

Diagnostic Medicine

Primary Career Cluster:	Health Science
Consultant:	Sloan Hudson, (615) 532-2839, sloan.hudson@tn.gov
Course Code(s):	5994
Prerequisite(s):	<i>Health Science Education</i> (5998)
Credit:	1
Grade Level:	10-11
Graduation Requirements:	This course satisfies one of three credits required for an elective focus when taken in conjunction with other Health Science courses.
Programs of Study and Sequence:	This is the second or third course in the <i>Diagnostic Services</i> program of study.
Aligned Student Organization(s):	HOSA: http://www.tennesseehosa.org Pamela Sieffert, (615) 532-6270, Pamela.Sieffert@tn.gov
Coordinating Work-Based Learning:	Teachers are encouraged to use embedded WBL activities such as informational interviewing, job shadowing, and career mentoring. For information, visit https://tn.gov/education/topic/work-based-learning .
Available Student Industry Certifications:	None
Dual Credit or Dual Enrollment Opportunities:	There are no known dual credit/dual enrollment opportunities for this course. If interested in developing, reach out to a local postsecondary institution to establish an articulation agreement.
Teacher Endorsement(s):	577, 720
Required Teacher Certifications/Training:	None
Teacher Resources:	https://tn.gov/education/article/cte-cluster-health-science

Course Description

Diagnostic Medicine is a second or third level course designed to prepare students to pursue careers in the fields of radiology, medical laboratory, optometry, and other patient diagnostic procedures. Upon completion of this course, proficient students will be able to describe new and evolving diagnostic technologies, compare and contrast the features of healthcare systems, explain the legal and ethical ramifications of the healthcare setting, and begin to perform foundational healthcare skills. In addition, students will continue to add artifacts to a portfolio, which they will continue to build throughout the program of study.

Program of Study Application

This is the second or third course in the *Diagnostic Services* programs of study. For more information on the benefits and requirements of implementing these programs in full, please visit the Health Science website at <https://tn.gov/education/article/cte-cluster-health-science>.

Implementation options are as follows:

- Option 1: Diagnostic Medicine taught as a Level Two course
- Option 2: Diagnostic Medicine taught as a Level Three course

Core standards are required for both options above:

Core standards: 1,2,3,4,5,6,7,8,9,10,11,14,15,16,19,20,23,24,25,26,27,28,29,30,31

Additional standards:

Option 1: 12, 17, 21

Option 2: 13, 18, 22

Course Standards

Career Planning and Professionalism

- 1) Revise the career information portfolio developed in the *Health Science Education* course and update with more in-depth information surrounding careers in diagnostic sciences. Identify specific roles and responsibilities for each career in this field. Investigate and compare the range of skills, competencies, and professional traits required for such careers. Compare findings to current individual strengths and identify opportunities for personal development.
- 2) Summarize the Health Insurance Portability and Accountability Act (HIPAA), in particular those aspects related to maintaining confidentiality, patient rights, patient safety, and other ethical/legal directives governing medical treatment. Using medical terminology and accurate definitions of legal concepts, explain how the content of these ethical/legal ramifications affects patients' rights for all aspects of care.

Technology

- 3) Investigate and document the history of radiology, medical laboratories, and other related areas of diagnostic medicine. Explain how technology, including telemedicine, is influencing the future of each. Synthesize research from professional journals and other medical or technical literature (noting the authors and their purposes) to analyze the barriers to these technologies and predict how the industry might respond.
- 4) Synthesize information from professional journals and digital resources to investigate the use of robotics in healthcare other than in surgical procedures. Develop a proposal, sketch, mock press release, or similar written artifact for a new technology or an improvement to a current technology that can be used in the field of diagnostics. Detail all the specifications of the new technology, including an explanation of how the technology will be used, the

projected cost-saving measures, and the most applicable professions that would use the technology.

- 5) Evaluate data from research articles encompassing the reliability of home testing kits (i.e., pregnancy test) and portable diagnostic equipment (i.e., glucometers). Explain findings in an informational essay, citing at least three different peer-reviewed articles and including appropriate medical terminology.

Safety

- 6) Obtain medical laboratory manuals from at least three different resources or physical laboratory sites. Identify the elements of containment regarding general infection control, chemistry precautions, fire safety, chemical hazards, electrical safety, mechanical safety, general lab safety, accident exposure, and disaster preparedness. Develop a written or digital lab manual for a medical laboratory at school based on findings from the research.
- 7) Research the guidelines pertaining to radiation safety for staff, patients, and family who are receiving any radiological procedure. Develop an informational artifact, public service announcement, or health education presentation that instructs patients/clients on what patients should know about medical radiation safety.
- 8) Explore policies and procedures related to diagnostic equipment quality control monitoring and evaluation. Synthesize information into a digital or written presentation to instruct appropriate staff on the importance of implementing quality control processes according to policy.

Infection Control/Medical Microbiology

- 9) Demonstrate mastery of concepts and skills related to asepsis, Universal Precautions, sanitation, disinfection, and sterilization for patient/client care settings in adherence to standards and guidelines from the Centers for Disease Control and Prevention (CDC) and the Occupational Safety and Health Administration (OSHA) in a lab/clinical setting.
- 10) Define the term normal flora and explain how its deviation can prevent or cause a disease or disorder. Outline specific preventive measures to align to acceptable standards of care in the healthcare field.
- 11) Assess the differences between healthcare-associated infections and non-healthcare-associated infections using examples drawn from mock patient documents or case studies. Support explanations with relevant surveillance statistics, preventive measures, and methodologies concerning outbreak detection, management, and education.

