Department of Education | College, Career and Technical Education

May 2025

Health Science Education

Primary Career Cluster:	Health Science
Course Contact:	CTE.Standards@tn.gov
Course Code:	C14H14
Prerequisite:	None
Credit:	1
Grade Level:	9
Elective Focus-Graduation Requirements:	This course satisfies one of three credits required for an elective focus when taken in conjunction with other Health Science or Business courses.
POS Concentrator:	This course satisfies one out of two required courses to meet the Perkins V concentrator definition when taken in sequence in the approved program of study.
Programs of Study and Sequence:	This is the Year 1 course in all programs of study in the Health Science career cluster. It is also an option for the Year 1 course in the Health Services Administration program of study in the Business cluster.
Aligned Student Organization(s):	HOSA: http://www.tennesseehosa.org SkillsUSA: https://www.skillsusatn.org
Coordinating Work-Based Learning:	Teachers are encouraged to use embedded WBL activities such as informational interviewing, job shadowing, and career mentoring. For information, visit https://www.tn.gov/education/educators/career-and-technical-education/work-based-learning.html.
Promoted Tennessee Student Industry Credentials:	Credentials are aligned with postsecondary and employment opportunities and with the competencies and skills that students acquire through their selected program of study. For a listing of promoted student industry credentials, visit https://www.tn.gov/content/tn/education/educators/career-and-technical-education/student-industry-certification.html.
Teacher Endorsement(s):	577, 720
Required Teacher Certifications:	Please refer to Occupational Educator Licensure Guidance for a full list.
Required Teacher Training:	None
Teacher Resources:	https://www.tn.gov/education/educators/career-and-technical-education/career-clusters/cte-cluster-health-science.html Best for All Central: https://bestforall.tnedu.gov

Course at a Glance

CTE courses provide students with an opportunity to develop specific academic, technical, and 21st-century skills necessary to be successful in careers and life. In pursuit of ensuring every student in Tennessee achieves this level of success, we begin with rigorous course standards that feed into intentionally designed programs of study.

Students engage in industry-relevant content through general education integration and experiences such as career and technical student organizations (CTSO) and work-based learning (WBL). Through these experiences, students are immersed with industry-standard content and technology, solve industry-based problems, meaningfully interact with industry professionals, and use/produce industry-specific, informational texts.

Using a Career and Technical Student Organization (CTSO) in Your Classroom

CTSOs are a great resource to put classroom learning into real-life experiences for your students through classroom, regional, state, and national competitions, and leadership opportunities. Below are CTSO connections for this course, note this is not an exhaustive list.

- Participate in the CTSO Fall Leadership Conference to engage with peers by demonstrating logical thought processes and developing industry-specific skills that involve teamwork and project management.
- Participate in contests that highlight job skill demonstration, interviewing skills, community service activities, extemporaneous speaking, and job interviews.
- Participate in leadership activities such as Organizational Leadership, Prepared Speaking, HOSA Service Project, Creative Problem Solving, and HOSA Service Project.

Using Work-Based Learning (WBL) in Your Classroom

Sustained and coordinated activities that relate to the course content are the key to successful work-based learning. Possible activities for this course include the following. This is not an exhaustive list.

- **Standards 1.1-1.4** | Invite a malpractice lawyer or paralegal to discuss medicolegal cases.
- **Standards 2.1-2.2** | Tour a hospital or clinic.
- **Standards 3.1-3.3 |** Ingroups, virtually collaborate with a healthcare professional to prepare a health education presentation for a specified age group.
- **Standards 5.1-5.11** | Invite an EMT or EMR to present first aid skills for burns, wounds, and bone/joint injuries incorporating infection control measures into the skills.

Course Description

Health Science Education is an introductory course designed to prepare students to pursue careers in the fields of public health, therapeutics, health services administration, diagnostics, and support services. Upon completion of this course, a proficient student 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 Health Science programs of study as well as the Health Services Administration program of study.

Course Standards

1. Career Planning

1.1 Healthcare Systems: Examine the historical **evolution of healthcare systems** in the United States. Explain the importance of **major contributors and developments** linking them with **modern healthcare innovations and practices.**

1.2 Public Health Systems: Gather relevant information from multiple sources concerning the history of community health, disease outbreaks, historical figures, time periods, and/or practices to **understand how the public health system** has evolved.

1.3 Healthcare Careers: Compare and contrast **careers** in the **five health science career areas:** biotechnology research, therapeutic services, support services, health informatics, and diagnostic services. Include the following in the compare/contrast process:

a. job description;
b. roles and responsibilities;
c. programs or paths of study available to reach occupational goals;
d. licensing requirements; and
e. job availability, salaries, and benefits.

1.4 Professional Traits and Soft Skills in Healthcare: Summarize **professional traits and soft skills**, such as leadership, ethical responsibility, and time management, **required of healthcare professionals** in twenty-first-century healthcare systems. Compare **professional traits and soft skills to self-identified traits and soft skills** determining areas for growth.

1.5 Ethics and Legal Issues: Define **ethics and legal terms** related to health care including, but not limited to the following:

a. law,
b. ethics,
c. abuse,
d. assault and battery,
e. slander,
f. libel,
g. false imprisonment,
h. malpractice,
i. invasion of privacy, and
j. advanced directives.

Create an artifact that includes a definition of the term, and a brief description of **how each might be demonstrated in a healthcare setting.** Use the chart to participate in a class discussion about notable medicolegal cases using appropriate **medicolegal terminology**.

1.6 Ethical Artificial Intelligence (AI): **Explore the ethical implications of AI usage** through interactive discussions and case studies, learning to identify bias, ensure fairness, and protect privacy in AI systems. **Develop** critical thinking **skills to evaluate the societal impact of AI technologies**, while fostering a sense of responsibility and ethical decision-making in the use of AI tools.

1.7 Career and Technical Student Organization Introduction: Introduce the program's aligned Career and Technical Student Organization (CTSO), **HOSA and/or SkillsUSA**, through an interactive activity, such as a classroom competition.

2. Healthcare Systems

2.1 Healthcare Delivery Systems: Identify the different **types of facilities and options for healthcare delivery** in **the United States.** Compare and contrast the **United States' healthcare delivery system with two other countries** that have high-efficiency scores in healthcare as rated by agencies such as the World Health Organization. Identify **areas for improvement in the United States** and brainstorm possible solutions.

2.2 Methods of Payment for Health Care: Differentiate among the **methods of payment for health care** in the United States, including **private and state or federal insurance.** Define **insurance terms** including, but not limited to premium, deductible, co-pay, and benefit then use these terms to discuss the influence of increased costs on healthcare decisions made by healthcare consumers.

2.3 State and Federal Legislation: Summarize major state and federal legislation related to **community health** using both primary sources (such as laws) and secondary sources (such as media reports). Describe the **effects** of these **laws** on the provision of **healthcare in Tennessee** and the implications for at-risk populations.

3. Body Function and Structure

3.1 Body Systems, Quadrants, and Homeostasis: Break down each **body system** into a **list of organs** and describe the **function** of each system. Identify **cavities and quadrants** listing organs contained in each. Define **homeostasis** then use at least two systems and illustrate how they work together to maintain homeostasis.

3.2 Growth and Development Related to Health and Wellness: Evaluate **factors that impact human growth and development** related to the biophysical and mental/cognitive areas of infants, toddlers, school-age children, adolescents, and young, middle-aged, and senior adults. Elaborate on how each of these factors contributes to the **health and wellness of individuals**.

3.3 Child/Infant Mortality: Compare and contrast causes of **child/infant mortality** within the **first five years of life** in Tennessee versus the United States. Identify **effective interventions** for the prevention of infant and childhood disorders, supporting recommendations with evidence-based medical or public health practice standards retrieved from a variety of sources.

3.4 Patient Health Education Topics: Design a **patient health education awareness program** about 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 characteristics of the behavior and/or signs and symptoms of the issue; major physical concerns associated with the issue; preventive measures; treatments; and support systems.

4. Infection Control/Medical Microbiology

4.1 Infection Control Concepts: Define the **chain of infection** and provide **strategies for how to break each part of the chain** to prevent the spread of infection. Identify **infectious disease outbreaks** that have plagued our planet over the last ten years and apply the strategies for breaking the chain to each outbreak identified.

4.2 Infection Control Skills: 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, and
c. mask wearing.

5. Foundational Health Care Skills

5.1 Medical Terminology: Interpret the **historical development of the medical language**, illustrating the Latin and Greek origination of the medical terms used today. Detail the **importance of historical events** in medicine and **their relationship to modern medical language.** Identify and explain the **definitions and roles of the four types of word parts** (word roots, combining forms, combining vowels, suffixes, and prefixes) in forming medical terms. Apply knowledge of **word forms and structures** to interpret unfamiliar medical terms throughout this course.

5.2 Cultures and Communication: Differentiate between **verbal and nonverbal communication** and identify **common barriers.** Discuss **techniques for effective communication** and evaluate **how different cultures and generations attach different meanings** to various gestures, intonations, and other communication techniques. Model/role-play **effective communication techniques** for interactions with different cultures and generations.

5.3 Patient and Employee Safety: Investigate **current safety practices in healthcare settings** including, but not limited to fire, electrical, chemical, and back safety. Demonstrate **safety practices** in the classroom lab.

5.4 Complementary and Alternative Medicine: Review health topics surrounding **complementary and alternative medicine,** such as acupuncture, biofeedback, and herbal treatments on sites like the National Institute of Health, the Mayo Clinic, or Medline Plus. Rate the therapies according to perceived effectiveness. Include general information, purported benefits, use in the United States, side effects and/or risks, relevant research, cost, and links to more information.

5.5 Emergency Medicine Skills: 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 for bleeding and wounds,
b. Basic First Aid care for burns, and
c. Basic First aid for bone and joint injuries.

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

5.7 Medical Laboratory Assisting Skills: 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.

5.8 Medical Assisting and Nursing Assisting Skills: Understand principles of and successfully perform **skills related to Medical Assisting and Nursing Assisting,** incorporating rubrics from textbooks or clinical standards of practice for the following:
   a. temperature, pulse, respiration, and blood pressure assessment; and
   b. weighing an ambulatory patient.

5.9 Physical Therapy and Athletic Training Skills: Understand principles of and successfully perform **skills related to Physical Therapy and Athletic Training,** incorporating rubrics from textbooks or clinical standards of practice for the following:
   a. ambulation with crutches or cane,
   b. administering cold applications,
   c. assessment of athlete with injured ankle or wrist, and
   d. basic stretching exercises.

5.10 Pharmacy Technician Skills: Understand principles of and successfully perform **skills related to the Pharmacy Technician**, incorporating rubrics from textbooks or clinical standards of practice for the following:
   a. accurately weigh dry compounds using balance or electronic scales or accurately measure liquid using graduated cylinders, pipettes, and/or syringes; and
   b. verify prescription.

5.11 ECG Technician Skills: Understand principles of and successfully perform **skills related to the ECG Technician,** incorporating rubrics from textbooks or clinical standards of practice for the following:
   a. Assess the O2 level using a pulse oximeter.
   b. Simulate accurate placement of electrodes for a 5-lead ECG on a chart or a CPR manikin.

6. Data Analysis

6.1 Data Analysis in Health Science: Research the **use of data in Health Science** career fields. Include data that is generated internally by businesses, and externally by local communities, state, and the nation. Explore examples of how the data is used, including the following:
   a. customer/client use of products and services,
   b. demographics of end users,
   c. community, state, and national statistics, and
   d. data that must be reported to another entity.

7. Course Project

7.1 Engineering Design Process: As a team, using the **Engineering Design Process**, create an original medical innovation idea and design using HOSA Medical Innovation resources. The innovation should be something that could lead to an advancement in medicine or the delivery of healthcare.

a. Teams will **build a basic prototype of their innovation**, and provide supporting evidence for why this innovation is needed.
b. Topics could include, but are not limited to the following:
    i. medical or healthcare innovation,
    ii. emerging technologies in health, or
    iii. advances in medicine.
c. **Conduct research** to identify current medical needs or problems that the device could address. **Analyze demographic data** to understand the target population and potential market size. **Evaluate** competitor products and market trends to assess the competitive landscape.
d. **Compile** the elements of the medical innovation idea with data and other artifacts for inclusion in a design portfolio, such as an engineering design notebook, to be updated throughout the program of study.

Standards Alignment Notes

*References to other standards include:

- 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.

Anatomy and Physiology

Primary Career Cluster:	Health Science
Course Contact:	CTE.Standards@tn.gov
Course Code:	C14H09
Prerequisite(s):	*Health Science Education* (C14H14). Suggested prerequisite or co-requisite: *Biology I* (G03H53)
Credit:	1
Grade Level(s):	10-12
Elective Focus-Graduation Requirements:	This course satisfies one of three credits required for an elective focus when taken in conjunction with other Health Science courses. In addition, this course satisfies one credit of laboratory science required for graduation.
POS Concentrator:	This course satisfies one out of two required courses to meet the Perkins V concentrator definition when taken in sequence in the approved program of study.
Programs of Study and Sequence:	This is the Year 2 course in the *Diagnostic Services, Nursing Services, Emergency Services, Therapeutic Services* and *Sport and Human Performance* programs of study.
Aligned Student Organization(s):	HOSA: http://www.tennesseehosa.org SkillsUSA: https://www.skillsusatn.org
Coordinating Work-Based Learning:	Teachers are encouraged to use embedded WBL activities such as informational interviewing, job shadowing, and career mentoring. For information, visit https://www.tn.gov/education/educators/career-and-technical-education/work-based-learning.html.
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Teacher Endorsement(s):	577, 720
Required Teacher Certifications:	Please refer to Occupational Educator Licensure Guidance for a full list.
Required Teacher Training:	None
Teacher Resources:	https://www.tn.gov/education/educators/career-and-technical-education/career-clusters/cte-cluster-health-science.html Best for All Central: https://bestforall.tnedu.gov/

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Using Work-Based Learning (WBL) in Your Classroom

Sustained and coordinated activities that relate to the course content are the key to successful work-based learning. Possible activities for this course include the following. This is not an exhaustive list.

- **Standards 1.1- 2.5** | Job shadow an exercise physiologist, athletic trainer, or physical therapist.
- **Standards 3.1-3.4** | Interview a patient with an endocrine or neurological disorder to practice preparing a history and physical report.
- **Standards 4.1- 4.8** | Participate in a service-learning project for the American Heart Association or the American Lung Association.
- **Standards 5.1- 5.4** | Visit a dialysis center or work with a dietitian to create a school-wide diabetes awareness project.
- **Standards 6.1- 6.2** | Interview a genetics counselor.

Course Description

Anatomy and Physiology is designed to develop an understanding of the structures and functions of the human body while relating those to knowledge and skills associated with pathophysiology. Upon completion of this course, proficient students will be able to (1) apply the gross anatomy from earlier courses to a deeper understanding of all body systems, (2) identify the organs and structures of the support and movement systems, (3) relate the structure and function of the communication, control, and integration system, and (4) demonstrate a professional, working understanding of the transportation, respiration, excretory, and reproduction systems.

Course Standards

1. Organization of the Human Body

1.1 Organization of the Body: Review the relationship between anatomy and physiology (A&P) from previous courses differentiating the **major organ systems** of the human body by their anatomy and physiology and engage in an argument about defined boundaries due to their **functional connectivity.** Characterize the organizational levels of the human body and observe patterns in **cell types and tissue types** across organ systems.

1.2 Body Cavities and Directional Terms: Use a human model to differentiate the **major body cavities and organs** located within them. Describe the model using proper anatomical and **directional terminology** for **body regions, planes, and cavities**.

1.3 Terminology of Body Planes, Cavities, Directional Terms, and Body Systems: Evaluate multiple evidence-based research articles. Document the **correlation of diseases and/or disorders** discussed in the articles with terminology associated **with anatomical positions, body planes, cavities, directional terms, body systems, and symbols.**

1.4 Homeostasis and Feedback Mechanisms: Evaluate how organisms use **positive and negative feedback mechanisms** to maintain their **internal environment** and respond to **external environmental changes**. Investigate possible consequences that can occur if the body does not maintain **homeostasis**. Summarize how **cellular metabolism** can affect the body's homeostatic state.

1.5 Terminology related to Body Systems: Analyze and interpret **vocabulary related to pathology, diagnostic, and therapeutic medical terms, as well as abbreviations of the body systems** below, by evaluating professional texts featuring such terms. Demonstrate **mastery of medical terminology use and accurate spelling** in each area through verbal and written explanation.

a. Cells, tissues, and glands
b. Genetics
c. Integumentary
d. Respiratory
e. Cardiovascular
f. Musculoskeletal
g. Endocrine
h. Nervous
i. Lymphatic/immune and hemolytic

j. Gastrointestinal
k. Urinary
l. Special senses
m. Reproductive

2. Support and Movement

2.1 Integumentary System: Analyze the **anatomical structures of the integumentary system** and investigate their role in the physiological processes of **protection, temperature homeostasis, and sensation.** Assess the microscopic components of the **skin layers** in a cross-sectional image summarizing potential **diseases, disorders, and syndromes** possible for each layer.

2.2 Bone Formation, Growth, and Repair: Summarize the **processes of bone formation, growth, and repair**. Diagram **microscopic bone structures**, identifying regions that participate in **hematopoiesis** and **storage of minerals and fat.** Discuss **diseases and disorders** of the skeletal system as they relate to **bone formation, growth, repair, hematopoiesis, and storage of minerals and fat.**

2.3 Skeletal Anatomy, Function, and Movement: Label the **major bones** within the **axial and appendicular divisions** on a skeleton; relate their **physiological roles** in creating a body scaffold, internal organ protection, and anchor points for skeletal muscles participating in the movement. Demonstrate the generation of **movement of bones through antagonistic muscle groups.**

2.4 Joints and Articulation: Classify joints based on their **structure and function**. Compare and contrast the **three types of joints** and provide an example of each, including the involvement of tendons, ligaments, bursae, and cartilage where applicable. Determine the **effects of various types of arthritis** on each category of joint.

2.5 Types of Muscle and Muscle Anatomy, Physiology, and Pathophysiology: Differentiate **visceral, cardiac, and skeletal muscle tissues** based on anatomical criteria and their physiological role in the movement of body parts and/or substances. Model the **gross and microscopic anatomy of skeletal muscle and muscle fibers** and provide examples of possible **pathophysiology**. Use the model to highlight **major muscle groups** and explain the **physiology of skeletal muscle contraction**.

3. Communication, Control, and Integration

3.1 Hormones and the Endocrine System: Relate the **hormones produced by the endocrine system** to the glands that produce them and their **effects on target organs** using the concept of **negative feedback.** Explain the relationship between **receptors and ligands** and differentiate between **steroid and non-steroid hormones as ligands.**

3.2 Nervous System Anatomy: Compare and contrast the anatomy of the **central nervous system** and the **peripheral nervous system**, including possible **diseases and disorders** of each. Link structures to their physiological roles and include the **structure and function of the somatic and autonomic nervous systems** in the explanation. Interpret the importance

of **cerebrospinal fluid** and its connection to circulation including the phenomenon of the **blood-brain barrier** within the brain in the explanation.

3.3 Neurons and Action Potentials: Label the **cellular and subcellular structures of neurons** and explain the **molecular neurophysiology of membrane potentials and** the conduction of information through **synaptic transmission**. Evaluate the process of **action potentials** of the nervous system and name the factors that affect the speed at which a nerve impulse travels.

3.4 Central Nervous System and Sensory Systems: Model the **major parts of the brain and spinal cord** relating each to its **source of sensory information** and/or its primary target of regulation. Identify and describe the **types of sensory receptors** found in the human body and explain the structures, functions, and limitations of the human sensory systems: **hearing, balance/proprioception, sight, touch, smell, and taste**.

4. Respiration, Transportation, and Defense

4.1 Cardiac Anatomy and Circulation: Create an artifact to outline the **structure and functions of the cardiovascular system**, paying special attention to the musculature of the walls, the chambers, and the valves of the heart and blood vessels. Demonstrate the **circulation of blood through the heart** comparing and contrasting **systemic and pulmonary circulation**.

4.2 Electrophysiology and the Cardiac Cycle: Describe the phases of the **cardiac cycle** and the heart's **internal and external control mechanisms** involved in producing the heartbeat. Discuss how **heart rate** and **cardiac output** relate to one another. Listen to **heart sounds,** either digitally or with a stethoscope, to identify the **normal and abnormal sounds** made during the cardiac cycle. Give reasons for the abnormal sounds encountered.

4.3 Blood Pressure and Homeostasis: Create or use a model of the human heart to clarify **systole and diastole** related to **blood pressure** and the factors affecting **blood pressure's role in homeostasis**. Discuss the heart's **intrinsic and extrinsic control mechanisms** involved in producing a heartbeat.

4.4 Respiratory Anatomy and Physiology and Pathophysiology of the Cardiorespiratory System: Examine how the **anatomy of the respiratory system** functions to provide **oxygen and carbon dioxide transport mechanisms** between the lungs and the circulatory system, considering **capillary structures, red blood cell structures, diffusion, and affinity**. Discuss the **pathophysiology of the cardiorespiratory system and** its effects on the human body.

4.5 Blood and its Components: Identify the **liquid and cellular components of blood** using appropriate medical terminology. Summarize the structural characteristics, normal levels, function, and life span of each. Analyze **how and where each component is manufactured** (i.e., as with **hematopoiesis and erythropoiesis)** and the **possible complications** with the development of cellular components.

4.6 Blood Typing: Break down the **roles of antigens and antibodies** in the blood while explaining the **ABO system** and **Rh classification system.** In a lab setting with simulated

blood, determine the ABO and Rh of samples with an explanation of results, including a description of **cross-matching** and the causes and possible outcomes of a **transfusion reaction.**

4.7 Structure and Function of the Lymphatic System: Assess the relationship between the **structure and function of the lymphatic system**. Differentiate between **innate and adaptive immunity,** the cells involved, and how each functions to maintain **homeostasis** in the body.

4.8 Temperature Homeostasis: Interpret the relationship between the **integumentary, muscular, and cardiovascular systems in temperature homeostasis**. Relate how malfunctions in any of the three systems can affect temperature regulation.

