

**Florida Department of Education
Curriculum Framework**

Program Title: Biomedical Sciences
Program Type: Non Career Preparatory
Career Cluster: Health Science

Secondary – Non Career Preparatory

Program Number	8708100
CIP Number	0326010201
Grade Level	9-12
Standard Length	4 credits
Teacher Certification	Refer to the Program Structure section.
CTSO	HOSA
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Health Science career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Health Science career cluster.

The purpose of this program is to provide students with a foundation of knowledge and technically oriented experiences in the study and applications of biomedical sciences and the possibilities in the biomedical field.

The content includes but is not limited to the study of human body systems, medicine, health, key biological concepts, communication, transport of substances, locomotion, metabolic processes, defense, protection, research processes, engineering principles, and an introduction to bio-informatics. The program also includes the design and development of various medical interventions, including vascular stents, cochlear implants, and prosthetic limbs. In addition, students review the history of organ transplants and gene therapy, and stay updated on cutting-edge developments via current scientific literature.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

Students complete the three foundation courses (8708110, 8708120, and 8708130), and the capstone course (8708140).

This program is a planned sequence of instruction totaling four credits.

To teach the courses listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the secondary program structure:

Course Number	Course Title	Teacher Certification	Length	Level	Graduation Requirement
8708110	Principles of the Biomedical Sciences	BIOLOGY 1 @2	1 credit	3	EQ
8708120	Human Body Systems	REG NURSE 7 G	1 credit	3	EQ
8708130	Medical Interventions	MED PROF 7 G	1 credit	3	EQ
8708140	Biomedical Innovation	PARAMEDIC @7 7G	1 credit	3	
		LAB TECH @7 7G			
		PLTW HEALTH 7G			

(Graduation Requirement Abbreviations- EQ= Equally Rigorous Science, PA= Practical Arts, EC= Economics)

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

1. Act as a responsible and contributing citizen and employee.
2. Apply appropriate academic and technical skills.
3. Attend to personal health and financial well-being.
4. Communicate clearly, effectively and with reason.
5. Consider the environmental, social and economic impacts of decisions.
6. Demonstrate creativity and innovation.
7. Employ valid and reliable research strategies.
8. Utilize critical thinking to make sense of problems and persevere in solving them.
9. Model integrity, ethical leadership and effective management.
10. Plan education and career path aligned to personal goals.
11. Use technology to enhance productivity.
12. Work productively in teams while using cultural/global competence.

Standards

After successfully completing this program, the student will be able to perform the following:

Principles of the Biomedical Sciences

- 01.0 Demonstrate an understanding of the nature of science and how to correctly use appropriate medical and scientific equipment.
- 02.0 Describe the importance of professional ethics and legal responsibilities.
- 03.0 Understand the structure and functions of the major human body systems, the organs making up these systems and the interconnections between body systems.
- 04.0 Understand how determining the cause of death involves the investigation of many aspects of the medical condition of the victim.
- 05.0 Explore various careers related to biomedical science and its impact on public health.
- 06.0 Understand and describe the importance of the cardiovascular system by examining the structure and function of the heart.
- 07.0 Understand and describe the importance of blood in relation to the cardiovascular system and the human body.
- 08.0 Demonstrate an understanding of how essential nutrients contribute to the health of the human body.
- 09.0 Describe how food provides nutrients for the body to help maintain homeostasis.
- 10.0 Describe and discuss the causes, symptoms, treatments and effects of diabetes and the impact that this specific disease has on the human body and human lifestyle.
- 11.0 Investigate the role of DNA and Chromosomes in the human body.
- 12.0 Describe factors that contribute to sickle cell disease and the impact it can have on the human body.
- 13.0 Understand the factors involved in heredity and mutation in relation to sickle cell disease.
- 14.0 Examine how changes in chromosomes or genes can cause disease/chromosomal mutations.
- 15.0 Demonstrate an understanding of the function of cholesterol in the body and its role in cardiovascular disease.
- 16.0 Describe molecular biological techniques for diagnosing diseases, specifically hypercholesterolemia.
- 17.0 Demonstrate an understanding of bacteria as a cause for infectious diseases.

