

# ***BIOMEDICAL CURRICULUM FRAMEWORK***



This document was prepared by:

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## INTRODUCTION

The Nevada CTE Curriculum Frameworks are a resource for Nevada's public and charter schools to design, implement, and assess their CTE programs and curriculum. The content standards identified in this document are listed as a model for the development of local district programs and curriculum. They represent rigorous and relevant expectations for student performance, knowledge, and skill attainment which have been validated by industry representatives.

The intent of this document is to provide a resource to districts as they develop and implement CTE programs and curricula.

This program ensures the following thresholds are met:

- The CTE course and course sequence teaches the knowledge and skills required by industry through applied learning methodology and, where appropriate, work-based learning experiences that prepare students for careers in high-wage, high-skill and/or high-demand fields. Regional and state economic development priorities shall play an important role in determining program approval. Some courses also provide instruction focused on personal development.
- The CTE course and course sequence includes leadership and employability skills as an integral part of the curriculum.
- The CTE course and course sequence are part of a rigorous program of study and include sufficient technical challenge to meet state and/or industry-standards.

The CTE program components include the following items:

- Program of Study
- State Skill Standards
- Employability Skills for Career Readiness Standards
- Career Technical Student Organizations (CTSO)
- Curriculum Framework
- CTE Assessments:
  - Workplace Readiness Skills Assessment
  - End-of-Program Technical Assessment
- Certificate of Skill Attainment
- CTE Endorsement on a High School Diploma
- CTE College Credit

**NEVADA DEPARTMENT OF EDUCATION  
CURRICULUM FRAMEWORK FOR  
BIOMEDICAL**

<b>PROGRAM TITLE:</b>	<b>BIOMEDICAL</b>
<b>STATE SKILL STANDARDS:</b>	<b>BIOMEDICAL</b>
<b>STANDARDS REFERENCE CODE:</b>	<b>BIOM</b>
<b>CAREER CLUSTER:</b>	<b>HEALTH SCIENCE</b>
<b>CAREER PATHWAY:</b>	<b>THERAPEUTIC SERVICES</b>
<b>PROGRAM LENGTH:</b>	<b>3 LEVELS (L1, L2, L3C)</b>
<b>PROGRAM ASSESSMENTS:</b>	<b>BIOMEDICAL WORKPLACE READINESS SKILLS</b>
<b>CTSO:</b>	<b>hosa: FUTURE HEALTH PROFESSIONALS</b>
<b>GRADE LEVEL:</b>	<b>9-12</b>
<b>AVAILABLE INDUSTRY CERTIFICATIONS/LICENSES PROVIDERS:</b>	<b>CPR/FIRST AID</b>

**PROGRAM PURPOSE**

The purpose of this program is to prepare students for postsecondary education and employment in the Biomedical industry.

The program includes the following state standards:

- Nevada CTE Skill Standards: Biomedical
- Employability Skills for Career Readiness
- Nevada Academic Content Standards (alignment shown in the Nevada CTE Skill Standards):
  - Science (based on the Next Generation Science Standards)
  - English Language Arts (based on the Common Core State Standards)
  - Mathematics (based on the Common Core State Standards)
- Common Career Technical Core (alignment shown in the Nevada CTE Skill Standards)

**CAREER CLUSTERS**

The National Career Clusters™ Framework provides a vital structure for organizing and delivering quality CTE programs through learning and comprehensive programs of study (POS). In total, there are 16 Career Clusters in the National Career Clusters™ Framework, representing more than 79 Career Pathways to help students navigate their way to greater success in college and career. As an organizing tool for curriculum design and instruction, Career Clusters™ provide the essential knowledge and skills for the 16 Career Clusters™ and their Career Pathways.\*

\*Cite: National Association of State Directors of Career Technical Education Consortium. (2012). Retrieved from <http://www.careertech.org/career-clusters/glance/careerclusters.html>

**PROGRAM OF STUDY**

The program of study illustrates the sequence of academic and career and technical education coursework that is necessary for the student to successfully transition into postsecondary educational opportunities and employment in their chosen career path. (NAC 389.803)

**PROGRAM STRUCTURE**

The core course sequencing provided in the following table serves as a guide to schools for their programs of study. Each course is listed in the order in which it should be taught and has a designated level. Complete program sequences are essential for the successful delivery of all state standards in each program area.

