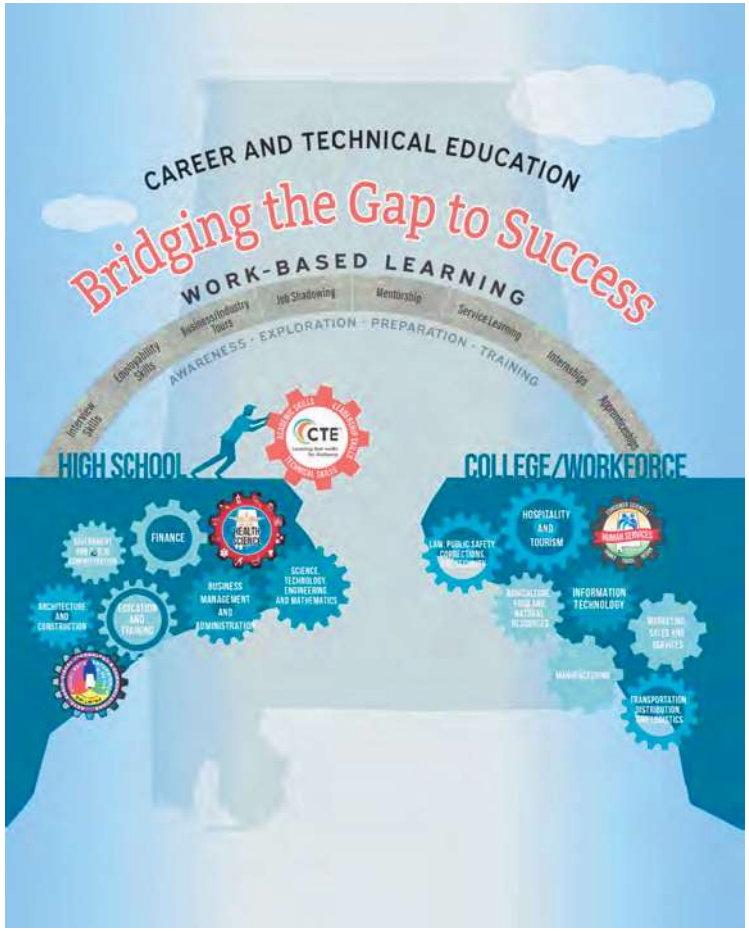
Alabama Course of Study
Career and Technical Education



2023
Eric G. Mackey, State Superintendent of Education
Alabama State Department of Education



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Alabama Course of Study: Career and Technical Education
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Alabama Course of Study
Health Science



Eric G. Mackey
State Superintendent of Education

STATE SUPERINTENDENT OF EDUCATION'S MESSAGE

Dear Alabama Educator:

The 2023 *Alabama Course of Study: Career and Technical Education, Health Science* presents standards designed to prepare students for the career and technical demands of the future, both in the workplace and in the postsecondary education setting.

This document contains a set of challenging standards designed to promote students' engagement and career interests in Health Science fields. I encourage each system to use the document in developing local curriculum guides that determine how its students will achieve and even exceed these standards.

The 2023 *Alabama Course of Study: Career and Technical Education, Health Science* was developed by educators and business and community leaders to provide a foundation for building quality Health Science programs across the state. Implementing the content of this document through appropriate instruction will promote students' exploration and enhance preparation for further study and careers in a variety of Health Science fields.

Eric G. Mackey
State Superintendent of Education

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PREFACE

The 2023 *Alabama Course of Study: Career and Technical Education, Health Science* provides the framework for Grades 6-12 Health Science programs in Alabama's public schools. Content standards in this document are minimum and required (*Code of Alabama,* 1975, §16-35-4). They are fundamental and specific, but not exhaustive. Health Science standards are aligned with national standards and prepare students for a multitude of medical careers.

When developing local curriculum, school systems may include additional content standards to reflect local needs and philosophies. Systems are encouraged to add implementation guidelines, resources, and activities based upon the content standards in the Health Science course of study.

The 2023 Alabama Career and Technical Education Course of Study Committee and Task Force conducted extensive research during the development of the Health Science course of study, analyzing career and technical education standards and curricula from other states, previous versions of Alabama's career and technical education courses of study, and national standards. The Committee and Task Force also reviewed information from professional journals and Internet sites, listened to and read comments from interested individuals and industry groups throughout the state, considered suggestions from independent reviewers, sought input from advisory councils, and thoroughly discussed each issue and standard among themselves. The Committee and Task Force reached consensus and developed what members believe to be the best Health Science course of study for students in Alabama's public schools.

Alabama Course of Study
Health Science

ACKNOWLEDGMENTS

This document was developed by the Health Science Committee and Task Force of the 2023 Alabama Career and Technical Education Course of Study Committee and Task Force, composed of middle school, high school, and college educators appointed by the Alabama State Board of Education and business and professional persons appointed by the Governor (*Code of Alabama*, 1975, §16-35-1). The Committee and Task Force began work in January of 2023 and submitted the document to the Alabama State Board of Education for adoption at the December 2023 meeting.

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Alabama Course of Study
Health Science

GENERAL INTRODUCTION

Alabama's Career and Technical Education programs empower students with the workplace-readiness skills required for success in the twenty-first century. Courses are designed to equip students to become productive, well-prepared citizens who possess the necessary knowledge and skills for postsecondary education and employment. Career and Technical Education provides opportunities for students to combine core academic content with rigorous and relevant technical knowledge and expertise.

The *Alabama Course of Study: Career and Technical Education* is intended for all students in Grades 6-12. Alabama's Career and Technical Education programs promote students' career awareness through engaging career exploration and development activities. Career and Technical Education programs focus on providing students with knowledge and skills that reinforce attainment of academic core content through hands-on, experiential learning. These programs are organized into the sixteen national career clusters identified by the United States Department of Education, which arrange instruction into groups of similar occupations. Within the sixteen national career clusters, separate course content standards have been developed for more than fifty career programs.

Because of the interconnected nature of Career and Technical Education programs, some courses will be utilized in more than one cluster. Shared courses are not reprinted in each course of study, but instead are indicated in the clusters' program guides, which are the definitive listings of required courses for each cluster. Program guides can be found on the Alabama State Department of Education website.

Alabama's Career and Technical Education programs are designed to keep abreast of the rapid changes in business and industry and to be responsive to current and future workforce demands. Rigor in each course of study is derived from both core academic content and industry-specific knowledge and skills required for students to achieve, maintain, and advance in employment in a particular career pathway. The level of academic and workplace rigor determines the degree to which each Alabama Career and Technical Education program prepares students for high-skill, high-wage, and in-demand careers. For each Career and Technical Education program, industry-recognized credentials of value and certifications have been established that validate the rigor of the curriculum to students, parents, and members of business and industry. In addition, articulation agreements are developed in partnership with the Alabama Community College System to allow for a seamless transition for students to further their education.

Alabama's growing economy calls for increasing numbers of highly skilled workers. Alabama's Career and Technical Education programs, through the implementation of each career cluster's course of study, equip students with the employability skills and technical knowledge necessary to meet current and future workforce demands by preparing them for lifelong learning.

Alabama Course of Study
Health Science
CONCEPTUAL FRAMEWORK



CONCEPTUAL FRAMEWORK

The conceptual framework is a graphic representation of the various aspects of the Health Science career cluster and how it enables future health professionals to plan, manage, and provide care within multiple pathways (therapeutic services, diagnostic services, health informatics, support services, and biotechnology research and development). The healthcare industry currently employs nearly 205,000 people in Alabama, and workforce demand in the healthcare field is increasing much faster than the average rate among all occupations.

The colors of the graphic – maroon, navy, and medical white – were adopted from the logo of the cluster's career and technical student organization, HOSA–Future Health Professionals. These colors represent compassion, loyalty, and purity of purpose, which are essential characteristics of healthcare workers, who focus on the overall social, mental, and physical well-being of the patient.

The inner aspect of the design includes the predominant Health Science cluster name on top of the caduceus symbol representing harmony and balance. These are projected from a map of Alabama, signifying that healthcare professionals are a vital component to keeping our state healthy. The navy background behind the state features biomedical and first aid symbols common in the healthcare world.

The symbols on the perimeter of the cog represent various equipment, professions, and concepts associated with healthcare occupations: a microscope for biomedical research, a stethoscope used for auscultation, an anatomical heart as the true pump of the human body, an x-ray for radiology, paw prints for veterinary careers, a tooth for dentistry, a mortar and pestle for pharmacy, a body in motion to represent sports medicine/athletic training, the Star of Life representing emergency medicine, an electrocardiogram rhythm to indicate the importance of technology in the medical field, da Vinci's Vitruvian Man representing the embodiment of human health, and a needle and syringe to represent the administration of medications.

Health Science education equips students with the knowledge, skills, and work-based learning experiences to prepare them for further education and careers in the ever-advancing healthcare industry.

POSITION STATEMENTS

Health Science

The Career and Technical Education Health Science program prepares students for employment in careers that involve planning, managing, and providing healthcare services through professions in the following categories: therapeutic services, diagnostic services, health informatics, support services, and biotechnology research and development. Certain fundamental understandings which support the Health Science program are outlined below. They must be embraced by schools and school districts in order to provide students with the best possible experiences in the classroom and in the field. These position statements summarize the requirements for an effective Health Science program.

Classroom and Laboratory Environment

The effective health science classroom should be a safe space, fully equipped with current and emerging technologies, supplies, and materials needed for instruction, where students can increase their skills. As in other clusters in Career and Technical Education, health science instruction cannot be confined within the four walls of a traditional classroom. Students and teachers should have access to laboratory environments on campus and in the community where students can experience practical, real-world situations in the health science field.

Technology, Equipment, and Facilities

Classroom healthcare equipment and technology must be readily available, efficiently maintained, and routinely upgraded according to a regular schedule. Students and teachers utilize equipment to conduct a variety of classroom instruction and learning activities. Using up-to-date healthcare equipment and technology enhances the learning environment and prepares students for future career opportunities. In addition, students should have access to other classroom supplies and materials (such as medical supplies, textbooks, reference materials, and software) in classroom libraries, research areas, and materials centers to support instruction and credentialing. Sufficient funds must be allocated to provide and maintain the technology and materials necessary for a superior career and technical education program.

Safety

The safety of students and instructors is a prime consideration in every learning environment. Creating and implementing a written safety plan is an essential part of designing, carrying out, and evaluating each career and technical education program. An effective plan may include federal, state, local, school, and program guidelines. Care must be taken to ensure that students are in safe environments both on and off campus. Students are required to pass safety tests with one hundred percent accuracy. Safety includes not only physical and emotional well-being but also digital and online security.

Professional Development

Because both technology and instructional methods continue to evolve, it is essential for teachers to participate in professional development and technical training opportunities to stay abreast of innovations pertaining to their content area and the workplaces in which their students will be employed. Teachers who continually expand their pedagogical knowledge and skills are able to adjust the learning environment to reflect current and emerging trends in teaching methods and to address their students' varied learning styles. Regular program assessment by students, administrators, business and industry personnel, and the educators themselves guides professional development, which in turn enhances the instructional program.

Administrative Support

Full support from district and local administrators is essential in providing the necessary components of a Health Science program. Administrators should recruit highly qualified teachers who possess appropriate credentials and secure funding for professional development activities and industry certification for those teachers. Administrators must also provide time for professional development and for planning for the integration of academic content areas into the Health Science cluster. Administrators should actively promote the Health Science program within the school and in the community.

Instructional Model

The health science course of study is designed to address the challenges of a changing, technological, diverse, and global society in which students must apply knowledge, skills, and ideas to solve problems and make decisions. The health science curriculum designed by each local education agency should be project-based, process-oriented, and work-based so that students can develop their abilities to collaborate, analyze, communicate, manage, and lead.

The content standards contained in this document require students to use innovative, critical-thinking skills. Teachers should utilize the course of study to identify the issue or concern addressed in a specific content standard and then use the local curriculum guide to plan appropriate learning experiences. Teachers must understand that there are differences among standards, curriculum, and resources. The health science content standards delineate what students are expected to know or be able to do at the end of each course. A curriculum is a sequence of tasks, activities, and assessments that teachers enact to support students in learning the standards while drawing on a textbook or other resources when appropriate.

Academic core content should be integrated into the Health Science program. To achieve the solution to a given problem, students must possess an adequate foundation in reading, writing, speaking, listening, viewing, and presenting; knowledge and skills in mathematics, science, and social studies; and knowledge of current and emerging technologies.

The Health Science program should also integrate workplace demands and employability skills, incorporating various instructional strategies to accommodate students' learning styles and interests. A variety of assessments should be used to evaluate individual students' interests, aptitudes, and abilities.

When individual needs have been determined for students in special populations, a support service program should be planned cooperatively by Health Science instructors and other appropriate personnel, because Individual Education Programs are most effective when developed in conjunction with students' career and technical education instructors. Courses and equipment may be tailored to ensure equal access to the full range of learning experiences and skill development in the Health Science program.

Career and Technical Student Organizations

Nationally-affiliated Career and Technical Student Organizations (CTSOs) are integral, co-curricular components of instruction in each career and technical education course, designed to help students develop an understanding of all aspects of industry and technology. These organizations enhance classroom instruction while helping students develop teamwork and leadership abilities, expand workplace-readiness skills, and access opportunities for personal and professional growth. The importance of CTSOs is indicated by their inclusion in the foundational standards to be taught in every Health Science course. Students in the Health Science cluster affiliate with HOSA–Future Health Professionals.

Business-Industry-School Relationships

The very nature of Health Science requires a close relationship between the school and the healthcare community. Some aspects of this relationship are specified by state and federal laws and regulations, while others are determined by the desires, interests, and willingness of school personnel and healthcare leaders in the local community. The relationship between schools and businesses can be immensely beneficial to all parties involved.

Student Work Experience

As students begin to plan careers, they must have opportunities to visit, tour, and work at local industries and businesses. Real-world experiences such as cooperative education, internships, apprenticeships, and job shadowing contribute to the work-based, service-based, and project-based learning that enhances classroom instruction. An additional benefit comes from continuous feedback from students and supervisors, who evaluate the program to facilitate changes that satisfy industry needs.

Advisory Councils and Partnerships

In accordance with Alabama State Department of Education guidelines, each Career and Technical Education program has an advisory council made up of representatives of the local business community that provides professional, real-world input regarding equipment needs, curriculum emphases, technical updates, and problem-solving. This link to business and industry may also provide external support by supplying equipment, resource materials, or qualified speakers. Community partners may provide program sponsors, judges for CTSO events, financial support, scholarships, field trip sites, and other program needs.

