5, 9; TN CCSS Writing 9)

21) Research advocacy strategies used to support global health initiatives. Identify the major decision-makers and stakeholders involved in the promotion and implementation of health policies, ranging from the provision of maternal care in under-resourced areas to the administration of humanitarian aid in regions of armed conflict. Discuss the political and transnational process around implementing quality health policies for populations in need. (TN CCSS Reading 2, 5, 6, 9; TN CCSS Writing 9)

22) Drawing on material learned in this course, conduct a needs assessment for a target population affected by a health issue such as diabetes, cancer, HIV/AIDS, or other disease/disorder. Retrieve relevant health surveillance data related to the prevalence of the disease/disorder and the environmental and genetic factors that contribute to the problem. Synthesize research on existing policies, programs, and initiatives currently or formerly in place to alleviate the problem, and compile the results of the needs assessment into a written report supported by graphical and statistical aids. (TN CCSS Reading 1, 2, 3, 7, 8, 9; TN CCSS Writing 2, 4, 7, 8, 9; TN CCSS Mathematics S-ID, S-IC, S-CP)

23) Building off the needs assessment conducted in standard 21, create a plan to address the needs of the target population. Consider a range of potential policy solutions, weighing the costs and benefits of each, including the obstacles to implementation. Then advance a recommendation for one of the solutions, outlining a strategy to engage the appropriate agencies, decision-makers, and other stakeholders. (TN CCSS Reading 7, 9; TN CCSS Writing 1, 4, 7, 8, 9)

Standards Alignment Notes

*References to other standards include:

- TN CCSS Reading: Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects; Reading Standards for Literacy in Science and Technical Subjects 6-12; Grades 11-12 Students (page 62).
    - Note: While not directly aligned to one specific standard, students who are engaging in activities outlined above should be able to also demonstrate fluency in Standard 10 at the conclusion of the course.
- TN CCSS Writing: Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects; Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects 6-12; Grades 11-12 Students (pages 64-66).
    - Note: While not directly aligned to one specific standard, students who are engaging in activities outlined above should be able to also demonstrate fluency in Standards 3, 5 and 10 at the conclusion of the course.
- TN CCSS Math: Tennessee Common Core State Standards for Mathematics; Math Standards for High School: Statistics and Probability, Modeling (pages 58-83).
    - Note: The standards in this course are not meant to teach mathematical concepts. However, the concepts referenced above may provide teachers with opportunities to collaborate with mathematics educators to design project based activities or collaborate on lesson planning. Students who are engaging in activities listed above should be able to demonstrate statistical reasoning as applied to specific technical concepts. In addition students will have the opportunity to practice the habits of mind as described in the eight Standards for Mathematical Practice.
- Tennessee Science: Anatomy and Physiology:
    - Note: While not directly aligned to one specific standard, students who are engaging in activities outlined above should be able to also demonstrate fluency in TN Anatomy and Physiology 6.

Additional Notes

**Major agencies and organizations include, but are not limited to: the World Health Organization (WHO), the United Nations, the Pan American Health Organization (PAHO) and the International Committee of the Red Cross (ICRC).

***Resources suggested for the mock outbreak project include:

- CDC Outbreak Investigation Overview for Vessel Sanitation Program: http://www.cdc.gov/nceh/vsp/surv/investigationoverview.htm
- CDC Current Outbreak List: http://www.cdc.gov/outbreaks/
- Epidemiological Investigation of Outbreaks: http://www.gov.mb.ca/health/publichealth/cdc/protocol/investigation.pdf

Health Information Technology

Primary Career Cluster:	Health Science
Consultant:	Sheila Carlton, (615) 532-2839, Sheila.Carlton@tn.gov
Course Code:	5997
Prerequisite(s):	*Health Science Education* and *Medical Terminology*
Credit:	1
Grade Level:	11-12
Graduation Requirement Substitution:	None
Programs of Study and Sequence:	This is the third course in the *Health Informatics* program of study.
Necessary Equipment:	Refer to the teacher resources page below.
Aligned Student Organization(s):	HOSA: http://www.tennesseehosa.org Amanda Hodges, (615) 532-6270, Amanda.Hodges@tn.gov
Coordinating Work-Based Learning:	If a teacher has completed work-based learning training, he or she can offer placement in Job Shadowing or Clinical Internship. http://www.tn.gov/education/cte/wb/
Available Student Industry Certifications:	None
Dual Credit or Dual Enrollment Opportunities:	Statewide Dual Credit: Health Information Technology
Teacher Endorsement(s):	577, 721, 722
Required Teacher Certifications/Training:	None
Teacher Resources:	http://www.tn.gov/education/cte/HealthScience.shtml

Course Description

Health Information Technology is a third-level applied course in the Health Informatics program of study intended to prepare students with an understanding of the changing world of health care information. With the inclusion of 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, 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. Standards in this course are aligned with Tennessee Common Core State Standards for English Language Arts & Literacy in Technical Subjects and Tennessee Common Core State Standards in Mathematics.*

Program of Study Application

This is the applied third course in the *Health Informatics* program of study. For more information on the benefits and requirements of implementing this program in full, please visit the Health Science website at http://www.tn.gov/education/cte/HealthScience.shtml.

Course Standards

Careers

1) Define the broad field of informatics and discuss its increasing importance in health care. Compare and contrast the types of healthcare informatics, such as medical, clinical, biomedical, nursing, public health, and information science. Identify the impact each of these areas of informatics has had on its corresponding sector of healthcare. (TN CCSS Reading 2, 7; TN CCSS Writing 4, 6, 8, 9)

2) Research careers within the healthcare informatics, health information management, and health information technology fields, and document educational requirements as well as state and national guidelines governing practicing professionals (such as licensing, certifications, training, and compliance). Using real-time and projected labor market data, identify local and national employment opportunities and determine areas of growth. Complete a job application, resume, and cover letter for one of the jobs located in the search. (TN CCSS Writing 2, 7, 8, 9)

3) Compare and contrast the history of health informatics with projected developments and innovations expected in the future. Discuss in an oral, digital, or written presentation the relationship between major issues in healthcare and the changes in health information technology. (TN CCSS Reading 2, 8; TN CCSS Writing 4, 6)

4) Analyze an ethical issue related to health informatics, such as ownership of and access to data, or the debate around respecting the privacy of individuals versus promoting the public good in the disclosure of health threats like HIV/AIDS and avian flu. Relate the findings of the research to the International Medical Informatics Association and American Health Information Management Association (AHIMA) Code of Ethics for Health Information Professionals. (TN CCSS Reading 1, 2, 6; TN CCSS Writing 2, 9)

Medical Records

5) Summarize the purposes and functions of the patient health record. Identify the purpose of each of the following components:
    a. History and Physical
    b. Discharge summary
    c. Progress notes and orders

d. Nursing notes
e. Operative reports
f. Preoperative and postoperative anesthesia notes
g. Pathology reports
h. Consultation reports
i. Medication administration records
j. Consent forms
k. Ancillary reports (X-ray, lab, therapy reports)
l. Advance Directives (Do Not Resuscitate, living will, power of attorney, specialty records such as in OB, ER, and nursery)

(TN CCSS Reading 2, 4, 8; TN CCSS Writing 4, 9)

6) Compose a list of clinical health information data points for alternative care settings including but not limited to ambulatory care, behavioral health, stand-alone clinical laboratory, home care, long-term care, stand-alone surgical center, and walk-in/urgent care clinics. For example, list all the typical diagnostic information collected as part of a routine physical. For each setting examined, explain why certain data points are of more interest or importance to the healthcare provider in that particular setting. (TN CCSS Reading 2, 3, 4; TN CCSS Writing 4, 8, 9)

7) Explain the guidelines surrounding medical record storage, control, and retention as prescribed by local, state, and federal regulations. (TN CCSS Reading 2; TN CCSS Writing 4, 9)