<b>BIOMEDICAL Core Course Sequence</b>	
<b>COURSE NAME</b>	<b>LEVEL</b>
Biomedical I	L1
Biomedical II	L2
Biomedical III	L3C

The core course sequencing with the complementary courses provided in the following table serves as a guide to schools for their programs of study. Each course is listed in the order in which it should be taught and has a designated level. A program does not have to utilize all of the complementary courses in order for their students to complete their program of study. Complete program sequences are essential for the successful delivery of all state standards in each program area.

<b>BIOMEDICAL Core Course Sequence with Complementary Courses</b>	
<b>COURSE NAME</b>	<b>LEVEL</b>
Biomedical I	L1
Biomedical II	L2
Biomedical III	L3C
Biomedical Advanced Studies*	AS

\*Complementary Courses

**STATE SKILL STANDARDS**

The state skill standards are designed to clearly state what the student should know and be able to do upon completion of an advanced high school career and technical education (CTE) program. The standards are designed for the student to complete all standards through their completion of a program of study. The standards are designed to prepare the student for the end-of-program technical assessment directly aligned to the standards. (Paragraph (a) of Subsection 1 of NAC 389.800)

## **EMPLOYABILITY SKILLS FOR CAREER READINESS STANDARDS**

Employability skills, often referred to as “soft skills”, have for many years been a recognizable component of the standards and curriculum in career and technical education programs. The twenty-one standards are organized into three areas: (1) Personal Qualities and People Skills; (2) Professional Knowledge and Skills; and (3) Technology Knowledge and Skills. The standards are designed to ensure students graduate high school properly prepared with skills employers prioritize as the most important. Instruction on all twenty-one standards must be part of each course of the CTE program. (Paragraph (d) of Subsection 1 of NAC 389.800)

## **CURRICULUM FRAMEWORK**

The Nevada CTE Curriculum Frameworks are organized utilizing the recommended course sequencing listed in the Program of Study and the CTE Course Catalog. The framework identifies the recommended content standards, performance standards, and performance indicators that should be taught in each course.

## **CAREER AND TECHNICAL STUDENT ORGANIZATIONS (CTSOS)**

To further the development of leadership and technical skills, students must have opportunities to participate in one or more of the Career and Technical Student Organizations (CTSOS). CTSOs develop character, citizenship, and the technical, leadership and teamwork skills essential for the workforce and their further education. Their activities are considered a part of the instructional day when they are directly related to the competencies and objectives in the course. (Paragraph (a) of Subsection 3 of NAC 389.800)

## **WORKPLACE READINESS SKILLS ASSESSMENT**

The Workplace Readiness Skills Assessment has been developed to align with the Nevada CTE Employability Skills for Career Readiness Standards. This assessment provides a measurement of student employability skills attainment. Students who complete a program will be assessed on their skill attainment during the completion level course. Completion level courses are identified by the letter “C”. (e.g., Level = L3C) (Paragraph (d) of Subsection 1 of NAC 389.800)

## **END-OF-PROGRAM TECHNICAL ASSESSMENT**

An end-of-program technical assessment has been developed to align with the Nevada CTE Skill Standards for this program. This assessment provides a measurement of student technical skill attainment. Students who complete a program will be assessed on their skill attainment during the completion level course. Completion level courses are identified by the letter “C”. (e.g., Level = L3C) (Paragraph (e) of Subsection 1 of NAC 389.800)

## **CERTIFICATE OF SKILL ATTAINMENT**

Each student who completes a course of study must be awarded a certificate which states that they have attained specific skills in the industry being studied and meets the following criteria: A student must maintain a 3.0 grade point average in their approved course of study, pass the Workplace Readiness Skills Assessment, and pass the end-of-program technical assessment. (Subsection 4 of NAC 389.800)