Community Involvement and Service

There are many ways for Health Science students and teachers to become involved with community service projects, providing benefits for students and their communities. Local organizations such as civic clubs, professional educational groups, youth organizations, and community adult education programs are valuable resources for Health Science programs. Open houses, tours, and presentations allow families and other interested citizens to become informed about Health Science and involved in the education environment.

Postsecondary and Higher Education Credit

Postsecondary and higher education articulation is a significant element in a student's career path. Secondary and postsecondary instructors must communicate on a regular basis to ensure a smooth transition for students and to make students aware of articulation opportunities. Articulation may occur through program alignment with postsecondary programs, early college enrollment, or dual enrollment programs.

Students benefit in a variety of ways when cooperation exists between secondary and postsecondary institutions. One of the benefits is the earning of postsecondary credit in conjunction with work completed while the student is still in secondary school. Postsecondary teachers may offer additional benefits by serving as guest speakers, donating equipment, sharing expertise through professional development activities, and addressing other needs appropriate for the school community.

Dual Enrollment for Dual Credit is an enrichment opportunity allowing eligible high school students to earn high school and college credits for courses taken through an Alabama Community College System (ACCS) institution or an Alabama college or university while still enrolled in high school. Articulated credit is awarded when a student enrolls and satisfactorily completes work in a postsecondary institution that has an articulation agreement with that student's participating school.

DIRECTIONS FOR INTERPRETING STANDARDS

The 2023 *Alabama Course of Study: Career and Technical Education, Health Science* is organized around the following elements: foundational standards, topics, and content standards.

Foundational standards are an important part of every course. Through these standards, students learn and apply safety concepts; explore career opportunities and requirements; practice the skills needed to succeed in the workplace; take advantage of leadership, teamwork, and personal growth opportunities afforded by Career and Technical Student Organizations; and learn and practice essential digital skills. Each foundational standard completes the stem *"Students will..."*

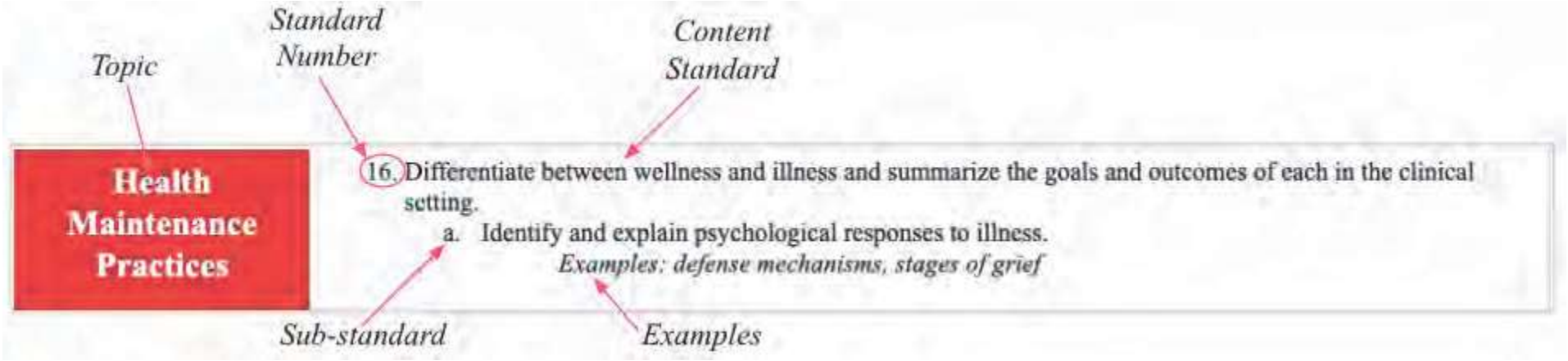
Related content standards are grouped under **Topics**. In the example below, the topic is "Health Maintenance Practices". Standards from different topics may be closely related.

Content Standards contain the minimum required content and define what students should know or be able to do at the conclusion of a course. Some have **sub-standards**, indicated with *a, b, c, d...,* which are extensions of the content standards and are also required. Some standards are followed by italicized **examples**, which present options that might prove useful in instruction of the standard. Examples are not intended to be exhaustive lists and are not required to be taught.

Each content standard completes the stem *"Students will..."* When "including" appears in standards, it should be construed as "including but not limited to." The items listed after "including" must be taught; others may also be incorporated in instruction

The course of study does not dictate curriculum, teaching methods, or sequence; the order in which standards are listed within a course or grade is not intended to convey the order for instruction. Even though one topic may be listed before another, the first topic does not have to be taught before the second. A teacher may choose to teach the second topic before the first, to teach both at the same time to highlight connections, or to select a different topic that leads to students reaching the standards for both topics. Each local education agency should create its own curriculum and pacing guide based on the Course of Study. The standards in each course are to be used as a minimal framework and should encourage innovation. Local education agencies (LEAs) may add standards to meet local needs and incorporate local resources.

Because of the interconnected nature of Career and Technical Education programs, some courses will be utilized in more than one cluster. Shared courses are not reprinted in each course of study, but instead are indicated in the clusters' program guides, which are the definitive listings of required courses for each cluster. They can be found on the Alabama State Department of Education website.



CLUSTER OVERVIEW

Health Science

A carefully designed and well-implemented Health Science program allows students to develop the essential knowledge and skills for pursuing careers in the following five categories: therapeutic services, diagnostic services, health informatics, support services, and biotechnology research and development. All Health Science courses, beginning with the required foundational course (Foundations of Health Science, the prerequisite for all secondary courses in the cluster), include rigorous and challenging content, opportunities to utilize a variety of instructional strategies, and work-based learning experiences. They also include foundational standards which are both shared with other career and technical education courses and customized for Health Science. Rigorous coursework is aligned with industry-recognized certification exams, providing students the opportunity to earn national credentials.

While most courses in the Health Science cluster are designed for grades 9-12, the course of study offers three courses for students in grades 6-8 in order to introduce healthcare careers at an earlier age. Middle grades course content includes practices that promote health and wellness, disease prevention, legal and medical ethics, communication, medical math, medical terminology, and technical skills related to healthcare. These courses are designed to give students a variety of opportunities to apply their learning and demonstrate relevant interpersonal and workforce skills. The local education agency has the autonomy to offer the middle school courses as nine-week, semester, or year-long classes as long as the appropriate standards are taught.

Students in the Health Science cluster affiliate with HOSA–Future Health Professionals, a career and technical student organization (CTSO) designed for students interested in health care. The mission of HOSA–Future Health Professionals is to empower its members to become leaders in the global health community through education, collaboration, and experience by actively promoting career opportunities in the health industry and seeking to enhance the delivery of quality health care to all people. Since CTSOs are designed to be co-curricular, teachers are encouraged to integrate appropriate HOSA resources in all courses.

Course of study standards represent the minimum required content and are not intended to be the course curriculum. LEAs and local schools should use these standards to create a curriculum that utilizes available resources to meet the specific needs and interests of the local community. LEAs may add content standards to reflect local needs and philosophies. All Career and Technical Education courses emphasize the application of knowledge and skills to solve practical problems.

CONTENT STANDARDS: MIDDLE SCHOOL COURSES

Health Science Discovery	
Course Duration	Nine weeks (Content standards 1-1c are required) **OR** One semester (Content standards 1-1c, 3, 4, 5, and 7 are required) **OR** One year (All content standards are required)
Grade Levels	6-8
Prerequisites	

Health Science Discovery introduces concepts and skills needed in a variety of professions in healthcare, including nursing, physical therapy, emergency medicine, medical laboratory technology, respiratory therapy, environmental sciences, and informational services. Course content presents basic skills, education, training, and job requirements in selected healthcare professions to help students make informed decisions regarding their college and career goals. The course includes information concerning practices that promote health and wellness and prevent disease. Students will also be introduced to legal and medical ethics, communication, medical math, medical terminology, and technical skills related to healthcare. The course is designed to encourage hands-on learning using equipment, materials, and technology appropriate to the course content in accordance with current practices.

Career and Technical Student Organizations are integral, co-curricular components of each career and technical education course. These organizations enhance classroom instruction while helping students develop leadership abilities, expand workplace-readiness skills, and access opportunities for personal and professional growth. Students in the Health Science cluster affiliate with HOSA– Future Health Professionals.

Foundational standards, shown in the table below, are an important part of every course. Through these standards, students learn and apply safety concepts; explore career opportunities and requirements; practice the skills needed to succeed in the workplace; take advantage of leadership, teamwork, and personal growth opportunities afforded by Career and Technical Student Organizations; and learn and practice essential digital skills. The foundational standards are to be incorporated throughout the course.

Each foundational standard completes the stem *"**Students will**..."*

Foundational Standards	1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces. 2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork. 3. Explore the range of careers available in the field and investigate their educational requirements and demonstrate job-seeking skills including resume-writing and interviewing. 4. Advocate and practice safe, legal, responsible, and ethical use of information and technology tools specific to the industry pathway. 5. Participate in a Career and Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork. 6. Demonstrate effective infection control techniques as defined by the Centers for Disease Control and Prevention (CDC) and The Joint Commission guidelines.

HEALTH SCIENCE DISCOVERY
CONTENT STANDARDS

Please refer to "Directions for Interpreting Standards" on page 9.

Each content standard completes the stem *"**Students will**..."*

Healthcare Professions	1. Describe a variety of healthcare professions, indicating the purpose and scope of practice of each one. a. Research and report on the historical development of the healthcare industry, its leaders, and its response to major scientific advancements. b. Research and report on the impact of medical research on the healthcare industry. c. Investigate and present information about a healthcare career area of interest.

Ethics	2. Identify and explain legal and ethical practices related to the healthcare industry, including malpractice, negligence, invasion of privacy, HIPAA, ethics and law, Patients' Bill of Rights, licensure, and use of social media. a. Research and report on a medical malpractice case.
Communication	3. Demonstrate verbal and nonverbal communication techniques appropriate for healthcare industry settings. *Examples: active listening, electronic communication etiquette*
Medical Math	4. Apply the metric system to convert standard weights, measurements, and volumes commonly used in a healthcare setting. a. Determine time using the 24-hour time format utilized in the healthcare industry.
Medical Terminology	5. Identify common medical terms and abbreviations associated with the healthcare industry.
Health Science Principles	6. Describe basic structures and functions of the human body systems.
Health and Wellness	7. Research and report on current health and wellness topics. *Examples: mental health, stress management, body image* a. Explain risk factors that contribute to illness, including heredity, environment, lifestyle, diet, and age. b. Describe environmental conditions and lifestyle choices that affect wellness. *Examples: stress, diet, pollution, screen time* c. Explain how cultural and individual differences relate to wellness and quality of life and how these differences impact the overall health of society. d. Summarize practices for the prevention and early detection of diseases, including health screenings and examinations.

Technical Skills

8. Measure, record, and graph height and weight.
    a. Demonstrate medical aseptic techniques for handwashing.
    b. Demonstrate basic first aid skills.
        Examples: controlling bleeding, injecting epinephrine, administering naloxone, providing basic wound care
    c. Demonstrate cardiopulmonary resuscitation (CPR), use of an automated external defibrillator (AED), and first aid for choking victims.

Healthcare Career Exploration

Course Duration	Nine weeks (Content standards 1-1c are required) **OR** One semester (Content standards 1-1c, 2-2b, 3-3c are required) **OR** One year (All content standards are required)
Grade Levels	6-8
Prerequisites	

Healthcare Career Exploration is designed to give middle school students a broad overview of professions within the health science career cluster. Students will be introduced to the careers and terminology associated with each pathway. Skills and technologies associated with each profession will also be included. To implement the standards effectively, instruction and learning activities should be provided in a classroom/laboratory setting using hands-on experiences involving the equipment, materials, and technology appropriate to the course content in accordance with current practices.

Career and Technical Student Organizations are integral, co-curricular components of each career and technical education course. These organizations enhance classroom instruction while helping students develop leadership abilities, expand workplace-readiness skills, and access opportunities for personal and professional growth. Students in the Health Science cluster affiliate with HOSA–Future Health Professionals.

Foundational standards, shown in the table below, are an important part of every course. Through these standards, students learn and apply safety concepts; explore career opportunities and requirements; practice the skills needed to succeed in the workplace; take advantage of leadership, teamwork, and personal growth opportunities afforded by Career and Technical Student Organizations; and learn and practice essential digital skills. The foundational standards are to be incorporated throughout the course.

Each foundational standard completes the stem *"**Students will**..."*

Foundational Standards	
	1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces. 2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork. 3. Explore the range of careers available in the field and investigate their educational requirements and demonstrate job-seeking skills including resume-writing and interviewing.

4. Advocate and practice safe, legal, responsible, and ethical use of information and technology tools specific to the industry pathway.
5. Participate in a Career and Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.
6. Demonstrate effective infection control techniques as defined by the Centers for Disease Control and Prevention (CDC) and The Joint Commission guidelines.

HEALTHCARE CAREER EXPLORATION CONTENT STANDARDS

Please refer to "Directions for Interpreting Standards" on page 9.

Each content standard completes the stem *"**Students will**..."*

Introduction to Health Careers

1. Research the history of health careers and describe how careers have advanced throughout the years.
   a. Identify and describe the five health science career pathways.
   b. Define and use general medical terminology, including word roots, prefixes, and suffixes.
      Examples: *cardi-, -itis, -ology, -ologist, -otomy, -ectomy*
   c. Explain the importance of legal and ethical behaviors in health careers.