8) Compare and contrast numbering and filing systems used in health information departments. Differentiate among and be able to retrieve files using the following health record numbering systems: enterprise-wide numbering, unit numbering, serial numbering, and serial-unit numbering. (TN CCSS Reading 3, 4; TN CCSS Writing 6, 7)

9) Compare and contrast qualitative and quantitate record analysis, then practice the skill of assembling a patient health record. Apply alphabetical, numerical, and terminal digit filing methods to patient records. Analyze the record for completeness and accuracy. (TN CCSS Reading 3, 4)

10) Using correct medical terminology and authentication of patient record entries, compare and contrast the standards from external agencies (such as the Joint Commission and AHIMA) and facility policies regarding provider documentation responsibilities. Refer to the American Society for Testing and Materials (ASTM) publication ASTM E2369-12 Standard Specification for Continuity of Care Record. (TN CCSS Reading 4, 9; TN CCSS Writing 4, 9)

Electronic Health Records

11) Define Electronic Health Record (EHR) and briefly explain its emergence and evolution. Compare the advantages and disadvantages of manual versus automated record systems. Identify barriers and challenges associated with the large-scale move to EHR in healthcare institutions. (TN CCSS Reading 2, 9; TN CCSS Writing 4, 9)

12) Research how the Affordable Care Act and the American Recovery Reinvestment Act, Public Law 111-5 have impacted the evolution and integration of Electronic Health Records. Citing specific textual evidence from the laws, together with professional and scholarly commentary, debate

whether these changes will benefit consumers and healthcare providers, and analyze the short-term and long-term consequences. (TN CCSS Reading 2, 8, 9; TN CCSS Writing 1)

Health Information Systems

13) Identify the multiple indexes maintained by health care facilities and state and federal agencies, and create a brief profile of each based on evidence drawn from case studies. Record in the profile the content, significance, purpose, development, and maintenance of indexes such as the master patient index, disease index, and operation index. (TN CCSS Reading 2, 9; TN CCSS Writing 4, 9)

14) Investigate the major parameters most frequently reported in health databases, including descriptive health care statistics and hospital-based statistics. Review a case scenario involving health care statistics and summarize the statistical information into a bar graph, pie chart, scatterplot, or other graphical representation. Identify the characteristics, units, and standards of each parameter, including applicable medical terminology. (TN CCSS Reading 1, 7, 8, 9; TN CCSS Writing 4, 6; TN CCSS Math N-Q, S-ID)

15) Differentiate between the terms *registries* and *registers* and detail the characteristics of each. Review data from the National Center for Health Statistics (NCHS) in order to develop a vital statistics depiction of a community. Record items such as births per thousand, deaths, fetal death, marriages, divorces, and maternal health information in an electronic spreadsheet or chart. (TN CCSS Reading 4, 7, 8; TN CCSS Writing 4, 6, 7)

16) Develop a digital or paper presentation to illustrate the purpose, content, and use of registries in the United States, such as:
    a. Tumor Registry
    b. Birth Registry
    c. Trauma Registry
    d. Brain Injury Registry
    e. Implant Registry
    f. Immunization Registry
    g. Diabetes Registry

    (TN CCSS Reading 2, 4, 6, 7; TN CCSS Writing 4, 6, 9)

Legal Ramifications of Health Information

17) Summarize the Health Insurance Portability and Accountability Act (HIPAA) and applicable state laws to explain methods of ensuring data security and confidentiality by controlling access and release of information. Develop a policy and procedure explaining the process for providing access to health records for a variety of third parties, including but not limited to state licensing boards, court systems (i.e., in the event a subpoena is issued), insurance companies, law enforcement, government agencies, employers, and other health care providers. (TN CCSS Reading 2, 4, 8, 9; TN CCSS Writing 2, 4, 8)

18) Explain in a written, oral, or digital format the differences in privacy of individually identifiable health information, protected health information (PHI), and security rule. Review case studies to

identify violations, preventive measures, and penalties that might be levied for violations. (TN CCSS Reading 2, 4, 8, 9; TN CCSS Writing 4, 9)

19) Research major federal and state legislation that has impacted health information management. Identify the law or regulation, the year it was instated, the sponsor(s) of the legislation, a description of its content, any justification provided for its passage, and a case that has used the legislation in the defense on the patient/client's behalf. (TN CCSS Reading 2, 8, 9; TN CCSS Writing 4)

20) Identify emerging technologies and practices related to health information, such as the use of mobile technologies, consumer outline to health records, and evidenced-based practices. Argue the ethical and legal complications associated with these practices. (TN CCSS Reading 2, 4; TN CCSS Writing 1, 4)

21) Investigate identify theft and fraud associated with electronic health information. Develop a Public Service Announcement for the elderly or other vulnerable population to alert them to the problems and explain how to prevent fraud or theft of their health care information. (TN CCSS Reading 2, 5; TN CCSS Writing 4, 6)

Coding and Reimbursement

22) Design a comprehensive teaching brochure for a new patient that explains the multiple sources of reimbursement in healthcare services and how medical records can affect the reimbursement rate. Report on areas such as capitation, Medicare, TennCare, prospective payment systems, Relative Value Resource Based systems (RVRB), case mix, MS-DRGs, healthcare insurance, and accountable care organizations. (TN CCSS Reading 2, 4, 7, 9; TN CCSS Writing 4, 6, 9)

23) Differentiate between medical nomenclatures and classification systems used for reporting to third-party payers for reimbursement, for data collection, and for education and research. Identify the components of the coding systems, including but not limited to: DSM, CPT, ICIDH, HCPCS Level II, CDT, NDC, ICD-9-CM, and ICD-10-CM. (TN CCSS Reading 1, 2, 8, 9; TN CCSS Writing 8)

24) The Centers for Medicare and Medicaid Services (CMS) developed the prospective payment System (PPS), payment systems, fee schedules, and exclusions. Explain the payments systems of third-party payers as related to the types of forms they use. Develop a written or visual presentation explaining the differences among the payment systems. (TN CCSS Reading 6, 7, 8; TN CCSS Writing 4, 6, 8)

25) Compare and contrast the following types of data sets related to medical coding and/or reimbursement: OASIS, HEDIS, UHDDS, DEEDS and MDS 3.0. Explain in an informational text the development of, purpose, advantages, challenges, and health care setting in which each might be used. (TN CCSS Reading 2, 3, 4; TN CCSS Writing 2, 4, 9)

26) Practice the introductory skills related to coding for diagnosis using the ICD-9 or ICD-10 coding system and CPT coding system for procedures. (TN CCSS Reading 3, 4; TN CCSS Writing 7, 4)

27) Define the terms related to billing and coding fraud and abuse. Evaluate multiple scenarios to identify fraud and/or abuse and explain how they can be avoided. Cite specific regulations and/or laws from the Fair Debt Collection Act, HIPAA, and the Privacy Act in the explanation. (TN CCSS Reading 1, 2, 4; TN CCSS Writing 4, 9)

Standards Alignment Notes

*References to other standards include:

- TN CCSS Reading: Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects; Reading Standards for Literacy in Science and Technical Subjects 6-12; Grades 11-12 Students (page 62).
    - Note: While not directly aligned to one specific standard, students who are engaging in activities outlined above should be able to also demonstrate fluency in Standard 10 at the conclusion of the course.
- TN CCSS Writing: Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects; Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects 6-12; Grades 11-12 Students (pages 64-66).
    - Note: While not directly aligned to one specific standard, students who are engaging in activities outlined above should be able to also demonstrate fluency in Standards 1, 3, and 10 at the conclusion of the course.
- TN CCSS Math: Common Core State Standards for Mathematics; Math Standards for High School: Numbers and Quantity, Statistics and Probability.
    - Note: The standards in this course are not meant to teach mathematical concepts. However, the concepts referenced above may provide teachers with opportunities to collaborate with mathematics educators to design project-based activities or collaborate on lesson planning. Students who are engaging in activities listed above should be able to demonstrate quantitative and statistical reasoning as applied to specific technical concepts. In addition, students will have the opportunity to practice the habits of mind as described in the eight Standards for Mathematical Practice.
- P21: Partnership for 21st Century Skills Framework for 21st Century Learning
    - Note: While not all standards are specifically aligned, teachers will find the framework helpful for setting expectations for student behavior in their classroom and practicing specific career readiness skills.