5. Nutrition and Excretion

5.1 Gastrointestinal System and the Hepatic Portal System: Model the **sequential organization of the alimentary canal** and its **accessory organs** to describe the physiological role of each, including a discussion of the **major digestive enzymes and hormones** produced along with their functions. Outline how the **hepatic portal system** couples the digestive and cardiovascular systems.

5.2 Absorption and Transport: Analyze **gastrointestinal wall histology** and interpret how the anatomical architecture supports the efficient **absorption and transport of molecules** into the cardiovascular or lymphatic circulation. Discuss **possible outcomes of a disruption** of this process.

5.3 Lipid Transport: Demonstrate the **progression of lipid transport** from the digestive system, through the lymphatic system, and into the cardiovascular circulation.

5.4 Blood Filtration and Waste Excretion by the Urinary System: Design a concept map of the **structures of the urinary system** to establish the **physiological role of blood filtration and waste excretion from the body**. Include a detailed description of the **parts of a nephron** and how they assist in homeostatic mechanisms through **urine formation.** Clarify how **disorders of the urinary system** affect homeostasis.

6. Reproduction, Growth, and Development

6.1 Reproductive System Anatomy and Physiology: Outline the **structure and function of the male and female reproductive systems** that provide the physiological functions of **gametogenesis, fertilization, and embryogenesis**, based on the **secretion of hormones**. Correlate the **endocrine tissues of the reproductive system** with their roles in the regulation of secondary sex characteristics, the female menstrual cycle, pregnancy, fetal development, and parturition.

6.2 Egg, Sperm, and Fertilization: Examine the **microscopic structures of the human egg and sperm** and determine how those structures relate to their function. Evaluate the **process of fertilization**, and then create a timeline of the phases of fetal development from fertilization until birth. Describe the abnormalities that can occur at each phase.

7. Team Project

7.1 Team Project with Data Analysis: As a team, **identify a problem** related to the program of study as a whole. **Research and utilize the Engineering Design Process to design a solution**. Document the following steps in an engineering design notebook for inclusion in the program portfolio. When possible, connect the problem to an existing CTSO event.

a. **Problem Identification**: Brainstorm specific problems and challenges within the program of study. Conduct basic research to understand the scope and implications of the identified problem. Identify one problem as a focus area.
b. **Research and Analysis**: Conduct in-depth research on chosen topics related to the problem. Locate and analyze a dataset related to the problem.
c. **Review the Stages of the Engineering Design Process**: Define the problem, research, brainstorm solutions, develop prototypes, test and evaluate, and iterate. Consider constraints such as cost, efficiency, and environmental impact during the design process.
d. **Project Implementation**: Assign specific roles within the design teams (e.g., project manager, researcher, designer, tester). Design a solution tailored to address the identified problem or scenario. Document progress through design journals, sketches, diagrams, and digital presentations. (Note: Prototype is optional in the Level II course.)
e. **Presentation and Reflection**: Showcase the problem and solution to the class. Share the data that was analyzed and how it affected the solution. Discuss the design process and challenges. As a class, critically evaluate the effectiveness and feasibility of the solutions and propose potential improvements.

Standards Alignment Notes

*References to other standards include:

- P21: Partnership for 21st Century Skills Framework for 21st Century Learning
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Behavioral Health

Primary Career Cluster:	Health Science
Course Contact:	CTE.Standards@tn.gov
Course Code:	C14H79
Prerequisite(s):	*Health Science Education* (C14H14) & *Anatomy & Physiology* (C14H09)
Credit:	1 credit
Grade Level(s):	11-12
Elective Focus-Graduation Requirements:	This course satisfies one of three credits required for an elective focus when taken in conjunction with other Health Science courses.
POS Concentrator:	This course satisfies one out of two required courses to meet the Perkins V concentrator definition when taken in sequence in the approved program of study.
Programs of Study and Sequence:	This is the Year 3 course in the Behavioral Health program of study.
Aligned Student Organization:	HOSA: http://www.tennesseehosa.org
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Students engage in industry-relevant content through general education integration and experiences such as career and technical student organizations (CTSO) and work-based learning (WBL). Through these experiences, students are immersed with industry-standard content and technology, solve industry-based problems, meaningfully interact with industry professionals, and use/produce industry-specific, informational texts.

Using a Career and Technical Student Organization (CTSO) in Your Classroom

CTSOs are a great resource to put classroom learning into real-life experiences for students through classroom, regional, state, and national competitions, and leadership opportunities. Below are CTSO connections for this course. Note this is not an exhaustive list.

- Participate in the CTSO Fall Leadership Conference to engage with peers by demonstrating logical thought processes and developing industry-specific skills that involve teamwork and project management.
- Participate in contests that highlight job skill demonstration, interviewing skills, community service activities, extemporaneous speaking, and job interviews.
- Participate in leadership activities such as Organizational Leadership, Prepared Speaking, HOSA Service Project, Creative Problem Solving, and HOSA Service Project.

Using Work-Based Learning (WBL) in Your Classroom

Sustained and coordinated activities that relate to the course content are the key to successful work-based learning. Possible activities for this course include the following. This is not an exhaustive list.

- **Standards 1.2-1.4** | Informational interview with an industry partner.
- **Standards 5.1-5.5** | Complete an integrated project with multiple interactions with professionals in the Behavioral Health field.
- **Standards 7.1** | Present final presentation to potential industry employer.

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Course Description

Behavioral Health is the Year 3 course designed to prepare students to pursue careers in the fields of behavioral medicine and social-emotional health. Upon completion of this course, proficient students will be able to describe basic principles of behavioral health and wellness care in behavioral health settings and current issues in Tennessee and America.

Course Standards

1. Career Planning and Professionalism

1.1 Career Exploration: Revise the career information portfolio developed in the *Health Science Education* course with **research of more in-depth information surrounding careers in behavioral health**. Identify specific roles and responsibilities for each career in this field. Investigate and compare the range of skills, competencies, and professional traits required for such careers. Compare findings to current individual strengths and identify opportunities for personal development.

1.2 Roles of the Team: **Explain the functions of the various members of the behavioral health care team**, such as social workers, behavioral health nurses, physical and occupational therapists, and psychiatrists. Include the primary functions and duties of each.

1.3 Healthcare Shortages: **Illustrate state and nationwide shortages in mental health professionals**, including psychiatrists. Indicate the areas of the state and country which will likely suffer significant shortfall.

1.4 Characteristics of Team Members: Develop a list of **personal and professional characteristics in a mental health team member** that are necessary for success. Briefly describe why each is important in the career field.

2. Mental Health and Addiction

2.1 Addiction Statistics: Research the statistics on **addiction in Tennessee and nationwide** and explain areas of concern. Include the following in your explanation:

a. number of people dying from drug overdoses in Tennessee annually and nationwide;
b. number of Tennesseans using illicit drugs in a given month and nationwide; and
c. number of young adults (age 18-25) who use illicit drugs in a given month, and the number dying from overdoses.

2.2 Suicide Statistics: Research the statistics on **suicide in Tennessee and nationwide** and explain areas of increase. Include the following in your explanation:

a. number of people dying from suicide in Tennessee annually and nationwide;
b. number of young adults (age 18-25) dying from suicide in a given month; and
c. increases in statistics in targeted demographics within the last five years.

2.3 Treatment Stigmas: Summarize the historical attitudes **and stigmas related to mental health care treatment and recovery**. Explain proactive methods to change these attitudes.

3. Stress and Anxiety

3.1 Selye's General Adaptation Syndrome: Differentiate between stress and anxiety. Explain the **three-stage process of Selye's General Adaptation Syndrome**.

3.2 Coping Mechanisms: **Outline coping mechanisms** in dealing with stress, including adaptive and maladaptive responses. Provide examples for multiple situations.

3.3 Anxiety Interventions: Describe **interventions for persons experiencing severe panic and anxiety.**

4. Ethical and Legal Issues in Behavioral Health

4.1 Ethics: **Outline ethical and legal issues specific to behavioral health**, such as voluntary and involuntary commitment, medication refusal, use of seclusion and restraints, and the duty to warn principle.

4.2 Crisis De-Escalation: Explore **procedures in crisis de-escalation**, including the documentation process for crisis situations.

5. Treatment Facilities and the Therapeutic Relationship

5.1 Available Treatment Facilities: **Investigate various types of treatment facilities** in Tennessee for mental health and addiction. Include explanations of counseling services, outpatient vs. residential, and timelines to recovery. Where available, list approximate costs.

5.2 Models of Mental Healthcare: **Explain the models of mental healthcare**, including the disease model of addiction, the recovery to practice (RTP) model, and the five core elements of recovery.

5.3 Therapeutic Relationships: **Examine the therapeutic relationship**, including its phases, appropriate boundaries, and the ideal therapeutic environment.

5.4 Communication in Mental Health: **Diagram characteristics of communication and their usage in the therapeutic environment,** including the following:

a. non-verbal communication techniques, both therapeutic and non-therapeutic; and

b. verbal communication techniques, both therapeutic and non-therapeutic.

5.5 Open Questions, Affirmations, Reflective Listening, and Summarizing (OARS) Technique: **Practice the OARS technique** of motivational interviewing.

6. Disorders and Evaluations

6.1 Diagnostic Statistical Manual (DSM) 5 Assessment: **Explore the DSM 5 assessment measures**. Outline and describe the major categories of behavioral and mental health disorders.

6.2 Early Development and Home Background (EDHB): Review the Early Development and Home Background (EDHB) form and the Cultural Formulation Interviews. **Explain the intent of these assessments** and the information that might be gleaned from conversations. Describe behaviors that might interfere with adaptive family functioning.

6.3 Psychotic Disorders: **Outline common psychotic disorders**. Describe behavior patterns associated with these.

6.4 Mood Disorders: **Outline common mood disorders**. Describe behavior patterns associated with these.

6.5 Substance Abuse: **Describe substance abuse diagnosis**. Describe behavior patterns associated with this.

6.6 Personality Disorders: **Outline common personality disorders**. Describe behavior patterns associated with these.

7. Final Project

7.1 Project: Choose one **behavioral or mental health disorder as the focus of an in-depth investigation**. Include the following information:

a. description of the disorder,
b. common symptoms and behavior patterns,
c. coping mechanisms,
d. possible interventions, and
e. case studies and/or examples.

Standards Alignment Notes

*References to other standards include:

- 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.

Behavioral Health Practicum

Primary Career Cluster:	Health Science
Course Contact:	CTE.Standards@tn.gov
Course Code:	C14H80
Prerequisite(s):	*Health Science Education* (C14H14), *Anatomy & Physiology* (C14H09), & *Behavioral Health* (C14H79)
Credit:	1 credit
Grade Level:	12
Elective Focus-Graduation Requirements:	This course satisfies one of three credits required for an elective focus when taken in conjunction with other Health Science courses.
Program of Study (POS) Concentrator:	This course satisfies one out of two required courses to meet the Perkins V concentrator definition when taken in sequence in the approved program of study.
Programs of Study and Sequence:	This is the Year 4 course in the Behavioral Health program of study.
Aligned Student Organization:	HOSA: http://www.tennesseehosa.org
Coordinating Work-Based Learning:	Teachers who hold an active WBL certificate may offer placement for credit when the requirements of the state board's WBL Framework and the Department's WBL Policy Guide are met. For information, visit https://www.tn.gov/education/educators/career-and-technical-education/work-based-learning.html.
Promoted Tennessee Student Industry Credentials:	Credentials are aligned with postsecondary and employment opportunities and with the competencies and skills that students acquire through their selected program of study. For a listing of promoted student industry credentials, visit https://www.tn.gov/content/tn/education/educators/career-and-technical-education/student-industry-certification.html.
Teacher Endorsement(s):	577, 720
Required Teacher Certifications:	Please refer to Occupational Educator Licensure Guidance for a full list.
Required Teacher Training:	None
Teacher Resources:	https://www.tn.gov/education/educators/career-and-technical-education/career-clusters/cte-cluster-health-science.html Best for All Central: https://bestforall.tnedu.gov/

Course at a Glance

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Using a Career and Technical Student Organization (CTSO) in Your Classroom

CTSOs are a great resource to put classroom learning into real-life experiences for students through classroom, regional, state, and national competitions, and leadership opportunities. Below are CTSO connections for this course; note this is not an exhaustive list.

- Participate in the CTSO Fall Leadership Conference to engage with peers by demonstrating logical thought processes and developing industry-specific skills that involve teamwork and project management.
- Participate in contests that highlight job skill demonstration, interviewing skills, community service activities, extemporaneous speaking, and job interviews.
- Participate in leadership activities such as Organizational Leadership, Prepared Speaking, HOSA Service Project, Creative Problem Solving, and HOSA Service Project.

Using Work-Based Learning (WBL) in Your Classroom

Sustained and coordinated activities that relate to the course content are the key to successful work-based learning. Possible activities for this course include the following. This is not an exhaustive list.

- **Standards 1.2 and 1.4** | Invite a Behavioral Health worker to give a safety and HIPAA briefing.
- **Standards 1.3** | Conduct an informational interview about postsecondary opportunities with an industry partner.
- **Standards 1.2-3.3** | Complete an integrated project with multiple interactions with professionals in the Behavioral Health field.
- **Standards 4.1** | Present final presentation to potential industry employer.

Course Description

Behavioral Health Practicum is the capstone course in the Behavioral Health program of study. It is intended to provide a work-based learning (WBL) experience for students to develop further understanding of professional issues, utilize employability skills, and demonstrate mastery of academic and technical skills learned throughout this program of study. The WBL experience provides opportunities to apply and practice the knowledge and skills learned in previous courses and gives students hands-on practical experiences related to aspects of behavioral and mental

health related fields of occupation. Upon completion of the course, a proficient student will be able to discern multiple pathways to a career in behavioral health and related fields, necessary steps toward applying for a postsecondary program, necessary steps toward applying for a job, and reflect on program goals and aspirations. Instruction will be delivered through the classroom environment in conjunction with a WBL placement, such as an internship.

Course Standards

1. Career Planning and Professionalism

1.1 Personalized Learning Plan: A student will have a personalized learning plan that **identifies their long-term goals**, demonstrates how the work-based learning (WBL) experience aligns with their elective focus and/or high school plan of study, addresses how the student plans to meet and demonstrate the course standards, and addresses employability skill attainment in the following areas:

a. application of academic and technical knowledge and skills (embedded in course standards);
b. career knowledge and navigation skills;
c. 21st century learning and innovation skills; and
d. personal and social skills.

1.2 Safety: Accurately read, interpret, and **demonstrate adherence to safety guidelines** appropriate for the roles and responsibilities of an employee of a healthcare facility. Listen to safety instructions and be able to explain why certain rules apply. Demonstrate safety techniques and follow all applicable facility policies and procedures (such as Standard Precautions) related to the clinical placement. Based on placement, document completion of training topics on the appropriate WBL and work site forms.

1.3 Postsecondary Opportunities**: Analyze the range of certificates and degrees** that can be earned that are aligned with career goals. Investigate in-state postsecondary programs in a variety of behavioral health services fields.

1.4 HIPAA: **Review the Health Insurance Portability and Accountability Act (HIPAA) concepts** and investigate methods to assure confidentiality within the healthcare setting. Employ techniques to ensure the client/patient's rights are maintained.

1.5 Ethics: Demonstrate integrity and ethical behavior when engaging in all worksite activities, including the use of tools and materials, documentation of hours, sharing of information, and completion of all personnel-related forms. Identify an actual or potential worksite ethical issue and **outline how the issue should be resolved**, including claims and counterclaims with relevant data to support conclusions.

1.6 On-Site Experience: **Complete tasks as directed with supervision**, knowing when to ask questions or request guidance. Exhibit resourcefulness and initiative in taking on new tasks and solving problems independently as appropriate to the workplace setting. Demonstrate how to learn and exhibit personal agency in identifying and achieving instrumental and ultimate learning objectives. Demonstrate curiosity to learn more about the tasks, workplace, and/or industry. Explore deeper content independently and request opportunities for professional development. Demonstrate self-efficacy and confidence in one's ability to succeed in specific situations.

2. Agencies and Resources

2.1 Identify Resources: **Summarize state and local resources and supports** devoted to behavioral health. Summarize the essential state and local resources available for behavioral and mental health and the divisions of state government responsible for each.

3. Primary Care and Referrals to Treatment

3.1 Impact of Trauma**: Explain the impact of Adverse Childhood Experiences (ACEs), Trauma, and Post Traumatic Stress Disorder (PTSD) in primary care**, including behaviors that can stem from these experiences. Determine treatment options for patients with these concerns.

3.2 Entering Treatment: Explore the **processes of screening, brief interventions, and referrals to treatment** (SBIRT), including the objectives and methods. Roleplay these discussions with peers.

3.3 Methodologies of Treatment: Examine the various treatment methodologies prescribed for behavioral health issues and **explain why certain diseases and disorders call for different types of treatment**, including but not limited to pharmacological regimens, changes in diet and exercise, counseling, and different types of therapy.

4. Final Project

4.1 Project: Examine articles and case studies to **explore how families and neighborhoods can change as the result of chronic or acute incidents of trauma**, such as generational poverty or acts of violence, and discuss the implications for community structure, family dynamics, and financial stability when behavioral and mental health issues are prevalent within a community. Develop a detailed plan to alleviate the effects of mental health on a community.

Standards Alignment Notes

References to other standards include:

- 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.

Diagnostic Medicine

Primary Career Cluster:	Health Science
Course Contact:	CTE.Standards@tn.gov
Course Code:	C14H12
Prerequisite:	*Health Science Education* (C14H14)
Credit:	1
Grade Level(s)	10-11
Elective Focus-Graduation Requirements:	This course satisfies one of three credits required for an elective focus when taken in conjunction with other Health Science courses.
POS Concentrator:	This course satisfies one out of two required courses to meet the Perkins V concentrator definition when taken in sequence in the approved program of study.
Programs of Study and Sequence:	This is the Year 3 course in the *Diagnostic Services* program of study.
Aligned Student Organization(s):	HOSA: http://www.tennesseehosa.org SkillsUSA: https://www.skillsusatn.org
Coordinating Work-Based Learning:	Teachers are encouraged to use embedded WBL activities such as informational interviewing, job shadowing, and career mentoring. For information, visit https://www.tn.gov/education/educators/career-and-technical-education/work-based-learning.html.
Available Student Industry Credentials:	Credentials are aligned with postsecondary and employment opportunities and with the competencies and skills that students acquire through their selected program of study. For a listing of promoted student industry credentials, visit https://www.tn.gov/content/tn/education/educators/career-and-technical-education/student-industry-certification.html.
Teacher Endorsement(s):	577, 720
Required Teacher Certifications:	Please refer to Occupational Educator Licensure Guidance for a full list.
Required Teacher Training:	None
Teacher Resources:	https://www.tn.gov/education/educators/career-and-technical-education/career-clusters/cte-cluster-health-science.html Best for All Central: https://bestforall.tnedu.gov/

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Using Work-Based Learning (WBL) in Your Classroom

Sustained and coordinated activities that relate to the course content are the key to successful work-based learning. Possible activities for this course include the following. This is not an exhaustive list.

- **Standards 1.1-1.2** | Interview a diagnostic medicine professional to determine how HIPAA's ethical/legal tenets affect the patient's rights for all aspects of care.
- **Standards 2.1-3.3** | Shadow a biomedical equipment technician to explore how diagnostic equipment has developed and to observe quality control monitoring.
- **Standards 4.1-4.3** | Invite an infection control specialist to present information on healthcare-associated infections related to diagnostic medicine.
- **Standards 5.1-5.5** | Tour an imaging department.
- **Standards 6.1-6.4** | Tour a medical laboratory program at a local community college.
- **Standards 7.1-7.4** | Shadow an ophthalmic technician to observe the use of diagnostic equipment.
- **Standards 8.1-8.7** | Participate in an abbreviated internship to practice the skills required of an EKG technician.

Course Description

Diagnostic Medicine is the Year 3 course designed to prepare students to pursue careers in the fields of diagnostic medical imaging, medical laboratory testing, optometry, and other patient diagnostic procedures. Upon completion of this course, proficient students will be able to describe new and evolving diagnostic technologies, compare and contrast the features of healthcare systems, explain the legal and ethical ramifications of the healthcare setting, and begin to perform foundational healthcare skills.

Course Standards

1. Career Planning and Professionalism

1.1 Diagnostic Careers: Differentiate **diagnostic services careers** from the four other health science career areas. Identify specific **roles and responsibilities** for a variety of careers in this field. Investigate and compare the range of skills, competencies, and professional traits required for such careers. Compare findings to current individual strengths and identify **opportunities for personal development**.

1.2 HIPAA: Summarize the **Health Insurance Portability and Accountability Act (HIPAA**), in particular those aspects related to maintaining **confidentiality, patient rights, patient safety, and other ethical/legal directives governing medical treatment**. Using medical terminology and accurate definitions of **legal concepts**, explain how the content of these ethical/legal ramifications affects **patients' rights** for all aspects of care.

2. Technology

2.1 History of Diagnostic Medical Imaging: Investigate and document the **history of diagnostic medical imaging, medical laboratories, and other related areas** of diagnostic medicine. Explain how technology, including **telemedicine,** is influencing the future of each. Analyze the **barriers to these technologies** and predict how the industry might respond.

2.2 Use of Robotics: Investigate the use of **robotics in diagnostic medicine**. Correlate robotic technologies with the areas of diagnostic medicine to which they align and explain the **advantages and disadvantages** of using the robotic technologies in these areas.

2.3 Home Test Kits and Medical Equipment: Evaluate the reliability of **home testing kits** (i.e., pregnancy test) and **portable diagnostic equipment** (i.e., glucometers). Support their use by non-medical individuals and their usefulness in day-to-day care.

3. Safety

3.1 Laboratory Safety Concepts: Obtain **medical laboratory manuals** from at least **three different resources** or physical laboratory sites. Identify the e**lements of containment** regarding general infection control, chemistry precautions, fire safety, chemical hazards, electrical safety, mechanical safety, general lab safety, accident exposure, and disaster preparedness. Apply concepts drawn from the manuals in a school-based medical laboratory or the health science classroom.

3.2 Radiation Safety: Research the **guidelines pertaining to radiation safety** for staff, patients, and family who are receiving any radiological procedure. Demonstrate the **delivery of information** to patients/clients regarding what they should know about medical radiation safety.