Therapeutic Services

2. Research and share information on some of the careers available in therapeutic services, including salary, educational requirements, working conditions, advantages, and disadvantages.
   Examples: registered nurse, medical assistant, dental hygienist, pharmacy technician, physical therapist, speech language pathologist, veterinarian, surgical technician
   a. Describe common characteristics of careers in the therapeutic services career pathway.
      Examples: hands-on skilled care, patient education
   b. Identify and demonstrate skills required to enter careers in the therapeutic services career pathway.
      Examples: checking pulse and blood pressure manually, filling a prescription, identifying dental instruments

Diagnostic Services	3. Research and share information on some of the careers available in diagnostic services, including salary, educational requirements, working conditions, advantages, and disadvantages. *Examples: radiology technologist, respiratory therapist, phlebotomist, EKG technician* a. Describe common characteristics of careers in the diagnostic services career pathway. b. Identify and demonstrate skills required to enter careers in the diagnostic services career pathway. *Examples: assessment of oxygen saturation using pulse oximeter, visual acuity assessment with Snellen Eye Chart* c. Perform lab activities related to diagnostic services. *Examples: blood glucose testing, blood typing, vision screening*
Health Informatics	4. Research and share information about some of the careers available in health informatics, including salary, educational requirements, working conditions, advantages, and disadvantages. *Examples: admitting clerk, quality management specialist, medical coding, clinical data manager* a. Describe common characteristics of careers in the health informatics career pathway. b. Identify and demonstrate skills required to enter careers in the health informatics career pathway. *Examples: interpretation of basic medical abbreviations* c. Perform office functions related to health informatics. *Examples: evaluating medical records or bills, office reception, telephone etiquette*
Support Services	5. Research and share information regarding some of the careers available in the support services career pathway including salary, educational requirements, working conditions, advantages, and disadvantages. *Examples: clinical simulation technician, behavioral disorder counselor, dietary manager or aide, transport technician* a. Describe common characteristics of careers in the support services career pathway. b. Identify and demonstrate skills required to enter careers in the support services career pathway. *Examples: lab and other departmental inventory supply management, organizational chart interpretation* c. Research and share information about employability skills related to support services.

	Examples: healthcare equipment maintenance, organizational chart management, inventory maintenance, housekeeping skills
Biotechnology Research and Development	6. Research and share information about some of the careers available in the biotechnology research and development career pathway, including salary, educational requirements, working conditions, advantages, and disadvantages. *Examples: bioinformatics associate, biomedical clinician, clinical trial research assistant* a. Describe common characteristics of careers in the biotechnology research and development career pathway. b. Identify and demonstrate skills required to enter careers in the biotechnology research and development career pathway. *Examples: identifying microbiology lab equipment, investigating aseptic techniques and DNA extraction*
Information Technology in Health Care	7. Identify information technology careers in the Health Science career cluster and summarize the responsibilities, tasks, and skills they require. *Examples: Chief Information Officer, telehealth and telemedicine, electronic health records* a. Identify ethical, legal, and security issues faced by healthcare professionals. *Examples: patient privacy, information security, transparency in using healthcare data, and preventing bias in the collection and use of information* b. Use various types of Internet search engines effectively to locate information relevant to the Health Science career cluster.

Medical Laboratory Science

Course Duration	One semester (Content standards 1-3b are required) **OR** One year (All content standards are required)
Grade Levels	7-8
Prerequisites	

Medical Laboratory Science introduces skills and careers found in clinical laboratory settings. It provides middle school students with the opportunity to gain knowledge and skills required for a traditional laboratory setting through hands-on experiences with equipment, materials, and technology in accordance with current practices. Course content includes laboratory math, terminology, and skills; hematology, immunology, genetics and cell biology concepts, microbiology, and parasitology. This course can be modified and taught successfully in a traditional classroom setting; however, access to a laboratory with the proper equipment is preferred.

Career and Technical Student Organizations are integral, co-curricular components of each career and technical education course. These organizations enhance classroom instruction while helping students develop leadership abilities, expand workplace-readiness skills, and access opportunities for personal and professional growth. Students in the Health Science cluster affiliate with HOSA–Future Health Professionals.

Foundational standards, shown in the table below, are an important part of every course. Through these standards, students learn and apply safety concepts; explore career opportunities and requirements; practice the skills needed to succeed in the workplace; take advantage of leadership, teamwork, and personal growth opportunities afforded by Career and Technical Student Organizations; and learn and practice essential digital skills. The foundational standards are to be incorporated throughout the course.

Each foundational standard completes the stem *"**Students will**..."*

Foundational Standards	
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3. Explore the range of careers available in the field and investigate their educational requirements and demonstrate job-seeking skills including resume-writing and interviewing.
4. Advocate and practice safe, legal, responsible, and ethical use of information and technology tools specific to the industry pathway.
5. Participate in a Career and Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.
6. Demonstrate effective infection control techniques as defined by the Centers for Disease Control and Prevention (CDC) and The Joint Commission guidelines.

MEDICAL LABORATORY SCIENCE CONTENT STANDARDS

Please refer to "Directions for Interpreting Standards" on page 9.

Each content standard completes the stem *"**Students will**..."*

Laboratory Terminology

1. Identify and explain common medical terms and abbreviations used in the laboratory setting.
   Examples: microbes, inoculation, lymphocyte, polymerase chain reaction (PCR)

Laboratory Skills

2. Identify commonly used laboratory equipment and explain how each item is used.
   a. Perform basic technical skills following laboratory protocol.
      Examples: using a microscope and a pipette, inoculating an agar plate, performing a urinalysis, determining blood type
   b. Prepare solutions of defined concentrations.

Laboratory Math	3. Perform basic mathematical calculations related to the composition of solutions, weights, and measurements used in the medical laboratory. a. Convert standard weights, measurements, and volumes to metric measurements commonly used in a healthcare setting. b. Express time using the 24-hour time format as it applies to the healthcare industry.
Hematology	4. Identify red blood cells, white blood cells, plasma, and platelets and explain the function of each in maintaining hemostasis.
Immunology	5. Identify components of the immune system and explain their functions. *Examples: antigen, antibodies, lines of defense*
Genetics and Cell Biology	6. Describe key cellular structures and explain their respective functions. *Examples: nucleus, chromosome, ribosome, mitochondria* a. Describe the structure and function of deoxyribonucleic acid (DNA) and explain its use in DNA fingerprinting and genetic technology. *Examples: gel electrophoresis, karyotyping, genetic testing* b. Explain the significance of Mendel's work to the development of modern genetics, including the laws of segregation and independent assortment. c. Compare and contrast ionic, hydrogen, covalent, and metallic bonds.
Microbiology and Parasitology	7. Differentiate among common microbes, including bacteria, viruses, fungi, and protozoans. a. Explain how microbes cause the development and spread of infectious diseases. b. Explain how the immune system responds when a foreign microbe enters the body.

CONTENT STANDARDS: HIGH SCHOOL COURSES

Biotechnology I

Course Credit	1.0
Grade Levels	11-12
Prerequisites	Foundations of Health Science

Biotechnology I is designed to provide an overview of the scope, concepts, and procedures of the biotechnology field. This course introduces students to a variety of topics in the biotechnology setting. Course topics include career exploration, laboratory procedures and technical skills fundamental to biotechnical research biochemistry, genetics and cell biology concepts, and genetic innovations.

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BIOTECHNOLOGY I
CONTENT STANDARDS

Please refer to "Directions for Interpreting Standards" on page 9.

Each content standard completes the stem *"**Students will**..."*

Career Opportunities

1. Trace the history of biotechnology and the emergence of biotechnology careers.
    a. Identify scientific fields related to biotechnology.

Laboratory Procedures and Technical Skills

2. Use a microscope to observe and record measurements and characteristics of specimens.
    a. Prepare slides for microscopic examination.
        Examples: blood smear, wet mount
3. Use scientific notation, significant digits, and decimals when performing and recording laboratory calculations.
4. Adjust the pH of specific solutions with commonly used acids and bases, using a pH meter to verify results.
    a. Explain the principle by which a pH meter works.
5. Perform polymerase chain reaction (PCR) to amplify a DNA sample, diagnose a disease, or isolate a pathogen.
6. Perform DNA extraction.

	7. Demonstrate techniques used in working with recombinant DNA. *Examples: DNA sequencing, isolation of DNA segments, polymerase chain reaction (PCR), plasmid transformation, restriction digest* 8. Maintain bacterial cultures, including preparing growth media and culturing microorganisms.
Biochemistry	9. Explain concepts of molecular mass, mole, and formula weight. a. Calculate molecular mass of specific molecules and the molarity of a solution. 10. Explain cell theory, correlating key cellular components to functions. *Examples: nucleus, chromosome, ribosome, mitochondria* a. Describe the interactions among cells, and between cells and their environment.
Genetics and Cell Biology	11. Construct models demonstrating the process of meiosis and the cell cycle, explaining the hereditary significance of each. a. Distinguish between spermatogenesis and oogenesis, using charts or models to illustrate differences between them. 12. Contrast typical and atypical chromosome karyotypes. a. Describe the structure of eukaryotic chromosomes, including transposons, introns, and exons. 13. Explain the significance of Mendel's work in the development of the modern science of genetics, including the laws of segregation and independent assortment. 14. Describe and illustrate inheritance patterns based on gene interactions. a. Predict patterns of heredity using pedigree analysis, including incomplete dominance, codominance, and multiple allelism. 15. Compare and contrast sex linkage, autosomal linkage, crossover, multiple alleles, and polygenes. 16. Model protein synthesis and explain the procedure, citing the central dogma of molecular biology.

17. Research and report on methods cells use to regulate gene expression and demonstrate their effect on protein synthesis.

18. Diagram and explain the replication of DNA and RNA viruses, including lytic and lysogenic cycles.

19. Research and report on factors that cause genetic mutations, including the effects of genetic variability on adaptations.
    Examples: radiation, chemical exposure, spontaneous events
    a. Describe how DNA mutations impact both individual organisms and populations.

20. Explain how the Hardy-Weinberg principle provides a baseline for recognizing evolutionary changes in gene frequency due to genetic drift, gene flow, non-random mating, mutation, and natural selection.

Genetic Innovations

21. Obtain, evaluate, and share information about applications of biotechnology in a variety of settings, including plant, animal, microbial, forensic, and marine environments.
    Examples: hybridization, cloning, insulin production, DNA profiling, bioremediation

22. Explain the development, purpose, findings, and applications of the Human Genome Project, and discuss ethical, social, and legal implications.

    a. Identify and explain medical uses of gene therapy, including vaccines and tissue and antibody engineering.
    b. Utilize computer bioinformatics resources to provide information regarding DNA, protein sequences, and human genetic diseases.
        Examples: National Center for Biotechnology Information (NCBI), protein data bank, gene reviews

Biotechnology II

Course Credit	1.0
Grade Levels	11-12
Prerequisites	Biotechnology I

Biotechnology II extends the content and skills presented in Biotechnology I through the application of concepts related to biomedical science research and development. An understanding of the industry and laboratory procedures that are fundamental to biomedical research is presented through course topics, including biomedical career opportunities in the biotechnology industry, technical skills and application, biochemistry concepts, biological systems, applied mathematics, research, and the scientific method.

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	3. Explore the range of careers available in the field and investigate their educational requirements and demonstrate job-seeking skills including resume-writing and interviewing.

4. Advocate and practice safe, legal, responsible, and ethical use of information and technology tools specific to the industry pathway.
5. Participate in a Career and Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.
6. Demonstrate effective infection control techniques as defined by the Centers for Disease Control and Prevention (CDC) and The Joint Commission guidelines.

BIOTECHNOLOGY II
CONTENT STANDARDS

Please refer to "Directions for Interpreting Standards" on page 9.

Each content standard completes the stem *"**Students will**..."*

Career Opportunities

1. Outline the role of various departments in a biotechnology company, including research and development, quality assurance, quality control, and manufacturing.

Biotechnology Industry

2. Identify and describe the roles of regulatory agencies governing the manufacture and distribution of biotechnology-derived products.
    a. Outline the processes of developing, manufacturing, and obtaining regulatory approval of biopharmaceuticals.

3. Research and implement safety and quality control standards specific to the biotechnology industry.
    a. Explain the purpose of Good Laboratory Practice (GLP), Good Clinical Practice (GCP), and Current Good Manufacturing Practice (CGMP).
    b. Explain how environmental monitoring is carried out in a controlled space.
    c. Identify, analyze, and explain the roles of documentation utilized in CGMP-compliant industries.
        Examples: production and process controls, laboratory controls, records, reports

Technical Skills and Applications	4. Demonstrate current techniques used in biotechnology labs. a. Differentiate among sterilization, decontamination, and disinfection; describe equipment and procedures for each; and explain when each process should be employed. b. Demonstrate and explain methods of molecule and protein isolation, purification, and quantification using polyacrylamide gel. c. Research and discuss methods of DNA isolation, purification, and quantification. d. Use models to illustrate the transformation and transfection of organisms. e. Model or utilize clustered regularly interspaced short palindromic repeats (CRISPR) in the lab setting to introduce genetic information into a genome. f. Perform immunoassay using serial dilution. *Example: Enzyme-linked immunosorbent assay (ELISA)* g. Describe common stains used in the laboratory and explain when each is preferred. *Examples: Gram Stain, Gemsa, Silver Stain, Gentian Violet, periodic acid-schiff (PAS)*
Biochemistry	5. Analyze and explain vital intracellular processes. a. Compare and contrast types of chemical bonds within cells. *Example: ionic, hydrogen, covalent, metallic* b. Model the structures and explain the functions of molecules and macromolecules. *Examples: carbohydrates, lipids, proteins, nucleic acids* c. Compare and contrast aerobic and anaerobic respiration. *Example: Use a model to identify similarities and differences in types of cellular respiration.* d. Use enzymes to modify reaction rates in the laboratory setting. 6. Model the structure and describe the functions of proteins in an organism.
Biological Systems	7. Map and explain the response of the immune system in the body, beginning with the identification of a foreign antigen.

Applied Mathematics in Biotechnology	8. Prepare laboratory solutions, buffers, and media, performing necessary calculations, including serial dilutions, dilution ratios, molarity, and dilution factor. a. Calculate conversions within the metric system using scientific notation, significant digits, and decimals. b. Calculate volume/volume (v/v) and weight/volume (w/v) of solutions. c. Produce a graph by applying Beer's Law to generate a standard curve, plot data, and interpret results. d. Calculate bacterial transformation efficiency. e. Record time-sensitive laboratory data using the 24-hour clock.
Research and Scientific Method	9. Demonstrate use of the scientific method to document and analyze the results of a laboratory procedure. a. Outline the characteristics of good experimental design, including the proper use of controls. b. Collect, record, analyze, and interpret data, including statistical analysis. c. Outline various ways of communicating scientific research, including peer-reviewed journals, exhibitions, laboratory notebooks, and live or online presentations.

Career Pathway Project in Health Science

Course Credit	1.0
Grade Levels	10-12
Prerequisites	Successful completion of two or more courses in the Health Science cluster

Career Pathway Project (CPP) in Health Science is a capstone course which allows students to utilize the knowledge and skills gained through their secondary coursework in a practical, real-world experience that showcases their learning. It provides an opportunity for a student to choose an area of interest and explore it in depth while demonstrating problem-solving, decision-making, and independent learning skills. The CPP contributes to an educational plan of challenging courses and practical experiences that prepares students for the workplace or for pursuing further education.