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Health Science Education

Primary Career Cluster:	Health Science
Consultant:	Sheila Carlton, (615) 532-2839, Sheila.Carlton@tn.gov
Course Code(s):	5998
Prerequisite(s):	None
Credit:	1
Grade Level:	9
Graduation Requirement Substitution:	None
Programs of Study and Sequence:	This is the first course in *Biotechnology Research, Diagnostic Services, Therapeutic Nursing Services, Emergency Services, Therapeutic Clinical Services,* and *Public Health* programs of study.
Necessary Equipment:	Equipment lists can be found on the Health Science website.
Aligned Student Organization(s):	HOSA: http://www.tennesseehosa.org Amanda Hodges, (615) 532-6270, Amanda.Hodges@tn.gov
Coordinating Work-Based Learning:	If a teacher has completed work-based learning training, he or she can offer placement in Job Shadowing or Clinical Internship. For more information, please visit http://www.tn.gov/education/cte/wb.
Available Student Industry Certifications:	None
Dual Credit or Dual Enrollment Opportunities:	There are no known dual credit/dual enrollment opportunities for this course. If interested in developing, reach out to a local postsecondary institution to establish an articulation agreement.
Teacher Endorsement(s):	577
Required Teacher Certifications/Training:	None
Teacher Resources:	http://www.tn.gov/education/cte/HealthScience.shtml

Course Description

Health Science Education is an introductory course designed to prepare students to pursue careers in the fields of biotechnology research, therapeutics, health informatics, diagnostics, and support services.

Upon completion of this course, a student proficient in *Health Science Education* will be able to identify careers in these fields, compare and contrast the features of healthcare systems, explain the legal and ethical ramifications of the healthcare setting, and begin to perform foundational healthcare skills. This course will serve as a strong foundation for all of the health science programs of study. Standards in this course are aligned with Tennessee Common Core State Standards in English Language Arts & Literacy in Technical Subjects.*

Program of Study Application

This is the foundational course in the *Biotechnology Research, Diagnostic Services, Therapeutic Nursing Services, Emergency Services, Therapeutic Clinical Services, Medical Administrative Services,* and *Public Health* programs of study. For more information on the benefits and requirements of implementing these programs in full, please visit the Health Science website at http://www.tn.gov/education/cte/HealthScience.shtml.

Course Standards

Career Planning

1) Synthesize information found in news media, professional journals, and trade magazines to create a report and/or presentation on the historical evolution of healthcare in the United States. Use a timeline or other graphic to illustrate major developments beginning with the first medical school through today. (TN CCSS Reading 2, 7; TN CCSS Writing 6, 8)

2) Prepare a paper or electronic career profile for at least one occupation in each of the five health science career areas (biotechnology research, therapeutic services, support services, health informatics, and diagnostic services), to be included in the student's health science portfolio. Draw on print and online sources, such as government occupational profiles, and/or interviews with health care professionals to capture at minimum the following:
    a. Job description
    b. Roles and responsibilities
    c. Essential knowledge and skills needed for the career
    d. Programs or paths of study available to reach occupational goals, beginning with high school and proceeding through postsecondary
    e. Required personality traits for the career
    f. Licensure and credentialing requirements
    g. Non-educational job requirements such as physical fitness tests, minimum age, and psychological evaluations
    h. Photographs or digital prints of each career (refer to HOSA Medical Photography guidelines)

    (TN CCSS Reading 1, 2; TN CCSS Writing 4, 6, 9)

3) Drawing evidence from occupational profiles, industry journals, and textbooks, summarize the professional traits (such as leadership, ethical responsibility, and time management) required of healthcare professionals in the twenty-first century. (TN CCSS Reading 1; TN CCSS Writing 9)

Healthcare Systems

4) Identify the types and defining features of healthcare systems in the United States. Compare and contrast these systems with those of other countries that have a high efficiency score in healthcare as rated by agencies such as the World Health Organization. Create a report and/or presentation on these comparisons. (TN CCSS Reading 1, 5; TN CCSS Writing 7, 8 ,9)

5) Compare and contrast the average cost for a procedure such as childbirth, CT scan, and/or heart catheterization in the United States versus the average costs in Canada, Mexico, France, Japan, and/or other countries that have high efficiency scores in healthcare. Translate the information into a table, chart, graph, or other visual representation. Cite specific textual evidence to support the analysis. (TN CCSS Reading 1,5; TN CCSS Writing 7)

6) Differentiate among the methods of payment for healthcare in the United States. Include private and state or federal insurance, health savings accounts, managed care, Veteran's Health Administration, Military Health System/TRICARE, and long-term care. (TN CCSS Reading 1, 9)

7) Investigate current innovations in healthcare. Develop pro and con arguments based on information found in news media, professional journals, and trade magazines on how innovations have influenced the healthcare system. Support arguments with evidence presented in oral, visual, or written format. (TN CCSS Reading 1, 2, 9; TN CCSS Writing 1, 8, 9)

Body Function and Structure

8) Outline basic concepts of normal structure and function of all body systems, and explain how homeostasis is maintained. (TN CCSS Reading 2)

9) Describe how Maslow's Hierarchy of Needs can affect the physical, social, psychological, and behavioral status of a person. Use technology to produce a visual or digital chart or table to explain the information obtained from published or digital text. (TN CCSS Reading 1; TN CCSS Writing 6, 9)

10) Generate an informational brochure that explains to community members the biophysical, mental/cognitive, social, and emotional development of patients at various stages of the life cycle: infancy, toddler, school age, adolescence, and adulthood (young, middle, and older). Cite textual evidence to support explanations. (TN CCSS Reading 1; TN CCSS Writing 9)

11) Distinguish between the medical definitions of health and wellness, identifying preventive measures and behaviors that promote each. Discuss contemporary controversies to wellness theories, such as but not limited to the debates surrounding electronic medical records, the use of performance-enhancing supplements for athletes, and alternative diets. (TN CCSS Reading 5)

12) Develop a patient health education presentation surrounding one of the following wellness issues: optimal health, exercise and fitness, healthy eating and nutrition, sleep, stress or other mental health issues, drug/alcohol/tobacco use and abuse, body decoration, sexually transmitted infections, or cyber safety. Include signs and symptoms of the behavior and/or disease, major physical concerns associated with it, preventive measures, treatments, and support systems. Include at least three resources. (TN CCSS Reading 1, 3, 5; TN CCSS Writing 2, 4, 7, 9)

Infection Control/Medical Microbiology

13) Define chain of infection and provide strategies of how to break each part of the chain to prevent infection. Conduct a short research project on the effects of practices of sanitation and disinfection on health and wellness, examining the implications for public health. Synthesize findings in a written, oral, or digital presentation, citing evidence from the investigation. (TN CCSS Reading 1; TN CCSS Writing 6,7)

14) Understand the principles of and successfully perform the following skills to prevent or curtail the spread of pathogenic and non-pathogenic organisms:
    a. Hand washing
    b. Gloving

    (TN CCSS Reading 3)

Foundational Healthcare Skills

15) Review health topics surrounding complementary and alternative medicine such as acupuncture, biofeedback, and herbal treatments. Develop a public service announcement or academic poster presentation intended to inform consumers or health professionals about the specific topic. Include general information, purported benefits, uses in the United States, side effects and/or risks, relevant research, cost, and links to more information. Cite evidence from print and digital resources such as research journals, the National Institute of Health, the Mayo Clinic, and Medline Plus. (TN CCSS Reading 1, 9; TN CCSS Writing 2, 6, 8, 9)