3.3 Diagnostic Equipment Quality Control: Explore **policies and procedures related to diagnostic equipment quality control monitoring** and evaluation. Relate the importance of implementing quality control processes according to policy to **accurate results and patient safety.**

4. Infection Control/Medical Microbiology

4.1 Infection Control: Demonstrate **mastery of concepts and skills** related to asepsis, Universal Precautions, sanitation, disinfection, and sterilization for patient/client care settings in adherence to standards and guidelines from the **Centers for Disease Control and Prevention (CDC) and the Occupational Safety and Health Administration (OSHA)** in a lab/clinical setting.

4.2 Normal Flora Homeostasis: Define the term **normal flora** and explain how its **deviation** can prevent or cause a **disease or disorder.** Appraise specific **preventive measures** aligned to acceptable standards of care that maintain normal flora **homeostasis**.

4.3 Epidemiology of Healthcare-Associated Infections: Assess the differences between **healthcare-associated infections and non-healthcare-associated** infections using examples drawn from mock patient documents or case studies. Support explanations with relevant **surveillance statistics, preventive measures, and methodologies concerning outbreak detection, management, and education**.

5. Diagnostic Medical Imaging

5.1 Anatomy, Physiology, and Pathophysiology Related to Imaging: Outline the **in-depth normal structure and function of the musculoskeletal, digestive, and cardio-respiratory systems**, specifically as they relate to diagnostic medical imaging. Connect signs and symptoms of common diseases and disorders to each system. Review directions, planes, and sections of the body and their relationships to diagnostic imaging procedures.

5.2 Types of Diagnostic Medical Imaging: Distinguish between the various **types of diagnostic medical imaging,** citing the **uses, advantages, and disadvantages** of each. Develop an explanation that would be appropriate for patients/caregivers, incorporating **appropriate medical terminology.**

5.3 Direct Versus Computed Radiography and Image Storage: Distinguish between **direct radiography and computed radiography,** citing the benefits of each related to the effects of radiation dose and cost. Compare the benefits of image storage in **Picture Archive and Communication Systems** to **x-ray film storage**. Relate the benefits of **electronic image storage** to its application in **telemedicine.**

5.4 Radiographic Physics: Research the **principles of radiographic physics** and explain how the concepts are applied to produce high-quality radiographic images. Discuss the following in the explanation:
    a. properties of X-rays;
    b. production of X-rays;
    c. the X-ray tube and other parts of an X-ray machine; and
    d. absorption, scatter, and transmission of X-rays.

6. Clinical Laboratory (No Live Sticks)

6.1 Anatomy. Physiology, and Pathology of Blood Components and Related Lab Tests: Outline the **in-depth normal structure and function of blood and related components.** Relate signs and symptoms of common blood diseases and disorders to each component. Define the following common laboratory procedures, appraise both normal and abnormal results, and provide the rationale for obtaining the test:
    a. complete blood count,
    b. complete metabolic panel,
    c. fasting lipid panel, and
    d. Hemoglobin A1C.

6.2 Pathophysiology of Blood Components and Related Lab Tests: Analyze the **relationship of blood components to common blood diseases and disorders** listing signs and symptoms associated with each. Define the following common laboratory procedures, appraise both normal and abnormal results, and provide the rationale for obtaining the test:
    a. complete blood count,
    b. complete metabolic panel,
    c. fasting lipid panel, and
    d. Hemoglobin A1C.

6.3 Medical Laboratory Departments: Explain the **functions of the various departments of a medical laboratory**, such as microbiology, chemistry, hematology, blood banking, and urology. Include types of **fluid samples and tests** that are performed in each area with a detailed explanation of the **precautions** involved when handling each.

6.4 Phlebotomy Skills: Understand the principles of and successfully perform the **skills of a phlebotomist**, incorporating rubrics from National HOSA, textbooks, or clinical standards of practice.
    a. Distinguish sites and/or veins for blood draws in all populations using the required equipment and safety precautions.
    b. Perform collection procedures for micro-specimens and venipuncture on a mannequin using appropriate collection containers and identify factors affecting collection/test results.
    c. Provide guidelines for obtaining blood from neonates, pediatrics, and geriatrics.
    d. Perform skills of patient/specimen identification and transporting of specimens.

7. Ophthalmological Procedures

7.1 Anatomy, Physiology, and Pathology of the Eye: Outline the **in-depth normal structure and function of the eye**. Relate signs and symptoms of common diseases and disorders associated with each structure.

7.2 Pathology of the Eye and Related Lab Tests: Compare and contrast **normal versus abnormal structure and function of the eye** related to **common eye diseases** listing **signs and symptoms and diagnostic studies for each.**

7.3 Ophthalmic Exam Skills: Understand principles of and successfully perform **skills related to basic ophthalmic examination**, incorporating rubrics from textbooks or clinical standards of practice. Measure **pulse and blood pressure**, and conduct a **history and physical**, especially concerning areas related to the eye.

7.4 Visual Acuity and Abnormalities: Research the concepts surrounding the **measurement of visual acuity** with **associated equipment**, and explain **corrective measures for abnormalities** (i.e., surgery, glasses, or contacts). Specify measures that should be used with each abnormality.

8. Cardiologic Services

8.1 Cardiovascular Careers: Research the educational requirements, certification, and licensures for **cardiovascular technologists, diagnostic vascular technologists, electrocardiogram technicians, telemetry technicians, cardiac sonographers,** and other related cardiovascular careers. Compare and contrast the educational requirements of each.

8.2 Cardiac Diagnostic Procedures: Investigate **cardiac diagnostic procedures** both in-hospital and out-patient and identify the equipment required for these services.

8.3 Heart Anatomy and Physiology Including the Conduction System: Identify **gross heart anatomy and physiology** and **related cardiac conduction and circulatory pathways**.

8.4 Lead Placement: Assess **lead placements** and correlate their relationships to the **conduction system** using a diagram or model.

8.5 Waves, Complexes, and the Cardiac Cycle: Analyze the **P,Q,R,S,T complex** and its correlation to the **cardiac cycle**. Chart a mock representation of these waves on an electrocardiogram.

8.6 Rhythm Strip Analysis: Analyze **rhythm strips** and/or **12 lead EKGs** and differentiate between **critical and non-critical cardiac rhythms** using student-created algorithms.

8.7 Cardiac Output Assessment: Assess and analyze **cardiac output** and **tissue perfusion** using **capillary refill and/or pulse oximeter** by assessing multiple classmates and correctly charting on the flow chart.

9. Diagnostic Services Terminology

9.1 Diagnostic Services Terminology: Analyze and interpret **medical terminology and abbreviations related to anatomy and physiology, pathology, and diagnostic services**. Demonstrate mastery of medical terminology use and accurate spelling in each area through verbal and written explanation. Demonstrate the skills involved when **communicating with a patient or family member** by explaining the terminology, abbreviations, and symbols in **layman's terms**.

9.2 Interpreting a Text using Prefixes, Suffixes, Abbreviations, and Symbols: Examine a **professional medical journal or mock patient documents** specifically related to an unfamiliar disease, phenomenon, diagnosis, or area of medical research. Demonstrate the ability to locate medical terms and define the **prefixes, suffixes, abbreviations, and symbols** to arrive at a professional understanding of the topic discussed. Interpret and synthesize the text into an original summary, review, or other written or verbal analysis of the topic, demonstrating **mastery of unfamiliar terms.**

9.3 Diagnostic Procedures and Pharmacology Vocabulary: Interpret, analyze, and accurately spell **vocabulary linked to diagnostic procedures and pharmacology** in the following areas: therapeutic services, diagnostic medicine, biotechnology services, emergency medical services, cardiovascular services, and dental services. Demonstrate the **skills involved when interpreting a prescription or complex diagnostic procedure** by explaining the terminology, abbreviations, and symbols to a classmate in a language that is easy to understand.

Standards Alignment Notes

*References to other standards include:

- 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.
- National Accrediting Agency of Clinical Laboratory Sciences (NAACLS): Standards for Specific Approved Programs
    - Note: Students must be completers of a NAACLS-approved program to sit for a national phlebotomy certification exam.

Cardiovascular Services

Primary Career Cluster:	Health Science
Course Contact:	CTE.Standards@tn.gov
Course Code:	C14H18
Prerequisite:	*Diagnostic Medicine* (C14H12)
Credit:	1
Grade Level(s):	11-12
Elective Focus-Graduation Requirement:	This course satisfies one of three credits required for an elective focus when taken in conjunction with other Health Science courses.
POS Concentrator:	This course satisfies one out of two required courses to meet the Perkins V concentrator definition when taken in sequence in the approved program of study.
Programs of Study and Sequence:	This is the Year 4 course in the *Diagnostic Services* program of study.
Aligned Student Organization(s):	HOSA: http://www.tennesseehosa.org SkillsUSA: https://www.skillsusatn.org
Coordinating Work-Based Learning:	Teachers are encouraged to use embedded WBL activities such as informational interviewing, job shadowing, and career mentoring. For information, visit https://www.tn.gov/education/educators/career-and-technical-education/work-based-learning.html.
Promoted Tennessee Student Industry Credentials:	Credentials are aligned with postsecondary and employment opportunities and with the competencies and skills that students acquire through their selected program of study. For a listing of promoted student industry credentials, visit https://www.tn.gov/content/tn/education/educators/career-and-technical-education/student-industry-certification.html.
Teacher Endorsement(s):	577, 720
Required Teacher Certifications:	Please refer to Occupational Educator Licensure Guidance for a full list.
Required Teacher Training:	None
Teacher Resources:	https://www.tn.gov/education/educators/career-and-technical-education/career-clusters/cte-cluster-health-science.html Best for All Central: https://bestforall.tnedu.gov/

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Students engage in industry-relevant content through general education integration and experiences such as career and technical student organizations (CTSO) and work-based learning (WBL). Through these experiences, students are immersed with industry-standard content and technology, solve industry-based problems, meaningfully interact with industry professionals, and use/produce industry-specific, informational texts.

Using a Career and Technical Student Organization (CTSO) in Your Classroom

CTSOs are a great resource to put classroom learning into real-life experiences for students through classroom, regional, state, and national competitions, and leadership opportunities. Below are CTSO connections for this course; note this is not an exhaustive list.

- Participate in the CTSO Fall Leadership Conference to engage with peers by demonstrating logical thought processes and developing industry-specific skills that involve teamwork and project management.
- Participate in contests that highlight job skill demonstration, interviewing skills, community service activities, extemporaneous speaking, and job interviews.
- Participate in leadership activities such as Organizational Leadership, Prepared Speaking, HOSA Service Project, Creative Problem Solving, and HOSA Service Project.

Using Work-Based Learning (WBL) in Your Classroom

Sustained and coordinated activities that relate to the course content are the key to successful work-based learning. Possible activities for this course include the following. This is not an exhaustive list.

- **Standards 1.1-1.2** | Job shadow a cardiovascular or EKG technician.
- **Standards 2.1-2.2** | Interview medical office business/accounts manager to determine if preventive procedures would increase or decrease health care costs related to heart health.
- **Standards 5.1-5.6** | Visit an electrophysiology lab.
- **Standards 5.9** | Observe an echocardiogram.
- **Standards 6.1-6.2** | Partner with a cardiovascular office nurse to create a plan of action for assessment, diagnosis, and treatment of a patient experiencing cardiovascular or pulmonary complication.
- **Standards 7.1** | Work with the local health department to develop a marketing campaign to inform citizens about heart health related to the goals and objectives of the Healthy People Initiative.

Course Description

Cardiovascular Services is an 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, proficient students will have a thorough understanding of the anatomy and physiology of the heart and will be 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 EKG Technician (CET) Exam. Relevant standards are indicated below with **(CET)**.

Course Standards

1. Career Planning

1.1 Cardiopulmonary Careers: Research **careers** within **cardiovascular and pulmonary sciences** and explain the **educational/credentialing requirements, scope of practice**, as well as state and national **compliance guidelines** required of cardiovascular health care professionals. Using real-time and projected labor market data, identify local and national employment opportunities and determine areas of growth.

1.2 Professional Competencies and Skills: Analyze the range of **skills, competencies**, and **professional traits**, such as leadership, time management, and ethical responsibility, required for careers in cardiovascular or pulmonary sciences.

2. Legalities and Ethical Issues

2.1 HIPAA, Consent, Legal Concepts, and Patient Rights: Summarize the **Health Insurance Portability and Accountability Act (HIPAA)** and explain the 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.** 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.

2.2 Diagnostic Versus Preventive Medical Procedures: Compare and contrast the **costs of preventive medical procedures versus diagnostic medical procedures** related to the cardiovascular and pulmonary systems. Research and determine if preventive procedures would increase or decrease health care costs as it relates to heart health.

3. Anatomy and Physiology

3.1 Structure and Function of Cardiovascular and Autonomic Nervous Systems: Relate the **gross and cellular structure and function of the cardiovascular and autonomic systems** to the following areas:

a. Electrophysiology of the heart, including definitions of waveforms;
b. Control mechanisms and cardiac cycle with normal values; **(CET)**

c. Size, location, layers, chambers, valves, pressures, and blood flow of heart; **(CET)** and
d. Relationship of cardiac output to heart rate and stroke volume. **(CET)**

3.2 Pathophysiology of Heart and Breath Sounds: Interpret the **pathophysiology** related to **normal and abnormal heart sounds and breath sounds**. Evaluate simulated heart sounds to identify **normal heart sounds, normal lung sounds, murmurs, rubs, extra heart sounds, wheezes, or other abnormal breath sounds** via a mannequin or digital substitute.

3.3 Diseases, Disorders, and Emergency Situations: Evaluate **diseases, disorders, or emergency situations related to the cardiac, circulatory, or pulmonary systems**. Interpret 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.

3.4 Health Education Project: Formulate a health education project to inform an adult and/or geriatric audience about the **negative effects of co-morbidities** such as obesity, hypertension, diabetes, or renal impairment on the heart, circulatory, and pulmonary systems.

4. Cardiopulmonary Terminology

4.1 Cardiopulmonary Terminology: Analyze and interpret **medical terminology and abbreviations related to anatomy and physiology, pathology, diagnostic and therapeutic procedures, and pharmacology of the cardiopulmonary and autonomic systems**. Demonstrate mastery of medical terminology use and accurate spelling in each area through verbal and written explanation. Demonstrate the skills involved when **communicating with a patient or family member** by explaining the terminology, abbreviations, and symbols in **layman's terms**.

5. Diagnostics and Procedures

5.1 Pre-Procedural Tasks: Perform the following duties and tasks related to **pre-procedural activity**: **(CET)**
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 a 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;
h. vital sign assessment; and
i. pulse oximeter.

5.2 ECG Leads: 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.

5.3 ECG Machines: Compare and contrast the **single- and three-channel ECG machines**. Define the **purpose of the equipment,** and explain **indications for use, expected outcomes, advantages, disadvantages, and limitations** of each.

5.4 Perform an ECG: 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: **(CET)**

a. gather supplies and equipment,
b. educate patient on procedure expectations,
c. apply electrodes and leads to patient,
d. confirm equipment, and
e. perform standard ECG.

5.5 Rhythm Analysis: Obtain ECG tracing strips and perform **rhythm analysis**, including the following: **(CET)**

a. analyze ECG tracing for the presence of P, Q, R, S, and T waves and heart rate calculation;
b. identify ECG tracings indicative of sinus, junctional, atrial, ventricular, atrioventricular, hypertrophy, chamber enlargement, and pacemaker rhythms, including 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 findings (wavelengths, segments, intervals, etc.) with cardiac function; and
e. correlate ECG morphology with anatomy and physiology.

5.6 Patient Teaching: Demonstrate the ability to explain the **purpose of the ECG,** the **associated risks**, and **patient expectations before, during, and after testing.**

5.7 Radiographic and Nuclear Cardiovascular and Pulmonary Imaging: Compare and contrast various types of **nuclear imaging and radiographic cardiovascular and pulmonary tests**. Provide an overview or explanation of each test and explain the **mechanics of the procedure**, the **associated risks**, and **patient expectations** before, during, and after testing.

5.8 Invasive Diagnostic Procedures: Research the types of **invasive diagnostic cardiovascular and pulmonary procedures**. Examples might include cardiac catheterization, carotid angiography, electrophysiological studies, intravascular ultrasound, or myocardial biopsy. Provide an overview or **explanation of the procedure** and explain the **associated risks**, **patient expectations** before, during, and after the test, and next steps for abnormal results.

5.9 Cardiovascular Ultrasound: 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**.

6. Invasive Treatment Procedures

6.1 Treatments for Cardiovascular and Pulmonary Diseases and Disorders: Research **treatments** involving cardiac, vascular, and thoracic surgery for **cardiovascular and pulmonary diseases and/or disorders**. Explain implications for each treatment, identifying trends and/or advances in available treatments over the past fifty years.

6.2 Cardiopulmonary Emergencies in the Physician Office: Identify characteristics and/or signs and symptoms of patients experiencing **cardiac and/or pulmonary complications** in physician offices or emergency rooms. Create a plan of action for **assessment, diagnosis, and treatment** of the patient.

7. Health Statistics

7.1 Heart Disease in the Community: In 2022, the National Center for Health Statistics identified the leading cause of death in the United States as **heart disease. In the local community**, identify the following:

a. incidence of heart disease and disorders,
b. number of associated deaths,
c. preventive measures currently being taken, and
d. 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.

Standards Alignment Notes

*References to other standards include:

- 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.

Clinical Internship

Primary Career Cluster:	Health Science
Course Contact:	CTE.Standards@tn.gov
Course Code:	C14H11
Prerequisite(s):	*Diagnostic Medicine* (C14H12), *Cardiovascular Services* (C14H18), *Medical Therapeutics* (C14H15), *Medical Assisting* (C14H10), *Dental Science* (C14H21), *Pharmacological Science* (C14H20), *Nutrition Science and Diet Therapy* (C19H16), *Rehabilitation Careers* (C14H08), ***OR*** *Exercise Science* (C14H22)
Credit(s):	1-4
Grade Level(s):	11-12; *Students must be at least 16 years old to be enrolled in this course.*
Student-Teacher Ratio:	15:1
Elective Focus- Graduation Requirements:	This course satisfies one of three credits required for an elective focus when taken in conjunction with other Health Science courses.
POS Concentrator:	This course satisfies one out of two required courses to meet the Perkins V concentrator definition when taken in sequence in the approved program of study.
Programs of Study and Sequence:	This is the Year 4 course in the *Therapeutic Services* program of study and can also be a choice for the Year 4 course in the *Diagnostic Services, Nursing Services,* and *Sport and Human Performance* programs of study. Students must have had one of the prerequisite courses listed on this document to enroll in *Clinical Internship*.
Aligned Student Organization(s):	HOSA: http://www.tennesseehosa.org SkillsUSA: https://www.skillsusatn.org
Coordinating Work-Based Learning:	Teachers who hold an active WBL certificate may offer placement for credit when the requirements of the state board's WBL Framework and the Department's WBL Policy Guide are met. For information, visit https://www.tn.gov/education/educators/career-and-technical-education/work-based-learning.html.
Promoted Tennessee Student Industry Credentials:	Credentials are aligned with postsecondary and employment opportunities and with the competencies and skills that students acquire through their selected program of study. For a listing of promoted student industry credentials, visit https://www.tn.gov/content/tn/education/educators/career-and-technical-education/student-industry-certification.html.
Teacher Endorsement(s):	577, 720
Required Teacher Certifications:	Please refer to Occupational Educator Licensure Guidance for a full list..
Required Teacher Training:	Teachers must attend WBL training and earn the WBL Certificate provided by the Tennessee Department of Education in addition to the online Clinical Internship training.
Teacher Resources:	https://www.tn.gov/education/educators/career-and-technical-education/career-clusters/cte-cluster-health-science.html Best for All Central: https://bestforall.tnedu.gov/

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Sustained and coordinated activities that relate to the course content are the key to successful work-based learning. Possible activities for this course include the following. This is not an exhaustive list.

- **Standard 1.1** | On-the-job training to master course standards. Internship required for industry credential.
- **Standards 2.1-2.4** | On-the-job training to develop professional behavior, including soft skills.
- **Standards 3.1-3.8** | On-the-job training to develop students' mastery of organizational culture, safety, HIPAA regulations, and workplace codes of ethics.
- **Standards 4.1-4.2** | On-the-job training to develop a variety of workplace communication and use of medical terminology in the workplace.
- **Standard 6.1** | On-the-job training to develop students' career portfolios, including resumes, artifacts, and the implementation of feedback.

Course Description

Clinical Internship **is a capstone course and work-based learning experience designed to provide students with real-world application of skills and knowledge obtained in a pre-requisite Health Science course. Upon completion of this course, proficient students will be able to pursue certification in the prerequisite course of *Cardiovascular Services, Exercise Physiology, Medical Therapeutics,* or *Pharmacological Science*. Prior to beginning work at a clinical site, students must be certified in Basic Life Support (BLS) Cardiopulmonary Resuscitation (CPR) and deemed competent in basic first aid, body mechanics, Standard Precaution guidelines, and confidentiality.**

Course Standards

1. Personalized Learning Plan

1.1 Personalized Learning Plan: A student will have a **personalized learning plan** that identifies their long-term goals, demonstrates how the Work-Based Learning (WBL) experience aligns with their elective focus and/or high school plan of study, addresses how the student plans to meet and demonstrate the course standards, and addresses employability skill attainment in the following areas:

a. application of academic and technical knowledge and skills embedded in course standards;
b. career knowledge and navigation skills;
c. 21st-century learning and innovation skills; and
d. personal and social skills.

2. Professionalism and Growth

2.1 Career Pathways Plan: Apply learning experiences from clinical placement to review and update an **education and career pathways** plan based on the knowledge and feedback acquired. Proactively identify **areas of strength** and opportunities for professional growth, encourage and act on feedback from peers, supervisors, and customers, and seek and use resources and support to improve skills.