## **CTE ENDORSEMENT ON A HIGH SCHOOL DIPLOMA**

A student qualifies for a CTE endorsement on their high school diploma after successfully completing the following criteria: 1) successful completion of a CTE course of study in a program area, 2) successful completion of academic requirements governing receipt of a standard diploma, and 3) meet all requirements for the issuance of the Certificate of Skill Attainment. (NAC 389.815)

**CTE COLLEGE CREDIT**

CTE College Credit is awarded to students based on articulation agreements established by each college for the CTE program, where the colleges will determine the credit value of a full high school CTE program based on course alignment. An articulation agreement will be established for each CTE program designating the number of articulated credits each college will award to students who complete the program.

CTE College Credit is awarded to students who: (1) complete the CTE course sequence with a grade-point average of 3.0 or higher; (2) pass the state end-of-program technical assessment for the program; and (3) pass the Workplace Readiness Assessment for employability skills.

Pre-existing articulation agreements will be recognized until new agreements are established according to current state policy and the criteria shown above.

Please refer to the local high school's course catalog or contact the local high school counselor for more information. (Paragraph (b) of Subsection 3 of NAC 389.800)

**ACADEMIC CREDIT FOR CTE COURSEWORK**

Career and technical education courses meet the credit requirements for high school graduation (1 unit of arts and humanities or career and technical education). Some career and technical education courses meet academic credit for high school graduation. Please refer to the local high school's course catalog or contact the local high school counselor for more information. (NAC 389.672)

**CORE COURSE:  
RECOMMENDED STUDENT PERFORMANCE STANDARDS**

<b>COURSE TITLE:</b>	<b>Biomedical I</b>
<b>ABBR. NAME:</b>	<b>BIOMEDICAL I</b>
<b>CREDITS:</b>	<b>1</b>
<b>LEVEL:</b>	<b>L1</b>
<b>CIP CODE:</b>	<b>26.0102</b>
<b>PREREQUISITE:</b>	<b>None</b>
<b>CTSO:</b>	<b>hosa: Future Health Professionals</b>

**COURSE DESCRIPTION**

This course introduces students to advanced science courses related to medical fields. Areas of investigation will include human body systems, infectious diseases, medical treatment, medical mysteries, and medical interventions. Topics include research processes, bioinformatics, HIPAA and human medicine. Practices incorporate an appreciation of alternative and culturally diverse healthcare contributions by different societies. The appropriate use of technology and industry-standard equipment is an integral part of this course.

**TECHNICAL STANDARDS****CONTENT STANDARD 1.0 : BIOMEDICAL SCIENCE AS INQUIRY**

Performance Standard 1.1 : Investigation and Analysis of Biomedical Problems

*Performance Indicators* : 1.1.1-1.1.10

**CONTENT STANDARD 2.0 : EXPLORATION OF AUTOIMMUNE HUMAN DISEASES**

Performance Standard 2.1 : Recognizing Autoimmune Diseases

*Performance Indicators* : 2.1.1-2.1.6

Performance Standard 2.2 : Effects of Human Nutrition

*Performance Indicators* : 2.2.1-2.2.4

**CONTENT STANDARD 3.0 : EXPLORATION OF GENETIC DISEASES**

Performance Standard 3.1 : Recognizing Genetic Diseases

*Performance Indicators* : 3.1.1-3.1.4

Performance Standard 3.2 : Understanding the Role of Genes, Chromosomes and Inheritance

*Performance Indicators* : 3.2.1-3.2.8

**CONTENT STANDARD 4.0 : EXPLORATION OF LIFESTYLE DISEASES**

Performance Standard 4.1 : Recognize Lifestyle Diseases

*Performance Indicators* : 4.1.1-4.1.3

Performance Standard 4.2 : Understand the Structure and Function of the Cardiovascular System