Human Body Systems

- 18.0 Investigate the anatomical and physiological commonalities in the human body.
- 19.0 Analyze the individual differences in body systems in tissues and cells.
- 20.0 Investigate the significance of DNA in relation to individual identity.
- 21.0 Investigate the role the brain plays in the communication system of the human body.
- 22.0 Determine how electrical communication works in the body and its effects.
- 23.0 Determine how chemical communication works in the body.
- 24.0 Investigate how the human body responds to external stimuli.
- 25.0 Describe the role food plays in the conversion and use of energy in the body.
- 26.0 Describe the role of oxygen in cellular respiration and macromolecule metabolism.
- 27.0 Describe the role of water in maintain homeostasis.
- 28.0 Demonstrate an understanding of how joints directly contribute to the movement of the human body.
- 29.0 Demonstrate an understanding of how muscles directly contribute to the movement of the human body.
- 30.0 Demonstrate an understanding of how blood acts as a transport for substances through the human body.
- 31.0 Using knowledge of power and movement in the human body, describe how the body fuels and responds to exercise.

- 32.0 Describe the structure and function of the integumentary system.
- 33.0 Describe the composition of bones and how the skeletal system serves as a protection for the human body.
- 34.0 Describe the composition the immune system and how it serves as a protection for the human body.
- 35.0 Analyze how various external factors require body systems to work together to maintain health and homeostasis.

Medical Interventions

- 36.0 Investigate the variety of interventions involved in the prevention, diagnosis and treatment of infectious disease.
- 37.0 Explore the factors that contribute to the effectiveness of antibiotics against infectious diseases.
- 38.0 Investigate the pathology of hearing loss as a detrimental effect of infectious disease.
- 39.0 Explore vaccination as a mode of infectious disease prevention.
- 40.0 Investigate the available types of genetic testing/screening and their ethical implications.
- 41.0 Examine the current reproductive and genetic technology and discuss the future of medical interventions.
- 42.0 Explore the diagnostic techniques and technology being used to better diagnose and understand cancer.
- 43.0 Explore the potential risk factors associated with cancer and the various situations which cause changes to DNA.
- 44.0 Investigate the treatments and therapies available to treat the physical, mental, and emotional effects of cancer.
- 45.0 Explore future medical interventions for cancer.
- 46.0 Explore the medical implications of proteins produced and purified in a laboratory setting.
- 47.0 Investigate the epidemiology and therapeutic interventions of kidney failure.
- 48.0 Explore the process, policies and procedures involved in organ transplantation.
- 49.0 Investigate how advances in medical knowledge and technology can aid in building a better human body for the future.

Biomedical Innovation

- 50.0 Investigate biomedical problems related to clinical care by designing an effective emergency care center.
- 51.0 Explore the variety of research study designs available and investigate how to set up and conduct valid and reliable studies.
- 52.0 Explore the process, knowledge and skills required to design a medical innovation.
- 53.0 Explore biomedical innovation through investigating water contamination.
- 54.0 Evaluate a public health issue and combat the problem using knowledge of epidemiology, disease diagnosis and public health resources.
- 55.0 Understand medical research and the process of writing a scientific grant.
- 56.0 (Optional) Use modern molecular biology techniques to clone and transfer DNA.
- 57.0 (Optional) Assuming the role of a medical expert, investigate a mysterious death using forensics autopsy techniques.
- 58.0 (Optional) Students work independently in an area of interest in the biomedical sciences and outline milestones in a long-term open ended problem using skills learned throughout the program to complete the project.