16) Understand principles of and successfully perform skills related to Emergency Medicine, incorporating rubrics from the American Heart Association or American Red Cross for the following:
    a. Basic First Aid care of bleeding and wounds
    b. Basic First Aid care for burns
    c. Basic First aid for bone and joint injuries

    (TN CCSS Reading 3)

17) Understand principles of and successfully perform skills related to Dental Assisting, incorporating rubrics from textbooks or clinical standards of practice for the following:
    a. Identifying teeth using the Federation Dentaire International Numbering System
    b. Demonstrate brushing and flossing techniques

    (TN CCSS Reading 3)

18) Understand principles of and successfully perform skills related to Medical Laboratory Assisting, incorporating rubrics from textbooks or clinical standards of practice for the following:
    a. Obtain a culture specimen and streak an agar plate (this may be simulated on paper)
(TN CCSS Reading 3)

19) Understand principles of and successfully perform skills related to Medical Assisting Skills, incorporating rubrics from textbooks or clinical standards of practice for the following:
    a. Temperature, pulse, respiration and blood pressure assessment
    b. Screening for vision problems
(TN CCSS Reading 3)

20) Understand principles of and successfully perform skills related to Physical Therapy Skills, incorporating rubrics from textbooks or clinical standards of practice for the following:
    a. Ambulation with crutches or cane
    b. Administering cold applications
(TN CCSS Reading 3)

21) Understand principles of and successfully perform skills related to Athletic Training, incorporating rubrics from textbooks or clinical standards of practice for the following:
    a. Assessment of athlete with injured ankle or wrist
    b. Basic stretching exercises
(TN CCSS Reading 3)

22) Understand principles of and successfully perform skills related to Forensic Scientist, incorporating rubrics from textbooks or clinical standards of practice for the following:
    a. Extraction of basic DNA
(TN CCSS Reading 3)

The following artifacts will reside in the student's portfolio:

- Career Exploration portfolio
- Skills performance rubrics
- Documentation of job shadowing hours
- Examples of written, oral, or digital presentations
- Short research project documents
- Examples of public service announcement scripts, community awareness, health education portfolio

Standards Alignment Notes

*References to other standards include:

- TN CCSS Reading: Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects; Reading Standards for Literacy in Science and Technical Subjects 6-12; Grades 9-10 Students (page 62).
    - Note: While not directly aligned to one specific standard, students who are engaging in activities outlined above should be able to also demonstrate fluency in Standard 10 at the conclusion of the course.

- TN CCSS Writing: Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects; Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects 6-12; Grades 9-10 Students (pages 64-66).
    - Note: While not directly aligned to one specific standard, students who are engaging in activities outlined above should be able to also demonstrate fluency in Standards 5 and 10 at the conclusion of the course.

Additional Notes

**Informational artifacts include but are not limited to brochures, posters, fact sheets, narratives, essays, and presentations. Graphic illustrations include but are not limited to charts, rubrics, drawings, and mode

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Introduction to Health Science

Primary Career Cluster:	Health Science
Consultant:	Sheila Carlton, (615) 532-2839, Sheila.Carlton@tn.gov
Course Code(s):	TBD
Prerequisite(s):	None
Credit:	N/A
Grade Level:	7-8
Graduation Requirement Substitution:	N/A
Programs of Study and Sequence:	This is an exploratory course designed to introduce students in middle school to health science education.
Necessary Equipment:	Equipment lists can be found on the Health Science website.
Aligned Student Organization(s):	HOSA: http://www.tennesseehosa.org Amanda Hodges, (615) 532-6270, Amanda.Hodges@tn.gov
Coordinating Work-Based Learning:	N/A
Available Student Industry Certifications:	N/A
Dual Credit or Dual Enrollment Opportunities:	There are no known dual credit/dual enrollment opportunities for this course. If interested in developing, reach out to a local postsecondary institution to establish an articulation agreement.
Teacher Endorsement(s):	577
Required Teacher Certifications/Training:	None
Teacher Resources:	http://www.tn.gov/education/cte/HealthScience.shtml

Course Description

Introduction to Health Science introduces middle school students to the exciting, dynamic world of the health sciences, an industry that is rapidly changing and high in demand for workers who can think

critically to solve a range of health-related problems. The course is designed to prepare middle school students to pursue courses in high school that lead to careers in the fields of biotechnology research, therapeutics, health informatics, diagnostics, and support services. Students will explore healthcare systems, legal and ethical issues in healthcare and basic healthcare skills. Standards in this course are aligned with Tennessee Common Core State Standards for English Language Arts & Literacy in Technical Subjects.*

Program of Study Application

This is an exploratory course for all health science programs of study. For more information on the benefits and requirements of implementing these programs in full, please visit the Health Science website at http://www.tn.gov/education/cte/HealthScience.shtml.

Course Standards

Career Planning

1) Identify key innovators and contributions made in the history of health care in the United States. Create a timeline or other graphic to illustrate major developments beginning with the first medical school through today, citing sources such as textbooks or online encyclopedias. (TN CCSS Reading 1, 2; TN CCSS Writing 6, 8)

2) Prepare a paper or electronic career profile for at least one occupation in one of the five health science career areas (biotechnology research, therapeutic services, support services, health informatics, and diagnostic services), to be included as part of a health science portfolio. Document the following related to the chosen occupation:
    a. A job description synthesized from print or online sources, such as government occupational profiles
    b. A brief biography or profile of a famous person who is known for this job, or, alternatively, a short narrative about a family or community member who holds this occupation
    c. The career path, level of education attained, and any additional training this person pursued in the course of successfully reaching his/her occupational goals

    The career profile can be compiled based on information drawn from textbooks, online encyclopedias, government websites, and similar sources, or from personal interviews with the family or community member chosen for the profile. (TN CCSS Reading 1, 7; TN CCSS Writing 4, 6, 8, 9)

3) Draw evidence from occupational profiles, industry journals, and textbooks to summarize the professional traits (such as leadership, ethical responsibility, and time management) required of healthcare professionals in the twenty-first century. (TN CCSS Reading 1; TN CCSS Writing 8, 9)

Healthcare Systems

4) Identify the types of healthcare facilities in the United States. Compile a list of healthcare professionals that work in these facilities. Compare and contrast the salaries of at least three healthcare professionals in two different sites, and create a report and/or presentation on these comparisons. (TN CCSS Writing 4, 7, 8, 9)

5) Define the terms culture, ethnicity, and race. Research customs, beliefs, and practices surrounding health care from another culture, ethnicity, or race, and relate findings in a written, oral, or digital presentation. Compare and contrast how aspects such as respect, informed consent and medical decision making, medical testing, and social context vary across different cultures and populations. (TN CCSS Reading 2, 4, 8; TN CCSS Writing 4, 9)

6) Differentiate between the methods of payment for healthcare in the United States. Compare and contrast private and state/federal insurance, health savings accounts, and managed care. (TN CCSS Reading 1, 4, 9)

Body Function and Structure

7) Outline the basic normal structure and function of all body systems. Present a visual illustration of a system within the human body, listing the basic structures and using medical terminology for each. (TN CCSS Reading 2, 4)

8) Distinguish between the medical definitions of health and wellness, identifying preventive measures and behaviors that promote each. Discuss contemporary controversies to wellness theories, such as but not limited to the debates surrounding concussion evaluation of middle and high school athletes, increased use of drugs and alcohol by middle school students, and alternative diets, e.g., those geared toward dramatic weight loss. (TN CCSS Reading 2, 8)