During this course, the student works with his or her coordinating teacher, academic teachers, and a product or process mentor who has expertise in the student's field of study. At the conclusion of the Career Pathway Project, the student presents or demonstrates the knowledge gained to an audience consisting of the coordinating teacher, academic teachers, the mentor, peers, and community and business representatives.

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3. Explore the range of careers available in the field and investigate their educational requirements and demonstrate job-seeking skills including resume-writing and interviewing.
4. Advocate and practice safe, legal, responsible, and ethical use of information and technology tools specific to the industry pathway.
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6. Demonstrate effective infection control techniques as defined by the Centers for Disease Control and Prevention (CDC) and The Joint Commission guidelines.

CAREER PATHWAY PROJECT IN HEALTH SCIENCE CONTENT STANDARDS

Please refer to "Directions for Interpreting Standards" on page 9.

Each content standard completes the stem *"**Students will**..."*

Project Proposal

1. Create a formal, narrative proposal that communicates a specific concept, creates a process, or develops a product related to health science.
   Examples: the impact of the healthcare worker shortage, contributions of telemedicine, the impact of current trends in healthcare such as the opioid epidemic, the effects of the coronavirus pandemic

Research

2. Conduct independent research related to the selected health science project.
   Examples: Internet research, related reading

Project Report	3. Write a detailed report on the chosen health science project, following established conventions for format, grammar, usage, and citation of sources.
Presentation	4. Produce an original multimedia presentation based upon career pathway project research and results. *Examples: producing a digital presentation and oral explanation, creating a documentary, presenting a project model and explanation*
Portfolio	5. Design and create a portfolio that documents all components of the health science pathway project and demonstrates the validity of the research process.

CTE Lab in Health Science

Course Credit	1.0
Grade Levels	10-12
Prerequisites	Successful completion of two or more courses in the Health Science career cluster

CTE Lab in Health Science is designed to enhance the student's general understanding and mastery of content in the cluster. This course is designed as a learning laboratory to support students' individual interests and goals. This laboratory may take place in a traditional classroom, in an industry setting, or in a virtual learning environment.

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CTE LAB IN HEALTH SCIENCE CONTENT STANDARDS

Please refer to "Directions for Interpreting Standards" on page 9.

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Occupational Expertise

1. Demonstrate expertise in a specific occupation within the Health Science cluster.
    a. Meet benchmarks selected by the instructor from the appropriate curriculum frameworks, based upon the individual student's assessed needs.

Research and Presentation

2. Conduct investigative research on a selected topic related to health science using approved research methodology, interpret findings, and prepare a presentation to defend results.
    a. Select an investigative study based on research and prior knowledge.
    b. Collect, organize, and analyze data accurately and precisely.
    c. Report, display, and defend the results of investigations to audiences that may include professionals and technical experts.

3. Demonstrate higher order critical thinking and reasoning skills appropriate for a career in health science.
   Example: Make inferences, explain connections, or express an in-depth understanding of how the career connects to the global healthcare community.
   a. Use mathematical and/or scientific skills to solve problems encountered in the chosen occupation.
   b. Locate, evaluate, and interpret information related to the chosen occupation in oral, print, and digital formats.
   c. Analyze and apply data and/or measurements to solve problems and interpret documents.
   d. Construct charts, tables, or graphs using functions and data.

Leadership

4. Apply leadership and professional career skills needed in health science careers.
   Examples: decision-making, time management, long-term planning, commitment, professional communication
   a. Develop and deliver a professional presentation offering potential solutions to a current issue.
   b. Demonstrate leadership and career skills in job placement, job shadowing, entrepreneurship, or internship, or by obtaining an industry-recognized credential of value.
   c. Participate in leadership development opportunities available through HOSA–Future Health Professionals and/or professional organizations in the health science field.
   d. Demonstrate written and oral communication skills through presentations, public speaking, live or virtual interviews, and/or an employment portfolio.

Diagnostic Services

Course Credit	1.0
Grade Levels	9-12
Prerequisites	Foundations of Health Science

Diagnostic Services is designed to give students an overview of diagnostic services careers, which focus on using tests to detect, assess, and diagnose conditions, injuries, and disease. The course presents practical applications of the tools, technologies, and assessments employed in this area of health care. Careers in diagnostic services include disciplines in clinical laboratory science, phlebotomy, radiology technician, genetic counseling, and diagnostic medical sonography.

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4. Advocate and practice safe, legal, responsible, and ethical use of information and technology tools specific to the industry pathway.
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DIAGNOSTIC SERVICES CONTENT STANDARDS

Please refer to "Directions for Interpreting Standards" on page 9.

Each content standard completes the stem *"**Students will**..."*

Diagnostic Careers

1. Compare roles and responsibilities of professionals in various diagnostic service careers.
   Examples: radiologic technician, pathologist, cardiovascular technician

Legal and Ethical Issues

2. Analyze responsibilities and limitations set forth in criminal and civil healthcare laws and explain their implications for workers in diagnostic services careers.
   Examples: confidentiality, informed consent, Patient Self-Determination Act; allegations of negligence or malpractice
   a. Review and report on federal legislation regarding healthcare practices and their effects on patient care procedures in diagnostic services.
      Examples: Health Insurance Portability and Accountability Act (HIPAA), Americans with Disabilities Act (ADA), Family Medical Leave Act (FMLA), Workers Compensation
3. Analyze healthcare-related ethical issues and their implications for respecting patients' cultural, social, and ethnic differences in delivering diagnostic services.
   Examples: embryo selection, tube feeding, smart watch use for monitoring A-fib

	a. Demonstrate respectful and empathetic treatment of all patients, clients, and families encountered in diagnostic service settings. *Examples: using vocabulary, tone, and mannerisms that avoid cultural bias; directing questions and comments toward the patient rather than a caregiver; establishing eye contact with the patient*
Medical Mathematics	4. Demonstrate proficiency in making and recording calculations commonly used in healthcare settings. *Examples: oxygen tank time, basic dosage calculations, vital signs* 5. Interpret charts, graphs, tables, and diagrams used in diagnostic careers, including vital signs graphic sheet, body mass index (BMI) graph, and lab result analysis sheet.
Anatomy	6. Relate specific body systems, including gross organ structures and general functions, to diagnostic healthcare skills. *Example: Explain how an electrocardiograph (EKG) measures specific cardiovascular functioning.*
Diseases and Disorders	7. Describe the etiology, pathology, and diagnosis of diseases and disorders that are commonly encountered by diagnostic service professionals. *Examples: streptococcal pharyngitis, tuberculosis, fracture*
Communication	8. Utilize effective therapeutic communication with patients and families in diagnostic service settings. *Examples: teach-back method, use of layman's terms, active listening* 9. Create documentation according to facility policy and industry standards, including records of the administration and results of diagnostic tests. *Examples: glucometer test results, urinalysis results, machine calibration log*
Diagnostic Skills	10. Explain procedures utilized in diagnostic services and describe the equipment and supplies needed for each one. *Examples: urinalysis, glucometer assessment, blood typing* 11. Demonstrate skills necessary for specified diagnostic careers. *Examples: performing rapid strep test, measuring visual acuity, simulating phlebotomy*

Health Technology	
	12. Demonstrate safe use of health technology in specified diagnostic service settings. *Examples: EKG machine, electronic charting system, X-ray simulator* 13. Research and utilize billing codes to document diagnostic procedures. *Example: International Classification of Diseases (ICD) procedure codes*

Emergency Medical Services

Course Credit	1.0
Grade Levels	9-12
Prerequisites	Foundations of Health Science

Emergency Medical Services introduces students to professions within the emergency medical field. Course content emphasizes patient and provider safety, human body structure and function, assessment of emergency patients, ethical behavior, and emergency care procedures. The course also focuses on interaction and communication between emergency medical personnel and other first responders.

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Foundational Standards	
	1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces. 2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork. 3. Explore the range of careers available in the field and investigate their educational requirements and demonstrate job-seeking skills including resume-writing and interviewing.

4. Advocate and practice safe, legal, responsible, and ethical use of information and technology tools specific to the industry pathway.
5. Participate in a Career and Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.
6. Demonstrate effective infection control techniques as defined by the Centers for Disease Control and Prevention (CDC) and The Joint Commission guidelines.

EMERGENCY MEDICAL SERVICES CONTENT STANDARDS

Please refer to "Directions for Interpreting Standards" on page 9.

Each content standard completes the stem *"**Students will**..."*

The Emergency Medical Services (EMS) System

1. Compare and contrast a variety of certification and cross-training opportunities in emergency medical services.
2. Summarize EMS roles within the broader healthcare system.
   Examples: facility transfer, air medical, critical care, emergency response
3. Compare and contrast the emergency response roles of EMS, firefighters, and law enforcement personnel.
   a. Describe how EMS, firefighters, and law enforcement personnel operate individually and as a team in an emergency setting according to the Incident Command Structure.
   b. Explain the role EMS plays in the mass casualty triage process.

Communication Skills

4. Demonstrate effective communication among medical and emergency personnel who are on the scene and at other locations.
   Examples: scene management, patient transition of care to medical facility

	5. Use therapeutic communication with patients and caregivers of diverse backgrounds. *Examples*: *active listening, sharing observations, sharing empathy, clarifying, summarizing* 6. Complete and organize medical documentation, using effective technical writing skills. *Examples: Patient Care Report, refusal of patient care*
Safety	7. Examine an emergency scene to identify dangerous materials and maintain situational awareness to notice threats, hazards, and dangerous conditions throughout the emergency. *Examples: hazardous materials, inclement weather, violent scenes* 8. Explain the importance of emotional, psychological, and physical well-being and stress management for the EMS provider. 9. Demonstrate best practices used by emergency medical personnel for infection control in a variety of environments.
Legal and Ethical Issues	10. Interpret legal issues that impact the EMS responder and indicate whether each issue involves civil, criminal, or contractual law, including negligence laws, patient abandonment laws, consent and refusal laws, Health Insurance Portability and Accountability Act (HIPAA), Good Samaritan laws, and duty to act. a. Describe the purpose of advance directives including living wills, do-not-resuscitate orders, medical power of attorney, and healthcare surrogate in emergency patient care. 11. Explain the ethical and moral obligations of the EMS responder. *Examples: end-of-life care, cultural sensitivity*
Anatomy	12. Describe the structure and function of human body systems and explain how emergency medical procedures can substitute for or improve upon certain bodily functions in emergency situations. *Examples: Cardiopulmonary resuscitation (CPR) can carry out the mechanical functions of the heart; properly performing the jaw-thrust maneuver can provide a clear passageway for airflow to the lungs; splinting a broken arm can stabilize it and relieve discomfort.*

Emergency Medical Skills

13. Perform basic skills in emergency medicine.
    Examples: assessing vital signs, administering CPR, controlling bleeding, managing shock

14. Describe advanced skills performed in emergency medical settings.
    Examples: intubation, intraosseous catheter placement

15. List and describe the purpose of medications, treatments, or therapies commonly used in emergency situations.
    Examples: aspirin, naloxone, oxygen, epinephrine

Foundations of Health Science

Course Credit	1.0
Grade Levels	9-12
Prerequisites	

Foundations of Health Science, the foundational course for the Health Science cluster, introduces students to a wide range of health careers. This course is designed to provide students with a solid basis for moving ahead in any healthcare field they may choose. The topics covered include safety, infection control, legal and ethical practices, career exploration, employability skills, medical math, healthcare delivery systems, health and wellness, communication and teamwork, medical terminology, body organization, basic anatomy and physiology of each major body system, and entry level technical skills. This course is the prerequisite for all other health science courses. It is recommended for students who want to prepare for further study at the postsecondary level for a broad array of health-related fields.

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	1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces. 2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork.

	3. Explore the range of careers available in the field and investigate their educational requirements and demonstrate job-seeking skills including resume-writing and interviewing. 4. Advocate and practice safe, legal, responsible, and ethical use of information and technology tools specific to the industry pathway. 5. Participate in a Career and Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork. 6. Demonstrate effective infection control techniques as defined by the Centers for Disease Control and Prevention (CDC) and The Joint Commission guidelines.

FOUNDATIONS OF HEALTH SCIENCE CONTENT STANDARDS

Please refer to "Directions for Interpreting Standards" on page 9.

Each content standard completes the stem *"**Students will**..."*

Anatomy and Physiology	1. Describe the basic organization of the human body. *Examples: molecules, cells, tissues, organs* 2. Utilize directional terms to indicate the locations of anatomical structures. 3. Identify basic structures and functions of human body systems.
Medical Math	4. Tell and record time using the 24-hour clock. 5. Use dimensional analysis to convert English and metric measurements commonly used in health care. *Examples: inches to feet and inches, liter to milliliter, teaspoon to milliliter, gram to ounce*

Communication	6. Compare and contrast verbal and nonverbal communication. 7. Identify common barriers to communication and describe ways to overcome them. *Examples: visual impairment, secondary languages, hearing impairment, health literacy* 8. Communicate with patients and co-workers using techniques of the sender-message-receiver feedback model. *Examples: role-playing, communication activities, teamwork games*
Medical Terminology	9. Use common roots, prefixes, and suffixes to communicate medical information. *Examples: a-, an-, dys-, -itis, cardio-* 10. Use and explain common medical abbreviations to communicate health information accurately.
Safety	11. Identify existing and potential hazards to clients, co-workers, and self in the healthcare setting. *Examples: trip hazards, electrical and fire hazards, incorrect body mechanics* 12. Identify and describe a variety of common infectious organisms, including blood-borne pathogens.
Healthcare Delivery Systems	13. Compare and contrast the focus, functions, and organization of various healthcare delivery systems. *Examples: acute care, ambulatory care, long-term care, medical and dental practices* a. Compare and contrast the focus, functions, and organization of healthcare-related agencies. *Examples: Centers for Disease Control and Prevention (CDC), Centers for Medicare and Medicaid Services (CMS), Veterans Administration (VA), government insurance marketplaces* 14. Compare and contrast early beliefs about the causes and treatment of disease with current knowledge and explain how advances in knowledge have led to changes in prevention and treatment. a. Identify 10 or more major events in the history of health care and explain their significance. *Examples: discovery of penicillin, sterilization of instruments, vaccinations, major medical equipment advancements*

Employability Skills	15. Describe personal and professional traits and attitudes that are desirable in a healthcare worker. *Examples: empathy, dependability, honesty, patience, tact, hygiene and attire appropriate for occupational area*
Legal and Ethical Responsibilities	16. Summarize legal and ethical responsibilities within the healthcare delivery setting. *Examples: following Patient's Bill of Rights and HIPAA requirements, reporting abuse or neglect* 17. Research and debate bioethical dilemmas encountered in the healthcare setting. *Examples: organ donation, gene editing, euthanasia, end-of-life care*
Health and Wellness	18. Describe fundamental principles and practices of health promotion and wellness. *Examples: disease prevention, exercise, proper diet, avoiding risky behaviors, sleep habits, stress management, weight control, mental health* 19. Identify and describe the social determinants of health. *Examples: housing, food insecurity, transportation, family stability* a. Explain the impact that trauma and the social determinants of health may have on patients and their health outcomes.
Technical Skills	20. Demonstrate entry-level skills required in various careers in the healthcare industry, including specific skills for areas of particular interest. *Examples: vital signs, vision screening, cardiopulmonary resuscitation/automated external defibrillator (CPR/AED), first aid, technical writing skills to record subjective and objective data*

Health Science Internship

Course Credit	1.0 (Standards 1-19 are required) **OR** 2.0 (All standards are required)
Grade Levels	11-12
Prerequisites	Foundations of Health Science and one Health Science concentrator course

Health Science Internship is a capstone course designed to provide advanced students with practical knowledge and skills needed for postsecondary healthcare education and employment. The practicum requirements in the course are designed to be completed in local healthcare facilities, such as a hospital, medical office, or long-term care facility. When Health Science Internship is offered as a two-credit course, work should be completed and credit awarded in a single school year. The two-credit course will include a summary project that reflects the extended learning opportunities and time spent in the clinical facility (standard 21).