2.2 Personal Behavior: Complete tasks as directed with supervision, knowing **when to ask questions or request guidance**. Exhibit **resourcefulness and initiative** in taking on new tasks and solving problems independently as appropriate to the workplace setting. Demonstrate **how to learn and exhibit personal agency** in identifying and achieving instrumental and ultimate learning objectives. Demonstrate **curiosity to learn more about the tasks, workplace, and/or industry**. Explore deeper content independently and request **opportunities for professional development**. Demonstrate **self-efficacy and confidence** in one's ability to succeed in specific situations.

2.3 Professional Behavior: Exhibit **professionalism and respect** when interacting with coworkers, supervisors, and customers. Demonstrate **reliability and responsibility** in attendance and in following through on assigned tasks. Provide **timely communication** with supervisor(s) when circumstances change. Understand and adhere to **appropriate**

workplace non-discrimination standards on the basis of sex, race, color, age, national origin, religion, disability, marital status, sexual orientation, gender identity, pregnancy, veteran status, or any characteristic of a person or group unrelated to the workplace. Respect **cultural differences** and work effectively with people from **diverse social and cultural backgrounds**.

2.4 Team Membership: Work effectively as a **member of a team** and address conflict with **sensitivity and respect for diverse points of view**. Demonstrate an understanding of one's impact and build on **different perspectives** to strengthen joint efforts. Demonstrate **leadership** where appropriate to collaborate on workplace tasks. Effectively employ **meeting management strategies**, such as agenda setting, timekeeping, and meeting **facilitation strategies**, and list action items to identify and schedule the next steps.

3. Workplace Policies and Behavior

3.1 Organizational Culture and Practice**:** Observe and analyze **organizational culture and practices**. For example, analyze how to **interact with supervisors, clients, and co-workers**, and how to recognize and address **health, safety, and sustainability issues**. Seek information from supervisors and other employees about **appropriate methods of pursuing employment in the industry**, and **determine what knowledge, skills, and educational credentials are required**.

3.2 Workplace Ethics and Ethical Issues: Demonstrate **integrity and ethical behavior** when engaging in all worksite activities, including the use of tools and materials, documentation of hours, handling of money, billing of clients, sharing of information, and completion of all personnel-related forms. Identify an **actual or potential work site ethical issue** and create a plan outlining how the issue should be resolved.

3.3 Employee and Facility Safety: Accurately read, interpret, and demonstrate adherence to **safety guidelines** appropriate for the **roles and responsibilities of an employee** of a healthcare facility. Listen to safety instructions and be able to explain why certain rules apply. Demonstrate **safety techniques** and follow all applicable **facility policies** and procedures, such as Standard Precautions, related to the clinical placement. Based on placement, document the completion of training topics on the appropriate work-based learning (WBL) and work site forms.

3.4 Challenges in the Workplace: Identify and ask significant questions to solve ***student-identified*** **challenges or areas of improvement in the workplace**. Brainstorm and select solutions providing the rationale for each, and then discuss the suggested solutions with a workplace mentor.

3.5 Flexibility: Exhibit **flexibility** by doing the following:

a. adapt to varied roles, job responsibilities, schedules, and contexts;
b. work effectively in a climate of ambiguity and changing priorities; and
c. respond positively with praise, setbacks, and constructive criticism.

3.6 Time and Project Management: Manage **time and projects** effectively by:

a. setting goals;
b. developing and using a system for prioritizing, planning, and managing daily work;

c. persisting in the face of challenges; and
d. seeking assistance and adjusting plans to adapt to changing circumstances.

Demonstrate **attention to detail and accuracy** appropriate to the task. Demonstrate **accountability to supervisors, coworkers, and custom**ers by delivering work to agreed-upon standards; accepting **constructive criticism**; completing designated projects on time; and exhibiting **pride in workmanship**.

3.7 Quality Assurance Methods: Analyze **patient quality assurance methods** used by clinical sites. Solve problems using **systems thinking**, (e.g., by understanding problems in terms of complex processes and environments). Identify key components and relationships that enable, influence, and produce outcomes.

3.8 HIPAA: Review the **Health Insurance Portability and Accountability Act (HIPAA) concepts** and investigate **methods to assure confidentiality** within the healthcare setting. Employ techniques to ensure the **client/patient's rights** are maintained.

4. Communication

4.1 Communication: Articulate ideas effectively in **written personal communications** with supervisors, coworkers, and customers. Verbally articulate ideas effectively in **interpersonal communications** with supervisors, coworkers, and customers. Develop and deliver messages effectively in **oral presentations**. Demonstrate **effective listening skills**, attending to the **meaning and intention of communication**, and accurately paraphrasing what has been heard. Communicate effectively with individuals of **diverse backgrounds** who may also speak languages other than English, using foreign language skills and facility resources as appropriate.

4.2 Medical Terminology: Analyze, interpret, and use **medical terminology and abbreviations** appropriately in all communications. Master the use of medical terminology appropriate for the assigned clinical area(s).

5. Use of Information and Technology

5.1 Information Validity: Access information efficiently, using **sources appropriate to task, purpose, and audience**. Distinguish between **credible and non-credible sources**, including the **difference between advertising and legitimate research**. Evaluate information for **usefulness, bias, and accuracy**, and question information that may not originate from **credible sources.** Demonstrate the ability to organize and manage information effectively and efficiently. Demonstrate **ethical and legal use of information**, including adherence to all **rules and regulations related to sharing of protected information**.

5.2 Effective Use of Technology: Use appropriate **technology in the classroom or clinical setting** for information search and retrieval, synchronous and asynchronous communications, multimedia presentations, document production, quantitative and qualitative analysis, and information management. Use **social networking and online collaboration tools,** such as **shared documents and web conferencing,** to create, integrate, and manage information in group projects.

5.3 Digital Communication of Patient Information: Access and manage **online communication and information**, such as electronic medical records, using multiple digital devices (e.g., laptop computers, tablets, smartphones, etc.). Demonstrate adherence to all **rules and regulations related to the use of electronic tools and the Internet**, including appropriate protection of passcodes and adherence to all security protocols.

6. Student Portfolio

6.1 Student Portfolio: Update the **Health Science student portfolio** that illustrates mastery of skills and knowledge outlined in the Health Science prerequisite course standards and applied in the *Clinical Internship* experience. Compile artifacts and similar work products reflecting thoughtful assessment and evaluation of the progression against goals in the personal growth plan. Artifacts may include the following:

a. career and professional development plan;
b. resume;
c. documentation of clinical hours at each site;
d. list of responsibilities undertaken throughout the placement;
e. examples of materials developed and used throughout the placement;
f. periodic journal entries reflecting on tasks and activities;
g. supervisor evaluations and observations;
h. approved WBL forms; and
i. WBL coordinator evaluations and observations.

Standards Alignment Notes

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Medical Therapeutics

Primary Career Cluster:	Health Science
Course Contact:	CTE.Standards@tn.gov
Course Code:	C14H15
Prerequisite:	*Health Science Education* (C14H14)
Credit:	1
Grade Level(s):	10-11
Elective Focus-Graduation Requirements:	This course satisfies one of three credits required for an elective focus when taken in conjunction with other Health Science courses.
POS Concentrator:	This course satisfies one out of two required courses to meet the Perkins V concentrator definition when taken in sequence in the approved program of study.
Programs of Study and Sequence:	This is the Year 3 course in the *Emergency Services, Nursing Services,* and *Therapeutic Services* programs of study.
Aligned Student Organization(s):	HOSA: http://www.tennesseehosa.org SkillsUSA: https://www.skillsusatn.org
Coordinating Work-Based Learning:	Teachers are encouraged to use embedded WBL activities such as informational interviewing, job shadowing, and career mentoring. For information, visit https://www.tn.gov/education/educators/career-and-technical-education/work-based-learning.html.
Promoted Tennessee Industry Credentials:	Credentials are aligned with postsecondary and employment opportunities and with the competencies and skills that students acquire through their selected program of study. For a listing of promoted student industry credentials, visit https://www.tn.gov/content/tn/education/educators/career-and-technical-education/student-industry-certification.html.
Teacher Endorsement(s):	577, 720
Required Teacher Certifications/Training:	Please refer to Occupational Educator Licensure Guidance for a full list.
Required Teacher Training:	None
Teacher Resources:	https://www.tn.gov/education/educators/career-and-technical-education/career-clusters/cte-cluster-health-science.html Best for All Central: https://bestforall.tnedu.gov/

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Using Work-Based Learning (WBL) in Your Classroom

Sustained and coordinated activities that relate to the course content are the key to successful work-based learning. Possible activities for this course include the following. This is not an exhaustive list.

- **Standards 1.1-1.3** | Interview a therapeutic medicine professional to determine how HIPAA's ethical/legal tenets affect the patient's rights for all aspects of care.
- **Standards 2.1-2.2** | Invite a patient advocate to discuss communication barriers related to patient rights.
- **Standards 3.1-3.4** | Shadow a healthcare quality improvement professional to observe the use of collected data in quality improvement initiatives.
- **Standards 4.1-4.3** | Observe and/or assist with a patient's history and physical.
- **Standards 6.1-6.4** | Partner with a healthcare professional to create a health education plan for recommended health screenings.

Course Description

Medical Therapeutics is an applied course designed to prepare students to pursue careers in therapeutic and nursing services. Upon completion of this course, a proficient student will be able to identify careers in therapeutic services; assess, monitor, evaluate, and report patient/client health status; and identify the purpose and components of treatments.

Course Standards

1. Therapeutic Careers

1.1 Career Pathways and Personal Career Aptitudes: Differentiate **career pathways** within the Therapeutics cluster. Describe the **scope of practice and the essential knowledge and skills** required for these careers. Complete one or more **career aptitude surveys,** analyze the results, and relate **how personal career aptitudes align with careers in therapeutics**.

1.2 Laws and Ethics Impacting Professional Practice: Analyze **specific laws and ethical issues that impact professional practice,** such as confidentiality, informed consent, and patient self-determination. Determine **how these laws and ethical issues impact healthcare professionals.**

1.3 Patient Confidentiality: Summarize the **Health Insurance Portability and Accountability Act** (HIPAA) within the context of mental health, infectious disease, and community health treatment relating key provisions of the act to patient rights. Contrast **patient/client rights** with a community's right to know about dangerous mental health clients or persons with communicable diseases.

1.4 Members of the Patient Care Team and Team-Based Care: Differentiate between the **common members of the patient care team** summarizing the individual roles and the interrelatedness of the team members as it relates to quality patient care. Explain the **concept of team-based** care to a patient.

2. Health Care Communication

2.1 Communication and Quality Patient Care: Evaluate **factors that contribute to effective communication** and explain **how these factors contribute to the development of quality patient care**. Demonstrate **practices to effectively manage communication barriers, cultural differences, and clients with special needs.**

2.2 Verbal and Non-Verbal Communication: Differentiate between **verbal and nonverbal communication** when interacting with patients. Examine **specific techniques for effective communication** and evaluate how different cultures attach different meanings to communication techniques.

3. Facility Guidelines for Practice

3.1 Electronic Health Records: Compare the **advantages and disadvantages of Electronic Health Records (EHR)**. Anticipate **barriers and challenges associated with the large-scale move to EHR in healthcare institutions.**

3.2 Patient Confidentiality: Explain 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.

3.3 Patient Care and Quality Improvement Data: Relate the use of collected **data by hospital information systems** to the use of **collected data in quality improvement initiatives**. Determine how data related to sex, race and ethnicity is used to reduce disparities in different types of care such as cardiac care or cancer treatment.

3.4 Equipment Safety, Quality Control, and Evaluation: Examine **policies and procedures related to therapeutic equipment safety, quality control monitoring, and evaluation**. Synthesize information to instruct a classmate on the **importance of safety practices** and the implementation of quality control processes according to policy.

4. Patient Assessment and Treatment

4.1 Medical Terminology: Research and summarize the **precautions surrounding the use of abbreviations and symbols** within the healthcare profession. Explain and demonstrate the **importance of clear, proper documentation** when filling out a patient/client chart or other patient document. For example, explain why using appropriate abbreviations is so important when prescribing the correct dosage for a patient's medication (i.e., writing "mg" for milligrams).

4.2 Medical Terminology: Demonstrate an understanding of **basic medical terminology** to monitor patient/client status through the following:

a. history and physical:
    i. family,
    ii. environmental,
    iii. social, and
    iv. mental history;
b. brief head-to-toe assessment noting normal vs. abnormal findings;
c. vital signs assessment (VS);
d. height/weight, body mass index (BMI)/calculation; and
e. specimen collection.

4.3 Anatomy, Physiology, and Pathophysiology: Outline the **gross normal structure and function of all body systems** and summarize appropriate medical text(s) to relate **signs and symptoms of common diseases and disorders** associated with each of the following:

a. integumentary and lymphatic systems,
b. nervous and musculoskeletal systems,
c. cardiovascular and respiratory systems,
d. digestive and urinary systems, and
e. reproductive and endocrine systems.

4.4 Therapeutic Procedures and Treatments: Relate a **therapeutic procedure/treatment** to a **specific body system**. Describe the anatomy involved with the treatment, the reason for

treatment, health care professionals assisting or performing the treatment, and patient education, including precautions that should occur prior to the treatment or procedure.

5. Fundamentals of Patient Care

5.1 Patient Care Skills: Demonstrate **concepts and skills** of the following in a **clinical/lab setting**:

a. patient positioning;
b. transfers and ambulation, including injury prevention and body mechanics;
c. O2 assessment and administration, including fire safety; and
d. BLS (Basic Life Support).

6. Fundamentals of Wellness and Disease Prevention

6.1 Infection Control: Demonstrate mastery of **concepts and skills related to asepsis, Universal Precautions, sanitation, disinfection, and sterilization** for patient/client care settings citing the **rationale** for each concept/skill using standards and guidelines from the Centers for Disease Control and Prevention (CDC) and the Occupational Safety and Health Administration (OSHA) in a lab/clinical setting.

6.2 Infection Control: Distinguish between these 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, COVID-19, or HIV/AIDS.

6.3 Normal Flora and Homeostasis: Correlate the function of normal flora with homeostasis and relate deviation to disease states. Evaluate specific **measures to prevent deviation** that are aligned with accepted standards of care.

6.4 Healthcare and Non-Healthcare Associated Infections: Assess the **differences between healthcare-associated infections and non-healthcare-associated infections** using examples drawn from mock patient documents or case studies. Support explanations with relevant surveillance statistics, preventive measures, and methodologies concerning **outbreak detection, management, and education**.

6.5 Disease and Disorders: Examine the **epidemiologic, 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. **Determine the factors** that contribute to higher or lower prevalence in a given population or area of the country.

a. Infectious diseases
b. HIV/AIDS
c. Neurodevelopment disabilities
d. Cancer
e. Cardiovascular disease
f. Diabetes
g. Dementia

6.6 Health Education Plan: Develop a **patient health education plan** including health screenings, preventive measures, signs, and symptoms of exacerbation of disease/disorder/injury, pharmacological needs, and support systems.

Standards Alignment Notes

*References to other standards include:

- 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.

Emergency Medical Services

Primary Career Cluster:	Health Science
Course Contact:	CTE.Standards@tn.gov
Course Code:	C14H13
Prerequisite(s):	*Health Science Education* (C14H14), *Anatomy & Physiology* (G03H31 or C14H09), and *Medical Therapeutics* (C14H15)
Credit:	1
Grade Level(s):	11-12 and students enrolled in this course must be 17 years old before the course concludes.
Student-Teacher Ratio:	25:1
Elective Focus-Graduation Requirements:	This course satisfies one of three credits required for an elective focus when taken in conjunction with other Health Science courses.
POS Concentrator:	This course satisfies one out of two required courses to meet the Perkins V concentrator definition when taken in sequence in the approved program of study.
Programs of Study and Sequence:	This is the Year 4 course in *Emergency Services* program of study.
Aligned Student Organization(s):	HOSA: http://www.tennesseehosa.org SkillsUSA: https://www.skillsusatn.org
Coordinating Work-Based Learning:	Teachers who hold an active WBL certificate may offer placement for credit when the requirements of the state board's WBL Framework and the Department's WBL Policy Guide are met. For information, visit https://www.tn.gov/education/educators/career-and-technical-education/work-based-learning.html.
Available Student Industry Credentials:	Credentials are aligned with postsecondary and employment opportunities and with the competencies and skills that students acquire through their selected program of study. For a listing of promoted student industry credentials, visit https://www.tn.gov/content/tn/education/educators/career-and-technical-education/student-industry-certification.html.
Teacher Endorsement(s):	577, 720, 751
Required Teacher Certifications:	Please refer to Occupational Educator Licensure Guidance for a full list.
Required Teacher Training:	Teachers must be WBL training certified. **NOTE:** If the teacher is not an authorized EMS Instructor at the EMR level, the teacher must partner with an authorized EMS Instructor at the EMR level who will provide 60 hours of instruction and coordinate with the local office of EMS for student certification.
Teacher Resources:	https://www.tn.gov/education/educators/career-and-technical-education/career-clusters/cte-cluster-health-science.html Best for All Central: https://bestforall.tnedu.gov/

Course at a Glance

CTE courses provide students with an opportunity to develop specific academic, technical, and 21st-century skills necessary to be successful in careers and life. In pursuit of ensuring every student in Tennessee achieves this level of success, we begin with rigorous course standards that feed into intentionally designed programs of study.

Students engage in industry-relevant content through general education integration and experiences such as career and technical student organizations (CTSO) and work-based learning (WBL). Through these experiences, students are immersed with industry-standard content and technology, solve industry-based problems, meaningfully interact with industry professionals, and use/produce industry-specific, informational texts.

Using a Career and Technical Student Organization (CTSO) in Your Classroom

CTSOs are a great resource to put classroom learning into real-life experiences for students through classroom, regional, state, and national competitions, and leadership opportunities. Below are CTSO connections for this course, note this is not an exhaustive list.

- Participate in the CTSO Fall Leadership Conference to engage with peers by demonstrating logical thought processes and developing industry-specific skills that involve teamwork and project management.
- Participate in contests that highlight job skill demonstration, interviewing skills, community service activities, extemporaneous speaking, and job interviews.
- Participate in leadership activities such as Organizational Leadership, Prepared Speaking, HOSA Service Project, Creative Problem Solving, and HOSA Service Project.

Using Work-Based Learning (WBL) in Your Classroom

Sustained and coordinated activities that relate to the course content are the key to successful work-based learning. Possible activities for this course include the following. This is not an exhaustive list.

- **Standards 1.1-1.6** | Shadow an emergency medical responder.
- **Standards 2.1-2.4** | Interview a mental health professional about stress in emergency response careers.
- **Standards 3.1-3.3** | Visit a 911 call center.
- **Standards 4.1-4.4** | Invite a law enforcement officer to discuss preservation of evidence at the scene.
- **Standards 5.1-5.7** | Partner with an EMS professional to practice using the equipment commonly used by emergency medical responders.

Course Description

Emergency Medical Services is a capstone course in the Emergency Medical Services program of study and is designed to prepare students to pursue careers in the field of emergency medicine. Upon completion of this course, proficient students will be able to identify careers and features of the EMS system; define the importance of workforce safety and wellness; maintain legal and ethical guidelines; correlate anatomy and physiology concepts to the patient with a medical or traumatic injury; and perform EMS skills with a high level of proficiency. If taught by an EMT instructor, students will be given the opportunity to sit for the National Emergency Medical Responder certification.

Each standard presumes that the expected knowledge and behaviors are within the scope of practice for that EMS licensure level, as defined by the National EMS Scope of Practice Model. Each competency applies to patients of all ages unless a specific age group is identified. The standards also presume there is a progression in practice from the Emergency Medical Responder level to the Paramedic level. The descriptors used to illustrate the increasing complexity of knowledge and behaviors through the progression of licensure levels originate, in part, from the National EMS Scope of Practice Model.

Note: If this course is taught for EMR certification, the program must be approved by the TN Department of Health, Office of Emergency Medical Services. The student-to-teacher ratio for this course is 25:1.
Students enrolled in this course must be 17 years old before the course concludes.

Course Standards

1. EMS Systems and Operations

1.1 EMS Systems and Operation: Compare and contrast the types of **Emergency Medical Services (EMS) systems and operations**, including ground, water, and air services. For each type of service, discuss how the public accesses EMS systems, the advantages and disadvantages, special considerations, and safety issues. Discuss the roles played by the state departments of EMS and the National Highway Traffic Safety Administration.

1.2 Geographic Information Systems and Global Positioning Systems: Research the **history of mapping, geographic information systems (GIS), global positioning systems (GPS), remote sensing, and other geospatial technologies**. Examine how these technologies have evolved in the area of EMS and discuss their **impact on the EMS system**.

1.3 EMS Careers: Differentiate between the **careers in various types of EMS**. Research and document educational requirements as well as state and national guidelines governing practicing professionals, such as licensing, initial certifications, re-certifications, training, and compliance. Identify **personal and physical characteristics required** of an EMS professional in a career portfolio.

1.4 Quality Improvement in Emergency Care: Evaluate concepts of **quality improvement** to provide safe, high-quality, and appropriate patient care and the impact of research on EMR care. Connect examples of research that has had an impact on **improvements in emergency care** for patients and/or victims of accidents/injuries.

1.5 Risks and Responsibilities of EMS Personnel: Outline the **risks and responsibilities** facing the **emergency response team** during **ambulance operations**. Address at minimum the following: apparatus and equipment readiness; pre-arrival considerations, especially for high-risk situations; scene safety of personnel and patient(s); traffic; 360-degree assessments; and how to leave a scene.

1.6 Vehicle Extrication Concepts and Roles: Research and summarize the **concepts surrounding vehicle extrication**, including safe vehicle extrication, tools used, and patient considerations. Include in the summary **common guidelines** related to the following: roles

of EMS; safety of staff, patients, and situation; vehicle stabilization; unique hazards; additional resources needed; and extrication considerations.

2. Safety and Wellness

2.1 Requirements for EMS Personnel: Appraise **physical, mental, and personal requirements for personnel in emergency and public safety services**. Document what the **"profile of proficiency"** looks like for professionals in these fields—for example, what scores are needed on a physical, mental, or emotional fitness test, and what guidelines must be followed for personal disease/disorder control.

2.2 Stress Management Procedures, Techniques, and Strategies: Investigate **stress management procedures** for professionals in the emergency response and public service sectors. Identify **stressors and stress-inducing situations** through interviews with professionals in the field. Identify **techniques and strategies for managing and alleviating stress**. Communicate recommendations for the use of these strategies, citing the source(s) of information.