9) Develop a patient health education presentation surrounding one of the following wellness issues: exercise and fitness, healthy eating and nutrition, sleep, the increase in food allergies, noise-induced hearing loss, or other topic approved by the instructor. Include signs and symptoms of the behavior and/or disease, major associated physical and/or mental concerns, preventive measures, and support systems. Include at least two resources drawn from textbooks, online healthcare journals, or websites (such as MedLine Plus, National Institute of Health, or the Centers for Disease Control). (TN CCSS Reading 1, 3, 8, 9; TN CCSS Writing 2, 4, 7, 9)

Infection Control/Medical Microbiology

10) Define chain of infection and provide strategies for how to break each part of the chain to prevent infection. Evaluate professional journals or news articles for examples of infectious outbreak within a community and the implications on an individual's health. Capture those findings in a written, oral, or digital presentation, citing evidence from the investigation. (TN CCSS Reading 1, 2; TN CCSS Writing 6, 7)

11) Understand the principles of and successfully perform the following skills to prevent or curtail the spread of pathogenic and non-pathogenic organisms:
    a. Hand washing
    b. Sneeze and cough prevention

    (TN CCSS Reading 3)

Foundational Healthcare Skills

12) Understand principles of and successfully perform skills related to Emergency Medicine, incorporating rubrics from American Heart Association or American Red Cross such as:
    a. Basic First Aid care of bleeding and wounds
    b. Basic First Aid care for burns
    c. Basic First aid for bone and joint injuries
    (TN CCSS Reading 3)

13) Understand principles of and successfully perform skills reacted to Medical Assisting Skills, incorporating rubrics from textbook or clinical standards of practice:
    a. Temperature, pulse and respiration assessment
    b. Screening for vision problems
    (TN CCSS Reading 3)

14) Understand principles of and successfully perform skills reacted to Physical Therapy Skills, incorporating rubrics from textbook or clinical standards of practice:
    a. Ambulation with crutches
    (TN CCSS Reading 3)

15) Understand principles of and successfully perform skills reacted to Athletic Training, incorporating rubrics from textbook or clinical standards of practice:
    a. Basic stretching exercises
    (TN CCSS Reading 3)

16) Understand principles of and successfully perform skills reacted to Forensic Scientist, incorporating rubrics from textbook or clinical standards of practice:
    a. Extraction of DNA
    (TN CCSS Reading 3)

Standards Alignment Notes

*References to other standards include:

- TN CCSS Reading: Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects; Reading Standards for Literacy in Science and Technical Subjects 6-12; Grades 6-8 Students (page 62).
    - Note: While not directly aligned to one specific standard, students who are engaging in activities outlined above should be able to also demonstrate fluency in Standards 5, 6, and 10 at the conclusion of the course.
- TN CCSS Writing: Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects; Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects 6-12; Grades 6-8 Students (pages 64-66).
    - Note: While not directly aligned to one specific standard, students who are engaging in activities outlined above should be able to also demonstrate fluency in Standards 3, 5, and 10 at the conclusion of the course.

TENNESSEE DEPARTMENT OF EDUCATION
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Pharmacological Sciences

Primary Career Cluster:	Health Science
Consultant:	Sheila Carlton, (615) 532-2839, Sheila.Carlton@tn.gov
Course Code:	5990
Prerequisite(s):	*Health Science Education*
Credit:	1
Grade Level:	11-12
Graduation Requirement Substitution:	None
Programs of Study and Sequence:	This is one of several options available as the third course in the *Therapeutic Clinical Services* program of study.
Necessary Equipment:	None
Aligned Student Organization(s):	HOSA: http://www.tennesseehosa.org Amanda Hodges, (615) 532-6270, Amanda.Hodges@tn.gov
Coordinating Work-Based Learning:	If a teacher has completed work-based learning training, he or she can offer placement in Job Shadowing or Clinical Internship. For more information, please visit http://www.tn.gov/education/cte/wb.
Available Student Industry Certifications:	None
Dual Credit or Dual Enrollment Opportunities:	There are no known dual credit/dual enrollment opportunities for this course. If interested in developing, reach out to a local postsecondary institution to establish an articulation agreement.
Teacher Endorsement(s):	577
Required Teacher Certifications/Training:	None
Teacher Resources:	http://www.tn.gov/education/cte/HealthScience.shtml

Course Description

Pharmacological Sciences is a third-level applied course in the *Therapeutic Clinical Services* program of study intended to prepare students with an understanding of the roles and responsibilities of the healthcare worker in a pharmacy setting. This course equips students with the communication, goal-setting, and information-processing skills to be successful in the workplace, in addition to covering key

topics in pharmacology, pharmacy law and regulations, sterile and non-sterile compounding, medication safety, quality assurance, and more. Students who complete this course and a Clinical Internship can apply to sit for the Pharmacy Technician Certification Board examination immediately after high school graduation. Standards in this course are aligned with Tennessee Common Core State Standards for English Language Arts & Literacy in Technical Subjects, Tennessee Common Core State Standards in Mathematics, and Tennessee Anatomy and Physiology standards.*

Program of Study Application

This is the third course in the *Therapeutic Clinical Services* program of study. For more information on the benefits and requirements of implementing this program in full, please visit the Health Science website at http://www.tn.gov/education/cte/HealthScience.shtml.

Course Standards

Pharmacology for Technicians

1) Receive and screen prescription/medication orders for completeness and authenticity, identifying generic and name brands of pharmaceuticals, strengths/dose, dosage form, physical appearance, route of administration, and duration of drug therapy. Develop an informative brochure explaining the top 200 medications per the criteria previous listed. (TN CCSS Reading 4; TN CCSS Writing 2, 6; PTCB Knowledge Domain 1.1, 1.4)

2) Construct a teaching plan for an elderly community person explaining definitions of various drug interactions (such as drug-disease, drug-drug, drug-dietary supplement, drug-OTC, drug-laboratory, and drug-nutrient). (TN CCSS Reading 1, 4, 9; TN CCSS Writing 8, 9; PTCB Knowledge Domain 1.3)

3) Compare and contrast the principles of pharmaceutical equivalents, generic equivalence, bioequivalence, pharmaceutical alternatives, and therapeutic equivalents as defined by the U.S Food and Drug Administration (FDA). Summarize the criteria for deeming a product therapeutically equivalent. (TN CCSS Reading 1, 2, 9; TN CCSS Writing 8, 9; PTCB Knowledge Domain 1.2)

4) Differentiate between common and severe side effects or adverse effects, allergies, and therapeutic contraindications associated with the top 200 medications as published in pharmaceutical print and online journals. (TN CCSS Reading 1, 2, 4, 9; TN CCSS Writing 9; PTCB Knowledge Domain 1.5)

5) Research the basic chemical properties, physical properties, dosages, and indications of legend for selected over-the-counter (OTC) drugs and herbal and dietary supplements. Illustrate findings in an oral, visual, or digital presentation, citing information obtained from print and online medical sites such as the U.S. National Library of Medicine databases. (TN CCSS Reading 1, 2, 4, 9; TN CCSS Writing 6, 8, 9; PTCB Knowledge Domain 1.6)

Pharmacy Law and Regulations

6) Design an action plan for a pharmacy related to the storage, handling, and disposal of hazardous substances and wastes (e.g., MSDS) with inclusion of procedures for prevention and treatment of hazardous substances exposure (e.g., eyewash, spill kit, MSDS). (TN CCSS Reading 2, 4; TN CCSS Writing 8, 9; PTCB Knowledge Domain 2.1, 2.2)

7) Evaluate the Drug Enforcement Administration (DEA) rules and regulations surrounding the transfer of controlled substances, verification of a prescriber's DEA number, and documentation requirements for receiving, ordering, returning, loss/theft, and destruction of controlled substances. Investigate the standards of practice of record keeping for repackaged and recalled products and supplies, including the FDA's recall classification. Summarize findings in an oral, written, or digital presentation. (TN CCSS Reading 2, 4; TN CCSS Writing 4, 6, 7, 8, 9; PTCB Knowledge Domain 2.3, 2.4, 2.5, 2.10, 2.12)