*Performance Indicators* : 4.2.1-4.2.5

Performance Standard 4.3 : Understanding Cardiovascular Diseases

*Performance Indicators* : 4.3.1-4.3.6

**CONTENT STANDARD 5.0 : EXPLORATION OF INFECTIOUS DISEASES**

Performance Standard 5.1 : Introduction to Microbiology

*Performance Indicators* : 5.1.1-5.1.5

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**CONTENT STANDARD 6.0 : EXPLORATION OF THE BIOMEDICAL PROFESSION**

Performance Standard 6.1 : Investigate the Roles and Responsibilities of Various Biomedical Professions

*Performance Indicators* : 6.1.1-6.1.4

**EMPLOYABILITY SKILLS FOR CAREER READINESS STANDARDS****CONTENT STANDARD 1.0 : DEMONSTRATE EMPLOYABILITY SKILLS FOR CAREER READINESS**

Performance Standard 1.1 : Demonstrate Personal Qualities and People Skills

*Performance Indicators* : 1.1.1-1.1.7

Performance Standard 1.2 : Demonstrate Professional Knowledge and Skills

*Performance Indicators* : 1.2.1-1.2.10

Performance Standard 1.3 : Demonstrate Technology Knowledge and Skills

*Performance Indicators* : 1.3.1-1.3.4

**ALIGNMENT TO THE NEVADA ACADEMIC CONTENT STANDARDS\***

**English Language Arts:** Reading Standards for Literacy in Science and Technical Subjects  
Writing Standards for Literacy in Science and Technical Subjects  
Speaking and Listening

**Mathematics:** Mathematical Practices  
Geometry-Congruence  
Geometry-Circles

**Science:** Nature of Science  
Physical Science  
Life Science  
Earth and Space

\* Refer to the Biomedical Standards for alignment by performance indicator

**CORE COURSE:  
RECOMMENDED STUDENT PERFORMANCE STANDARDS**

<b>COURSE TITLE:</b>	<b>Biomedical II</b>
<b>ABBR. NAME:</b>	<b>BIOMEDICAL II</b>
<b>CREDITS:</b>	<b>1</b>
<b>LEVEL:</b>	<b>L2</b>
<b>CIP CODE:</b>	<b>26.0102</b>
<b>PREREQUISITE:</b>	<b>Biomedical I</b>
<b>CTSO:</b>	<b>hosa: Future Health Professionals</b>
<b>COURSE DESCRIPTION</b>	
<p>This course is a continuation of Biomedical I. This course allows intermediate biomedical students to develop their knowledge and skills learned in Biomedical I. Areas of study will include prevention, diagnosis, treatment, genetics, public health, and biomedical engineering. The students will be introduced to the interactions of the human body and design experiments to investigate the structure and function. Topics include safe practices in a workplace, homeostatic balance, protection, support, and movement. The appropriate use of technology and industry-standard equipment is an integral part of this course.</p>	