**Florida Department of Education
Student Performance Standards**

Course Title: Principles of Biomedical Science
Course Number: 8708110
Course Credit: 1

Course Description:

Students investigate the human body systems and various health conditions. This course is designed to provide an overview of all the courses in the Biomedical Sciences program and lay the scientific foundation for subsequent courses. Students are introduced to human physiology, medicine, research processes and bioinformatics. Key biological concepts including homeostasis, metabolism, inheritance of traits, and defense against disease are embedded in the curriculum. Engineering principles including the design process, feedback loops, and the relationship of structure to function are also incorporated.

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental quality, and safety procedures will be an integral part of this course. Students will interact with materials and primary sources of data or with secondary sources of data to observe and understand the natural world. Students will develop an understanding of measurement error, and develop the skills to aggregate, interpret, and present the data and resulting conclusions. Equipment and supplies will be provided to enhance these hands-on experiences for students. A minimum of 20% of classroom time will be dedicated to laboratory experiences.

CTE Standards and Benchmarks	
01.0	Demonstrate an understanding of the nature of science and how to correctly use appropriate medical and scientific equipment. – The student will be able to:
01.01	Develop a theory through evidence-based research and find a conclusion to a problem utilizing the scientific method.
01.02	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.
01.03	Practice and demonstrate how to properly and safely use a microscope.
02.0	Describe the importance of professional ethics and legal responsibilities. – The student will be able to:
02.01	Discuss of the basics of the legal framework of the healthcare occupations
02.02	Explain common practices that could result in malpractice, liability and/or negligence.
02.03	Identify standards of the Health Insurance Portability and Accountability Act (HIPAA).
02.04	Describe the purpose of Informed Consent from the patient and provider perspective.

CTE Standards and Benchmarks	
02.05	Differentiate between legal and ethical issues in healthcare.
02.06	Evaluate and justify decisions based on ethical reasoning.
02.07	Identify and explain personal and long-term consequences of unethical or illegal behaviors in the workplace.
03.0	Understand the structure and functions of the major human body systems, the organs making up these systems and the interconnections between body systems. – The student will be able to:
03.01	Identify the major body systems and their functions.
03.02	Demonstrate an understanding of how body systems work together to maintain homeostasis.
03.03	Identify and locate specific organs that comprise the major human body systems.
03.04	Describe the general structure and function of each of these organs.
03.05	Identify common diseases and conditions that can disrupt the functioning of cells, tissues and organs within the body.
04.0	Understand how determining the cause of death involves the investigation of many aspects of the medical condition of the victim. – The student will be able to:
04.01	Describe how evidence at a crime scene, such as blood, hair, fingerprints, and shoeprints can help forensic investigators determine what might have occurred and help identify or exonerate potential suspects.
04.02	Understand that evidence can be seen post-mortem through medical examination and interpret information from an autopsy report to predict the manner of death.
04.03	Analyze bloodstain patterns to determine the mechanism of death through experimental design.
04.04	Analyze evidence gathered at a simulated crime scene.
04.05	Describe some of the major aspects involved in determining cause of death, including the gross physical condition of a victim, the need for internal and external examination of the body, and the need for chemical and microscopic analysis of tissues and body fluids.
04.06	Discuss how the use of medical terminology and the involvement of many medical professionals are vital to the investigation process.
05.0	Explore various careers related to biomedical science and its impact on public health. –The student will be able to:
05.01	Discuss and describe the role of a variety of biomedical sciences professionals that are involved in determining the cause of death.
05.02	Compare and contrast the role of the medical examiner and the coroner.
05.03	Investigate and discuss a variety of biomedical sciences careers that relate to the prevention, diagnosis, and treatment of both cardiovascular and infectious disease.