8) Gather data from Tennessee pharmaceutical board rules and regulations documents concerning record keeping, documentation, and record retention of prescriptions (e.g., length of time prescriptions are maintained on file). List the requirements for restricted drug programs and related prescription processing (e.g., for medications such as thalidomide, isotretinoin, and clozapine). (TN CCSS Reading 2, 4; TN CCSS Writing 8, 9; PTCB Knowledge Domain 2.6, 2.7)

9) Summarize professional standards related to data integrity and security and Health Insurance Portability and Accountability Act (HIPAA) guidelines. Using domain-specific language and accurate definitions of legal concepts, explain how these areas impact patients' rights for all aspects of pharmaceutical care. (TN CCSS Reading 1, 2, 4, 5; TN CCSS Writing 8, 9; PTCB Knowledge Domain 2.8)

10) In a lab/clinical setting, demonstrate application of concepts and skills of asepsis, Universal Precautions, sanitation, disinfection, and sterilization for pharmacy settings in adherence to standards and guidelines from the Centers for Disease Control and Prevention (CDC) and the Occupational Safety and Health Administration (OSHA). Perform or check for functions such as proper laminar air flow, hand washing, ensuring a clean room or workspace, and cleaning of counting trays, countertops, and equipment. (TN CCSS Reading 2, 3, 4, 5; TN CCSS Writing 8, 9; PTCB Knowledge Domain 2.11.)

11) Research the professional standards and state and federal laws regarding the roles and responsibilities of pharmacists, pharmacy technicians, and other pharmacy employees; describe when a pharmacist should provide consultation for a patient/client. (TN CCSS Reading 1, 2; TN CCSS Writing 8, 9; PTCB Knowledge Domain 2.9, 2.13, 2.14)

12) Formulate a list of facility, equipment, and supply requirements (e.g., space requirements, prescription file storage, cleanliness, and reference materials) required for a retail pharmacy as compared with a hospital-based pharmacy. (TN CCSS Reading 1, 8, 9; TN CCSS Writing 6, 8, 9; PTCB Knowledge Domain 2.15)

13) Develop an informative essay based on research of state and federal laws surrounding a pharmacist/pharmacy technician's roles and responsibilities for detecting prescription abuse. List specific legislation passed or currently in development in Tennessee meant to regulate the purchase of certain over-the-counter medications, such as pseudoephedrine. (TN CCSS Reading 1, 2, 5, 6, 7, 8; TN CCSS Writing 2, 4, 9; PTCB Knowledge Domain 2.14)

Sterile and Non-Sterile Compounding

14) Research and identify infection control standards utilized in a pharmacy compounding department as established by the CDC and OSHA. Demonstrate application of skills in lab/classroom/clinical setting in order to meet the standards identified. (TN CCSS Reading 2, 3, 4; TN CCS Writing 9; PTCB Knowledge Domain 3.1)

15) Demonstrate the following skills surrounding compounding:
    a. Handling and disposal requirements (e.g., receptacles, waste streams)
    b. Documentation (e.g., batch preparation, compounding record)**
    c. Determination of product stability (e.g., beyond-use dating, signs of incompatibility)**
    d. Selection and use of equipment and supplies
    e. Sterile compounding processes**
    f. Non-sterile compounding processes

    (TN CCSS Reading 3; TN CCSS Writing 4; TN CCSS Math N-Q; PTCB Knowledge Domain 3.2, 3.3, 3.4, 3.5, 3.6, 3.7)

Medication Safety

16) Outline in a written or digital presentation industry standards surrounding medication safety. Cite information obtained from textbooks, online and print pharmacy journals, and related websites. Include at minimum the following:
    a. Error prevention strategies for data entry (e.g., prescription or medication order to correct patient)
    b. Patient package insert and medication guide requirements (e.g., special directions and precautions)
    c. Issues that require pharmacist intervention (e.g., DUR, ADE, OTC recommendation, therapeutic substitution, misuse, missed dose)
    d. Common safety strategies (e.g., tall man lettering, separating inventory, leading and trailing zeros, limited use of error-prone abbreviations)

    (TN CCSS Reading 1, 2, 7; TN CCSS Writing 4, 6, 9; PTCB Knowledge Domain 4.1, 4.2, 4.3, 4.6)

17) Identify strategies for preventing medication errors by distinguishing medications that either look alike or sound alike, such as Ceftin, Cefotan, Cefzil, Rocephin and Cipro. Include strategies related to recognizing high-alert/high-risk medications such as Sporanox for patients who have ventricular dysfunction. (TN CCSS Reading 2, 4, 6, 8; TN CCSS Writing 8, 9; PTCB Knowledge Domain 4.4, 4.5)

Pharmacy Quality Assurance

18) Interpret quality assurance practices for medication and inventory control systems (e.g., matching National Drug Code (NDC) number, bar code, and data entry) and for infection control procedures and documentation (e.g., personal protective equipment [PPE], needle recapping). (TN CCSS Reading 3, 4; TN CCSS Writing 9; PTCB Knowledge Domain 5.1, 5.2)

19) Explain the common assurance measures used to monitor quality in a pharmacy. For example, explain risk management guidelines and regulations (e.g., error prevention strategies), communication channels necessary to ensure appropriate follow-up and problem resolution (e.g., product recalls, shortages), and productivity, efficiency, and customer satisfaction measures. Summarize information gathered from textbooks, retail pharmacy websites, print pharmacy journals, and/or personal interviews of pharmacists or pharmacy technicians. (TN CCSS Reading 2, 9; TN CCSS Writing 4, 9; PTCB Knowledge Domain 5.3, 5.4, 5.5)

Medication Order Entry and Fill Process

20) Identify all information a pharmacist or pharmacy technician should obtain from the patient/client before filling and dispensing any medication related to intake, interpretation, and data entry.** Information should include at minimum: name of patient/client, date of birth, address, insurance policy, physician's name, and any drug allergies. Practice interviewing skills in a lab/clinical/classroom setting. (TN CCSS Reading 3; TN CCSS Math N-Q; PTCB Knowledge Domain 6.2)

21) Create either an electronic or paper profile detailing the order entry process** per industry standards for each of the following: a hospital, a free-standing pharmacy, and a retail-based pharmacy. (TN CCSS Reading 3, 4; TN CCSS Writing 4, 9; TN CCSS Math N-Q; PTCB Knowledge Domain 6.1)

22) Calculate correct doses required when given a simulated prescription for a pediatric dose, adult dose, and geriatric dose based on weight (if applicable), length of administration, times per day of administration, and presence of other diseases/disorders.** (TN CCSS Reading 3, 7; TN CCSS Math N-Q, A-CED; PTCB Knowledge Domain 6.3)

23) Demonstrate the following skills of the prescription fill process:
    a. Select appropriate product
    b. Apply special handling requirements
    c. Measure and prepare product for final check

    (TN CCSS Reading 3; PTCB Knowledge Domain 6.4)

24) Demonstrate the following skills of prescription labeling requirements :
    a. Auxiliary and warning labels
    b. Expiration date
    c. Patient-specific information

    (TN CCSS Reading 3; PTCB Knowledge Domain 6.5)

25) Demonstrate the following skills of prescription packaging requirements:
    a. Type of bags
    b. Syringes
    c. Glass
    d. PVC
    e. Child resistant
    f. Light resistant**

    (TN CCSS Reading 3; TN CCSS Math N-Q; PTCB Knowledge Domain 6.6)

26) Demonstrate the following skills of the dispensing process:
    a. Validation of prescription with pharmacist
    b. Documentation and distribution

    (TN CCSS Reading 3; TN CCSS Writing 4; PTCB Knowledge Domain 6.7)

Pharmacy Inventory Management

27) Distinguish between the functions and applications of NDC number, lot numbers, and expiration dates of inventory found in a pharmacy. Articulate the importance of this information as it relates to protecting the safety of the public. (TN CCSS Reading 2, 4, 7, 8; PTCB Knowledge Domain 7.1)

