

Implementation date  
Fall 2009

**PROGRAM CONCENTRATION:**  
**CAREER PATHWAY:**  
**COURSE TITLE:**

**Health Care Science**  
**Diagnostic Services**  
**Basic Diagnostic Services**

**COURSE DESCRIPTION:** The goal of this course is to introduce students to basic concepts and methodologies in the area of diagnostic services. Concepts will include basic laboratory procedures and safety, microbiology, analytical chemistry, quality control procedures, and career explorations in diagnostic services. Students will begin creating and maintaining their individual Health Science Portfolios.

**Pre-requisite:** Introduction to Healthcare Science

### **LABORATORY SAFETY AND MEASUREMENT**

**HS-BDS-1. Students will obtain a working knowledge of laboratory safety rules/procedures and apply the use of the metric system.**

- a. Identify the difference between biological, chemical, and physical hazards.
- b. Identify and apply knowledge of OSHA, Universal Precautions, and Bloodborne Pathogen standards.
- c. Demonstrate and implement Personal Protective Equipment (PPE) usage in the laboratory.
- d. Demonstrate and implement proper disposal, storage, and clean up of bio-hazardous and chemical materials.
- e. Convert from one unit to another within and between customary and metric systems of measurement by using proportional relationships.
- f. Use appropriate units of measurement.

***Academic Standards:***

*ELA10LSV1 The student participates in student-to-teacher, student-to-student, and group verbal interactions.*

*ELA10RC3 The student acquires new vocabulary in each content area and uses it correctly.*

*MM2P1 Students will solve problems (using appropriate technology).*

*MM2P3 Students will communicate mathematically.*

*SCSH1 Students will use standard safety practices for all classroom laboratory and field investigations.*

*SCSH3 Students use tools and instruments for observing, measuring, and manipulating scientific equipment and materials.*

## **BASIC MICROBIOLOGY AND CHEMISTRY**

Students will be introduced to fundamentals of microbiology and analytical chemistry.

### **HS-BDS-2. Students will learn basic methods and all practical aspects relevant to microbiology.**

- a. Demonstrate good aseptic techniques in accordance to national good laboratory practice (GLPs) standards.
- b. Perform routine sterile plating techniques, i.e. 4 quadrant streak plate.
- c. Identify the characterizations and classifications of microorganisms.
- d. Demonstrate the ability to identify morphological characteristics.
- e. Identify the factors affecting the growth, survival, and death of microorganisms.
- f. Perform and interpret a Gram stain.
- g. Demonstrate how to operate and maintain a microscope.
- h. Understand the concepts and process of sterilization techniques.

#### ***Academic Standards:***

*ELA10RC3 The student acquires new vocabulary in each content area and uses it correctly.*

*MM2P4 Students will make connections among mathematical ideas and to other disciplines.*

*SCSh1 Students will use standard safety practices for all classroom laboratory and field investigations.*

*SCSH3 Students use tools and instruments for observing, measuring, and manipulating scientific equipment and materials.*

*SB2 Students will derive the relationship between single-celled and multi-celled organisms and the increasing complexity of systems.*

### **HS-BDS-3. Students will learn the basic procedures and concepts of analytical chemistry.**

- a. Identify, select, and use appropriate laboratory glassware including pipettes.
- b. Produce normal and molar solutions and dilutions.
- c. Perform serial dilutions.
- d. Understand pH and identify examples of different substances and how they relate to buffered systems.
- e. Understand the concept of specific gravity and interpret results.
- f. Understand pCO<sub>2</sub> and pO<sub>2</sub> concentration and balance as it relates to the human body.
- g. Explain basic concepts of titration and titration curves.

Implementation date  
Fall 2009

**Academic Standards:**

*ELA10RC3 The student acquires new vocabulary in each content area and uses it correctly.*

*MM2P4 Students will make connections among mathematical ideas and to other disciplines.*

*SCSh1 Students will use standard safety practices for all classroom laboratory and field investigations.*

*SCSH3 Students use tools and instruments for observing, measuring, and manipulating scientific equipment and materials.*

*SAP4 Students will analyze the physical, chemical, and biological properties of process systems as these relate to transportation, absorption and excretion, including the cardiovascular, respiratory, digestive, excretory, and immune systems.*

*SC5 Students will understand that the rate at which a chemical reaction occurs can be affected by changing concentration, temperature, or pressure and the addition of a catalyst.*

**QUALITY CONTROL**

**HS-BDS-4. Students will gain knowledge of typical quality control methods, procedures, and documentation.**

- a. Define quality control and quality assurance.
- b. Discuss and perform proper documentation.
- c. Demonstrate proper identification and labeling procedures.
- d. Interpret shifts and trends.
- e. Recognize out of control limits and follow proper protocol.
- f. Design a basic sample analysis flow chart for routine lab testing.
- g. Demonstrate the ability to document and analyze quality control charts.

**Academic Standards:**

*ELA10C1 The student demonstrates understanding and control of the rules of the English language, realizing that usage involves the appropriate application of conventions and grammar in both written and spoken formats.*

*MM2P5 Students will represent mathematics in multiple ways.*

*SCSh4 Students will demonstrate the computation and estimation skills necessary for analyzing data and developing reasonable scientific explanations.*

*SCSh5 Students will communicate scientific investigations and information clearly.*

## **CAREER EXPLORATION**

### **HS-BDS-5. Students will explore careers in diagnostic services.**

- a. Identify various departments, job titles, and roles of personnel working in diagnostic services.
- b. Discuss education, licensing and/or certification requirements, and professional organizations associated with career positions in diagnostic services.
- c. Identify basic equipment in clinical laboratory technology, respiratory therapy, ophthalmology, cardiology, radiology, dentistry, and audiology.
- d. Explore emerging career pathways in diagnostic services.
- e. Describe Career and Technical Student Organizations, recognize their importance in leadership development, and identify benefits of belonging to Health Occupations Students of America (HOSA).