2.3 Infection Control in EMS: Compare and contrast the difference in **Standard Precautions, personal protective clothing, and personal protective equipment (PPE) in EMS** from other healthcare settings. Outline response steps if **exposed to hazardous or bloodborne pathogens**. Demonstrate **donning and doffing of all PPE** and the care of **soiled equipment or vehicles.**

2.4 Scene safety and Management: Interpret **scene management and safety standards and/or protocols** for the following: (a) traffic or highway incidents, (b) violent encounters, (c) crowds, (d) nature of illness or mechanisms of injury, (e) number of patients and/or victims, and (f) personnel injury prevention. Identify the **appropriate responses from EMS professionals** and any additional resources that would be involved.

2.5 NIMS Compliance Courses: Complete the free **FEMA Emergency Management Institute's NIMS compliance courses** ICS-200 (Single Resources and Initial Action Incidents) and IS-5A (Introduction to Hazardous Materials). Review content from the IS-700, IS-800, and ICS-100 tests. Connect **roles and responsibilities of the EMR and other team members** with the **situations described in the FEMA courses.**

3. EMS, Emergency Allocation of Resources, and Communications

3.1 Medical Terminology: Analyze and interpret vocabulary related to emergency medicine, as well as abbreviations. Demonstrate mastery of **medical terminology** use and accurate spelling through verbal and written explanation.

3.2 Calling for Additional Assistance: Identify **situations in which an Emergency Medical Responder (EMR) would call for additional assistance** upon arrival at a scene including agencies that would be called. Demonstrate the **transfer of care of the patient,** incorporating pertinent information such as the patient's condition, history of what happened, care given, etc.

3.3 Request for Emergency Assistance Flow Chart: Select public health risks and emergencies that impact healthcare delivery. Using Tennessee's Crisis Standards of Care, **create a flowchart** of how local, state, and/or federal governments coordinate to **handle requests for emergency assistance** related to human resources, supplies/equipment, and medical countermeasures.

3.4 Emergency Communication: **Analyze emergency communication** using resources such as the Centers for Disease Control's Crisis Emergency Risk Communication plan. Identify **at-risk population** groups that need **customized messaging** and healthcare delivery during emergencies due to disease-specific needs, medical device needs, limited access to care/support, or language barriers. Discuss the needs of one specific group, citing local incidence information as compared to state, region, and national data. Include existing policies or plans that target the needs of the group and healthcare interventions available.

3.5 Effective Therapeutic Communication: Review the concepts of **effective therapeutic communication**. Examine **interview techniques** used during therapeutic communication and identify potential **hazards of interviewing**.

4. Legal/Ethical Guidelines

4.1 Pre-Hospital Care Report and Incident Communication: Interpret the rules, guidelines, and legal ramifications related to **incident documentation** by EMS staff. Complete a **pre-hospital care** report utilizing **appropriate medical terminology** and the acronyms **SAMPLE, DCAP-BTLS, and OPQRST.**

4.2 HIPAA, Consent, and Legal Directives: Summarize the **Health Insurance Portability and Accountability Act (HIPAA).** Explain characteristics of consent, confidentiality, advanced directives, living wills, durable power of attorney, and other legal directives governing medical treatment. Using appropriate **medical and legal terminology**, explain how the content of these legal documents impacts **patients' rights** for all aspects of care.

4.3 Ethics and Professional Conduct: Examine real-world situations that involve **ethical dilemmas and the application of correct professional conduct** as highlighted in recent news articles. Defend the importance of ethics and professional standards for persons working in Emergency Medical Services occupations. Argue the relevance of professional codes of conduct within the scope of practice and the importance of following professional code guidelines.

4.4 Reservation of Evidence and Mandatory Reporting: Research legal ramifications and responsibilities of the EMR associated with **evidence preservation and mandatory reporting requirements within the EMS system.** Identify the **process for reporting** specific situations to the appropriate authorities, such as child abuse and/or crimes.

5. Patient Assessment/Evaluation and Treatment

5.1 Illness and Injury Assessment: Accurately perform the **components of patient assessment** to identify and manage **immediate life-threatening illnesses and injuries** within the scope of practice of the EMR for pediatric, adult, and geriatric patients, utilizing rubrics from

textbooks, National HOSA guidelines, or clinical standards of practice. Include the following areas:

a. scene size-up,
b. primary survey or assessment,
c. history taking,
d. secondary assessment,
e. vital signs, and
f. reassessment.

5.2 Illness Management: Identify and manage **life-threatening illnesses**. Identify and perform skills to manage life-threatening illnesses based on assessment findings of a pediatric, adult, and geriatric patient with **medical emergencies,** identifying **anatomical structures** involved. Utilize rubrics from textbooks, National HOSA guidelines, or clinical standards of practice in the following areas:

a. altered mental status,
b. seizures,
c. stroke,
d. gastrointestinal bleeding,
e. anaphylaxis,
f. infectious diseases,
g. diabetes,
h. psychological emergencies,
i. chest pain,
j. poisoning,
k. respiratory distress/asthma,
l. vaginal bleeding, and
m. nosebleeds.

5.3 Shock and Arrest Recognition and Management: Use assessment information to recognize **shock**, **respiratory failure or arrest, and cardiac arrest** based on assessment findings. Demonstrate the ability to **manage the situation** while awaiting additional emergency response.

5.4 CPR: Successfully perform American Red Cross or American Heart Association adult, child, and infant **Basic Life Support (BLS) cardiopulmonary resuscitation (CPR) for Healthcare Providers or BLS for Prehospital Providers.**

5.5 Trauma Management Recognition and Management Skills: Research and evaluate **National Trauma Triage Protocol.** Identify and perform **skills to manage life-threatening injuries** based on assessment findings of a patient with **trauma emergencies**, identifying **anatomical structures** involved. Utilize rubrics from textbooks, National HOSA guidelines, or clinical standards of practice in the following areas:

a. internal and external bleeding;
b. chest trauma such as sucking chest wound and impaled objects in the chest;
c. abdominal trauma such as eviscerations and impaled objects;
d. orthopedic trauma such as fractures, dislocations, and amputations;
e. soft tissue trauma, burns, dressings, and bandages;

f. head, facial, neck, and spine trauma such as head injuries, scalp injuries, and injuries to the spine;
g. environmental emergencies such as submersion and exposure to heat and cold; and
h. multi-system trauma.

5.6 Life-Threatening Situations Involving Children, the Elderly, and Maternity Patients: Recognize and manage **life threats** based on simple assessment findings for special population patients, such as **children, the elderly, and maternity patients**, while awaiting additional emergency response. Utilize rubrics from textbooks, National HOSA guidelines, or clinical standards of practice for the following situations:
a. vaginal bleeding in pregnant patients;
b. signs of labor and delivery;
c. steps in pre-hospital delivery;
d. initial care of neonates;
e. care of mother after delivery;
f. pediatric respiratory distress, seizures, and Sudden Infant Death Syndrome (SIDS);
g. geriatric care; and
h. child, elderly, and domestic partner abuse.

5.7 Human Development and Psychological Norms: Discuss **developmental and psychological norms** for all ages, including pediatric and geriatric patients relating **normal vs abnormal psychological responses to illness and injury**.

Standards Alignment Notes

*References to other standards include:

- National Highway Traffic Safety Administration National Emergency Medical Services Education Standards for Emergency Medical Responders (EMR).
    - All standards are aligned to the National EMS Education Standards and National EMS Instructional Guidelines and approved by the Tennessee Department of Emergency Medical Services.
    - Key for alignment: P-Preparatory, AP-Anatomy and Physiology, MT-Medical terminology, PT-Pathophysiology, LD- Life Span Development, PH-Public Health, Pharm-Pharmacology, AW-Airway Management, Respirations and Artificial Ventilation, A-Assessment, M-Medicine, S-Shock and Resuscitation, T-Trauma, SP-Special Patient Populations, EM-EMS Operations
- 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.
- Federal Emergency Management Agency, National Incident Management Systems Emergency Management Institute curriculum

Emergency Medical Services Practicum

Primary Career Cluster:	Health Science
Course Contact:	**CTE.Standards@tn.gov**
Course Code:	**C14H24**
Prerequisite(s):	*Health Science Education* (C14H14), *Anatomy & Physiology* (G03H31 or C14H09), *Medical Therapeutics* (C14H15), *and Emergency Medical Services* (C14H13)
Credit:	**1**
Grade Level:	**12**
Elective Focus-Graduation Requirements:	**This course satisfies one of three credits required for an elective focus when taken in conjunction with other Health Science courses.**
POS Concentrator:	**This course satisfies one out of two required courses to meet the Perkins V concentrator definition when taken in sequence in the approved program of study.**
Programs of Study and Sequence:	**This is the Year 4 course in the *Emergency Services* program of study.**
Aligned Student Organization(s):	**HOSA: http://www.tennesseehosa.org** SkillsUSA: https://www.skillsusatn.org
Coordinating Work-Based Learning:	**Teachers who hold an active WBL certificate may offer placement for credit when the requirements of the state board's WBL Framework and the Department's WBL Policy Guide are met. For information, visit https://www.tn.gov/education/educators/career-and-technical-education/work-based-learning.html.**
Promoted Tennessee Student Industry Credentials:	Credentials are aligned with postsecondary and employment opportunities and with the competencies and skills that students acquire through their selected program of study. For a listing of promoted student industry credentials, visit https://www.tn.gov/content/tn/education/educators/career-and-technical-education/student-industry-certification.html.
Teacher Endorsement(s):	**577, 720**
Required Teacher Certifications:	Please refer to Occupational Educator Licensure Guidance for a full list.
Required Teacher Training:	**None**
Teacher Resources:	https://www.tn.gov/education/educators/career-and-technical-education/career-clusters/cte-cluster-health-science.html Best for All Central: https://bestforall.tnedu.gov/

Course at a Glance

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Students engage in industry-relevant content through general education integration and experiences such as career and technical student organizations (CTSO) and work-based learning (WBL). Through these experiences, students are immersed with industry-standard content and technology, solve industry-based problems, meaningfully interact with industry professionals, and use/produce industry-specific, informational texts.

Using a Career and Technical Student Organization (CTSO) in Your Classroom

CTSOs are a great resource to put classroom learning into real-life experiences for your students through classroom, regional, state, and national competitions, and leadership opportunities. Below are CTSO connections for this course; note this is not an exhaustive list.

- Participate in the CTSO Fall Leadership Conference to engage with peers by demonstrating logical thought processes and developing industry-specific skills that involve teamwork and project management.
- Participate in contests that highlight job skill demonstration, interviewing skills, community service activities, extemporaneous speaking, and job interviews.
- Participate in leadership activities such as Organizational Leadership, Prepared Speaking, HOSA Service Project, Creative Problem Solving, and HOSA Service Project.

Using Work-Based Learning (WBL) in Your Classroom

Sustained and coordinated activities that relate to the course content are the key to successful work-based learning. Possible activities for this course include the following. This is not an exhaustive list.

- **Standard 1.1** | Integrated project with multiple interactions with a business of the students' choice in which the student develops a series of artifacts to demonstrate the application of academic and technical skills, 21st-century skills, personal, and soft skills.
- **Standard 2.1** | Invite an EMS industry professional to speak about safety guidelines and protocol.
- **Standards 3.1-3.4** | Invite an industry partner to speak about the range of credentials, resume suggestions, and to conduct mock interviews.
- **Standards 4.1-4.2** | Internship or job placement to apply course content in the workplace.
- **Standard 5.1** | Compile a portfolio to demonstrate mastery of workplace skills and behavior including artifacts and industry partner feedback.
- **Standard 6.1** | Present final project to potential industry employer.

Course Description

Emergency Medical Services Practicum is a capstone course in the *Emergency Services* program of study that provides a practicum experience for students as they develop an understanding of professional and ethical issues. The capstone course will be based on the knowledge and skills from previous courses in the *Emergency Services* program of study. Upon completion of the course, students will be proficient in components of communication, critical thinking, problem-solving, information technology, ethical and legal responsibilities, leadership, and teamwork. Instruction may be delivered through school-based laboratory training or work-based learning arrangements, such as cooperative education, mentoring, and job shadowing.

Course Standards

1. Personalized Learning Plan

1.1 Personalized Learning Plan: A student will have a Personalized Learning Plan that identifies their **long-term goals**, demonstrates how the Work-Based Learning (WBL) experience aligns with their elective focus and/or high school plan of study, addresses how the student plans to meet and demonstrate the course standards, and addresses **employability skill attainment** in the following areas:

a. application of academic and technical knowledge and skills embedded in course standards;
b. career knowledge and navigation skills;
c. 21st-century learning and innovation skills; and
d. personal and social skills.

2. Safety

2.1 Safety and Universal Precautions: Identify **safety hazards** in the workplace and demonstrate **practices for safe working**. Accurately read, interpret, and demonstrate adherence to **safety guidelines**, including but not limited to guidelines pertaining to electrical safety, infection control, Occupational Safety and Health Administration (OSHA), chemical and back safety. Be able to distinguish between the guidelines and explain why certain guidelines apply. Recognize the need for and employ **universal precautions** with 100% accuracy.

3. Postsecondary and Career Preparation

3.1 Postsecondary Education and Credentials: Research the **range of credentials** one can earn within the **Emergency Medical Service (EMS) system.** Investigate both in-state and out-of-state **postsecondary programs** in a variety of EMS fields.

3.2 Professional Resume: Search for the **resumes of EMS professionals** retrieved from the websites of systems, companies, organizations, or professional networks. Discuss what is

typically included in the resumes of these professionals, compare and contrast several examples, and create a personal resume modeled after elements identified in the search.

3.3 Job Search, Application, and Cover Letter: Simulate the experience of conducting a **job search** by researching **local employment options**. In preparation for a future career in EMS, complete an authentic j**ob application** form and compose a **cover letter** following the guidelines specified in the vacancy announcement.

3.4 Mock Interview and Thank You Letter: Participate in a **mock interview**. Prior to the interview, research tips on dress and grooming, most commonly asked interview questions, appropriate conduct during an interview, and recommended follow-up procedures. Highlight sample work compiled in the portfolio that illustrates mastery of specific skills attained in the program of study. Upon completion of the interview, write a **thank you letter** to the interviewer in a written or email format.

4. Transferring Course Concepts to Practicum

4.1 Work-Based Learning Experience: Apply skills and knowledge from previous courses in an authentic work-based learning **internship, job shadow, or classroom-based project.** Develop a plan to demonstrate skills outlined in previous courses.

4.2 Practicum Journal: Create and continually update a **personal journal to document skills learned** during the practicum and draw connections between the experience and previous course content by reflecting on the following:

a. tasks accomplished and activities implemented;
b. positive and negative aspects of the experience;
c. how challenges were addressed;
d. team participation in a learning environment;
e. comparisons and contrasts between classroom and work environments;
f. interactions with colleagues and supervisors;
g. personal career development; and
h. personal satisfaction.

5. Portfolio

5.1 Portfolio: The following documents will reside in the **career portfolio**:

a. the career plan developed and revised in prior courses;
b. resume;
c. list of responsibilities undertaken through the course;
d. artifacts of project outcomes;
e. periodic journal entries reflecting on tasks and activities;
f. feedback from the instructor and/or supervisor based on observations; and
g. transcripts or other evidence of certifications obtained throughout the program of study.

6. Communication of Project Results

6.1 Practicum Presentation: Upon completion of the practicum, develop a technology-enhanced presentation using medical terminology and abbreviations appropriately to **showcase highlights, challenges, and lessons learned from the experience**. The presentation should be delivered orally but supported by relevant graphic illustrations, such as diagrams, drawings, videos, and photographs. Prepare the presentation in a format that could be presented to both a healthcare professional and non-healthcare professional audience, as well as for a career and technical student organization (CTSO) competition.

Standards Alignment Notes

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- 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.

Nursing Education

Primary Career Cluster:	Nursing Education
Course Contact:	CTE.Standards@tn.gov
Course Code:	C14H16
Prerequisite(s):	*Health Science* (C14H14), *Medical Therapeutics* (C14H15)*, and Anatomy & Physiology* (C14H09 or G03H31*)*
Credit:	1
Grade Level(s):	11-12
Student-Teacher Ratio:	25:1 (classroom), 15:1 (clinical)
Elective Focus-Graduation Requirement:	This course satisfies one of three credits required for an elective focus when taken in conjunction with other Health Science courses.
POS Concentrator:	This course satisfies one out of two required courses to meet the Perkins V concentrator definition when taken in sequence in the approved program of study.
Programs of Study and Sequence:	This is one of the Year 4 course options in the *Nursing Services* program of study.
Aligned Student Organization(s):	HOSA: http://www.tennesseehosa.org SkillsUSA: https://www.skillsusatn.org
Coordinating Work-Based Learning:	Students enrolled in this course who wish to pursue the CNA certification must spend a minimum of 16 hours in a nursing home clinical setting. Teachers must hold an active WBL Certificate provided by the Tennessee Department of Education. For more information, please visit: https://www.tn.gov/education/educators/career-and-technical-education/work-based-learning.html.
Promoted Tennessee Student Industry Credentials:	Credentials are aligned with postsecondary and employment opportunities and with the competencies and skills that students acquire through their selected program of study. For a listing of promoted student industry credentials, visit https://www.tn.gov/content/tn/education/educators/career-and-technical-education/student-industry-certification.html.
Teacher Endorsement(s):	577, 720
Required Teacher Certifications:	Please refer to Occupational Educator Licensure Guidance for a full list.
Required Teacher Training:	This course can only be taught by a Registered Nurse or a Licensed Practical Nurse if certifying students in the CNA certification. First-time teachers must also complete online training provided by the Department of Education. Additional training requirements: Work-Based Learning training and D&S Diversified training.
Teacher Resources:	https://www.tn.gov/education/educators/career-and-technical-education/career-clusters/cte-cluster-health-science.html Best for All Central: https://bestforall.tnedu.gov/

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CTSOs are a great resource to put classroom learning into real-life experiences for students through classroom, regional, state, and national competitions, and leadership opportunities. Below are CTSO connections for this course; note this is not an exhaustive list.

- Participate in the CTSO Fall Leadership Conference to engage with peers by demonstrating logical thought processes and developing industry-specific skills that involve teamwork and project management.
- Participate in contests that highlight job skill demonstration, interviewing skills, community service activities, extemporaneous speaking, and job interviews.
- Participate in leadership activities such as Organizational Leadership, Prepared Speaking, HOSA Service Project, Creative Problem Solving, and HOSA Service Project.

Using Work-Based Learning (WBL) in Your Classroom

Sustained and coordinated activities that relate to the course content are the key to successful work-based learning. Possible activities for this course include the following. This is not an exhaustive list.

- **Standards 1.1-10.1** | Students work in a local nursing home to develop nurse aide skills as an integral part of this course. Students must spend a minimum of 40 hours practicing skills and providing patient care in order to be eligible to sit for the Certified Nurse Aide exam.

Course Description

Nursing Education is a capstone course designed to prepare students to pursue careers in the field of nursing. Upon completion of this course, a proficient student will be able to implement communication and interpersonal skills, maintain residents' rights and independence, provide care safely, prevent emergency situations, prevent infection through infection control, and perform the skills required of a nursing aide At the conclusion of this course, students may sit for the Certified Patient Care Technician (CPCT) exam, or if students have logged a minimum of 75 hours, including 59 hours of classroom instruction and 16 clinical lab hours in a nursing home facility through a Department of Health approved program, they are eligible to take the certification examination as a Certified Nurse Aide (CNA).

Prior to beginning work at a clinical site, students must be certified in Basic Life Support (BLS) Cardiopulmonary Resuscitation (CPR) and deemed competent in basic first aid, body mechanics, Standard Precaution guidelines, and confidentiality.

Note: **In order for students to qualify for the nurse aide certification examination, the training program must be approved at least 30 days before the first day of class by the Health Facilities Commission program staff.**

Course Requirements

This capstone course aligns with the requirements of the Work-Based Learning (WBL) Framework (established in Tennessee State Board High School Policy), with the Tennessee Department of Education's Work-Based Learning Policy Guide, and with state and federal Child Labor Law.

Course Standards

1. Work-Based Learning

1.1 Personalized Learning Plan: A student will have a **Personalized Learning Plan** that identifies long-term goals, demonstrates how the **Work-Based Learning (WBL) experience** aligns with the elective focus and/or high school plan of study, addresses how the student plans to meet and **demonstrate the course standards**, and addresses **employability skill attainment** in the following areas:

a. application of academic and technical knowledge and skills (embedded in course standards);
b. career knowledge and navigation skills;
c. 21st-century learning and innovation skills; and
d. personal and social skills.

2. Role and Responsibility

2.1 Services and Careers in the Nursing Home Facility: Differentiate between the **services and careers in a nursing home setting,** identifying the careers within each service. Illustrate the interrelatedness of the care team members, including the individual services each provide.

2.2 Personal and Professional Characteristics of a Certified Nurse Aide (CNA): Distinguish the **personal and professional characteristics** of an employee in a nursing home facility. Explain the **characteristics in the context of the nurse aide (CNA) role** and relate them to common professionalism expectations, including expectations surrounding attire, accountability, the chain of command, scope of practice, resident care plans, the nursing process, productivity, and time management, and performing duties as assigned while demonstrating ethical behavior.

2.3 Professional Ethics and Legal Responsibilities of a CNA: Differentiate and explain the **professional ethics and legal responsibilities of a CNA** in the clinical setting. Analyze **legal and ethical issues related to practice** in the nursing home facility. Accurately

explain **personal and organizational liabilities** associated with these legal and ethical issues. Summarize a **CNA code of ethics** to prepare for a class discussion on the significance of specific standards and how they relate to the nursing home residents' bill of rights.

3. Residents' Rights

3.1 Resident's Bill of Rights: Use a nursing home resident's bill of rights document to analyze and discuss the **importance of maintaining a healthy, safe, and respectful environment that includes families and friends**. Address at minimum the following components: obligation of staff to inform resident and their families of rights and services, right to privacy, right to participate in their own care, right to independent choice, and informed consent. The following rights should be included for nursing home residents: avenues for dealing with disputes and/or grievances, residents' environment, and quality of life, and maintaining care and security of residents' possessions.