28) Define the concept of a formulary or approved/preferred product list. Research at least three different insurance companies for a listing of their approved formulary drug list. Compare and contrast the three lists with the top 200 drugs identified earlier in this course. Explain how the phrases “Dispense as Written” or “Do Not Substitute” can affect the formulary. Synthesize research into an informative essay. (TN CCSS Reading 1, 2, 4, 8, 9; TN CCSS Writing 2, 8, 9; PTCB Knowledge Domain 7.2)

Pharmacy Billing and Reimbursement

29) Role-play explaining the reimbursement policies and plans (e.g., HMOs, PPO, CMS, private plans) to a patient/client who has presented a prescription for three of the top 200 drugs. Ensure the accurate explanation of relevant third-party resolution issues (e.g., prior authorization, rejected claims, plan limitations)** and third-party reimbursement systems (e.g., PBM, medication assistance programs, coupons, and self-pay). (TN CCSS Reading 2, 9; TN CCSS Writing 4, 9; TN CCSS Math N-Q; PTCB Knowledge Domain 8.1, 8.2, 8.3)

30) Compare and contrast healthcare reimbursement systems in home health, long-term care, and home infusion. Develop a technology-enhanced presentation to share information with classmates, healthcare professionals, or pharmacy staff. (TN CCSS Reading 6, 9; TN CCSS Writing 6, 8, 9; PTCB Knowledge Domain 8.4, 8.5)

Pharmacy Information System Usage and Application

31) Research common software and databases used by pharmacies to manage electronic medical records and prescriptions. Understand the uses and capabilities of these programs as they relate to the roles and responsibilities of the pharmacy technician. (TN CCSS Reading 4, 7; PTCB Knowledge Domain 9.1, 9.2)

Standards Alignment Notes

*References to other standards include:

- TN CCSS Reading: Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects; Reading Standards for Literacy in Science and Technical Subjects 6-12; Grades 11-12 Students (page 62).
    - Note: While not directly aligned to one specific standard, students who are engaging in activities outlined above should be able to also demonstrate fluency in Standard 10 at the conclusion of the course.
- TN CCSS Writing: Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects; Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects 6-12; Grades 11-12 Students (pages 64-66).
    - Note: While not directly aligned to one specific standard, students who are engaging in activities outlined above should be able to also demonstrate fluency in Standards 1, 3, 5 and 10 at the conclusion of the course.
- TN CCSS Math: Common Core State Standards for Mathematics; Math Standards for High School: Number and Quantity, Algebra.
    - Note: The standards in this course are not meant to teach mathematical concepts. However, the concepts referenced above may provide teachers with opportunities to collaborate with mathematics educators to design project-based activities or collaborate on lesson planning. Students who are engaging in activities listed above should be able to demonstrate quantitative and algebraic reasoning as applied to specific technical concepts. In addition, students will have the opportunity to practice the habits of mind as described in the eight Standards for Mathematical Practice.
- TN A&P: Tennessee Department of Education Curriculum Standards, Secondary 9-12 Science, Human Anatomy & Physiology.
    - Note: While not directly aligned to one specific standard, students who are engaging in activities outlined above should be able to also demonstrate fluency in Tennessee Anatomy & Physiology Standard 6 at the conclusion of the course.
- PTCB Knowledge Domain: Pharmacy Technician Certification Exam (PTCE) Blueprint. The PTCE content was developed nationally by experts in pharmacy technician practice based on a national job analysis study. The updated blueprint will be the basis for the PTCE beginning in November 2013.

Additional Standards Notes

**Refers to standards that will require dosage calculations.

TENNESSEE DEPARTMENT OF EDUCATION
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Rehabilitation Careers

Primary Career Cluster:	Health Science
Consultant:	Sheila Carlton, (615) 532-2839, Sheila.Carlton@tn.gov
Course Code(s):	5999
Prerequisite(s):	*Health Science Education*
Credit:	1
Grade Level:	10-11
Graduation Requirements:	This course satisfies one of three credits required for an elective focus when taken in conjunction with other Health Science courses.
Programs of Study and Sequence:	This is a third course choice in the *Therapeutic Clinical Services* programs of study.
Necessary Equipment:	Equipment lists can be found on the Health Science website.
Aligned Student Organization(s):	HOSA: http://www.tennesseehosa.org Amanda Hodges, (615) 532-6270, Amanda.Hodges@tn.gov
Coordinating Work-Based Learning:	If a teacher has completed work-based learning training, he or she can offer placement in Job Shadowing or Clinical Internship. For more information, please visit http://www.tn.gov/education/cte/wb/.
Available Student Industry Certifications:	None
Dual Credit or Dual Enrollment Opportunities:	There are no known dual credit/dual enrollment opportunities for this course. If interested in developing, reach out to a local postsecondary institution to establish an articulation agreement.
Teacher Endorsement(s):	577
Required Teacher Certifications/Training:	None
Teacher Resources:	http://www.tn.gov/education/cte/HealthScience.shtml

Course Description

Rehabilitation Careers is an applied course designed to prepare students to pursue careers in rehabilitation services. Upon completion of this course, a proficient student will be able to identify careers in rehabilitation services. The successful student will recognize diseases, disorders or injuries related to rehabilitation services and correlate the related anatomy and physiology then develop a plan of treatment with appropriate modalities. The student will incorporate communication, goal setting, and information collection skills to be successful in the workplace. Standards in this course are aligned with

Tennessee Common Core State Standards for English Language Arts & Literacy in Technical Subjects, as well as Tennessee Anatomy and Physiology standards.*

Program of Study Application

This course is the second course in the *Therapeutic Nursing Services* and *Therapeutic Clinical Services* programs of study. For more information on the benefits and requirements of implementing these programs in full, please visit the Health Science website at http://www.tn.gov/education/cte/HealthScience.shtml.

Course Standards

Careers

1) Research careers within the Rehabilitation career pathway in Athletic Training, Physical Therapy, Occupational Therapy, Speech Therapy, Music Therapy, Pet Therapy, Exercise Therapy, Message Therapy, Chiropractic Medicine and Recreation Therapy. Explain in detail the educational/credentialing requirements, professional organizations, and continuing education unit requirements necessary for success in these fields, as well as state and national compliance guidelines required of Rehabilitation professionals. (TN CCSS Reading 2, 9; TN CCSS Writing 9)

2) Investigate and compare the range of skills, competencies, and professional traits required for careers in the Rehabilitation careers pathway. Using real-time and projected labor market data, identify local and national employment opportunities and determine areas of growth in rehabilitation careers. (TN CCSS Reading 2, 7; TN CCSS Writing 8, 9)

3) Compare and contrast the specific laws and ethical issues that impact relationships among patients/clients and the healthcare professional, and debate these issues in an oral or written format. Include issues such as codes and standards of practice. (TN CCSS Reading 2, 9; TN CCSS Writing 1, 4)

4) Summarize the Health Insurance Portability and Accountability Act (HIPAA) and other legal directives regarding medical treatment and analyze their impact on patient rights. Include confidential information shared concerning minor athletes and/or patients with someone other than parents. (TN CCSS Reading 1; TN CCSS Writing 9)

Healthcare Systems

5) Calculate the costs of a range of health insurance plans, including deductibles, co-pays, PPO's and HMO's. For a selected disease/disorder/injury, predict the total cost (including but not limited to the diagnostics, procedures, and medications involved), allowable reimbursement, and actual reimbursement under each of these plans for the course of the treatment. (TN CCSS Reading 7; TN CCSS Writing 8, 9)

6) Investigate current issues and practices surrounding assessment and treatment of clients seeking rehabilitation services such as athletes, military personnel, or patients recovering from surgery or trauma. Demonstrate understanding and application of major legislation and policy affecting patient/client interaction by determining the central idea or conclusion of a text.