#### ***Academic Standard:***

*ELA10LSV2 The student formulates reasoned judgments about written and oral communication.*

## **HEALTH SCIENCE PORTFOLIO**

### **HS-BDS-6: Students will create and maintain a Health Science Portfolio.\***

- a. Write a Letter of Introduction which gives information about the student's background, interests, and career expectations.
- b. Include a Resume which lists the student's course completions and work experiences (if any) and community service. This resume will also include supporting references.
- c. Include Best Work which contains at least two copies the student's learning successes during each course of study.
- d. Show Digital Images which portray the student involved in work and/or study scenarios involving Health Care Science activities.
- e. Include A Reflection in which the student evaluates and synthesizes what he or she has learned during the year or years in Health Care Science, including areas of strength or weakness.

\*The use of technology in creating and maintaining a Portfolio is strongly encouraged.

#### ***Academic Standards:***

*ELA10C1 The student demonstrates understanding and control of the rules of the English language, realizing that usage involves the appropriate application*

*ELA10C2 The student demonstrates understanding of manuscript form, realizing that different forms of writing require different formats.*

## **Reading Across the Curriculum**

### **Reading Standard Comment**

After the elementary years, students engage in reading for learning. This process sweeps across all disciplinary domains, extending even to the area of personal learning. Students encounter a variety of informational as well as fictional texts, and they experience text in all genres and modes of discourse. In the study of various disciplines of learning (language arts, mathematics, science, social studies), students must learn through reading the communities of discourse of each of those disciplines. Each subject has its own specific vocabulary, and for students to excel in all subjects, they must learn the specific vocabulary of those subject areas in *context*.

Beginning with the middle grades years, students begin to self-select reading materials based on personal interests established through classroom learning. Students become curious about science, mathematics, history, and literature as they form contexts for those subjects related to their personal and classroom experiences. As students explore academic areas through reading, they develop favorite subjects and become confident in their verbal discourse about those subjects.

Reading across curriculum content develops both academic and personal interests in students. As students read, they develop both content and contextual vocabulary. They also build good habits for reading, researching, and learning. The Reading Across the Curriculum standard focuses on the academic and personal skills students acquire as they read in all areas of learning.

### ***CTAE-RC-1 Students will enhance reading in all curriculum areas by:***

#### **Reading in All Curriculum Areas**

- Read a minimum of 25 grade-level appropriate books per year from a variety of subject disciplines and participate in discussions related to curricular learning in all areas.
- Read both informational and fictional texts in a variety of genres and modes of discourse.
- Read technical texts related to various subject areas.

#### **Discussing Books**

- Discuss messages and themes from books in all subject areas.
- Respond to a variety of texts in multiple modes of discourse.
- Relate messages and themes from one subject area to messages and themes in another area.
- Evaluate the merit of texts in every subject discipline.
- Examine author's purpose in writing.
- Recognize the features of disciplinary texts.

#### **Building Vocabulary Knowledge**

- Demonstrate an understanding of contextual vocabulary in various subjects.
- Use content vocabulary in writing and speaking.
- Explore understanding of new words found in subject area texts.

#### **Establishing Context**

Implementation date  
Fall 2009

- Explore life experiences related to subject area content.
- Discuss in both writing and speaking how certain words are subject area related.
- Determine strategies for finding content and contextual meaning for unknown words.

### **CTAE Foundation Skills**

The Foundation Skills for Career, Technical and Agricultural Education (CTAE) are critical competencies that students pursuing any career pathway should exhibit to be successful. As core standards for all career pathways in all program concentrations, these skills link career, technical and agricultural education to the state's academic performance standards.

The CTAE Foundation Skills are aligned to the foundation of the U. S. Department of Education's 16 Career Clusters. Endorsed by the National Career Technical Education Foundation (NCTEF) and the National Association of State Directors of Career Technical Education Consortium (NASDCTEc), the foundation skills were developed from an analysis of all pathways in the sixteen occupational areas. These standards were identified and validated by a national advisory group of employers, secondary and postsecondary educators, labor associations, and other stakeholders. The Knowledge and Skills provide learners a broad foundation for managing lifelong learning and career transitions in a rapidly changing economy.

**CTAE-FS-1 Technical Skills:** Learners achieve technical content skills necessary to pursue the full range of careers for all pathways in the program concentration.

**CTAE-FS-2 Academic Foundations:** Learners achieve state academic standards at or above grade level.

**CTAE-FS-3 Communications:** Learners use various communication skills in expressing and interpreting information.

**CTAE-FS-4 Problem Solving and Critical Thinking:** Learners define and solve problems, and use problem-solving and improvement methods and tools.

**CTAE-FS-5 Information Technology Applications:** Learners use multiple information technology devices to access, organize, process, transmit, and communicate information.

**CTAE-FS-6 Systems:** Learners understand a variety of organizational structures and functions.

Implementation date  
Fall 2009

**CTAE-FS-7 Safety, Health and Environment:** Learners employ safety, health and environmental management systems in corporations and comprehend their importance to organizational performance and regulatory compliance.

**CTAE-FS-8 Leadership and Teamwork:** Learners apply leadership and teamwork skills in collaborating with others to accomplish organizational goals and objectives.

**CTAE-FS-9 Ethics and Legal Responsibilities:** Learners commit to work ethics, behavior, and legal responsibilities in the workplace.

**CTAE-FS-10 Career Development:** Learners plan and manage academic-career plans and employment relations.

**CTAE-FS-11 Entrepreneurship:** Learners demonstrate understanding of concepts, processes, and behaviors associated with successful entrepreneurial performance.