CTE Standards and Benchmarks	
06.0	Understand and describe the importance of the cardiovascular system by examining the structure and function of the heart. – The student will be able to:
06.01	Understand and discuss that the human heart is a four-chambered living pump that provides the force needed to transport blood, both oxygenated and de-oxygenated, throughout the body without mixing the two types of blood.
06.02	Identify and describe the gross structures and functions of the heart.
06.03	Understand how a heartbeat is caused by the contraction of cardiac muscle cells that result in the blood flow from the heart to the arteries and to the whole body.
06.04	Calculate heart rate as the number of beats per minute.
06.05	Explain how blood pressure is a measure of the force put on the vascular walls by the blood as it is pushed by the cardiac muscles through the vascular system.
06.06	Describe the flow of electricity through the heart and the result of this electrical pattern.
06.07	Indicate how heart rate, blood pressure and EKG can be used to measure a person's medical condition.
06.08	Describe how selected internal and external factors such as being frightened, exercise, exposure to cold and rest affect heart function including heart rate, blood pressure and EKG.
06.09	Demonstrate the importance of technology in biomedical sciences by using software and equipment to collect and analyze cardiovascular data.
07.0	Understand and describe the importance of blood in relation to the cardiovascular system and the human body. – The student will be able to:
07.01	Explain that blood is a liquid connective tissue composed of erythrocytes, leukocytes and thrombocytes that are suspended in liquid plasma.
07.02	Compare and contrast the functions of erythrocytes, leukocytes, and thrombocytes.
07.03	Recognize that blood is a major transport for many substances in the body that must be replenished throughout life including hormones, gases, molecules, waste, and nutrients.
08.0	Demonstrate an understanding of how essential nutrients contribute to the health of the human body. – The student will be able to:
08.01	Identify the different categories used in a food label and what they mean in relation of the nutrition of the body.
08.02	Compare and contrast the recommended daily values for food groups, minerals and vitamins.
08.03	Describe that food is made of macromolecules and can be classified as protein, fats, or carbohydrates, which in turn are made of atoms.
08.04	Describe the structure and function of atoms.
08.05	Describe how homeostasis depends upon many different chemical reactions and large organic molecules.

CTE Standards and Benchmarks	
08.06	Describe the role of chemical bonding in chemical reactions and transfer of energy.
09.0	Describe how food provides nutrients for the body to help maintain homeostasis. – The student will be able to:
09.01	Describe the structure and function of macromolecules in relation to the breakdown of food and the human body.
09.02	Differentiate between the four classes of macromolecules in terms of their structure and function and build a model of each.
09.03	Explain the role of chemical indicators in identifying chemical compounds.
09.04	Describe different foods that contain each kind of nutrients.
10.0	Describe and discuss the causes, symptoms, treatments and effects of diabetes and the impact that this specific disease has on the human body and human lifestyle. – The student will be able to:
10.01	Understand that there are two different types of feedback systems, positive and negative.
10.02	Summarize how insulin regulates the transfer of glucose into the body cells and its role as part of the feedback system.
10.03	Compare and contrast Type 1 & Type 2 Diabetes.
10.04	Explain the major causes, symptoms, complications effects and treatments of both Type 1 and Type 2 diabetes.
10.05	Understand and describe the dietary requirements and restrictions of diabetics of both types and how these changes can impact one's lifestyle in order to avoid severe and life threatening diabetic emergencies.
10.06	Describe healthy behaviors and actions that could help prevent the onset of Type 2 diabetes.
10.07	Investigate and describe the roles of Biomedical Sciences professions related to the treatment and prevention of Diabetes.
11.0	Investigate the role of DNA and Chromosomes in the human body. – The student will be able to:
11.01	Describe the Structure and function of a chromosome.
11.02	Describe the structure and function of deoxyribonucleic acid (DNA).
11.03	Explain the relationship between chromosomes, DNA and Genes.
11.04	Explain the interactions between nucleotides using DNA models.
11.05	Demonstrate how the genetic information in DNA molecules provides instructions for creating protein molecules and that the structure of DNA is basically the same for all living organisms.
11.06	Describe the importance of nucleotides in the process of creating protein molecules with the information from DNA.