Construct an argumentative essay explaining the identified issue, any legislation and outcomes. Include both claims and counterclaims equally. (TN CCSS Reading 2; TN CCSS Writing 1)

7) Gather information on the history and development of physical therapy, occupational therapy, speech therapy, and athletic training, including but not limited to significant changes in the profession, major contributors to the field, and impactful practices that were developed. Document findings from print and digital professional journals, rehabilitation career related websites, and textbooks in an oral, visual, digital, or paper product with proper citations. (TN CCSS Reading 1, 2; TN CCSS Writing 6, 8)

8) Evaluate factors that contribute to effective patient/client communication, demonstrating sensitivity to barriers, cultural differences, and special needs individuals. Apply effective practices within a lab/clinical setting. (TN CCSS Reading 2; TN CCSS Writing 9)

Anatomy and Physiology

9) Outline the gross and cellular anatomy and physiology of the musculoskeletal, neurological, and cardiovascular systems. Review the gross anatomy of the other systems studied in previous courses. (TN CCSS Reading 2; TN CCSS Writing 8, 9)

10) Investigate the basic principles of kinesiology and relate in an informational paper, brochure, or presentation the connection to disease/disorder prevention. Address at minimum: movements of joints and bones, planes, directional terms, body motions, motions between joint articular surfaces, mechanisms of joints and biomechanical levers. (TN CCSS Reading 1, 4; TN CCSS Writing 6, 9)

11) Compare and contrast physiological responses of patients of differing ages, current health status, and presence of acute and/or chronic diseases. For example, compare the response of a healthy elderly patient with a fractured femur to an overweight adolescent with the same fracture. Explain how one would differentiate treatment to meet varying conditions. (TN CCSS Reading 2, 9; TN CCSS Writing 4, 9)

12) Describe the physiological and pathological processes of trauma, wound healing, and tissue repair, and evaluate their implications on the development, progression, and implementation of a therapeutic exercise regimen. For example, examine a post-operative cardiac patient undergoing cardiac rehabilitation. (TN CCSS Reading 2, 4; TN CCSS Writing 9)

13) Identify signs and symptoms as well as pathophysiology for the following injuries/diseases/disorders as they are connected to Rehabilitation Careers. Relate who the appropriate professional would be to provide the care:
    a. Acute inflammation related to an injury
    b. Shock
    c. Communicable diseases, such as pertussis or influenza
    d. Adverse reaction to environmental conditions, both heat and cold
    e. Open and closed wounds
    f. Asthma
    g. Neurological disorders such as stroke, dizziness, and/or vestibular disorders
    h. Orthopedic conditions

i. Speech disorders and/or swallowing disorders
j. Work- or sports-related injuries
k. Ambulation or gait difficulties
l. Concussions
m. Soft Tissue Injuries

(TN CCSS Reading 1, 4; TN CCSS Writing 8, 9)

Evaluation and Treatment

14) Describe evidence-based techniques and procedures for evaluating common medical conditions, disabilities, and injuries. Discuss at minimum the procedures surrounding inspection/observation, palpation, testing of flexibility, endurance, and strength, special evaluation techniques, and neurological testing. Role-play practicing these skills on a classmate and/or family member, or within in a lab/clinical setting. (TN CCSS Reading 1, 4, 9; TN CCSS Writing 7, 9)

15) Define the basic components of injury-specific rehabilitation goals, functional progress, and outcomes in a therapeutic exercise regime. Apply these concepts to a specific case; for example, outline standard goals for a patient who is aphasic. (TN CCSS Reading 1, 9; TN CCSS Writing 8, 9)

16) List and define the goals, indications, contraindications, and various techniques of therapeutic exercise, including both general and specific exercise regimes relative to treatment of soft tissue, bony, neurological disorders/diseases, and post-surgical complications. (TN CCSS Reading 1, 8, 9; TN CCSS Writing 4, 8, 9)

17) Describe the indications, contraindications, theory, and principles for the incorporation and application of therapeutic exercise equipment and techniques, including but not limited to: continuous passive motion machine, aquatic therapy, manual therapy, adaptive therapeutic techniques, and/or assistive devices and mobilization. (TN CCSS Reading 1, 8, 9; TN CCSS Writing 4, 8, 9)

18) Describe common surgical techniques and relevant anatomical alterations that may affect the implementation of a therapeutic exercise regime. (TN CCSS Reading 2, 9; TN CCSS Writing 2, 9)

19) Using appropriate medical language and terminology, interpret objective and subjective data obtained in standard 13 in developing an appropriate therapeutic treatment plan for a given injury, disease, or disorder, including determination of goals and objectives in order to return the patient to maximum level of performance based on level of functional outcomes. (TN CCSS Reading 2, 4; TN CCSS Writing 2, 9)

Patient Interaction

20) Understand and successfully practice the following treatment modalities with identification of appropriate equipment and inclusion of sanitation methods, universal precautions, and proper body mechanics.
    a. Passive and Active Range of Motion exercises
    b. Gait training with assistive devices
    c. Cryotherapy, elevation, and compression

d. Hydrotherapy
e. Heat therapy
f. Electrostimulation (such as e-stim, TENS, or Ultrasound)
g. Wound care with or without external hemorrhage
h. Extrication and transport of athletes
i. Normalization of body temperature in extreme heat or cold environments

(TN CCSS Reading 1, 3)

21) Summarize in an informational paper, brochure, or digital presentation the specific symptoms and proper responses to life-threatening events such as shock, brain injury, and spinal cord injury in athletes. (TN CCSS Reading 1; TN CCSS Writing 1, 4)

22) Adhering to industry standards and using appropriate medical terminology, document the findings from evaluation, treatment plan, and progress in the therapeutic exercise regime related to a disease or disorder examined in standard 20 or 21. (TN CCSS Reading 2, 3, 9; TN CCSS Writing 2, 8, 9)

Prevention of Injuries

23) Identify the basic concepts of wellness screening in connection to injury prevention. Complete an injury prevention assessment in a lab/clinical setting.(TN CCSS Reading 2, 3; TN CCSS Writing 7, 9)

24) Explain and demonstrate the effectiveness of taping, wrapping, bracing, and use of other supportive/protective devices in preventing exacerbation of injury, disease, or disorder in a lab/clinical setting. (TN CCSS Reading 2, 3 ; TN CCSS Writing 7, 9)

25) Develop a patient health education plan for a real or imagined person that describes recommended preventive measures, signs and symptoms of exacerbation of disease/disorder/injury, pharmacological needs, and support systems to ensure safe and speedy recovery. Incorporate and properly cite information from at least three authoritative sources such as textbooks, digital or print healthcare journals, or interviews with related healthcare professionals. Examples of possible topics include effective heat loss and heat illness prevention, work back injury prevention, reaching and maintaining optimal weight, safe and effective physical activity, and use of pet, recreation, or music therapy in autistic children. (TN CCSS Reading 2, 4, 5, 9; TN CCSS Writing 2, 8, 9)

Standards Alignment Notes

*References to other standards include:

- TN CCSS Reading: Tennessee Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects; Reading Standards for Literacy in Science and Technical Subjects 6-12; Grades 9-10 Students (page 62).
    - Note: While not directly aligned to one specific standard, students who are engaging in activities outlined above should be able to also demonstrate fluency in Standard 10 at the conclusion of the course.

- TN CCSS Writing: Tennessee Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects; Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects 6-12; Grades 9-10 Students (pages 64-66).
    - Note: While not directly aligned to one specific standard, students who are engaging in activities outlined above should be able to also demonstrate fluency in Standards 3, 5, and 10 at the conclusion of the course.
- TN A&P: Tennessee Science: Anatomy and Physiology
- P21: Partnership for 21st Century Skills Framework for 21st Century Learning
    - Note: While not all standards are specifically aligned, teachers will find the framework helpful for setting expectations for student behavior in their classroom and practicing specific career readiness skills.