Diagnostic Radiology

- 12) Outline the in-depth normal structure and function of the musculoskeletal, digestive, and cardio-respiratory systems, specifically as they relate to radiology. Review directions, planes, and sections of the body in order to perform radiographic images. Summarize appropriate

medical text(s) in order to list signs and symptoms of common diseases and disorders associated with each system.

- 13) Outline the bony anatomy and organ structures of the musculoskeletal, digestive, and cardio-respiratory systems as they relate to radiology. Review directions, planes, and sections of the body in order to perform radiographic images. Summarize appropriate medical text(s) in order to list signs and symptoms associated with and specific diagnostic studies used for common diseases and disorders associated with each system.
- 14) Distinguish between the various types of diagnostic radiology, citing the uses, advantages, and disadvantages of each. Develop an explanation that would be used for beginning health science students, incorporating appropriate industry and medical terminology.
- 15) Distinguish between Direct Radiography and Computed Radiography, citing the benefits of each related to the effects of radiation dose and cost. Compare the benefits of image storage in Picture Archive and Communication Systems to x-ray film storage. Relate the benefits of electronic image storage to its application in Telemedicine.
- 16) Research the principles of radiographic physics and explain how the concepts are applied to produce high-quality radiographic images. Discuss the following in the explanation:
 - a. Properties of X-rays
 - b. Production of X-rays
 - c. The X-ray tube and other parts of an X-ray machine
 - d. Absorption, scatter, and transmission of X-rays

Clinical Laboratory

- 17) Outline the in-depth normal structure and function of blood and related components. Summarize appropriate medical text(s) in order to list signs and symptoms of common blood diseases and disorders associated with each. Define the following common laboratory procedures, both normal and abnormal, and provide the reasoning for why the test should be obtained:
 - a. Complete Blood Count
 - b. Complete Metabolic Panel
 - c. Fasting Lipid Panel
 - d. Hgb A1C
- 18) Analyze the relationship of blood components to common blood diseases and disorders listing signs and symptoms associated with each. Define the following common laboratory procedures, both normal and abnormal, and provide the reasoning for why the test should be obtained:
 - a. Complete Blood Count
 - b. Complete Metabolic Panel
 - c. Fasting Lipid Panel
 - d. Hgb A1C

- 19) Develop a graphic organizer or concept map to explain the functions of the various departments of a medical laboratory, such as microbiology, chemistry, hematology, blood banking, and urology. Include types of fluid samples and test that are performed in each area with a detail of the precautions involved when handling each.
- 20) Understand principles of and successfully perform skills of a phlebotomist, incorporating rubrics from National HOSA, textbooks, or clinical standards of practice.
 - a. Distinguish sites and/or veins for blood draws in all populations using the required equipment and safety precautions.
 - b. Perform collection procedures for microspecimens and venipuncture on a mannequin using appropriate collection containers and identifying factors affecting collection/test results.
 - c. Provide guidelines for obtaining blood from neonates, pediatrics, and geriatrics.
 - d. Perform skills of patient/specimen identification and transporting of specimens.

Ophthalmological Procedures

- 21) Outline the in-depth normal structure and function of the eye. Summarize appropriate medical text(s) in order to list signs and symptoms of common diseases and disorders associated with each.
- 22) Summarize appropriate medical text(s) in order to compare and contrast normal versus abnormal structure and function of the eye related to common eye diseases listing signs and symptoms, and diagnostic studies for each.
- 23) Understand principles of and successfully perform skills related to basic ophthalmic examination, incorporating rubrics from textbooks or clinical standards of practice. Measure pulse and blood pressure, and conduct a history and physical, especially concerning areas related to the eye.
- 24) Research the concepts surrounding measurement of visual acuity with associated equipment, and explain corrective measures for abnormalities (i.e., surgery, glasses, or contacts). Specify what measures should be used with each abnormality.

Cardiologic Services

- 25) Research the educational requirements, certification, and licensures for cardiovascular technologist, diagnostic vascular technologist, electrocardiogram technician, telemetry technician, cardiac sonographers, and other related cardiovascular careers. Compare and contrast the educational requirements of each.
- 26) Investigate cardiac diagnostic procedures both in-hospital and out-patient and identify the equipment required for these services.
- 27) Create an infographic to identify gross heart anatomy and physiology and related cardiac conduction and circulatory pathways.

- 28) Assess lead placements and correlate their relationship to the conduction system through the use of a diagram or model.
- 29) Analyze the P,Q,R,S,T complex and its correlation to the cardiac cycle. Chart a mock representation of these waves on an electrocardiogram.
- 30) Analyze rhythm strips and/or 12 lead EKGs and differentiate between critical and non-critical cardiac rhythms using student created algorithms.
- 31) Assess and analyze cardiac output and tissue perfusion using capillary refill and/or pulse oximeter by assessing multiple classmates and correctly charting on flow chart.

The following artifacts should be included in the student's portfolio:

- Career exploration artifacts
- Skills performance rubrics
- Documentation of job shadowing hours
- Examples of written, oral, or digital presentations
- Short research project documents

Standards Alignment Notes

*References to other standards include:

- P21: Partnership for 21st Century Skills [Framework for 21st Century Learning](#)
 - Note: While not all standards are specifically aligned, teachers will find the framework helpful for setting expectations for student behavior in their classroom and practicing specific career readiness skills.
- National Accrediting Agency of Clinical Laboratory Sciences (NAACLS): [Standards for Specific Approved Programs](#)
 - Note: Students must be a completer of a NAACLS approved program in order to sit for a national phlebotomy certification exam.