CTE Standards and Benchmarks

11.07	Distinguish between the different levels of proteins and understand that a protein's shape can change depending on its environment.
11.08	Explain how the sequence of amino acids in a protein determines the protein's structure.
11.09	Demonstrate the appropriate laboratory methods to isolate DNA from plant and animal cells.
11.10	Explain how restriction enzymes cut DNA.
11.11	Describe how gel electrophoresis separates DNA fragments.
11.12	Recognize that gel electrophoresis can be used to examine DNA differences between individuals.
12.0	Describe factors that contribute to sickle cell disease and the impact it can have on the human body. – The student will be able to:
12.01	Describe and identify the difference between the appearance of normal and sickle cell blood using a microscope.
12.02	Describe the function of hemoglobin found in erythrocytes.
12.03	Demonstrate how changes to the structure of a protein can change its ability to work properly.
12.04	List the major symptoms and complications of sickle cell disease.
12.05	Research the occurrence of sickle cell disease between different countries around the world and investigate the reasons for the differences in incidence rates.
12.06	Investigate and discuss biomedical sciences careers responsible for the diagnosis and treatment of Sickle Cell Disease.
13.0	Understand the factors involved in heredity and mutation in relation to sickle cell disease. – The student will be able to:
13.01	Describe that chromosomes each carry numerous genes that are passed along from parents to offspring through reproductive cells.
13.02	Identify and be able to use a karyotype to identify multiploidy and sex in an individual.
13.03	Compare and contrast between chromosomal and gene mutations.
13.04	Explain the results of insertion and deletion gene mutations and the effects that they have on the corresponding proteins produced by the gene, such as b-globin protein and their associations with Sickle Cell Disease.
13.05	Describe the process of meiosis.
13.06	Explain how cell division results in the formation of haploid gametes.
13.07	Compare and contrast mitosis and meiosis and relate to the processes of sexual reproduction and their consequences for genetic variation.
13.08	Analyze genotype to determine phenotype.

CTE Standards and Benchmarks	
13.09	Analyze the major symptoms and complications of the sickle cell trait in relation to sickle cell disease.
13.10	Explain how anemia and lack of energy in a cell are related.
13.11	Use appropriate research techniques to obtain information on the symptoms and complications of the sickle cell trait and disease.
13.12	Create and analyze pedigree charts to illustrate passage of a trait through at least three generations and calculate the probability of a trait appearing in offspring.
14.0	Examine how changes in chromosomes or genes can cause disease/chromosomal mutations. – The student will be able to:
14.01	Define, identify and analyze karyotypes to determine multiploidy and sex.
14.02	Explain how karyotypes are used to diagnose certain medical conditions.
14.03	Explain how the substitution of a single amino acid can change a protein and indicate how it may change interactions with other proteins.
14.04	Identify the structure and function of chromosomes and their role in individual traits of humans.
14.05	Explain how specific mutations lead to specified genetic diseases.
15.0	Demonstrate an understanding of the function of cholesterol in the body and its role in cardiovascular disease. – The student will be able to:
15.01	Explain that there are different types of lipid molecules and that they have different physical properties and functions.
15.02	Describe how the type of bond between the carbon atoms in a fatty acid determines whether it is saturated or unsaturated with hydrogen atoms.
15.03	Explain that cholesterol is transported in the blood by protein complexes called high density lipoprotein (HDL) and low density lipoprotein (LDL) and the role each of them play in the body.
15.04	Describe how the measurement of these protein complexes affects a person's risk for cardiovascular disease.
15.05	Describe the function of an angiogram in diagnosing blocked vessels and list medical interventions to treat blocked vessels.
15.06	Discuss risk factors for cardiovascular disease.
16.0	Describe molecular biological techniques for diagnosing diseases, specifically hypercholesterolemia. – The student will be able to:
16.01	Explain how the processes of polymerase chain reaction (PCR), and DNA gel electrophoresis can be used in the diagnosis of genetic diseases and disorders such as the familial hypercholesterolemia.
16.02	Demonstrate using proper laboratory techniques how to separate DNA fragments by gel electrophoresis, including how to properly load a gel, how to use a micropipette, and how to set parameters using the power source.
16.03	Analyze the results of a gel electrophoresis to correctly diagnose the presence of the familial hypercholesterolemia mutation.