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	3. Explore the range of careers available in the field and investigate their educational requirements and demonstrate job-seeking skills including resume-writing and interviewing. 4. Advocate and practice safe, legal, responsible, and ethical use of information and technology tools specific to the industry pathway. 5. Participate in a Career and Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork. 6. Demonstrate effective infection control techniques as defined by the Centers for Disease Control and Prevention (CDC) and The Joint Commission guidelines.

HEALTH SCIENCE INTERNSHIP
CONTENT STANDARDS

Please refer to "Directions for Interpreting Standards" on page 9.

Each content standard completes the stem *"**Students will**..."*

Employability	1. Utilize skills related to specific healthcare facility requirements in delivering patient care.
Safety	2. Analyze safety needs of patients and caregivers in the clinical setting, utilizing critical thinking skills. 3. Employ safe work practices, following health and safety policies and procedures of the clinical facility.
Medical Terminology	4. Communicate orally and in writing in clinical settings, using correct medical terminology. *Examples: procedure names, anatomical structures, diagnoses*

Diseases and Disorders	5. Observe, research, and describe the etiology, pathology, diagnosis, treatment, and prevention of common diseases and disorders encountered in the clinical setting. *Examples: diabetes, hypertension, myocardial infarction, kidney failure*
Technical Skills	6. Perform basic healthcare skills according to facility protocol. *Examples: vital signs assessment, documentation of procedure* 7. Utilize mathematics in healthcare environments, including office and patient care settings. *Examples: drug dosage, intravenous (IV) drip rate calculations, intake and output, billing and coding* 8. Research procedures observed in the clinical setting and explain their relevance to the plan of care. *Examples: colonoscopy, respiratory treatment, biopsy, catheter insertion*
Communication	9. Distinguish between subjective and objective information throughout the healthcare plan process, including patient assessment, implementation, and evaluation. 10. Modify communication to meet the needs of the patient or client in ways that are appropriate for the situation. 11. Model professional verbal and nonverbal communication with patient or client, caregivers, and healthcare team members. 12. Construct examples of technical and formal writing. *Examples: nurses' notes, physician orders, health information forms*
Legal and Ethical Issues	13. Apply industry-standard ethical practices with consideration for patients' cultural, social, and ethnic differences in healthcare settings. *Examples: Incorporate autonomy, beneficence, justice, and nonmaleficence in all dealings with patients.*

	14. Follow regulations and industry standards safeguarding the privacy and confidentiality of health information. *Examples: regulations regarding Health Insurance Portability Accountability Act (HIPAA), advance directives, social media*
Teamwork	15. Research and explain how effective team dynamics can improve patient care.
Health Maintenance Practices	16. Differentiate between wellness and illness and summarize the goals and outcomes of each in the clinical setting. a. Identify and explain psychological responses to illness. *Examples: defense mechanisms, stages of grief* 17. Explain why a patient's compliance with the ordered plan of care is important for health maintenance. *Examples: self-assessment, record-keeping, following dietary guidelines*
Pharmacology	18. Research medications using medical reference sources to determine drug classifications, indications, contraindications, side effects, and dosages.
Healthcare Credentials	19. Research and report on specific standards required for credentialing in a health-related field. *Examples: Patient Care Technician, EKG technician, pharmacy technician, Certified Nursing Assistant, emergency medical responder*
Summary Project	20. Create a project based on extended research regarding a topic or issue encountered during clinical experience and present it to an audience of mentors, academic and career tech instructors, and peers. *Examples: specific diagnosis or procedure*

Human Body Structures and Functions

Course Credit	1.0
Grade Levels	9-12
Prerequisites	Foundations of Health Science

Human Body Structures and Functions is designed to help students develop basic knowledge of the normal anatomy and physiology of the human body. The course builds upon and extends the knowledge and terminology presented in Foundations of Health Science by presenting content that emphasizes how the eleven body systems coordinate to maintain homeostasis and how pathophysiology within each system leads to disease. An understanding of the structures and functions of the body is essential as students move on to further study and their future healthcare careers.

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4. Advocate and practice safe, legal, responsible, and ethical use of information and technology tools specific to the industry pathway.
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HUMAN BODY STRUCTURES AND FUNCTIONS CONTENT STANDARDS

Please refer to "Directions for Interpreting Standards" on page 9.

Each content standard completes the stem *"**Students will**..."*

Body Planes and Directional Terms

1. Model and describe positions of the human body, using directional terms.
   Examples: proximal, superficial, medial, supine, superior, inferior, anterior, posterior
2. Identify body planes, body cavities, quadrants, and abdominopelvic regions of the human body, using correct medical terminology.

Cells and Body Tissues

3. Identify the four principal types of tissues (epithelial, connective, muscle, and nervous) and describe their characteristics, functions, and locations.
4. Describe and differentiate among the structures, functions, and organization of cells and tissues in the human body.
   Examples: mitochondria, vacuoles; squamous, epithelial

Integumentary System	5. Identify and describe structures and functions of the integumentary system, including accessory organs, using correct medical terminology. *Examples: skin, hair, nails* a. Describe diseases and disorders of the integumentary system and the associated pathophysiological changes that lead to them, using medical terminology. *Examples: decubitus ulcer, melanoma, psoriasis*
Skeletal System	6. Identify the axial and appendicular subdivisions of the skeletal system and explain their functions. a. Classify joints as ball-and-socket, hinge, pivot, ellipsoidal, condyloid, or gliding according to their structure and movement. b. Identify the four main bone types and explain where they are found. c. Describe various skeletal system disorders and the associated pathophysiological changes that lead to them, using medical terminology. *Examples: fractures, arthritis*
Muscular System	7. Identify structures of the muscular system, including major muscles, origins, and insertions, and explain the functions of the muscular system, including types of body movements. a. Compare the cellular structures of skeletal, smooth, and cardiac muscles. b. Classify muscles as prime movers, antagonists, synergists, or fixators, based on their functions in the body. 8. Describe the steps of the sliding filament theory of muscle contraction and pathophysiological changes that lead to muscular disease. *Examples: muscular dystrophy, muscle cramps, rigor mortis*

Nervous System	9. Identify structures of the nervous system and explain their functions. *Examples: neuron, brain, spinal cord, nerve* a. Compare and contrast the functions of the peripheral and central nervous systems. b. Explain the functions of the sensory organs, including the eye, ear, tongue, and skin receptors. c. Describe diseases and disorders of the nervous system and the associated pathophysiological changes that lead to disease. *Examples: Parkinson's disease, meningitis*
Cardiovascular System	10. Identify and describe structures of the cardiovascular system and trace the flow of blood through the body. a. Describe blood cell formation, identify components of the blood, and distinguish among human blood groups. b. Describe common cardiovascular diseases and disorders and the associated pathophysiological changes that lead to disease. *Examples: myocardial infarction, mitral valve prolapse, varicose veins, arteriosclerosis*
Digestive System	11. Identify and describe the structures of the digestive system and explain their functions. *Examples: pathway of digestion; peristalsis, absorption, elimination* a. Explain the role of nutrition in maintaining homeostasis in the body. b. Describe disorders affecting the digestive system and the associated pathophysiological changes that lead to disease. *Examples: ulcers, Crohn's disease, diverticulitis*
Respiratory System	12. Identify and describe the structures of the respiratory system and explain their functions. *Examples: lungs, bronchi; inhalation/exhalation, oxygen/carbon dioxide exchange* a. Identify common disorders of the respiratory system and the associated pathophysiological changes that lead to disease. *Examples: asthma, bronchitis, cystic fibrosis*

Reproductive System	13. Describe structures and functions of the male and female reproductive systems. *Examples: ovary, testicle; ovulation, fertilization* a. Describe disorders of the reproductive system and the associated pathophysiological changes that lead to disease or affect fertility. *Examples: endometriosis, sexually transmitted disease, prostate cancer*
Urinary System	14. Identify and describe the structures of the urinary system and explain their functions, including the filtration of blood, the production of urinary filtrate, and the path of elimination of urine. a. Describe diseases and the disorders of the urinary system and the associated pathophysiological changes that lead to disease. *Examples: kidney stones, urinary tract infections*
Endocrine System	15. Identify endocrine glands and explain their functions, including the effects of hormones on the body. a. Identify common disorders of the endocrine system and the associated pathophysiological changes that lead to disease. *Examples: goiter, hyperthyroidism, diabetes insipidus*
Immune and Lymphatic Systems	16. Identify and describe the structures and functions of the immune and lymphatic systems, including the first, second, and third lines of defense against infection, and trace the response of the immune system when a pathogen enters the body. a. Compare and contrast active and passive immunity and explain their relationship to vaccination. b. Describe disorders and diseases of the immune system and the associated pathophysiological changes that lead to disease. *Examples: acquired immune deficiency syndrome (AIDS), acute lymphocytic leukemia (ALL)*

Medical Mathematics

Course Credit	1.0
Grade Levels	9-12
Prerequisites	Foundations of Health Science

Medical Mathematics utilizes mathematical concepts as they relate to healthcare and is designed to equip students with the mathematical skills to ensure accurate procedures, enhance patient safety, and improve healthcare efficiency. Topics include healthcare administration, disease distribution and spread, treatment schedules, measurement systems and conversions, charts and graphs, EKG, dosage calculations, statistical analysis, and applications.

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MEDICAL MATHEMATICS CONTENT STANDARDS

Please refer to "Directions for Interpreting Standards" on page 9.

Each content standard completes the stem *"**Students will**..."*

Healthcare Administration

1. Research and report on the costs associated with operating a medical facility.
   Examples: rent, utilities, insurance, debt, medical equipment, personnel
   a. Estimate and calculate basic payroll expenses for a medical office in a given scenario.
      Examples: salaries, taxes, employee benefits, liability insurance
   b. Estimate employee onboarding costs and calculate the length of time an employee would need to be retained to produce a positive return on investment.
      Examples: costs of recruitment, training, equipment, overfilling positions, relocating
   c. Analyze data to project ways to manage expenses and ensure that a medical facility generates the cash flow required to cover operating costs for a given scenario.
      Examples: patients per day, number of procedures required, number of office days, configuration of office hours, reimbursement rates for office visits and procedures, access to government subsidies
   d. Analyze data to predict what equipment, medication, personnel, and space will be needed to serve the medical needs of a given community or scenario.
      Examples: Plan a health fair, community clinic, or employee health screening.

Disease Distribution and Spread

2. Research and document the sizes and reproduction rates of common viruses and bacteria, organizing information in tables or graphs.
   Examples: E. coli, severe acute respiratory syndrome (SARS), streptococcus, influenza
   a. Express the size of virus and bacteria particles in microns and millimeters, using decimals, fractions, and scientific notation when appropriate.
   b. Examine datasets and graph multiplication rates of bacteria at various temperatures over time.
   c. Analyze graphical trends, explaining the effects of temperature on the multiplication of bacteria and describing ways that healthcare workers can use this information to lower the risk and spread of bacterial infections.

3. Research and report on an infectious disease, including its incidence rate, prevalence, and virulence.
   a. Create and use a mathematical model to predict the spread of a disease based on one infected person in a variety of scenarios.
      Examples: an infected person comes in contact with 1, 2, 3, 4, or more people over a period of days or weeks; airborne (tuberculosis), droplet (flu), contact (C. diff)
   b. Research specific diagnostic tests or screenings and use trial data to explain accuracy, sensitivity, specificity, and precision of the test results.
      Examples: flu, tuberculosis, coronavirus; incidence of false positives and negatives

Treatment Schedules

4. Interpret and utilize medical terms and abbreviations and create a schedule for administering medications or treatments using the 12- and 24-hour clock systems.
   Examples: BID, TID, PRN, IVPB

5. Research and report on the drug half-life of a variety of medications and explain how half-life affects dosing schedules.
   a. Generate a drug table showing the peak, trough, and therapeutic ranges for a given medication, write an equation to describe this relationship, and explain how to apply this information to maintain consistent levels of medication in the body.