3.2 HIPAA and Legal Documents: Summarize the **Health Insurance Portability and Accountability Act (HIPAA).** Differentiate the **characteristics and rights of residents** outlined in advanced directives, living wills, durable power of attorney, and other legal directives governing medical treatment in a nursing home setting. Discuss **how the content of these legal documents influences residents' rights in a nursing home** for all aspects of care.

3.3 Abuse and Neglect: Define the terms **abuse and neglect** and differentiate among various **types of abuse and neglect** through an evaluation of scenarios. Summarize findings from the scenarios, including all suspicious findings and actual signs of abuse and/or neglect. Accurately summarize the findings, citing evidence from documentation.

3.4 OBRA: Describe the **purpose of the Omnibus Reconciliation Act (OBRA)** and explain key concepts in an informational artifact that can be used when teaching new residents and/or their families. Key concepts can include, but are not limited to the following:

a. importance of an individualized plan of care for each resident;
b. minimal requirements for nursing assistant training;
c. long Term Care Minimum Data Sets (MDS) guidelines;
d. roles of Ombudsmen; and
e. purpose and importance of Patient Self-Determination Act.

4. Safety

4.1 Resident and Employee Safety: **Accurately read and interpret policies and procedures** for the following safety subjects aligned to the roles and responsibilities of a CNA. Participate in **facility safety training** and apply the **safety procedures** in the classroom and clinical setting to prevent injury and provide safety for residents. Document completion of training topics on the appropriate work-based learning (WBL) and work site forms such as:

a. proper identification of residents,
b. body mechanics,
c. fire and oxygen safety,

d. natural disasters,
e. chemical safety,
f. physical and mental restraints,
g. BLS for health care providers, and
h. safe use of mechanical lift.

4.2 Physical and Mental Changes in the Elderly: Identify **physical and mental changes in the elderly** that increase their risk for accidents including falls. Align **types of risks with their signs and symptoms and the prevention guidelines** that preserve nursing home residents' rights. Identify **risk situations** in the clinical setting and brainstorm solutions.

5. Infection Control/Medical Microbiology

5.1 Infection Control: Review **infection control guidelines**, Standard Precaution guidelines, Transmission-Based precautions, Personal Protective Equipment use, and infection control. Practice skills related to hand washing, donning and doffing a gown, masks, gloves, goggles, handling and cleaning spills, cleaning equipment, and handling laundry.

5.2 Infectious Diseases in the Nursing Home Facility: Identify the **signs/symptoms (s/sx), causative agents, precautions, and preventive measures** for the following **infectious diseases** frequently encountered in a nursing home facility:
a. tuberculosis,
b. hepatitis,
c. methicillin-resistant staphylococcus aureus (MRSA),
d. vancomycin-resistant enterococcus (VRE),
e. clostridium difficile or C. diff, and
f. other nosocomial infections.

6. Communication

6.1 Effective Communication: Examine the skills needed to **effectively and respectfully communicate** with a nursing home resident. Discuss the following facets of communication:
a. integration of interpersonal skills,
b. verbal and nonverbal communication,
c. barriers to communication,
d. special needs or cognitive impairments,
e. cultural diversity,
f. how to respond to negative or changing behaviors,
g. how to respond to grief, and
h. how to handle discussions about death and dying.
Practice communication skills in the classroom and nursing home setting with classmates, families, the elderly, and persons with special needs, obtaining objective and subjective resident information.

6.2 CNA Documentation: Research **guidelines and formats pertaining to nursing assistant documentation in a nursing home facility**. Interpret **words and phrases commonly used in documentation,** paying specific attention to legal requirements and correct

medical terminology. Role-play **giving and receiving a resident/patient status** report using the correct medical terminology.

7. Personal Care, Data Collection, and Care Impaired

7.1 Personal Care Skills: Understand principles of and successfully perform **skills related to personal care**. Incorporate guidelines for nursing home residents' rights and utilize rubrics from textbooks, National HOSA guidelines, or other clinical standards of practice for the following:

a. principles of self-care versus full care;
b. bathing/skincare/back rub;
c. grooming/shaving/hair care/nail care;
d. mouth care/denture care of conscious and comatose residents;
e. dressing;
f. transfers, positioning, turning in bed;
g. bed making, occupied and unoccupied; and
h. care for resident/patient when death is imminent.

7.2 Intake, Output, and Toileting Skills: Understand principles of and successfully perform **skills related to toileting, intake and output, and bedpan or bedside commode use**. Incorporate guidelines for nursing home residents' rights and utilize rubrics from textbooks, National HOSA guidelines, or other clinical standards of practice for the following:

a. urine characteristics, and abnormalities that should be reported to the charge nurse;
b. common disorders of bladder and bowels;
c. factors affecting the elimination of urine or stool;
d. types of urine specimens obtained;
e. catheter care/emptying urinary bag;
f. procedure for collecting urine and stool specimens;
g. care guidelines for ostomy; and
h. recording intake and output.

7.3 Restorative Care: Understand principles of and successfully perform **skills related to basic restorative care**. Incorporate guidelines of nursing home residents' rights and utilize rubrics from textbooks, National HOSA guidelines, or other clinical standards of practice for the following:

a. promoting self-care;
b. range of Motion (ROM) exercises and maintenance;
c. ambulation with and without assistive devices;
d. use of assistive devices in transferring, eating, and dressing; and
e. care and use of prosthetic/orthotic devices.

7.4 Proper Feeding Techniques: Understand principles of and successfully perform skills related to **proper feeding techniques** to assist with eating and hydration. Incorporate guidelines of nursing home residents' rights and utilize rubrics from textbooks, National HOSA guidelines, or other clinical standards of practice for the following:

a. nutritional needs of the elderly;
b. factors that influence food preference;
c. special diets;

d. thickened liquids;
e. swallowing issues and dysphagia;
f. abdominal thrust per American Heart Association or American Red Cross standards; and
g. reporting food intake.

8. Basic Nursing Skills and Disease Process

8.1 Vital Signs: **Assess vital signs** to determine oral temperature, radial and apical pulse, respirations, blood pressure, height, and weight. **Calculate body mass index (BMI)**. Identify acceptable ranges for adult and geriatric residents, as well as the measurements that must be reported to the nurse, including possible causes. Using appropriate medical terminology, document assessment findings on a classmate or resident's chart at least ten times during the semester.

8.2 Oxygen Therapy: Articulate CNA standards for the **care of a nursing home resident who is receiving oxygen therapy**. Using appropriate medical terminology, discuss the **indications for oxygen therapy, types of therapy, types of devices, and safety precautions**. Demonstrate these standards of care in the classroom and clinical setting.

8.3 Pain Control: Compare and contrast the **quality of life of nursing home residents with and without pain**. Using appropriate medical terminology, discuss **measures a CNA may use to reduce pain** and **signs/symptoms to report to the nurse,** including the use of a pain scale. Demonstrate **pain-reducing measures** in the classroom and the clinical setting.

8.4 Geriatric Anatomy and Nursing Care Plan: Outline the **specific changes that occur in each system of the body with geriatric clientele**. Using appropriate medical terminology, include **common diseases/disorders,** including signs and symptoms for this population and key reportable information. Using a chosen geriatric resident or mock resident, create a **nursing care plan** with a nursing diagnosis and at least one intervention and rationale for each of the following systems. Interventions should be appropriate for a CNA to use in a clinical setting.

a. Integumentary systems
b. Nervous system with eyes and ears
c. Musculoskeletal systems
d. Cardiovascular and respiratory systems
e. Digestive and urinary systems
f. Endocrine systems

8.5 Potential Medical Emergencies: Outline **potential medical emergencies within a nursing home facility**, including but not limited to those related to shock, Myocardial Infarction (MI), bleeding, burns, fainting, diabetes, Cardiovascular Accident (CVA), and seizures. Using appropriate medical terminology, generate a **plan and/or guidelines of care** for each of the areas previously listed, incorporating facility policies, national standards, and any other resources necessary.

9. Mental Health and the Aging Process

9.1 Geriatric Mental Health: **Investigate mental health diseases** in the elderly and compare their challenges to those faced by middle adults in Erikson's psychosocial developmental stage. Using appropriate medical terminology, create an artifact that includes signs and symptoms, incidence, how the disease/disorder affects the resident and/or family, how to modify staff behavior in response to residents' behavior, and possible treatments. Use this artifact to prepare for participation in a post-clinical conference.

9.2 Cognitively Impaired Residents: Using appropriate medical terminology, describe **therapies or strategies for addressing the unique needs of cognitively impaired residents** and modifying behavior in a positive manner. Model strategies in classroom role play and interactions with residents in the clinical setting for the following:

a. developmental task of aging;
b. methods to reduce the effects of cognitive impairment;
c. attitudes of staff caring for cognitively impaired residents;
d. communication with cognitively impaired residents;
e. methods to reduce effects of cognitive impairment;
f. acceptable interventions associated with cognitive disorders and behaviors;
g. Safe management of a combative resident; and
h. acceptable interventions associated with sundowners and wandering.

10. Portfolio

10.1 Portfolio Artifacts: Compile and continually update a **portfolio of artifacts** completed in this course. If pursuing the Nurse Aide certification or dual enrollment/dual credit hours, document hours spent on activities such as clinical placement or classroom contact with an articulated institution. Upon completion of the course, prepare the portfolio in a professional style to **present to an appropriate nursing audience**.

Standards Alignment Notes

*References to other standards include:

- 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.
- Nurse Aide Training Program requirements for Tennessee
  - These are the minimum requirements that all programs must include in order for students to be eligible to take the competency evaluation to become a Certified Nursing Assistant.

Rehabilitation Careers

Primary Career Cluster:	Health Science
Course Contact:	CTE.Standards@tn.gov
Course Code:	C14H08
Prerequisite:	*Health Science Education* (C14H14)
Credit:	1
Grade Level(s):	10-11
Focus Elective Graduation Requirements:	This course satisfies one of three credits required for an elective focus when taken in conjunction with other Health Science courses.
Program of Study (POS) Concentrator:	This course satisfies one out of two required courses to meet the Perkins V concentrator definition when taken in sequence in the approved program of study.
Programs of Study and Sequence:	This is the Year 3 course choice in the *Sport and Human Performance* program of study.
Aligned Student Organization(s):	HOSA: http://www.tennesseehosa.org SkillsUSA: https://www.skillsusatn.org
Coordinating Work-Based Learning:	Teachers are encouraged to use embedded WBL activities such as informational interviewing, job shadowing, and career mentoring. For information, visit https://www.tn.gov/education/educators/career-and-technical-education/work-based-learning.html.
Promoted Tennessee Student Industry Credentials:	Credentials are aligned with postsecondary and employment opportunities and with the competencies and skills that students acquire through their selected program of study. For a listing of promoted student industry credentials, visit https://www.tn.gov/content/tn/education/educators/career-and-technical-education/student-industry-certification.html.
Teacher Endorsement(s):	577, 720
Required Teacher Certifications:	Please refer to Occupational Educator Licensure Guidance for a full list.
Required Teacher Training:	None
Teacher Resources:	https://www.tn.gov/education/educators/career-and-technical-education/career-clusters/cte-cluster-health-science.html Best for All Central: https://bestforall.tnedu.gov/

Course at a Glance

CTE courses provide students with an opportunity to develop specific academic, technical, and 21st-century skills necessary to be successful in careers and life. In pursuit of ensuring every student in Tennessee achieves this level of success, we begin with rigorous course standards that feed into intentionally designed programs of study.

Students engage in industry-relevant content through general education integration and experiences such as career and technical student organizations (CTSO) and work-based learning (WBL). Through these experiences, students are immersed with industry-standard content and technology, solve industry-based problems, meaningfully interact with industry professionals, and use/produce industry-specific, informational texts.

Using a Career and Technical Student Organization (CTSO) in Your Classroom

CTSOs are a great resource to put classroom learning into real-life experiences for students through classroom, regional, state, and national competitions, and leadership opportunities. Below are CTSO connections for this course; note this is not an exhaustive list.

- Participate in the CTSO Fall Leadership Conference to engage with peers by demonstrating logical thought processes and developing industry-specific skills that involve teamwork and project management.
- Participate in contests that highlight job skill demonstration, interviewing skills, community service activities, extemporaneous speaking, and job interviews.
- Participate in leadership activities such as Organizational Leadership, Prepared Speaking, HOSA Service Project, Creative Problem Solving, and HOSA Service Project.

Using Work-Based Learning (WBL) in Your Classroom

Sustained and coordinated activities that relate to the course content are the key to successful work-based learning. Possible activities for this course include the following. This is not an exhaustive list.

- **Standards 1.1-1.4** | Interview a rehabilitation professional to determine how HIPAA's ethical/legal tenets affect the patient's rights for all aspects of care.
- **Standards 2.1-2.4** | Invite a patient advocate to discuss communication barriers related to patient rights.
- **Standards 3.1-3.6** | Shadow a kinesiologist.
- **Standards 4.1-4.6** | Participate in an abbreviated internship to focus on patient assessment and treatment modalities.
- **Standards 6.1-6.3** | Shadow the school's athletic trainer to observe taping and application of supportive devices to prevent injury or prevent exacerbation of injury.

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, recognize diseases, disorders, or injuries related to rehabilitation services, correlate the related anatomy and physiology, and then develop a plan of treatment with appropriate modalities.

Course Standards

1. Careers

1.1 Rehabilitation Services Careers: Research **careers within the rehabilitation career pathway** in Athletic Training, Physical Therapy, Occupational Therapy, Speech Therapy, Music Therapy, Pet Therapy, Exercise Therapy, Massage 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.

1.2 Rehabilitation Careers Skills and Employment Opportunities: 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.**

1.3 Law, Ethics, and Standards of Practice: Compare and contrast the **specific laws and ethical issues** that impact relationships between patients/clients and the healthcare professional, including issues such as **codes and standards of practice.**

1.4 HIPPA and Patient Rights: 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.

2. Healthcare Systems

2.1 Health Insurance Coverage: 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.

2.2 Issues, Legislation, and Policy Affecting Rehabilitation Services Patients: Investigate current issues and practices surrounding the **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**.

2.3 History and Development of Physical Therapy: Research 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.

2.4 Communication: 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.

3. Anatomy and Physiology

3.1 Anatomy and Physiology: 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.

3.2 Basic Kinesiology related to Disease/Disorder Prevention: Investigate the **basic principles of kinesiology** and relate the connection to disease/disorder prevention. Address at a minimum: movements of joints and bones, planes, directional terms, body motions, motions between joint articular surfaces, mechanisms of joints, and biomechanical levers.

3.3 Physiological Responses of Patients of Differing Ages: 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**.

3.4 Trauma, Wound Healing, and Tissue Repair: 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.

3.5 Pathophysiology of Injuries, Diseases, and Disorders Connected to Rehabilitation Careers: 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; and
m. soft tissue injuries.

3.6 Normal Anatomy and Physiology versus Pathophysiology of Injuries, Diseases, and Disorders Connected to Rehabilitation Careers: Identify **signs and symptoms as well as normal anatomy and physiology versus 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; and
m. soft tissue injuries.

4. Evaluation and Treatment

4.1 Patient Assessment/Evaluation: 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 a lab/clinical setting.

4.2 Therapeutic Exercise Regime Goals and Functional Progress: 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 an aphasic patient.

4.3 Therapeutic Exercise Techniques: List and define the **goals, indications, contraindications, and various techniques of therapeutic exercise**, including both general and specific exercise regimes relative to the treatment of soft tissue, bony, neurological disorders/diseases, and post-surgical complications.

4.4 Therapeutic Exercise Equipment and Techniques: 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.

4.5 Common Surgical Techniques: Describe **common surgical techniques and relevant anatomical alterations** that may affect the implementation of a therapeutic exercise regime.

4.6 Therapeutic Treatment Plan: Using **appropriate medical language and terminology,** interpret **objective and subjective data** obtained in standard 13 or 14 in developing an **appropriate therapeutic treatment plan** for a given injury, disease, or disorder, including the determination of goals and objectives to return the patient to maximum level of performance based on level of functional outcomes.

5. Patient Interaction

5.1 Treatment Modalities: Understand and successfully practice or evaluate the following **treatment modalities** with the identification of **appropriate equipment** and the 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

5.2 Life-threatening Events: Summarize the **specific symptoms and proper responses to life-threatening events** such as shock, brain injury, and spinal cord injury in athletes.

5.3 Documentation: Adhering to industry standards and using appropriate medical terminology, **document the findings from the evaluation, treatment plan, and progress in the therapeutic exercise regime** related to a disease or disorder.

6. Prevention of Injuries

6.1 Wellness Screening: Identify the basic concepts of **wellness screening** in connection to **injury prevention**. Complete an **injury prevention assessment** in a lab/clinical setting.

6.2 Supportive Techniques and Devices: 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.

6.3 Health Education Plan: 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**. 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 the use of pets, recreation, or music therapy in autistic children.

Standards Alignment Notes

*References to other standards include:

- 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.

Exercise Science

Primary Career Cluster:	Health Science
Course Contact:	CTE.Standards@tn.gov
Course Code:	C14H22
Prerequisite:	*Rehabilitation Careers* (C14H08)
Credit:	1
Grade Level(s):	11-12
Elective Focus-Graduation Requirements:	This course satisfies one of three credits required for an elective focus when taken in conjunction with other Health Science courses.
Program of Study (POS) Concentrator:	This course satisfies one out of two required courses to meet the Perkins V concentrator definition when taken in sequence in the approved program of study.
Programs of Study and Sequence:	This is the Year 4 course in the *Sport and Human Performance* program of study.
Aligned Student Organization(s):	HOSA: http://www.tennesseehosa.org SkillsUSA: https://www.skillsusatn.org
Coordinating Work-Based Learning:	Teachers are encouraged to use embedded WBL activities such as informational interviewing, job shadowing, and career mentoring. For information, visit https://www.tn.gov/education/educators/career-and-technical-education/work-based-learning.html.
Promoted Tennessee Student Industry Credentials:	Credentials are aligned with postsecondary and employment opportunities and with the competencies and skills that students acquire through their selected program of study. For a listing of promoted student industry credentials, visit https://www.tn.gov/content/tn/education/educators/career-and-technical-education/student-industry-certification.html.
Teacher Endorsement(s):	577, 720
Required Teacher Certifications:	Please refer to Occupational Educator Licensure Guidance for a full list.
Required Teacher Training:	None
Teacher Resources:	Best for All Central: https://bestforall.tnedu.gov/

Course at a Glance

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Students engage in industry-relevant content through general education integration and experiences such as career and technical student organizations (CTSO) and work-based learning (WBL). Through these experiences, students are immersed with industry-standard content and technology, solve industry-based problems, meaningfully interact with industry professionals, and use/produce industry-specific, informational texts.

Using a Career and Technical Student Organization (CTSO) in Your Classroom

CTSOs are a great resource to put classroom learning into real-life experiences for students through classroom, regional, state, and national competitions, and leadership opportunities. Below are CTSO connections for this course; note this is not an exhaustive list.

- Participate in the CTSO Fall Leadership Conference to engage with peers by demonstrating logical thought processes and developing industry-specific skills that involve teamwork and project management.
- Participate in contests that highlight job skill demonstration, interviewing skills, community service activities, extemporaneous speaking, and job interviews.
- Participate in leadership activities such as Organizational Leadership, Prepared Speaking, HOSA Service Project, Creative Problem Solving, and HOSA Service Project.

Using Work-Based Learning (WBL) in Your Classroom

Sustained and coordinated activities that relate to the course content are the key to successful work-based learning. Possible activities for this course include the following. This is not an exhaustive list.

- **Standards 1.1-1.4** l Invite a guest speaker to discuss careers within clinical exercise physiology, roles, and responsibilities, and required education and credentials.
- **Standards 2.1-6.4** l Participate in an abbreviated internship in a cardiac rehab clinic or rehab center to follow a patient from intake to graduation from the program.

Course Description

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

Course Standards

1. Exercise Science as a Career

1.1 Exercise Physiology Careers: Define **exercise physiology** and link to the careers within the **Clinical Exercise Physiology career pathway** as a cardiac rehabilitation therapist, certified strength and conditioning coach, personal trainer, lifestyle and weight management coach, athletic trainer, and corporate wellness supervisor/instructor. Explain in detail the e**ducation level, credentialing/licensure requirements, and continuing education** unit requirements necessary for success in these fields, as well as state and national compliance guidelines. Research professional organizations and codes of ethics associated with these occupations.

1.2 Roles and Responsibilities of Exercise Physiology Professionals: Compare and contrast the **roles and responsibilities of professionals in exercise physiology** with those of **professionals in other rehabilitation areas**. Determine the differences in client-therapist/trainer relationships, entities of risk management, liability issues, and protocols for working with special populations.

1.3 Exercise Physiology Professionals' Relationships to Other Professionals: Explain the **relationship of exercise physiology professionals with other healthcare and community professionals**, related to concerns over encroachment and role delineation. Provide suggestions to promote a working, team-building environment.

1.4 History of Exercise Physiology and Connection to Other Sciences: Research the **history and development of exercise physiology** connecting the sciences of **physics, chemistry, biology, anatomy and physiology, bioenergetics, and kinesiology**. Include the following: current research, new technologies and treatments, governmental initiatives, and injury/illness prevention.

2. Anatomy and Physiology

2.1 S.A.I.D. and F.I.T.T. Principles in Exercise and Fitness: Research the theories of the **Specific Adaptation to Imposed Demands (S.A.I.D.) principle and the Frequency, Intensity, Type, and Time (F.I.T.T.) principle**. Using medical terminology appropriately, explain the application of these principles to exercise and fitness; then describe the **changes that occur within normal anatomy and physiology** associated with these theories.

2.2 Regular Physical Activity and Positive Health Outcomes: Review the *Physical Activity Guidelines Advisory Committee Report* (latest edition) from the U.S. Department of Health. Explain the **scientific evidence surrounding participation in regular physical activity and exercise** and its association with **positive health outcomes**, especially involving the cardiovascular, musculoskeletal, and respiratory systems.