CTE Standards and Benchmarks	
17.0	Demonstrate an understanding of bacteria as a cause for infectious diseases. – The student will be able to:
17.01	Identify the basic structures of a bacterial cell.
17.02	Describe the epidemiology of different types of bacteria and why some cause disease while some do not.
17.03	Classify bacteria by shape, metabolism and reaction to gram staining.
17.04	Understand how antibiotics are used to treat infections and that their effectiveness depends on the type of bacteria that has caused the infection.
17.05	Explain that chronic use of antibiotics can cause resistance in bacteria and what that means to human health.
17.06	Describe the immune response in relation to the introduction of antigens.
17.07	Isolate and examine bacterial colonies using aseptic techniques.
17.08	Communicate effectively the symptoms, prevalence, and treatment for bacterial infection as well as the global and social impact of an infectious disease that is caused by bacteria.

**Florida Department of Education
Student Performance Standards**

Course Title: Human Body Systems
Course Number: 8708120
Course Credit: 1

Course Description:

Students examine the interactions of body systems as they explore identity, communication, power, movement, protection, and homeostasis. Students design experiments, investigate the structures and functions of the human body, and use data acquisition software to monitor body functions such as muscle movement, reflex and voluntary action, and respiration. Exploring science in action, students build organs and tissues on a skeletal manikin, work through interesting real world cases and often play the role of biomedical professionals to solve medical mysteries.

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental quality, and safety procedures will be an integral part of this course. Students will interact with materials and primary sources of data or with secondary sources of data to observe and understand the natural world. Students will develop an understanding of measurement error, and develop the skills to aggregate, interpret, and present the data and resulting conclusions. Equipment and supplies will be provided to enhance these hands-on experiences for students. A minimum of 20% of classroom time will be dedicated to laboratory experiences.

CTE Standards and Benchmarks	
18.0	Investigate the anatomical and physiological commonalities in the human body. -- The student will be able to:
18.01	List the major organs within each human body system and the functions of the different human body systems.
18.02	Describe how multiple body systems are interconnected.
18.03	Describe how the interconnections and interactions of multiple body systems are necessary for maintaining homeostasis.
18.04	Demonstrate the correct usage of directional terms and regional terms to identify locations of the human body.
18.05	Identify key directional terms on a model of the human body.
18.06	Apply knowledge of human body systems to indicate how disease can impact function in another system.
19.0	Analyze the individual differences in body systems in tissues and cells. – The student will be able to:
19.01	Describe the differences in the appearance of epithelial and connective tissues.
19.02	Explain the basic structure and function of the skeletal system.

CTE Standards and Benchmarks	
19.03	Identify the muscles in the face around the eyes and mouth.
19.04	Interpret bone markings, bone landmarks and bone measurements to provide information about gender, race, ethnicity and height.
19.05	Use mathematical calculations to predict height from the length of a bone.
20.0	Investigate the significance of DNA in relation to individual identity. – The student will be able to:
20.01	Explain how restriction enzymes cut DNA.
20.02	Explain how gel electrophoresis separates DNA fragments by size.
20.03	Analyze gel electrophoresis results.
20.04	Define biometrics and through research create an argument related to ethical issues associated with it.
20.05	Describe the way in which characteristics such as fingerprints, facial features and retinal patterns can be used to establish identity.
20.06	Design a comprehensive security plan for a real-world situation using biometrics.
20.07	Understand the roles and responsibilities of a forensic anthropologist and a DNA analyst.
21.0	Investigate the role the brain plays in the communication system of the human body. –The student will be able to:
21.01	Describe the general structure and function of the central nervous system.
21.02	Interpret how a malfunction in the nervous system would impact the function of the human body.
21.03	Identify the regions of the brain responsible for specific actions, emotions, or functions of human body.
21.04	Differentiate the regions of the brain that are responsible for basic life functions.
22.0	Determine how electrical communication works in the body. – The student will be able to:
22.01	Explain the basics of how electrical signals are created and transmitted in the human body.
22.02	Explain the roles of ions in creating electrical impulses in the human body.
22.03	Explain how neurotransmitters help propagate electrical impulses.
22.04	Describe neuron structure and function.
22.04.01	Explain the ascending and descending pathways of the CNS.