Measurement Systems and Conversions

6. Utilize and fluently convert between the metric, English, and apothecary systems to indicate length, weight, and volume.
   Examples: patient's height and weight, intake and output measurements, household measurements; pounds and ounces, drams and grams, teaspoons and tablespoons, milliliters and milligrams; Roman and Arabic numerals
   a. Interpret measurement markings and scales on various types of syringes, graduated cylinders, IV solution bags, and urinary drainage bags and create accurate records of the amounts indicated.
   b. Convert temperature readings between Fahrenheit and Celsius scales.
      Examples: recording body temperature, storing and administering medication, maintaining food safety

7. Research and report on the use of goniometry to assess joint and skeletal anomalies.
   Examples: scoliosis, postural deviations, range of motion

Charts and Graphs

8. Record objective patient data during rehabilitation from an injury or surgical procedure for a given scenario.
   Examples: Use goniometer, spreadsheets, graphing calculators, and calculations involving trigonometry and percentages to document progress.
   a. Assess a patient's recovery by comparing objective measurements to predictive goals established by evidenced-based standards of care.
      Examples: baseline, rehabilitative goal, rehab progression
9. Create and analyze medical charts and graphs, identifying trends and rates of change.
   Examples: temperature/pulse/respiration (TPR) flow chart, pediatric growth chart, intake and output, mean blood pressure, demographics, BMI, statistical outliers, cholesterol chart, bone density, body proportion

Ultrasound	10. Research and report on the use of ultrasound technology in healthcare professions, identifying the frequencies, wavelengths, and modes used to produce clear images. a. Explain how different ultrasound frequencies and wavelengths are used for various purposes, including imaging and physical therapy through thermal healing and cavitation. *Examples: fetal imaging, diagnosing vein abnormalities; healing of ligaments and tendons, increasing circulation, decreasing pain*
EKG	11. Identify a normal sinus rhythm from an electrocardiogram (EKG), locating and describing a constant interval and a normal P wave. a. Measure P wave, QRS interval, PR interval, ST segment, QT interval and T wave to determine times and amplitude of electrical cardiac activity. b. Identify and describe cardiac arrhythmias in graphs of EKG results that do not fall into the normal range.
Dosage Calculations	12. Interpret and calculate oral medication orders, utilizing rounding rules, unit rates, ratios, proportions, and dimensional analysis for pediatric, adult, and geriatric patients. *Examples: dosages of pill and liquid medications* 13. Interpret and calculate intravenous medication orders and drip rates for patients of various ages, using rates, ratios, proportions, and dimensional analysis. 14. Calculate medication dosage rate. *Examples: microgram per milliliter per minute, milligrams per hour* 15. Compare and contrast the amounts of radiation exposure associated with various imaging tests. *Examples: x-ray, CT scan, PET scan, mammogram, lower GI, bone density scan* a. Using scientific notation, express the amount of radiation exposure from an imaging test and explain how the test exposure is related to a patient's average daily exposure. 16. Calculate body surface area and describe how this measure is used by medical professionals in diagnosing illness or administering treatment. *Examples: extent of burn injuries, providing chemotherapy*

Statistical Analysis	17. Research and collect a dataset for a medical topic of interest. *Examples: medical conditions, procedure outcomes, diagnostic tests, morbidity and mortality rates* a. Use a dataset from research on a medical topic to create a display with a sufficient number of data points to predict a pattern. *Examples: table, histogram, scatter plot, pie chart, line chart* b. Describe the relationships present in the dataset and make a prediction based upon the pattern of change. *Examples: medication needs, medical supply needs, staffing needs*
Application	18. Research and report on healthcare applications of the relationships of the Golden Ratio. *Examples: dentistry, cosmetic surgery; skull structure, blood pressure, body proportions* 19. Research and report on the prevalence and consequences of errors in a given medical facility or scenario, presenting data in the form of graphs or charts and explaining its implications in the healthcare setting. *Examples: data related to medication, IV rate, weight, or procedure or protocol errors; legal expenses, sanctions, increased oversight, increased insurance rates, termination of employment, loss of license; changes in health protocols and policies*

Medical Terminology

Course Credit	1.0
Grade Levels	9-12
Prerequisites	Foundations of Health Science

Medical Terminology requires students to develop knowledge of the language of medicine for use in a wide range of healthcare occupations. Content includes the usage and meaning of word roots and affixes and meanings of abbreviations, that pertain to particular diagnoses, equipment, procedures, and medical specialties. Terminology is applied in detail to describe body organization, explain the structure of body systems (which forms the majority of the course content), and produce technical writing.

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4. Advocate and practice safe, legal, responsible, and ethical use of information and technology tools specific to the industry pathway.
5. Participate in a Career and Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.
6. Demonstrate effective infection control techniques as defined by the Centers for Disease Control and Prevention (CDC) and The Joint Commission guidelines.

MEDICAL TERMINOLOGY CONTENT STANDARDS

Please refer to "Directions for Interpreting Standards" on page 9.

Each content standard completes the stem *"**Students will**..."*

Introduction to Medical Terminology

1. Identify and explain Greek and Latin origins for parts of medical terms.
   Examples: oste-, hepat- (Latin); derm-, cardi- (Greek)
2. Decode medical terms by breaking them down into the individual word parts and translating each to decipher meaning
3. Arrange word elements including word root, combining forms, prefixes, and suffixes to correctly build medical terms.
   Examples: Combine arthr/o- *with* -itis *to build the word* arthritis*; combine* arthr/o- *with* -scope *to create the term* arthroscope.
4. Identify medical abbreviations approved by The Joint Commission and explain their proper use.
5. Interpret common prefixes and explain how they are used.
   Examples: pre-, sub-, peri-, a-
6. Compare and contrast prefixes pertaining to numbers, color, measurements, and negatives and explain how each one modifies the meaning of words.
   Examples: tri-, uni-, poly-; cyano-; milli-; anti-, dys-

7. Utilize and explain suffixes pertaining to instruments, diagnostic procedures, and surgical procedures.
   Examples: -gram, -scopy, -biopsy, -tomy, -ectomy
8. Recognize and interpret suffixes pertaining to symptoms or diagnosis.
   Examples: -pathy, -itis, -osis
9. Utilize and explain suffixes pertaining to specialties and specialists.
   Examples: -logy, -logist

Levels of Body Organization

10. Use medical terminology to describe locations of body planes, regions, and cavities in relation to anatomical positions.
11. Explain and demonstrate directional and positional terms.
    Examples: superior-inferior, proximal-distal, anterior-posterior
12. Utilize and explain abbreviations associated with body organization.
    Examples: RUQ, LLQ, UE

Body Systems

Note: Standards 13 16 will be addressed for all body systems: integumentary, muscular, skeletal, cardiovascular, blood/lymphatic/immune, respiratory, digestive, urinary, female/male reproductive, endocrine, nervous, and special senses.

13. Decipher and explain combining forms, prefixes, and suffixes specific to each body system.
14. Locate anatomical structures relating to each body system.
15. Interpret medical terms and abbreviations that are common to each system from a variety of technical writings.
    Examples: journal text, doctor's orders, lab reports, case studies
16. Create technical writing samples that include proper body system terminology.
    Examples: SOAP notes, patient chart entries, research documentation or presentation, official Do Not Use list

Nurse Aide Training

Course Credit	2.0
Grade Levels	11-12
Prerequisites	Foundations of Health Science

Nurse Aide Training is designed to prepare students for careers as nurse aides and for taking the Alabama Certified Nurse Aide (CNA) examination. Learning takes place in a long-term clinical care setting as well as in the classroom and laboratory. Topics include basic nursing and personal care, residents' rights, caring for residents who have cognitive impairment, and mental health, social, and restorative services. The course requires completion of at least eight hours more of clinical time than the minimum contact hours required by the Alabama Department of Public Health.

The nurse aide training program and health science instructor must be approved by the Alabama Department of Public Health (ADPH), Division of Healthcare Services, for students to be eligible to take the National Nurse Aide Assessment. Students must successfully complete an approved program and pass the National Nurse Aide Assessment certification exam in order to become a Certified Nurse Aide (CNA). Current guidelines and information can be found on the Alabama Department of Public Health website.

The course of study subscribes to the Health Department's requirement that a student must complete at least 16 hours of training in the following areas before any direct contact with patients or residents: communication and interpersonal skills, infection control, safety and emergency procedures, promoting residents' independence, and respecting residents' rights.

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Each foundational standard completes the stem *"**Students will**..."*

Foundational Standards	1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces. 2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork. 3. Explore the range of careers available in the field and investigate their educational requirements and demonstrate job-seeking skills including resume-writing and interviewing. 4. Advocate and practice safe, legal, responsible, and ethical use of information and technology tools specific to the industry pathway. 5. Participate in a Career and Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork. 6. Demonstrate effective infection control techniques as defined by the Centers for Disease Control and Prevention (CDC) and The Joint Commission guidelines.

NURSE AIDE TRAINING
CONTENT STANDARDS

Please refer to "Directions for Interpreting Standards" on page 9.

Each content standard completes the stem *"**Students will**..."*

Basic Nursing Skills	1. Outline the communications structure in the skilled nursing facility. 2. Describe physical changes that occur during the aging process. 3. Assess and record vital signs, including blood pressure measured manually.

	4. Measure and record height and weight. 5. Assess the safety and cleanliness of the residents' environment according to the facility's policy. 6. Report changes in residents' physical, mental, and emotional status to a supervising nurse. *Examples: cognitive function, vital signs, skin integrity* 7. Describe stages in death and dying and explain procedures associated with caring for a person who is dying. 8. Complete Basic Life Support (BLS) certification.
Personal Care Skills	9. Bathe residents according to established procedures, including catheter, perineal, hand, and foot care. 10. Provide grooming care, including oral hygiene and denture care. 11. Dress residents using approved procedures. 12. Assist residents with toileting safely. 13. Assist residents with eating and hydration, utilizing industry-approved techniques and adaptive equipment. 14. Provide skincare, following industry best practices to prevent skin breakdown. *Examples: massage, lotion, hygiene, pressure ulcer prevention* 15. Transfer, turn, and position residents safely for activities of daily living (ADLs), using appropriate ergonomics and body mechanics.
Mental Health and Social Services	16. Identify and describe psychological changes associated with the aging process. 17. Tailor behavior and communication to residents' behavior, using therapeutic techniques to respect patients' rights. *Examples*: *tact, discretion, empathy, displaying gentleness and respect*

	18. Explain and utilize practices that allow residents to make personal choices. *Examples: choices regarding selection of clothing, interpersonal relationships, participation in activities* 19. Describe and implement ways in which staff can protect the resident's dignity. *Examples: closing doors, drawing privacy curtains, using therapeutic communication* 20. Describe ways a resident's family can support the resident's well-being.
Care of Residents with Cognitive Impairments	21. Demonstrate techniques for addressing the unique needs and behaviors of individuals with dementia to minimize the effects of cognitive impairment. *Examples: reminiscing, re-directing, validating feelings* 22. Describe effective means of communicating with residents who have cognitive impairments. *Examples: closed questions, single-step instructions* 23. Describe and demonstrate ways to respond appropriately to the behaviors of residents who are cognitively impaired. *Examples: speaking calmly, distraction, calm-down procedures, re-direction*
Basic Restorative Services	24. Describe practices involved in maintaining a resident's abilities for self-care. 25. Use assistive devices to help residents with transferring, ambulating, eating, and dressing. *Examples: gait belt, wheelchair, crutches, cane, walker, modified eating utensils* 26. Perform passive range of motion exercises on a resident, including shoulder, elbow, wrist, hip, knee, and ankle. 27. Identify and describe complications resulting from inactivity. *Examples: contractures, pressure ulcers, constipation* 28. Turn and position residents in bed and chair using approved procedures to minimize skin breakdown and complications resulting from inactivity.

	29. Outline steps for bowel and bladder retraining. 30. Demonstrate care and use of prosthetic and orthotic devices. *Examples: dentures, hand roll, trochanter roll*
Residents' Rights	31. Summarize residents' rights to make personal choices regarding their needs. *Examples: do-not-resuscitate (DNR) order, power of attorney, living will* 32. Outline the steps involved in the residents' grievance process. *Examples: direct family members to supervising nurse, ombudsman* 33. Provide assistance to residents participating in family groups and social activities. *Examples: transport to activities, assisting resident in participation according to individual ability; bingo, crafts, social gatherings*

Operating Room Essentials

Course Credit	1.0
Grade Levels	9-12
Prerequisites	Foundations of Health Science

Operating Room Essentials introduces students to the exciting and dynamic world of the operating room and to an array of multidisciplinary specialties and concepts within perioperative medicine. Course content focuses on the knowledge and skills needed to promote patient safety and optimize surgical outcomes. Operating Room Essentials is recommended for students who want to prepare for postsecondary study in health-related fields that utilize sterile techniques and/or provide care for patients before, during, or after surgery.

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4. Advocate and practice safe, legal, responsible, and ethical use of information and technology tools specific to the industry pathway.
5. Participate in a Career and Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.
6. Demonstrate effective infection control techniques as defined by the Centers for Disease Control and Prevention (CDC) and The Joint Commission guidelines.

OPERATING ROOM ESSENTIALS CONTENT STANDARDS

Please refer to "Directions for Interpreting Standards" on page 9.

Each content standard completes the stem *"**Students will**..."*

Structure and Operation of Surgical Facilities

1. Compare and contrast types of healthcare facilities that perform surgery.
   Examples: ambulatory surgery centers, hospitals, public facilities, private facilities or practices, academic practice, trauma center designation and verification (I, II, III, IV, V)
2. Outline the preoperative, intraoperative, and postoperative phases of surgery.
3. Differentiate among the functions of the different areas of the surgical department: preoperative holding (Pre-op), operating room (OR), post-anesthesia care unit (PACU/recovery), sterile processing department (SPD), and restricted, semi-restricted, and non-restricted areas.
4. Explain the roles and responsibilities of sterile and non-sterile surgical team members within perioperative services.
   a. *Examples: surgeon, registered nurse (including circulator role), surgical technologist, surgical technician, surgical physician assistant, registered nurse first assistant, certified surgical first assistant, anesthesiologist, certified registered nurse anesthetist, cardiac perfusionist, medical sales representative, sterile processing technician, patient care technician*

	5. Explain the rationale for arranging the perioperative environment, including its proximity to patient care units in the hospital. 6. Explain how members of multidisciplinary teams interact across departments throughout the healthcare facility. *Examples: emergency department, intensive care units, medical-surgical nursing units, blood bank, biomedical engineering, pathology, radiology*
Safety and Industry Standards	7. Explain the use of The Joint Commission's accreditation and certification standards, the Association of Perioperative Registered Nurses' guidelines for perioperative practice, and the Association of Surgical Technologists' guidelines for best practices. 8. Summarize safe work practices within the surgical suite as outlined by Occupational Safety and Health Administration (OSHA) standards: *Examples: safety data sheets, waste anesthetic gasses, bloodborne pathogens, latex allergy, compressed gases, static and awkward postures, smoke plume, laser hazards, hazardous chemicals, equipment hazards, slips or trips or falls, radiation exposure, tuberculosis precautions* 9. Scrub for surgery, using industry-standard hand scrub techniques and products.
Legal and Ethical Implications	10. Identify and describe sentinel events, explain reporting procedures, and describe prevention measures. *Examples: retained foreign objects, wrong-site surgery*
Patient Care and Advocacy	11. Recognize barriers related to the physical, psychosocial, and spiritual needs of diverse surgical patients and explain how they impact patient care. *Examples: special populations, cultural diversity, family considerations, pre-surgery anxiety* 12. Explain the importance of patient advocacy in the preoperative setting, surgical environment, and postoperative setting.