2.3 Anatomy and Physiology of the Musculoskeletal, Nervous, and Cardiovascular Systems: Review the **gross and cellular anatomy and physiology of the musculoskeletal, nervous, and cardiovascular systems**. Define the terms **neuromuscular integration and central command.** Summarize how neuromuscular integration, central command, and training

and/or rehabilitation plans are based on the integration of the muscle nerve with the muscles of these systems.

2.4 Types of Muscle Fibers and the Role of Genetics in Training: Identify the **two types of muscle fibers and their subtypes**, slow twitch, and fast twitch. Relate the concepts of **histochemistry, immunocytochemistry, and physiologic contraction** times to the performance of athletes in various sports. Evaluate the **role genetics and training play in muscle fiber adaptations**. Practice sharing this information with athletes or clients as part of an exercise/training program.

2.5 Anatomy and Physiology of the Respiratory System: Review the **gross and cellular anatomy and physiology of the respiratory system** and explain the **ventilation process**. Develop an **exercise program** and a **rehabilitation plan** for a patient/client who has chronic obstructive pulmonary disease (COPD) and one who is training for a marathon based on their respective respiratory needs. Compare and contrast these plans to justify the components included.

2.6 Aerobic Exercise and the Cardiovascular System: Compare and contrast the **functions of the cardiovascular system in response to aerobic exercises**. Cite the specific changes that are likely to occur and the part of the anatomy that is involved. Using this information, develop an informative artifact to inform others about the importance of exercise in maintaining positive cardiovascular health.

3. Adaptations to Exercise

3.1 Exercise Program Adaptations: Explain why **adaptations** must be made to **exercise programs** to account for different clients' needs. Given a scenario or profile of a client/patient, develop an exercise program with the following adaptations:

a. immediate effects of exercise;
b. long-term effects of exercise (heart/lungs/weight control/disease prevention);
c. effects of acclimatization, such as changes in temperature, altitude, climate, etc.;
d. effects of travel on the client and/or athlete; and
e. medications.

3.2 Kinesiology and Biomechanics: Review the concepts of **kinesiology and biomechanics** from the Rehabilitation Careers course. Explain how joint and bone movement, body motion, and levers can have positive or negative effects on an athlete's performance and development. Share with young athletes, the **effects of overtraining on the musculoskeletal system,** and relate the importance of adopting **safe biomechanical practices** when training.

4. Nutrition

4.1 Normal Adult Nutritional Needs: Research the importance of a **balanced diet** in the achievement of **optimum nutrition and exercise**. Compare and contrast the **nutritional needs** of a normal healthy adult with the needs of other clients, such as those training for an intensive sporting event, those with cardiac disease, or those being treated for and/or

recovering from illness. Using appropriate medical terminology, prepare an informative artifact to discuss the findings.

4.2 Sports Drinks: Investigate the **chemical makeup of various sports drinks**. Compare and contrast the nutritional value of these drinks compared to water as a form of hydration, electrolyte replacement, and vitamin replenishment for athletes. State the **advantages and disadvantages of each and the dangers that are likely to occur with inappropriate hydration techniques and/or dehydration.** Discuss the importance of hydration before, during, and after a sporting event, as well as the factors that affect the hydration process.

4.3 Nutrition for Athletes: Analyze **appropriate nutritional intake recommendations for athletes.** Develop a **pre- and post-sport activity meal plan for adolescent, young adult, middle-aged, and older adult athletes in contact and non-contact sports**. Include in the meal plan carbohydrate loading, carbohydrate maintenance, protein loading, and nutritional needs for anaerobic versus aerobic exercise. Revise the plan as new information and circumstances arise.

4.4 Creation of ATP: Explain **how chemical energy contained in glucose, fats, and amino acids is converted to adenosine triphosphate (ATP).** Describe how this process is important in the following areas of practice: health/fitness, medicine, athletic performance, and rehabilitation.

4.5 Weight Management Disorders: Research local incidence information of **weight management disorders,** such as anorexia nervosa and bulimia nervosa, and investigate the scope of the disease/disorder in vulnerable populations. Compare that data to similar state, regional, and national information. Develop an action **plan for addressing the weight management disorder** for the identified area, complete with an analysis of the pros and cons associated with popular diets, recommended caloric intake, appropriate exercise, and other healthcare interventions.

4.6 Ergogenic Aids: According to articles in professional journals, **ergogenic aids** have been theorized to improve athletic performance in a variety of ways. Compare ergogenic aids, identify how they are classified, including those that are banned, and describe documented benefits, dangers, and side effects, especially for adolescent athletes.

5. Assessment and Fitness Measurement

5.1 Baseline Assessment and Fitness Measurement: Understand principles of, and successfully perform skills related to, **baseline assessment and fitness measurement**, incorporating rubrics from National HOSA guidelines, textbooks, or clinical standards of practice for the following:

a. cardiovascular testing,
b. muscular strength testing,
c. flexibility testing,
d. muscular endurance testing,
e. postural screening,
f. speed testing,

g. balance testing,
h. reaction time testing,
i. coordination testing,
j. agility testing, and
k. muscular power testing,

5.2 Biometric Measurements: Understand principles of, and successfully perform skills related to**, biometric measurements,** incorporating rubrics from National HOSA guidelines, textbooks, or clinical standards of practice for the following:
a. body mass index (BMI),
b. how to calculate,
c. importance of knowing,
d. myths and misconceptions,
e. body fat percentage calculations,
f. girth,
g. waist and hip ratio,
h. resting heart rate,
i. resting blood pressure, and
j. resting respiratory rate.

6. Exercise Program

6.1 Exercise Plan: Identify and explain the **components of an exercise plan**. Evaluate an exercise plan for a healthy athlete, then compare and contrast the plan with one that has been designed for a patient with cardiac, neurological, or orthopedic difficulties. Note the similarities and differences in a side-by-side chart.

6.2 Training Principles: Evaluate and summarize the following **training principles.** In the summary, identify how each principle can be incorporated into the F.I.T.T. principle covered earlier in the course to develop an optimal exercise plan for clients who are currently not involved with exercise.
a. goal setting/reality principle,
b. inherent ability principle,
c. intrinsic motivation principle,
d. client education model principle,
e. physical assessment principle,
f. overload/progressive principle,
g. specificity principle,
h. trainability principle,
i. periodization principle,
j. overtraining principle, and
k. detraining principle.

6.3 Patient Consultation and Evaluation: Complete **consultation and evaluation** of a patient/client who is preparing for an intense athletic event, recovering from a cardiovascular illness/injury, making lifestyle modifications to improve health, or is required to improve health for work/insurance reasons. Ensure that the evaluation covers

therapeutic communication and psychology, nutrition, cardiovascular and muscular strength and endurance, acute variables that will affect training/rehabilitation, and training goals. Document findings in an authentic template using appropriate medical terminology.

6.4 Individualized Exercise/Rehabilitation Program: Utilizing information from the consultation, evaluation, fitness testing, and biometric measurements previously obtained, develop and document using appropriate medical terminology an **exercise/rehabilitation program** for each of the following:

a. juvenile athlete,
b. adult athlete,
c. senior adult athlete,
d. cardiovascular rehabilitation, and
e. morbid obesity with a co-morbidity.

Standards Alignment Notes

*References to other standards include:

- 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.

Dental Science

Primary Career Cluster:	Health Science
Course Contact:	CTE.Standards@tn.gov
Course Code:	C14H21
Prerequisite:	*Health Science* (C14H14)
Credit:	1
Grade Level(s):	11-12
Focus Elective Graduation Requirements:	This course satisfies one of three credits required for an elective focus when taken in conjunction with other Health Science courses.
POS Concentrator:	This course satisfies one out of two required courses to meet the Perkins V concentrator definition when taken in sequence in the approved program of study.
Programs of Study and Sequence:	This is the Year 3 course in the *Therapeutic Services* program of study.
Aligned Student Organization(s):	HOSA: http://www.tennesseehosa.org SkillsUSA: https://www.skillsusatn.org/
Coordinating Work-Based Learning:	Teachers are encouraged to use embedded WBL activities such as informational interviewing, job shadowing, and career mentoring. For information, visit https://www.tn.gov/education/educators/career-and-technical-education/work-based-learning.html.
Promoted Tennessee Student Industry Credentials:	Credentials are aligned with postsecondary and employment opportunities and with the competencies and skills that students acquire through their selected program of study. For a listing of promoted student industry credentials, visit https://www.tn.gov/content/tn/education/educators/career-and-technical-education/student-industry-certification.html.
Teacher Endorsement(s):	577, 720
Required Teacher Certifications:	Please refer to Occupational Educator Licensure Guidance for a full list.
Required Teacher Training:	None
Teacher Resources:	https://www.tn.gov/education/educators/career-and-technical-education/career-clusters/cte-cluster-health-science.html Best for All Central: https://bestforall.tnedu.gov/

Course at a Glance

CTE courses provide students with an opportunity to develop specific academic, technical, and 21st-century skills necessary to be successful in careers and life. In pursuit of ensuring every student in Tennessee achieves this level of success, we begin with rigorous course standards that feed into intentionally designed programs of study.

Students engage in industry-relevant content through general education integration and experiences such as career and technical student organizations (CTSO) and work-based learning (WBL). Through these experiences, students are immersed with industry-standard content and technology, solve industry-based problems, meaningfully interact with industry professionals, and use/produce industry-specific, informational texts.

Using a Career and Technical Student Organization (CTSO) in Your Classroom

CTSOs are a great resource to put classroom learning into real-life experiences for your students through classroom, regional, state, and national competitions, and leadership opportunities. Below are CTSO connections for this course; note this is not an exhaustive list.

- Participate in the CTSO Fall Leadership Conference to engage with peers by demonstrating logical thought processes and developing industry-specific skills that involve teamwork and project management.
- Participate in contests that highlight job skill demonstration, interviewing skills, community service activities, extemporaneous speaking, and job interviews.
- Participate in leadership activities such as Organizational Leadership, Prepared Speaking, HOSA Service Project, Creative Problem Solving, and HOSA Service Project.

Using Work-Based Learning (WBL) in Your Classroom

Sustained and coordinated activities that relate to the course content are the key to successful work-based learning. Possible activities for this course include the following. This is not an exhaustive list.

- **Standards 1.1-1.3** | Conduct informational interviews with various members of the dental care team to analyze skills, competencies, and professional traits of dental health professionals.
- **Standards 2.1-2.4** | Job shadow at a free dental clinic to focus on cost and services for dental care.
- **Standards 3.1-3.5** | Job shadow a dental hygienist and practice filling out the tooth numbering chart.
- **Standards 4.1-4.2** | Invite a Tennessee Occupational Safety and Health Administration (TOSHA) representative to discuss chemical safety and hazardous wastes in dental facilities.
- **Standards 5.3** | Partner with a dental health professional to create an age-specific dental health education plan for patients. **Standards 6.1-6.3** | Observe an in-office oral surgery procedure.

Course Description

Dental Science is an applied course in the *Therapeutic 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, proficient

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.

Course Standards

1. Careers in Dental Science

1.1 History of Dentistry and Dental Care: Gather relevant information from textbooks and online searches concerning the **history of dentistry**, with emphasis on **changes in care and prevention** to understand how the practice of dentistry has evolved. Research **emerging dental technologies** related to dental and oral health, including but not limited to **procedures, equipment, and diagnostics tools**.

1.2 Dental Careers: Research **careers within the dental sciences** and explain 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 Endodontics.

1.3 Required Professional Traits for Dental Careers: 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.

2. Legalities and Ethical Issues

2.1 Ethical Issues: Investigate **ethical issues 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. Discuss **how these issues will affect or have affected the dental community.**

2.2 Legal Responsibilities: 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.

2.3 Cultural Differences: 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. Explain **how these customs either enhance or diminish the outcomes of dental care treatments and procedures**.

2.4 Dental Insurance Coverage: 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 to a classmate and/or family member.

3. Anatomy and Physiology

3.1 Dental Terminology: Outline the **gross and cellular structure and function of head and neck anatomy**, including bones, muscles, sinuses, salivary glands, nerves, and blood vessels using appropriate dental terminology.

3.2 Embryonic Development of the Head, Oral Cavity, and Teeth: Research and highlight the stages of **embryonic development of the head, oral cavity, and teeth**. Examine the **environmental and genetic factors affecting embryonic development**, differentiating between normal and abnormal findings using dental and medical terminology.

3.3 Tooth Anatomy and Health Practices: Analyze the **parts and functions of teeth**. Include the **effects of nutrition on tooth development** and continuous good health and dental prevention care.

3.4 Universal Dental Numbering System: Compare and contrast the **FDI World Dental Federation, the Universal Numbering System, and the Palmer dental notation systems**. Number the teeth located in the human dentition on a model or chart.

3.5 Dental Health Diseases and Disorders: 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. Discuss 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.

4. Microbiology, Infection Control, and Disease Prevention

4.1 Microorganisms Related to Dental Disease: Define the **terms pathogenic and non-pathogenic as they relate to microorganisms** and explain how each can cause a **dental disease or disorder**. Outline **modes of transmission and prevention of the spread** of these organisms. Investigate oral manifestations related to pathogenic and non-pathogenic organisms. Analyze concepts of disinfection, OSHA standards, and use of Personal Protective Equipment (PPE) to prevent spreading of disease to dental staff.

4.2 Hazardous Wastes in Dental Facilities: 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. Describe the **characteristics of the most common chemicals and compounds found in the dental office**.

5. Dental Examinations

5.1 Dental Assistant Skills: 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; and
d. oral prophylaxis.

5.2 Dental Office Instruments: 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.

5.3 Dental Disease Prevention: Develop a **patient health education plan,** including preventive measures, signs and symptoms of exacerbation of disease/disorder/injury, pharmacological needs, and support systems.

5.4 Impending/Developing Dental Emergencies: Summarize the **signs and symptoms of impending or developing dental emergencies**, citing environmental, medical, and hygienic factors that may contribute to the condition. Evaluate an **office emergency policy and procedure** that outlines the responsibilities and actions of each healthcare worker.

5.5 Cardiopulmonary Resuscitation: Complete training in American Heart Association or American Red Cross **Cardiopulmonary Resuscitation (CPR).** Students should be certified in either American Heart Association Heartsaver CPR or BLS for Healthcare Provider -or- Red Cross Adult and Pediatric CPR or Healthcare Provider CPR prior to clinical rotation.

6. Dental Procedures and Specialties

6.1 Dental Procedures: Follow **medical procedures** precisely when performing **patient/client skills** in a classroom or clinical setting related to the role of the Dental Assistant including the following:

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; and
i. document findings and procedures in a recognized format for a dental facility using correct dental terminology.

6.2 Dental Treatment Plan: 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 me.

6.3 Dental Specialty Procedures: Research a **dental specialty procedure**, such as oral surgery, prosthetic dentistry, or gingivoplasty, and 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.

Standards Alignment Notes

*References to other standards include:

- American Red Cross BLS CPR Guidelines. http://www.redcross.org/.
- American Heart Association BLS Guidelines. http://www.heart.org/HEARTORG/#.
- 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.

Pharmacological Sciences

Primary Career Cluster:	Health Science
Course Contact:	CTE.Standards@tn.gov
Course Code:	C14H20
Prerequisite:	*Health Science* (C14H14)
Credit:	1
Grade Level(s):	10-12
Elective Focus- Graduation Requirements:	This course satisfies one of three credits required for an elective focus when taken in conjunction with other Health Science courses.
Program of Study (POS) concentrator:	This course satisfies one out of two required courses to meet the Perkins V concentrator definition when taken in sequence in the approved program of study.
Programs of Study and Sequence:	This is one of several options available as a Year 3 course in the *Therapeutic Services* program of study.
Aligned Student Organization(s):	HOSA: http://www.tennesseehosa.org SkillsUSA: https://www.skillsusatn.org
Coordinating Work-Based Learning:	Teachers are encouraged to use embedded WBL activities such as informational interviewing, job shadowing, and career mentoring. For information, visit https://www.tn.gov/education/educators/career-and-technical-education/work-based-learning.html.
Promoted Tennessee Student Industry Credentials:	Credentials are aligned with postsecondary and employment opportunities and with the competencies and skills that students acquire through their selected program of study. For a listing of promoted student industry credentials, visit https://www.tn.gov/content/tn/education/educators/career-and-technical-education/student-industry-certification.html.
Teacher Endorsement(s):	577, 720
Required Teacher Certifications:	Please refer to Occupational Educator Licensure Guidance for a full list.
Required Teacher Training:	None
Teacher Resources:	https://www.tn.gov/education/educators/career-and-technical-education/career-clusters/cte-cluster-health-science.html Best for All Central: https://bestforall.tnedu.gov/

Course at a Glance

CTE courses provide students with an opportunity to develop specific academic, technical, and 21st-century skills necessary to be successful in careers and life. In pursuit of ensuring every student in Tennessee achieves this level of success, we begin with rigorous course standards that feed into intentionally designed programs of study.

Students engage in industry-relevant content through general education integration and experiences such as career and technical student organizations (CTSO) and work-based learning (WBL). Through these experiences, students are immersed with industry-standard content and technology, solve industry-based problems, meaningfully interact with industry professionals, and use/produce industry-specific, informational texts.

Using a Career and Technical Student Organization (CTSO) in Your Classroom

CTSOs are a great resource to put classroom learning into real-life experiences for students through classroom, regional, state, and national competitions, and leadership opportunities. Below are CTSO connections for this course; note this is not an exhaustive list.

- Participate in the CTSO Fall Leadership Conference to engage with peers by demonstrating logical thought processes and developing industry-specific skills that involve teamwork and project management.
- Participate in contests that highlight job skill demonstration, interviewing skills, community service activities, extemporaneous speaking, and job interviews.
- Participate in leadership activities such as Organizational Leadership, Prepared Speaking, HOSA Service Project, Creative Problem Solving, and HOSA Service Project.

Using Work-Based Learning (WBL) in Your Classroom

Sustained and coordinated activities that relate to the course content are the key to successful work-based learning. Possible activities for this course include the following. This is not an exhaustive list.

- **Standards 1.1-1.5** | Virtually connect with a pharmacist to construct a teaching plan for seniors regarding drug interactions.
- **Standards 2.1-2.7** | Invite a Drug Enforcement Administration (DEA) agent to talk about controlled substances.
- **Standards 3.1-3.2** | Shadow a compounding pharmacist.
- **Standards 4.1-4.2** | Visit a hospital pharmacy to evaluate error prevention strategies.
- **Standards 5.1-5.2** | Shadow a certified pharmacy technician to observe quality assurance methods, prescription fill processes, inventory management, and patient record input.

Course Description

Pharmacological Sciences is a Year 3 course in the *Therapeutic 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. Upon completion of this course, proficient students who have also completed a *Clinical Internship* can apply to sit for the Pharmacy Technician Certification Board examination immediately after high school graduation.

Course Standards

1. Pharmacology for Technicians

1.1 Medication Details: Receive and screen **prescription/medication orders for completeness and authenticity**, identifying classifications, generic and name brands of pharmaceuticals, strengths/dose, dosage form, physical appearance, route of administration, and duration of drug therapy. Prepare an **annotated list** explaining the top 200 medications per the criteria previously listed flagging narrow therapeutic index (NTI) medications.

1.2 Senior Customer Teaching Plan: Construct a **teaching plan for a senior customer** explaining the following:

a. definitions of various drug interactions, including drug-disease, drug-drug, drug-dietary supplement, drug-OTC, drug-laboratory, and drug-nutrient;
b. effects of patient-specific factors on drug and non-drug therapy (e.g., cultural beliefs, disabilities, language barriers, socioeconomic status); and
c. proper storage of medications (e.g., temperature ranges, light sensitivity, restricted access.

1.3 Pharmaceutical Equivalents: 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**.

1.4 Side Effects: 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.

1.5 Legend vs. OTC Drugs: Research and present indications for **using legend in the place of selected over-the-counter (OTC) drugs** and herbal and dietary supplements.

2. Pharmacy Law and Regulations

2.1 Hazardous Materials in the Pharmacy: Investigate the **storage, handling, and disposal of hazardous substances and wastes** (e.g., MSDS) including procedures for prevention and treatment of hazardous substances exposure (e.g., eyewash, spill kit, MSDS).

2.2 Controlled Substance Management: 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.

2.3 Data Integrity/Security and HIPAA: Summarize **professional standards related to data integrity and security and Health Insurance Portability and Accountability Act (HIPAA) guidelines**. Using HIPAA guidelines, create a **policy and procedure for the proper use of pharmacy reports** such as inventory reports, diversion reports, discrepancy reports, override reports, usage reports, input accuracy reports, and business summary reports. Include a **process for handling and destroying confidential/classified information**.

2.4 Infection Control in the Pharmacy: In a lab/clinical setting, demonstrate the **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.

2.5 Roles and Responsibilities of Pharmacy Employees: 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**. Explain the **process to determine the state, federal, and local laws and regulations that apply to a practice site**.

2.6 Facility, Equipment, and Supply Requirements: Examine **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.

2.7 Federal Pharmacy Requirements: Develop a reference toolkit of **federal pharmacy requirements** for each of the following:

a. receiving, ordering, refilling, labeling, dispensing, returning, take-back programs, and loss or theft of non-controlled substances;
b. OSHA Hazard Communication Standard (i.e., Employee Right to Know);
c. availability of medications (i.e., legend, over the counter, and behind the counter);
d. non-controlled substance prescription transfer;
e. OBRA-90 requirement for consultation;
f. process to determine the state, federal, and local laws and regulations; and
g. restricted drug programs.

3. Sterile and Non-Sterile Compounding

3.1 Infection Control in Compounding Pharmacy: 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 to meet the standards identified.

3.2 Compounding Skills: 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 and non-sterile compounding processes; and
   f. procedures to compound non-sterile products (e.g., ointments, mixtures, liquids, emulsions, suppositories, enema).

4. Medication Safety

4.1 Prescription Errors: Survey the **most common types of prescription errors** and outline industry **standards surrounding medication safety.** Include at minimum the following:
   a. error prevention strategies for data entry (e.g., prescription or medication order to correct patient);
   b. patient packages 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 zeroes, limited use of error-prone abbreviations);
   e. procedures for responding to FDA recalls of medications, devices, supplies, and supplements;
   f. guidelines for ensuring the stability of drugs such as oral suspensions, insulin, reconstitutables, injectables, and vaccinations;
   g. procedures for performing root cause analysis and reporting events, such as medication errors, adverse effects, near miss, and product integrity; and
   h. requirements and strategies for addressing errors in practice (e.g., quality improvement teams, adverse drug reaction reporting, opportunity/suggestion cards).