### TECHNICAL STANDARDS

#### CONTENT STANDARD 7.0 : EXPLORATION OF BODY SYSTEMS

Performance Standard 7.1 : Introduction to Human Anatomy

*Performance Indicators :* 7.1.1-7.1.4

Performance Standard 7.2 : Principles of Histology

*Performance Indicators :* 7.2.1-7.2.2

Performance Standard 7.3 : Introduction to DNA Biotechnology

*Performance Indicators :* 7.3.1-7.3.4

#### CONTENT STANDARD 8.0 : EXPLORATION OF HUMAN BODY COMMUNICATION SYSTEMS

Performance Standard 8.1 : Understand the Central Nervous System

*Performance Indicators :* 8.1.1-8.1.3

Performance Standard 8.2 : Understand Peripheral Nervous System

*Performance Indicators :* 8.2.1-8.2.6

Performance Standard 8.3 : Understand Chemical Communication

*Performance Indicators :* 8.3.1-8.3.3

#### CONTENT STANDARD 9.0 : EXPLORATION OF METABOLISM

Performance Standard 9.1 : Introduction to Metabolic Systems

*Performance Indicators :* 9.1.1-9.1.2

Performance Standard 9.2 : Understand the Digestive System

*Performance Indicators :* 9.2.1-9.2.6

Performance Standard 9.3 : Understand the Respiratory System

*Performance Indicators :* 9.3.1-9.3.4

Performance Standard 9.4 : Understand the Urinary System

*Performance Indicators :* 9.4.1-9.4.5

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**CONTENT STANDARD 10.0 : EXPLORATION OF EXERCISE PHYSIOLOGY**

Performance Standard 10.1 : Understand the Skeletal System

*Performance Indicators* : 10.1.1-10.1.7

Performance Standard 10.2 : Understand the Muscular System

*Performance Indicators* : 10.2.1-10.2.3

Performance Standard 10.3 : Understand the Cardio-Respiratory System

*Performance Indicators* : 10.3.1-10.3.5

Performance Standard 10.4 : Understand Energy and Motion

*Performance Indicators* : 10.4.1-10.4.3

**CONTENT STANDARD 11.0 : EXPLORATION OF IMMUNOLOGY**

Performance Standard 11.1 : Understand the Integumentary System

*Performance Indicators* : 11.1.1-11.1.3

Performance Standard 11.2 : Understand the Lymphatic System

*Performance Indicators* : 11.2.1-11.2.4

**CONTENT STANDARD 12.0 : EXPLORATION OF HOMEOSTASIS**

Performance Standard 12.1 : Understanding Health and Wellness

*Performance Indicators* : 12.1.1-12.1.4

**EMPLOYABILITY SKILLS FOR CAREER READINESS STANDARDS****CONTENT STANDARD 1.0 : DEMONSTRATE EMPLOYABILITY SKILLS FOR CAREER READINESS**

Performance Standard 1.1 : Demonstrate Personal Qualities and People Skills

*Performance Indicators* : 1.1.1-1.1.7

Performance Standard 1.2 : Demonstrate Professional Knowledge and Skills

*Performance Indicators* : 1.2.1-1.2.10

Performance Standard 1.3 : Demonstrate Technology Knowledge and Skills

*Performance Indicators* : 1.3.1-1.3.4

**ALIGNMENT TO THE NEVADA ACADEMIC CONTENT STANDARDS\***

**English Language Arts:** Reading Standards for Literacy in Science and Technical Subjects  
Writing Standards for Literacy in Science and Technical Subjects  
Speaking and Listening

**Mathematics:** Mathematical Practices  
Geometry-Congruence  
Geometry-Circles

**Science:** Nature of Science  
Physical Science  
Life Science  
Earth and Space

\* Refer to the Biomedical Standards for alignment by performance indicator

**CORE COURSE:  
RECOMMENDED STUDENT PERFORMANCE STANDARDS**

<b>COURSE TITLE:</b>	<b>Biomedical III</b>
<b>ABBR. NAME:</b>	<b>BIOMEDICAL III</b>
<b>CREDITS:</b>	<b>1</b>
<b>LEVEL:</b>	<b>L3C</b>
<b>CIP CODE:</b>	<b>26.0102</b>
<b>PREREQUISITE:</b>	<b>Biomedical II</b>
<b>PROGRAM ASSESSMENTS:</b>	<b>BIOMEDICAL WORKPLACE READINESS SKILLS</b>
<b>CTSO:</b>	<b>hosa: Future Health Professionals</b>

**COURSE DESCRIPTION**

This course is a continuation of Biomedical II. This course provides advanced biomedical students with instruction in advanced techniques and processes. The students will be introduced to clinical medicine, physiology and biomedical engineering related to the human species and veterinary practices. Topics include scientific method, ethical considerations, innovative research, emergency room principles, and variety of disorders. The appropriate use of technology and industry-standard equipment is an integral part of this course. Upon successful completion of this course, students will have acquired entry-level skills for employment and be prepared for postsecondary education.