13. Describe various surgical specialties and identify typical procedures performed by practitioners in these fields, using correct medical terminology.
    Examples: general, endoscopy, orthopedic, plastic, vascular specialties; appendectomy, colonoscopy, carpal tunnel, excision of skin lesion
14. Differentiate among elective, urgent, and emergent surgical procedures.
15. Demonstrate and explain the key elements related to developing a "surgical conscience" used behind the "red line" regarding attire, behavior, movement, and sterile field surveillance.
16. Summarize principles and procedures of antisepsis, disinfection, and sterilization.
17. Describe methods of positioning patients and equipment in surgery for various procedures.
18. Explain the importance of perioperative thermoregulation and embolism prevention.
19. Explain integral components of universal protocol, including pre-procedure verification, surgical site marking, and time-out.
20. Describe hemostatic agents and methods including mechanical, thermal, and pharmacological.
21. Explain surgical wound classifications.
22. Describe potential sources of contamination.

Instruments, Supplies, and Equipment

23. Identify basic surgical instruments and supplies and describe how they are handled.
24. Identify special furniture, equipment, and technology in the operative setting and explain how they are used.
    Examples: OR table usage, electrosurgical unit (ESU) dispersive pad placement
25. Differentiate between disposable and non-disposable items used in operative settings.
26. Explain the importance of cost-containment strategies in the operative setting.

Pharmacology and Medical Math	27. Explain the role of the hospital pharmacy in operative patient care. 28. Demonstrate basic medication skills including handling, labeling, dosage calculations, and conversions.
Perioperative Technical Skills	29. Explain and demonstrate basic technical skills utilized in surgical patient care. *Examples: vital signs, preoperative checklist, gowning and gloving other members of surgical team, creating and maintaining a sterile field, inspecting and opening sterile items onto the surgical field, pouring sterile solutions, transferring patient, surgical patient positioning and draping, preoperative hair removal, Foley catheter insertion, thermoregulation and anti-embolism methods, surgical patient skin preparation, surgical counts, time-out procedures*

Patient Care Technician

Course Credit	1.0
Grade Levels	11-12
Prerequisites	Foundations of Health Science

Patient Care Technician is designed to provide students with the opportunity to become effective, efficient, and multi-skilled healthcare providers. The course aims to provide a working knowledge of advanced patient care skills, vital signs, 12-lead EKGs, oxygen therapy, basic phlebotomy via simulation, and specimen collection and processing.

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4. Advocate and practice safe, legal, responsible, and ethical use of information and technology tools specific to the industry pathway.
5. Participate in a Career and Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.
6. Demonstrate effective infection control techniques as defined by the Centers for Disease Control and Prevention (CDC) and The Joint Commission guidelines.

PATIENT CARE TECHNICIAN CONTENT STANDARDS

Please refer to "Directions for Interpreting Standards" on page 9.

Each content standard completes the stem *"**Students will**..."*

Patient Care

1. Demonstrate competency in the performance of basic patient care, working cooperatively with residents to accomplish the tasks.
   Examples: bathing, bed-making, assisting with activities of daily living (ADLs), positioning, checking vital signs
2. Demonstrate necessary skills for the admission, discharge, and transfer of the patient.
   Examples: inventorying personal belongings, securing valuables, obtaining vital signs
3. Demonstrate skills related to caring for patients' bodily functions, observing protocols to protect privacy and dignity.
   Examples: intake and output, ostomy care, feeding the patient, catheter care, oxygen administration
4. Demonstrate restorative and rehabilitation activities.
   Examples: range of motion exercises, use of orthotic or prosthetic devices

Regulatory Compliance, Safety, and Professional Responsibilities	5. Verify requisition for testing, patient identity, and consent to treatment prior to performing any test or procedure. *Examples: lab order, electrocardiogram (EKG) order, accepted patient identifiers* 6. Move, lift, and transfer patients safely, using principles of body mechanics to avoid injury. 7. Demonstrate and maintain policies and protocols of the healthcare facility. 8. Identify and describe the national regulatory agencies with oversight of medical institutions. *Examples: The Joint Commission (TJC), Clinical Laboratory Improvements Amendment (CLIA) program* 9. Recognize and address problematic signs and symptoms observed during patient care activities. *Examples: syncope, diaphoresis, nausea, seizure* 10. Dispose of biohazardous materials and sharp objects, following guidelines set forth by Occupational Safety and Health Administration (OSHA) and Centers for Disease Control and Prevention (CDC).
Infection Control	11. Use standard and transmission-based precautions to control infection. *Examples: isolation techniques, use of personal protective equipment (PPE)* 12. Compare and contrast aseptic and sterile techniques in patient care. *Examples: sterile field setup, donning and doffing gloves*
Phlebotomy and Specimen Collection	13. Assemble proper equipment and supplies for blood and non-blood specimen collection. *Examples: urine or stool collection container, phlebotomy supplies* 14. Label, handle, transport, and maintain chain of custody for lab specimens according to facility guidelines. 15. Adhere to facility policy for specimen collection, including site specific anatomy. *Examples: order of the draw, clean-catch technique*

16. Explain color codings of evacuated tubes, including any additives present, common tests for each, and any special considerations for testing.
17. Communicate effectively with a variety of patients and caregivers regarding phlebotomy procedures to be performed.
18. Identify and describe common complications of phlebotomy.
    Examples: lack of blood flow, hematoma, petechiae, nerve injury

EKG

19. Communicate effectively with patients and caregivers regarding EKG procedures to be performed, including patients with special circumstances requiring alternative lead placement.
    Examples: pediatric, mastectomy, right-sided heart, posterior chest, amputations
20. Demonstrate set-up and preparation of patient and equipment for EKG and cardiac monitoring.
    Examples: 3-lead, 5-lead, and 12-lead placement, stress test, paper speed, sensitivity
21. Analyze and resolve artifacts from EKG tracing.
    Examples: wandering baseline, somatic, electrical
22. Assess and interpret waveforms of the cardiac cycle.
23. Interpret an EKG tracing to assess a patient's heart conduction.
    Examples: PR-interval, QRS duration, and QT-interval
24. Identify and describe the major classifications of arrhythmias.
25. Calculate heart rate from EKG tracings using various methods.
    Examples: 6-second method, 1500 method
26. Analyze EKG waveform variances that indicate ischemia, injury, or infarction.
27. Respond appropriately to simulated life-threatening arrhythmias.
    Examples: basic life-support interventions for ventricular tachycardia or ventricular fibrillation

Pharmacy Technician

Course Credit	1.0
Grade Levels	12
Prerequisites	Foundations of Health Science

Pharmacy Technician is designed to prepare students for employment as a pharmacy technician. The course covers content related to medication safety, quality assurance, pharmacy law, pharmacology, patient safety, customer service, sterile and non-sterile compounding, medical terminology, medical abbreviations, order processing, and pharmacy calculations.

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4. Advocate and practice safe, legal, responsible, and ethical use of information and technology tools specific to the industry pathway.
5. Participate in a Career and Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.
6. Demonstrate effective infection control techniques as defined by the Centers for Disease Control and Prevention (CDC) and The Joint Commission guidelines.

PHARMACY TECHNICIAN CONTENT STANDARDS

Please refer to "Directions for Interpreting Standards" on page 9.

Each content standard completes the stem *"**Students will**..."*

Overview

1. Describe and contrast the roles of pharmacy personnel, including the pharmacist, pharmacy technician, and pharmacy clerk.
   Examples: responsibilities, educational requirements, scope of practice, medication therapy management (MTM)
   a. Describe various pharmacy settings and business models.
      Examples: clinical, hospital, community, ambulatory, compounding, industrial

Medication Safety and Quality Assurance

2. Identify and describe high-alert medications, high-risk medications, and sound-alike look-alike drugs (SALAD).
   a. Explain the differences between side effects and adverse reactions and between contraindications and drug interactions, giving examples of each.
   b. Explain the five rights of medication administration (right patient, right drug, right time, right dosage, and right route).
   c. Research and report on the stability of drugs, including oral suspensions, insulin, reconstituted medications, injectables, and vaccines.

d. Demonstrate strategies for preventing medication errors, including prescription or medication order to the correct patient, tall man lettering, separating inventory, leading and trailing zeroes, barcode usage, and limiting the use of error-prone abbreviations.
e. Describe the benefits of using compliance aids and devices to help patients use and store medications safely.
   Examples: timers, personal automatic dispensing devices, lockboxes
f. Explain issues that require pharmacist intervention.
   Examples: drug utilization review (DUR), adverse drug events (ADE), over-the-counter (OTC) recommendations, therapeutic substitution (misuse or adherence),
g. Demonstrate proper event reporting procedures.
   Examples: medication errors, adverse effects, product integrity, near miss; root cause analysis (RCA), MedWatch
h. Research types of prescription errors and identify ways to prevent them.
   Examples: abnormal doses, early refills, incorrect quantities, incorrect patient, incorrect drug
i. Interpret the components of prescriptions, including superscription, inscription, subscription, signature, and prescription labels.
j. Disinfect work areas in each section of the pharmacy setting to prevent cross contamination of medications.
   Examples: medication counting trays, countertops, automation equipment
k. Compare medication disposal methods based on product-specific requirements.
   Example: disposing of medication containers with residue according to safety data sheets and pharmacy policy

Pharmacy Law and Regulations

3. Summarize federal requirements for handling and disposal of hazardous, non-hazardous, and pharmaceutical substances and wastes.
   a. Compare federal requirements for controlled substance prescriptions to requirements for non-controlled substance prescriptions.
      Examples: new prescription, refill, transfer
   b. Summarize federal requirements for ordering, receiving, storing, labeling, and dispensing controlled substances, including reverse distribution, take-back programs, and loss or theft.
      Examples: Drug Enforcement Agency policies, Food and Drug Administration guidelines

c. Describe the federal requirements for restricted drug programs and related medication processes.
Examples: pseudoephedrine guidelines, risk evaluation mitigation strategies (REMS)
d. Summarize Food and Drug Administration (FDA) procedures for responding to recalls of medications, devices, supplies, and supplements.
e. Explain the levels of authorized access to the pharmacy areas, including requirements regarding identification and levels of supervision.
f. Outline Alabama laws and regulations pertaining to pharmaceutical careers and explain where such information may be obtained.

Pharmacology

4. Describe and compare pharmacodynamics, pharmacogenetics, and pharmacokinetics.
Examples: mechanism of actions, therapeutic window, therapeutic index, bioavailability, metabolism, excretion
a. Recognize and report on the generic name, brand name, indications, contraindications, side effects, and side effect classifications of the top two hundred drugs, relating them to body systems and common diseases.
b. Identify common over-the-counter (OTC) medications and behind-the-counter (BTC) medications and explain their indications for use.
c. Compare and contrast common severe medication side effects, adverse effects, allergic reactions, and interactions.
Examples: drug-drug interactions, drug-food interaction, nausea, anaphylaxis
d. Describe the five controlled substance schedules and list the drugs at each level.
e. Compare and contrast the criteria of drugs for therapeutic equivalents and drugs with narrow therapeutic index (NTI).
Examples: digitoxin, lithium, phenobarbital, theophylline, warfarin
f. Identify strengths, doses, dosage forms, routes of administration, special handling and administration instructions, and duration of drug therapy in given scenarios.
g. Research and report on the indications for dietary supplements.

Medication Order Entry, Processing, and Dispensing

5. Describe the information that must be included on every prescription and the measures to be taken if the information is illegible or missing.
   Examples: name, date of birth, address, prescriber's signature
   a. Construct and enter complete patient profiles in pharmacy computer systems for use in input, storage, and output in the pharmacy.
      Examples: full name, address, date of birth, weight, sex, medical conditions, allergies
   b. Identify and interpret third party payer information on a prescription medication card, and summarize insurance terms needed to communicate with customers and the pharmacist.
      Examples: processor bank identification number (BIN), processor control number (PCN), member identification number, person code, Rx group
   c. Explain the meaning of each dispense-as-written (DAW) code and explain how to attach it to a third-party claim.
   d. Describe drug administration equipment and supplies included in prescriptions.
      Examples: spacers, oral and injectable syringes, unit dose, diabetic supplies
   e. Compare and contrast the basic types of insurance programs that may be encountered in a pharmacy setting.
      Examples: traditional indemnity, managed indemnity, managed care, government, private
   f. Identify and interpret lot numbers, expiration dates, and National Drug Code (NDC) numbers of medications.

Compounding

6. Compare and contrast the procedures, equipment, and regulations for sterile and non-sterile compounding in pharmacy settings.
   Examples: scales, balances, spatulas, ointment slab, mortar and pestle, labels, vertical and horizontal laminar airflow hood, aseptic techniques, garbing, restricted-access barrier, daily cleaning schedules
   a. Set up and maintain the four sets of records that sterile and non-sterile compounding pharmacies are required to create and keep (master formulation record, compounding record, standard operating procedures, and safety data sheets).

Medical Terminology and Abbreviations	7. Interpret Roman numerals, medical abbreviations, medical terminology, and symbols for days supply, quantity, dose, concentration, and dilutions commonly found on prescriptions. *Examples: b.i.d, IV, mg/kg, colitis, viii, NSAID, DAW, S.C.*
Pharmacy Calculations	8. Convert within and between each of the systems of measurements. *Examples: metric, household, Roman numerals, military time, ratio to proportion* a. Calculate the quantities of prescriptions or medication orders to be dispensed, utilizing applicable rules and formulas. *Examples: mEq, units, body surface area (BSA), Young's rule, Clark's rule, Fried's rule, mg/kg/day, IV flow rate, alligation calculations for solutions* b. Calculate the days' supply for prescriptions. c. Calculate individual and total daily dosages. d. Perform calculations for sterile and non-sterile compounding. e. Perform basic pharmacy business calculations. *Examples: pricing and inventory control, mark up, profit, gross, overhead* f. Perform temperature conversions required for medication storage. *Examples: temperature scales, Celsius, Fahrenheit* g. Calculate percentages related to medication as used in the pharmacy setting. *Examples: ratio strength, dilution and concentration, w/w%, w/v%, v/v%*

Sports Medicine I

Course Credit	1.0
Grade Levels	9-12
Prerequisites	Foundations of Health Science

Sports Medicine I introduces students to the field of sports medicine and its important goals of managing risk and preventing and treating sports-related injuries. The course presents basic concepts and skills regarding legal and ethical considerations, anatomy and physiology, safety, nutrition, assessment, therapeutic exercise, and physical modalities.