4.2 Strategies for Preventing Medication Errors: 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.

5. Pharmacy Quality Assurance

5.1 Medication Quality Assurance and Inventory Control: 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). Evaluate **information sources used to obtain data in a quality improvement process** (e.g., the patient's chart, patient's medication profile, computerized information systems, medication

administration record, immunization registry, medication therapy management [MTM] platforms)

5.2 Risk Management Guidelines and Regulations: 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, medication control systems (e.g., automated dispensing systems, bar coding for floor stock and crash cart stock), and problem resolution (e.g., product recalls, shortages), and productivity, efficiency, and customer satisfaction measures.

6. Medication Order Entry and Fill Process

6.1 Patient Information: Identify all **information a pharmacist or pharmacy technician should obtain from the patient/client** before filling and dispensing any medication. 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.

6.2 Order Entry Process: Detail the **order entry process per industry standards** for each of the following: a hospital, a free-standing pharmacy, and a retail-based pharmacy.

6.3 Dose Calculation: Calculate **correct doses required when given a simulated prescription** for a pediatric dose, adult dose, and geriatric dose based on weight, using the correct formulas, calculations, ratios, proportions, pharmacy math allegations, and conversions. Also, calculate **length of administration and times per day of administration**. Document results using appropriate **Sig codes** (e.g., b.i.d., t.i.d., and Roman numerals), **abbreviations, medical terminology, and symbols** for quantity dispensed, dose, concentration, and dilutions.

6.4 Prescription Fill Process: Demonstrate the following skills of the **prescription fill process**:

a. determine prioritization of prescription/medication order processing (e.g., stat, maintenance, waiting);
b. select the appropriate product;
c. apply special handling requirements;
d. measure and prepare the product for the final check; and
e. stage prescriptions for final verification.

6.5 Prescription Labeling: Demonstrate the following skills of **prescription labeling requirements**:

a. auxiliary and warning labels,
b. expiration date, and
c. patient-specific information.

6.6 Drug Administration Supplies and Equipment: Select **equipment/supplies required for drug administration** (e.g., package size, unit dose, diabetic supplies, spacers, oral and injectable syringes). Demonstrate the following **skills of prescription packaging** requirements:

a. type of bags,

b. syringes,
c. glass,
d. PVC,
e. child resistant, and
f. light resistant.

6.7 Dispensing Process: In a classroom lab, demonstrate the following **skills of the dispensing process:**
   a. validation of prescription with the pharmacist; and
   b. documentation and distribution.

7. Pharmacy Inventory Management

7.1 Coding of Pharmacy Inventory: Distinguish between the **functions and applications of NDC numbers, lot numbers, and expiration dates** of pharmacy inventory. Articulate the **importance of this information as it relates to protecting the safety of the public**.

7.2 Formulary or Approved/Preferred Product List: 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.

7.3 Ordering Medications and Supplies: Assess procedures for **ordering medications and supplies** including the following:
   a. inventory control practices and record keeping (e.g., par and reorder levels, turnover rates, drug usage patterns, and perpetual inventory);
   b. suitable alternatives for ordering (e.g., transferring or borrowing medications from another pharmacy;
   c. procedures to address improperly stored inventory (e.g., out-of-range temperature issues); and
   d. procedures for identifying and returning dispensable, non-dispensable, and expired medications and supplies (e.g., credit return, return to stock, reverse distribution).

8. Pharmacy Information System Usage and Application

8.1 Electronic Medical Records and Prescriptions: 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.

Standards Alignment Notes

*References to other standards include:

- 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 is the basis for the PTCE effective November 2013.
- 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.

Medical Assisting

Primary Career Cluster:	Health Science
Course Contact:	CTE.Standards@tn.gov
Course Code:	C14H10
Prerequisite:	*Health Science Education* (C14H14)
Credit:	1
Grade Level(s):	10-11
Elective Focus-Graduation Requirements:	This course satisfies one of three credits required for an elective focus when taken in conjunction with other Health Science courses.
Program of Study (POS) Concentrator:	This course satisfies one out of two required courses to meet the Perkins V concentrator definition when taken in sequence in the approved program of study.
Programs of Study and Sequence:	This is the Year 3 course in the *Therapeutic Services* program of study.
Aligned Student Organization(s):	HOSA: http://www.tennesseehosa.org SkillsUSA: https://www.skillsusatn.org
Coordinating Work-Based Learning:	Teachers are encouraged to use embedded WBL activities such as informational interviewing, job shadowing, and career mentoring. For information, visit https://www.tn.gov/education/educators/career-and-technical-education/work-based-learning.html.
Available Student Industry Credentials:	Credentials are aligned with postsecondary and employment opportunities and with the competencies and skills that students acquire through their selected program of study. For a listing of promoted student industry credentials, visit https://www.tn.gov/content/tn/education/educators/career-and-technical-education/student-industry-certification.html.
Teacher Endorsement(s):	577, 720
Required Teacher Certifications:	Please refer to Occupational Educator Licensure Guidance for a full list.
Required Teacher Training:	None
Teacher Resources:	https://www.tn.gov/education/educators/career-and-technical-education/career-clusters/cte-cluster-health-science.html Best for All Central: https://bestforall.tnedu.gov/

Course at a Glance

CTE courses provide students with an opportunity to develop specific academic, technical, and 21st-century skills necessary to be successful in careers and life. In pursuit of ensuring every student in Tennessee achieves this level of success, we begin with rigorous course standards that feed into intentionally designed programs of study.

Students engage in industry-relevant content through general education integration and experiences, such as career and technical student organizations (CTSO) and work-based learning (WBL). Through these experiences, students are immersed with industry-standard content and technology, solve industry-based problems, meaningfully interact with industry professionals, and use/produce industry-specific, informational texts.

Using a Career and Technical Student Organization (CTSO) in Your Classroom

CTSOs are a great resource to put classroom learning into real-life experiences for students through classroom, regional, state, and national competitions, and leadership opportunities. Below are CTSO connections for this course; note this is not an exhaustive list.

- Participate in the CTSO Fall Leadership Conference to engage with peers by demonstrating logical thought processes and developing industry-specific skills that involve teamwork and project management.
- Participate in contests that highlight job skill demonstration, interviewing skills, community service activities, extemporaneous speaking, and job interviews.
- Participate in leadership activities such as Organizational Leadership, Prepared Speaking, HOSA Service Project, Creative Problem Solving, and HOSA Service Project.

Using Work-Based Learning (WBL) in Your Classroom

Sustained and coordinated activities that relate to the course content are the key to successful work-based learning. Possible activities for this course include the following. This is not an exhaustive list.

- **Standards 1.1-1.5** | Job shadow in a physician's practice front office.
- **Standards 2.1-2.7** | Participate in an employee orientation at a medical facility to focus on safety and disaster preparedness.
- **Standards 3.1-3.4 |** Invite a patient advocate to discuss communication barriers, cultural differences, special needs, dealing with patients' defense mechanisms, and end-of-life care.
- **Standards 4.1-4.9** | Participate in an abbreviated internship to practice approved medical assisting skills.

Course Description

Medical Assisting is a Year 3 course designed to prepare students to pursue careers in medical assisting. Upon completion of this course, a proficient student will be able to implement communication and interpersonal skills, provide care safely, prevent emergency situations, prevent infection through infection control, and perform the skills required of a medical assistant. At the conclusion of this course and an appropriate clinical internship, students may sit for the Certified Clinical Medical Assistant (CCMA) exam.

Course Standards

1. Front Office

1.1 Professionalism and Career Readiness: Relate the **concepts of professionalism and career readiness** to the delivery of quality patient care. Demonstrate all the following professional characteristics in a classroom lab setting:

a. honesty and integrity,
b. reliability and punctuality,
c. appropriate communication skills,
d. cooperation and teamwork, and
e. initiative and adaptability.

1.2 Workplace Etiquette and Information Gathering: Describe **professional workplace etiquette** as it relates to greeting, escorting, responding to, and instructing patients. Explain the **process of collecting new and updated information** from patients. Create and perform role-plays to demonstrate professional workplace etiquette and information-gathering concepts.

1.3 CCMA Front Office Expectations: Investigate the **expectations a medical office has for a CCMA** in the front office related to the following:

a. reception room environment;
b. scheduling guidelines;
c. written communication and transmission of information through facsimile/scanner/patient portal/social media;
d. medical record preparation and related legal concepts;
e. handling vendors/business associates;
f. use and maintenance of business equipment;
g. medical billing and coding; and
h. office supply inventory.

Research to compare and contrast the differences in expectations among **solo practices, group practices, and employed physician practices.**

1.4 Sources of Reimbursement: Explain the multiple **sources of reimbursement in healthcare services** and discuss the relationship of the following to healthcare and patient finances:

a. capitation,
b. Medicare,
c. Tenn Care,
d. prospective payment systems,
e. relative value resource-based systems (RVRB),
f. case mix,
g. Medicare severity diagnosis-related group (MS-DRGs),
h. healthcare insurance, and
i. accountable care organizations.

1.5 Law and Ethics: Analyze specific **laws and ethical issues** that impact professional practice such as confidentiality, informed consent, and patient self-determination. Summarize the

Health Insurance Portability and Accountability Act (HIPAA), paying specific attention to aspects related to maintaining confidentiality, patient rights, patient safety, and other ethical/legal directives governing medical treatment.

2. Back Office

2.1 Patient Care Team: Differentiate between the **common members of the patient care team** summarizing the individual roles and the interrelatedness of the team members as it relates to quality patient care. Prepare an informative artifact to explain the concept of team-based care to a patient.

2.2 Safe Use of Equipment: Examine policies and procedures related to **diagnostic equipment safety, quality control monitoring, and evaluation**. Explain the importance of safety practices and the implementation of quality control processes according to policy.

2.3 Infection Control Concepts and Skills: In the classroom lab, demonstrate mastery of **concepts and skills** related to the following:

a. asepsis,
b. universal precautions,
c. sanitation,
d. disinfection,
e. surgical scrub, and
f. sterilization.

2.4 Patient and Employee Safety: Summarize the elements of containment regarding **fire safety and chemical hazards, electrical safety, mechanical safety, general lab safety, accidental exposure, and disaster preparedness**. Demonstrate these elements in all classroom lab activities and patient care simulations.

2.5 Medication Administration: Research the medical assistant's scope of practice regarding **medication administration** in Tennessee and create a comprehensive list of **medication administration routes** the medical assistant may use. Demonstrate a working knowledge of the 50 most commonly prescribed medications through the creation of an artifact, role-play, or written scenarios (see "Top 200 Drugs" at www.rxlist.com).

2.6 Medical Assistant Skills: Demonstrate **medical assistant concepts and skills** of the following in a classroom lab setting:

a. patient positioning;
b. transfers and ambulation, including injury prevention and body mechanics concepts;
c. O2 assessment and administration, including fire safety measures;
d. BLS (Basic Life Support);
e. assisting with common office procedures such as eye and ear irrigation, dressing change, suture/staple removal, etc., including infection control measures;
f. vital sign measurement; and
g. preparing and administering oral and parenteral medications.

2.7 Medical Records: Examine **common documentation approaches for medical records** such as the SOAP (Subjective, Objective, Assessment, and Plan) and POMR (Problem Oriented Medical Records) methods. Explain the **importance of documenting all interventions and**

patient compliance. Practice **documentation using correct medical terminology** that contains subjective and objective information including patient complaints. Demonstrate **how to correct errors** in the patient chart.

3. The Patient

3.1 Human Anatomy and Pathophysiology: Outline the **gross normal structure and function of all body systems and their interrelationships**. List signs and symptoms of **common diseases and disorders** associated with each system.

3.2 Communication and Cultural Differences: Differentiate between **verbal and nonverbal communication** when interacting with patients. Examine **specific techniques for effective communication** and evaluate how **different cultures** attach different meanings to communication techniques. Evaluate **factors that contribute to effective communication** and explain how these factors contribute to the development of quality patient care. Demonstrate practices to effectively manage the following:

a. common communication barriers,
b. cultural differences,
c. patients with special needs,
d. patients exhibiting various defense mechanisms, and
e. patients with terminal illnesses.

3.3 Physician Office Emergencies: Outline **potential medical emergencies** within an office setting, especially those related to anaphylaxis, syncope, shock, Myocardial Infarction (MI), diabetes, and Cardiovascular Accident (CVA). Describe **guidelines of care for each of the emergencies** and indicate various staff member responsibilities.

3.4 Patient Health Screenings Education Plan: Develop a **patient health education** plan including health screenings, preventive measures, nutritional needs, and community support systems. Adapt content based on **growth and development stages**.

4. Diagnostic Procedures (NO LIVE STICKS)

4.1 Phlebotomy Skills and Results: Explain the principles of and successfully perform **skills of a phlebotomist**, incorporating rubrics from National HOSA, textbooks, or clinical standards of practice. Define the following **common laboratory values, both normal and abnormal**, and provide the **rationale for obtaining the test:**

a. Complete Blood Count,
b. Complete Metabolic Panel,
c. Fasting Lipid Panel, and
d. Hemoglobin A1C.

4.2 Physician Office Laboratory and Regulation: Analyze the medical assistant's role in the **physician office laboratory** (POL) and link the role with Clinical Laboratory Improvement Amendment (CLIA) regulations for the POL. Demonstrate the following:

a. identification of the parts and use of the microscope;
b. proper handling and specimen preservation;
c. preparation of a specimen;

d. microscope slide set-up;
e. proper labeling of specimen;
f. operation of centrifuge and incubator; and
g. collection of fecal and sputum specimens.

4.3 Throat Culture: Compare and contrast **bacterial cultures and rapid testing** summarizing the pros and cons of each. Demonstrate the following:
a. throat swab for culture,
b. wound culture, and
c. inoculation of a culture plate.

4.4 Urinalysis and Health: Evaluate **urinalysis results**, both normal and abnormal, relating the **most common disorders** with the abnormal results. Include an explanation of **different methods of urine collection**, such as clean-catch midstream and catheterization. In the classroom lab demonstrate the following:
a. description of physical characteristics of urine (color, odor, appearance);
b. use of a reagent strip to identify abnormalities;
c. ability to set up a wet mount for microscopic analysis; and
d. performance of a urine pregnancy test.

4.5 Basic Ophthalmic Examination: Evaluate principles of and successfully perform skills related to **basic ophthalmic examination**, including the concepts surrounding the measurement of visual acuity with associated equipment incorporating rubrics from textbooks or clinical standards of practice.

4.6 Gross Heart Anatomy and Cardiac Conduction: Identify gross **heart anatomy and physiology** and related **cardiac conduction and circulatory pathways**. Assess **lead placements** and correlate their relationship to the conduction system through the use of a diagram or model.

4.7 Cardiac Cycle and the P, Q, R, S, T Complex: Analyze the **P, Q, R, S, T complex** and its correlation to the **cardiac cycle**. Chart a mock representation of these waves on an electrocardiogram. Create algorithms to differentiate between **critical and non-critical cardiac rhythms** on rhythm strips and/or 12 lead electrocardiograms (EKGs).

4.8 12-Lead EKGs: Accurately perform the steps of **obtaining a 12-lead EKG** utilizing rubrics from textbooks, National HOSA guidelines, or clinical standards of practice. Include the following areas:
a. skin preparation;
b. proper lead placement;
c. EKG machine data input;
d. patient positioning to decrease somatic tremor or wandering baseline;
e. recognizing current interference and artifact; and
f. recording the EKG.

4.9 Cardiac Diagnostic Procedures: Investigate **cardiac diagnostic procedures**, both in-hospital and out-patient, and identify the **equipment** required for these services.
a. Holter monitor (24-48 hour)

b. Stress test
c. Event monitor (30 days)

Standards Alignment Notes

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- P21: Partnership for 21st Century Skills Framework for 21st Century Learning
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Introduction to Health Science

Primary Career Cluster:	Health Science
Course Contact:	CTE.Standards@tn.gov
Course Code:	C14X00
Prerequisite:	None
Credit:	N/A
Grade Level(s):	7-8
Elective Focus- Graduation Requirements:	N/A
Programs of Study and Sequence:	This course serves as a middle school primer for all programs of study in the Health Science career cluster.
Aligned Student Organization(s):	HOSA: http://www.tennesseehosa.org SkillsUSA: https://www.skillsusatn.org/
Coordinating Work- Based Learning:	Teachers are encouraged to use embedded WBL activities such as informational interviewing, job shadowing, and career mentoring. For information, visit https://www.tn.gov/education/educators/career-and-technical-education/work-based-learning.html.
Available Student Industry Credentials:	None
Teacher Endorsement(s):	001, 015, 016, 101, 123, 126, 127, 210, 211, 212, 4 00, 4 01, 402, 415, 416, 440
Teacher Resources:	https://www.tn.gov/education/educators/career-and-technical-education/career-clusters/cte-cluster-health-science.html Best for All Central: https://bestforall.tnedu.gov

Course at a Glance

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Students engage in industry-relevant content through general education integration and experiences such as career and technical student organizations (CTSO) and work-based learning (WBL). Through these experiences, students are immersed with industry-standard content and technology, solve industry-based problems, meaningfully interact with industry professionals, and use/produce industry-specific, informational texts.

Using a Career and Technical Student Organization (CTSO) in Your Classroom

CTSOs are a great resource to put classroom learning into real-life experiences for students through classroom, regional, state, and national competitions, and leadership opportunities. Below are CTSO connections for this course, note this is not an exhaustive list.

- Participate in the CTSO Fall Leadership Conference to engage with peers by demonstrating logical thought processes and developing industry-specific skills that involve teamwork and project management.
- Participate in contests that highlight job skill demonstration, interviewing skills, community service activities, extemporaneous speaking, and job interviews.
- Participate in leadership activities such as Organizational Leadership, Prepared Speaking, Creative Problem Solving, and HOSA and/or SkillsUSA Service Projects.

Using Work-Based Learning (WBL) in Your Classroom

Sustained and coordinated activities related to the course content are the key to successful work-based learning. Possible activities for this course include the following. This is not an exhaustive list.

- **Standards 1.1-1.3**|Invite a human resources specialist to discuss careers, professional traits, and the healthcare system.
- **Standards 4.1-42**|Invite a Department of Health educator to discuss patient health education and community outbreaks.
- **Standards 5.1-5.6|** Participate in a skills lab in a local health care facility.

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 in demand for workers who can think critically to solve a range of health-related problems. Students will explore healthcare systems, legal and ethical issues in healthcare, and basic healthcare skills. Upon completion of this course, proficient students will be prepared to pursue courses in high school that lead to careers in the fields of biotechnology research, therapeutics, health informatics, diagnostics, and support services.

Course Standards

1. Career Planning

1.1 History of Healthcare: Identify **key innovators and contributions** made in the **history of healthcare** in the United States. Create a timeline or other graphic to illustrate **major developments** beginning with the first medical school through today.

1.2 Health Science Careers and Career Areas: Research 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. job description,
b. career path,
c. level of education required,
d. typical salaries, and
e. additional training needed to successfully reach occupational goals.

1.3 Professional Traits: Summarize the **professional traits**, such as leadership, ethical responsibility, and time management, required of healthcare professionals in the twenty-first century.

2. Healthcare Systems

2.1 Healthcare Facilities and Insurance: Identify the **types of healthcare facilities** in the United States. Compile a list of **healthcare professionals** that work in these facilities. 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.**

2.2 Cultural Awareness: Define the terms **culture, ethnicity, and race.** Research **customs, beliefs, and practices surrounding health care from another culture, ethnicity, or race**. Compare and contrast how aspects such as respect, informed consent, medical decision-making, medical testing, and social context vary across different cultures and populations.

3. Body Function and Structure

3.1 Human Anatomy and Physiology: Outline the basic **normal structure and function of all body systems.** Present a visual depiction of a system within the human body, listing the basic structures and using medical terminology for each.

3.2 Health and Wellness: 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).

3.3 Patient Education: Develop a **patient health education** presentation about 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 topics approved by the instructor. Include characteristics of the behavior and/or signs and symptoms of the issue; major physical concerns associated with the issue; preventive measures; treatments; and support systems.

4. Infection Control/Medical Microbiology

4.1 Chain of Infection: Define the **chain of infection** and provide **strategies for how to break each part of the chain** to prevent the spread of infection. Research examples of **infectious outbreaks within a community** and the implications on an individual's health. Apply the principles of the chain of infection to community outbreaks.

4.2 Infection Control Skills: 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, and
b. sneeze and cough prevention.

5. Foundational Health Care Skills

5.1 Medical Terminology: Identify and explain the **definitions and roles of the four types of word parts** (word roots, combining forms, combining vowels, suffixes, and prefixes) in forming medical terms. Apply knowledge of **word forms and structures** to interpret unfamiliar medical terms throughout this course.

5.2 Emergency Medicine Skills: Understand principles of and successfully perform **skills related to Emergency Medicine**, incorporating rubrics from the American Heart Association or American Red Cross such as the following:

a. Basic First Aid care for bleeding and wounds,
b. Basic First Aid care for burns, and
c. Basic First aid for bone and joint injuries.

5.3 Medical Assisting Skills: Understand principles of and successfully perform **skills related to Medical Assisting Skills**, incorporating rubrics from textbooks or clinical standards of practice:

a. temperature, pulse, and respiration assessment; and
b. screening for vision problems.

5.4 Physical Therapy Skills: Understand principles of and successfully perform **skills related to Physical Therapy Skills**, incorporating rubrics from textbooks or clinical standards of practice:

a. ambulation with crutches.

5.5 Athletic Training Skills: Understand principles of and successfully perform **skills related to Athletic Training**, incorporating rubrics from textbook or clinical standards of practice:

a. basic stretching exercises.

5.6 Forensic Scientist Skills: Understand principles of and successfully perform **skills related to Forensic Scientists,** incorporating rubrics from textbooks or clinical standards of practice:

a. extraction of DNA.

Standards Alignment Notes

*References to other standards include:

- 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.