**TECHNICAL STANDARDS**

**CONTENT STANDARD 13.0 : EXPLORATION OF PATHOGEN DEFENSE**

Performance Standard 13.1 : Investigating Community Health

*Performance Indicators :* 13.1.1-13.1.8

Performance Standard 13.2 : Preventing and Treating Pathogenic Disease

*Performance Indicators :* 13.2.1-13.2.6

**CONTENT STANDARD 14.0 : EXPLORATION OF MOLECULAR BIOLOGY**

Performance Standard 14.1 : Researching Techniques of Genetic Testing and Screening

*Performance Indicators :* 14.1.1-14.1.5

Performance Standard 14.2 : Understanding Genetic Future and Bioethics

*Performance Indicators :* 14.2.1-14.2.6

**CONTENT STANDARD 15.0 : EXPLORATION OF ONCOLOGY**

Performance Standard 15.1 : Preventing, Detecting and Treating Cancer

*Performance Indicators :* 15.1.1-15.1.5

Performance Standard 15.2 : Future of Cancer Treatment

*Performance Indicators :* 15.2.1-15.2.2

**CONTENT STANDARD 16.0 : EXPLORATION OF APPLIED BIOMEDICAL ENGINEERING**

Performance Standard 16.1 : Introduction to Biotechnology

*Performance Indicators :* 16.1.1-16.1.6

Performance Standard 16.2 : Critiquing Current Standards of Care

*Performance Indicators :* 16.2.1-16.2.7

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**EMPLOYABILITY SKILLS FOR CAREER READINESS STANDARDS****CONTENT STANDARD 1.0 : DEMONSTRATE EMPLOYABILITY SKILLS FOR CAREER READINESS**

Performance Standard 1.1 : Demonstrate Personal Qualities and People Skills

*Performance Indicators* : 1.1.1-1.1.7

Performance Standard 1.2 : Demonstrate Professional Knowledge and Skills

*Performance Indicators* : 1.2.1-1.2.10

Performance Standard 1.3 : Demonstrate Technology Knowledge and Skills

*Performance Indicators* : 1.3.1-1.3.4

**ALIGNMENT TO THE NEVADA ACADEMIC CONTENT STANDARDS\***

**English Language Arts:** Reading Standards for Literacy in Science and Technical Subjects  
Writing Standards for Literacy in Science and Technical Subjects  
Speaking and Listening

**Mathematics:** Mathematical Practices  
Geometry-Congruence  
Geometry-Circles

**Science:** Nature of Science  
Physical Science  
Life Science  
Earth and Space

\* Refer to the Biomedical Standards for alignment by performance indicator

**COMPLEMENTARY COURSE(S):**

Programs that utilize the complementary courses can include the following courses. The Advanced Studies course allows for additional study through investigation and in-depth research.

<b>COURSE TITLE:</b>	<b>Biomedical Advanced Studies</b>
<b>ABBR. NAME:</b>	<b>BIOMEDICAL AS</b>
<b>CREDITS:</b>	<b>1</b>
<b>LEVEL:</b>	<b>AS</b>
<b>CIP CODE:</b>	<b>26.0102</b>
<b>PREREQUISITE:</b>	<b>Biomedical III</b>
<b>CTSO:</b>	<b>hosa: Future Health Professionals</b>

**COURSE DESCRIPTION**

This course is offered to students who have achieved all content standards in a program whose desire is to pursue advanced study through investigation and in-depth research. Students are expected to work independently or in a team and consult with their supervising teacher for guidance. The supervising teacher will give directions, monitor, and evaluate the students' topic of study. Coursework may include various work-based learning experiences such as internships and job shadowing, involvement in a school-based enterprise, completion of a capstone project, and/or portfolio development. This course may be repeated for additional instruction and credit.

**TECHNICAL STANDARDS**

Students have achieved all program content standards and will pursue advanced study through investigation and in-depth research.

**EMPLOYABILITY SKILLS FOR CAREER READINESS STANDARDS**

Students have achieved all program content standards and will pursue advanced study through investigation and in-depth research.

**SAMPLE TOPICS**

- Genetic Engineering
- Advanced Nuclear Medicine
- Complementary Alternative Medicine
- Organ Transplants