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	4. Advocate and practice safe, legal, responsible, and ethical use of information and technology tools specific to the industry pathway. 5. Participate in a Career and Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork. 6. Demonstrate effective infection control techniques as defined by the Centers for Disease Control and Prevention (CDC) and The Joint Commission guidelines.

SPORTS MEDICINE I
CONTENT STANDARDS

Please refer to "Directions for Interpreting Standards" on page 9.

Each content standard completes the stem *"**Students will**..."*

Basics of Sports Medicine	1. Outline the historical foundations and development of the sports medicine profession. 2. Compare the purposes, membership, and activities of various professional organizations dedicated to sports medicine.
Legal and Ethical Considerations	3. Research and share information on legal requirements dealing with liability, negligence, supervision, and assumption of risks and on ethical concepts involving beneficence, justice, and honesty. 4. Research and report on banned performance-enhancing substances. *Examples: human growth hormone (HGH), blood doping, anabolic steroids*

Safety in Sports Medicine	5. Explain how atmospheric conditions can cause or contribute to environmental injury. *Examples: lightning, heat, cold* 6. Describe safety equipment that sports medicine providers utilize for various sports activities. 7. Demonstrate effective methods of infection control in sports medicine settings. *Examples: hand hygiene, equipment cleanliness, personal protective equipment (PPE)* 8. Create and present an Emergency Action Plan (EAP) for a given scenario in sports medicine. a. Demonstrate the appropriate use of emergency equipment for an ill or injured athlete, including automated external defibrillator (AED), bag mask, cervical collar, and backboard.
Anatomy and Physiology	9. Identify basic body structures and explain the functions of the integumentary, skeletal, muscular, nervous, and endocrine systems. 10. Describe common injuries and disorders of the integumentary, skeletal, muscular, and nervous systems related to participation in sports.
Assessment and Evaluation of Sports Injuries	11. Contrast the goals and procedures of assessment, evaluation, and diagnosis of a sports injury. 12. Differentiate between manual muscle testing and range of motion testing. 13. Evaluate an athletic injury using a systematic approach, including primary and secondary injury surveys. 14. Identify and explain two documentation methods utilized by sports medicine professionals.
Sports Medicine Nutrition	15. Describe the six classes of nutrients (carbohydrates, lipids, proteins, vitamins, minerals, and water) and their primary functions. 16. Identify and describe common nutritional deficiencies and the supplements used to combat them, and explain how supplements impact athletic performance.

	17. Assess body types and evaluate body composition using industry-approved assessment tools. 18. Create a balanced meal plan to promote health and wellness in a given scenario, utilizing current federal dietary guidelines.
Therapeutic Exercises and Rehabilitation	19. Explain the role of rehabilitation in the sports medicine field. 20. Outline the general components, objectives, and phases of a rehabilitation plan. 21. Contrast therapeutic exercise to physical conditioning exercise, including goals and procedures. 22. Distinguish between aerobic and anaerobic exercise in rehabilitation and explain the importance of each type. 23. Describe types of strength training exercises and indicate what they are designed to accomplish as part of a rehabilitation plan. *Examples: isometric exercise, isotonic exercise, isokinetic exercise, circuit training, stretching and flexibility, proprioceptive neuromuscular facilitation (PNF)* 24. Explain the purpose and benefits of exercise dosage. 25. Describe physical effects of prolonged inactivity and injury immobilization.
Therapeutic Physical Modalities	26. Explain the use and effectiveness of common physical modalities, including mechanical, thermal, and electrical. *Examples: thermotherapy, cryotherapy, electrical stimulation, traction, instrument-assisted soft tissue mobilization (IASTM)*

Taping, Wrapping, Bracing, and Bandaging

27. Determine whether injuries should be taped, wrapped, or braced.
28. Identify the materials and supplies utilized in taping, wrapping, and splinting for athletes and active individuals.
29. Describe the purpose, types, and application of non-elastic and elastic adhesive tape.
30. Perform basic wrapping procedures for various parts of the body.
    Examples: prophylactic taping of ankle, shoulder wrapping, taping of wrist, knee, and elbow
31. Match braces to injuries involving ankles, knees, shoulders, and wrists.
32. Explain the advantages and disadvantages of taping and bracing.
33. Describe the steps of application for a variety of bandages.
34. Explain considerations for properly fitting protective sports equipment, including braces and padding.

Sports Medicine II

Course Credit	1.0
Grade Levels	10-12
Prerequisites	Sports Medicine I

Sports Medicine II extends the content of Sports Medicine I with strong emphasis on musculoskeletal injuries and on psychological and sociological responses to injuries and illness. The course also emphasizes critical thinking, oral and written communication of anticipated outcomes, and patient care skills related to prevention, rehabilitation, and management. Course content incorporates basic pathophysiology, kinesiology, and principles of treatment. Analysis of a variety of health situations related to the sports medicine pathway is also included through project-based learning, laboratory activities, and simulation.

Career and Technical Student Organizations are integral, co-curricular components of each career and technical education course. These organizations enhance classroom instruction while helping students develop leadership abilities, expand workplace-readiness skills, and access opportunities for personal and professional growth. Students in the Health Science cluster affiliate with HOSA–Future Health Professionals.

Foundational standards, shown in the table below, are an important part of every course. Through these standards, students learn and apply safety concepts; explore career opportunities and requirements; practice the skills needed to succeed in the workplace; take advantage of leadership, teamwork, and personal growth opportunities afforded by Career and Technical Student Organizations; and learn and practice essential digital skills. The foundational standards are to be incorporated throughout the course.

Each foundational standard completes the stem *"**Students will**..."*

Foundational Standards	
	1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces. 2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork. 3. Explore the range of careers available in the field and investigate their educational requirements and demonstrate job-seeking skills including resume-writing and interviewing.

	4. Advocate and practice safe, legal, responsible, and ethical use of information and technology tools specific to the industry pathway. 5. Participate in a Career and Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork. 6. Demonstrate effective infection control techniques as defined by the Centers for Disease Control and Prevention (CDC) and The Joint Commission guidelines.

SPORTS MEDICINE II
CONTENT STANDARDS

Please refer to "Directions for Interpreting Standards" on page 9.

Each content standard completes the stem *"**Students will**..."*

Pharmacology	1. Summarize the differences between over-the-counter and prescription medications. 2. Explain the classifications of common medications and indicate how they are commonly used in sports medicine. 3. Identify and explain safety guidelines for using medications commonly utilized in sports medicine. 4. Research and share information about recreational and performance-enhancing drugs and explain problems associated with using drugs to enhance athletic performance. *Examples: creatine, branched-chain amino acid (BCAA), caffeine*
Kinesiology	5. Explain how knowledge of kinesiology and body systems is utilized in sports medicine. 6. Describe the articular skeletal system and explain the motion of joints during body movements, including measurable degrees of active and passive movement. *Examples: Hinge joints allow bending and straightening motion. Ball and socket joints allow backward, forward, sideways, and rotating movements.*

	7. Explain the differences between open and closed kinetic chains and how they relate to the articular system. 8. Describe the cardio-pulmonary system including cardiac conduction, monitoring methods, and implications with athletics.
Injury Assessment	9. Identify and explain the components of injury assessment, including inspection, palpation, vital signs, and injury history. 10. Utilize the History-Observation-Palpation-Special Test (HOPS), History-Inspection-Palpation-Special Test (HIPS) evaluation tool to create a clear and effective subjective, objective, assessment, and plan (SOAP) note. 11. Demonstrate techniques used to assess injuries. *Examples: range of motion assessment, stress tests for structural integrity, neurological, functional* 12. Describe the three basic types of bleeding and the recommended care for each type. 13. Differentiate among types of shock, indicating symptoms and treatment for each type.
Bones and Soft Tissue	14. Explain the difference between the axial and the appendicular skeleton and how each bone group facilitates body movement and function in athletes. 15. Describe the classifications and degrees of fractures. 16. Contrast the functions, locations, and cellular makeup of skeletal, smooth, and cardiac muscles. 17. Explain common causes of soft tissue injuries in athletes and indicate appropriate treatment methods. 18. Identify symptoms of nervous system injuries and describe appropriate treatment approaches depending on the severity of injuries. *Examples: neurapraxia, axonotmesis, neurotmesis* 19. Describe each phase of the healing process for injuries to bones and soft tissues, including changes on the cellular level.

Upper and Lower Extremity Injuries	20. Identify the bony anatomy, muscular structures, and vascular structure of the upper and lower extremities. 21. Simulate passive range of motion (PROM) and active range of motion (AROM) tests to the extremities, explaining procedures as they are performed. 22. Explain how to assess the strength of extremities using manual muscle tests (MMT). 23. Describe the prevention, treatment, and rehabilitation of common injuries to the upper and lower body.
Head, Facial, Spinal, Nerve, Thoracic and Abdominal Injuries	24. Identify the anatomy of the head, face, spine, nerves, thorax, and abdomen. 25. Demonstrate assessment of cranial nerves, spinal nerves, and injuries to head, face, thorax, and abdomen. 26. Describe common sports injuries to the head, face, spine, nerves, thorax, and abdomen. 27. Demonstrate a systematic process for evaluating head and facial injuries, including concussions. *Examples: Sport Concussion Assessment Tool (SCAT6), Acute Concussion Evaluation (ACE)* 28. Describe the roles sports medicine professionals play in the prevention, treatment, and rehabilitation of injuries to the head, face, spine, nerves, thorax, and abdomen.
Special Considerations in Sports Medicine	29. Describe signs, symptoms, and treatment of bacterial, fungal, and viral skin infections. 30. Describe signs, symptoms, and treatment of hyperglycemia and hypoglycemia, including diabetic coma. 31. Describe common cardiac conditions and explain how they influence physical reactions in athletes. 32. Outline the appropriate actions to take when an athlete has a seizure. 33. Explain the importance of psychology in sports medicine. 34. Explain how environmental conditions may have a negative effect on athletic performance and outline ways to avoid injuries or physical problems related to weather.

	Examples: dehydration, heat-related injuries
Project-Based Learning Experience	35. Create and present a culminating project utilizing a sports medicine case study related to injury prevention, treatment, rehabilitation, and/or management of an athlete. *Example: taking an athlete from injury to return to play*

Therapeutic Services

Course Credit	1.0
Grade Levels	9-12
Prerequisites	Foundations of Health Science

Therapeutic Services is designed to give students an overview and introduction to careers in therapeutic services, which focus on direct patient care and improvement of the status of patient health over time. Therapeutic services include disciplines in nursing, medicine, dentistry, physical therapy, respiratory therapy, emergency medicine, and veterinary medicine. This course extends core skills introduced in Foundations of Health Science by introducing students to professional standards, skills, settings, and the basic knowledge needed in therapeutic occupations.

Career and Technical Student Organizations are integral, co-curricular components of each career and technical education course. These organizations enhance classroom instruction while helping students develop leadership abilities, expand workplace-readiness skills, and access opportunities for personal and professional growth. Students in the Health Science cluster affiliate with HOSA–Future Health Professionals.

Foundational standards, shown in the table below, are an important part of every course. Through these standards, students learn and apply safety concepts; explore career opportunities and requirements; practice the skills needed to succeed in the workplace; take advantage of leadership, teamwork, and personal growth opportunities afforded by Career and Technical Student Organizations; and learn and practice essential digital skills. The foundational standards are to be incorporated throughout the course.

Each foundational standard completes the stem *"**Students will**..."*

Foundational Standards	
	1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces. 2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork. 3. Explore the range of careers available in the field and investigate their educational requirements and demonstrate job-seeking skills including resume-writing and interviewing.

4. Advocate and practice safe, legal, responsible, and ethical use of information and technology tools specific to the industry pathway.
5. Participate in a Career and Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.
6. Demonstrate effective infection control techniques as defined by the Centers for Disease Control and Prevention (CDC) and The Joint Commission guidelines.

THERAPEUTIC SERVICES CONTENT STANDARDS

Please refer to "Directions for Interpreting Standards" on page 9.

Each content standard completes the stem *"**Students will**..."*

Therapeutic Careers

1. Compare roles and responsibilities of various therapeutic services professionals.
   Examples: nurse, respiratory therapist, social worker, occupational therapist, speech language pathologist, veterinarian

Legal and Ethical Issues

2. Analyze civil and criminal legal responsibilities and limitations impacting therapeutic services providers and explain their ramifications for patient care.
   Examples: confidentiality, informed consent, patient self-determination
3. Analyze ethical issues and how patients' cultural, social, and ethnic differences impact their involvement in therapeutic services.
   a. Demonstrate respectful and empathetic treatment of all patients, clients, and families in therapeutic services settings.
      Examples: using vocabulary, tone, and mannerisms that avoid cultural bias; speaking directly to the patient; listening attentively to the patient's responses; attending to non-verbal cues

Medical Mathematics	4. Demonstrate proficiency performing calculations commonly used in healthcare settings. *Example*: $\frac{D\ (Desired\ Amount)}{H\ (Amount\ on\ Hand)} \bullet\ Q\ (Quantity)\ =\ Dose$ 5. Interpret charts, graphs, tables, and diagrams used in therapeutic service careers. *Examples: vital signs graphic sheet, growth charts, intake and output charts*
Anatomy	6. Relate specific body systems, including gross organ structures and general functions, to therapeutic healthcare skills. *Example: Describe how the respiratory system is affected by the administration of a nebulizer treatment.*
Diseases and Disorders	7. Describe the etiology, pathology, diagnosis, treatment, and prevention of diseases and disorders that are commonly encountered by professionals in the therapeutic services field. *Examples: chronic obstructive pulmonary disease (COPD), cerebral vascular accident (CVA), total knee replacement (TKR) rehabilitation*
Communication	8. Utilize effective therapeutic communication with patients and families in therapeutic service settings, including subjective and objective data. *Examples: teach back method, use of layman's terms, active listening* 9. Create documentation according to facility policy and industry standards. *Examples: history and physical, treatment plan, patient education plan*
Patient Care and Treatment	10. Explain medical procedures utilized in therapeutic service careers. *Examples: gait training, wound care, oxygen therapy* 11. Demonstrate skills necessary for specified therapeutic service careers. *Examples: assessing vital signs, BLS training or certification, transfers, ambulation*

Health Technology	
	12. Demonstrate safe use of health technology used in specified therapeutic service settings. *Examples: electronic charting system, high fidelity simulators* 13. Research and utilize billing codes to document treatment provided during therapeutic services. *Examples: International Classification of Diseases (ICD) diagnosis codes*

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