CTE Standards and Benchmarks	
22.05	Analyze how reflexes impact reaction time.
22.06	Demonstrate an understanding of how nervous system disorder impacts quality of life.
22.07	Research the roles and responsibilities of biomedical professionals who can improve the quality of life for those coping with nervous system dysfunction.
22.08	Using data acquisition software to investigate the relationship between reflexes and reaction time.
23.0	Determine how chemical communication works in the body. – The student will be able to:
23.01	Explain the basics of how hormones interact with target cells.
23.02	Explain the difference between endocrine and exocrine glands as well as protein/peptide and steroid hormones.
23.03	Using research, interpret the symptoms and physical characteristics of a patient to determine an endocrine system pathology.
23.04	Explain in general how hormones contribute to maintain homeostasis.
24.0	Investigate how the human body responds to external stimuli. – The student will be able to:
24.01	Describe the structures and function of the eye.
24.02	Describe how the eye and the brain work together to produce vision.
24.03	Explain and demonstrate visual perception, including visual acuity, depth perception, peripheral vision, color vision, and the interpretation of optical illusions.
24.04	Utilize a Snellen chart to determine an individual's vision acuity.
24.05	Explain how the lens of the eye utilizes light waves to produce a visual image and explain how to correct visual problems with corrective lenses.
24.06	Describe the roles and responsibilities of an optometrist, ophthalmologist, and optician.
25.0	Describe the role food plays in the conversion and use of energy in the body. – The student will be able to:
25.01	Describe the human body systems that absorb process and distribute oxygen, water, and food.
25.02	Describe the structure and function of organs in the human digestive system.
25.03	Explain how energy is stored and released in ATP through the process of hydrolysis and phosphorylation.
25.04	Assess overall health through analysis of calories consumed and calories expended in daily activities.

CTE Standards and Benchmarks

25.05	Explain the structure and function of, enzymes and co enzymes and how they all work together.
25.06	Explain the role of enzymes in maintaining homeostasis in the body.
25.07	Demonstrate an understanding of both lock and key models and induced fit models of enzyme function.
25.08	Interpret enzyme function in the digestive system through laboratory experiments.
25.09	Build a model of the human digestive system
25.10	Design and perform an experiment to determine optimal conditions for digestive enzyme reactions.
26.0	Describe the role of oxygen in cellular respiration and macromolecule metabolism. –The student will be able to:
26.01	Describe the structure and function of the human respiratory system.
26.02	Explain the process of gas exchange in the lungs and identify where in the lungs gas exchange occurs.
26.03	Explain that the blood is the primary transport for oxygen and carbon dioxide in the body.
26.04	Perform a spirometry test to determine an individual's tidal volume, inspiratory reserve volume, expiratory reserve volume, vital capacity, and total lung volume.
26.05	Analyze the differences of various medications used to treat respiratory dysfunction and describe the various pharmacological routes of administration for each.
26.05.01	Utilize pharmacological abbreviations to analyze prescriptions.
26.06	Explain the roles and responsibilities of a respiratory therapist.
27.0	Describe the role of water in maintaining homeostasis. – The student will be able to:
27.01	Describe the structure and function of the human urinary system.
27.02	Describe the structure and function of the kidney.
27.03	Describe and illustrate the movement of fluids and ions in and out of the various parts of the nephron.
27.04	Explain the role of ADH (anti-diuretic hormone) and Aldosterone on fluid and electrolyte balance in the body.
27.05	Compare and contrast the composition of blood and urine.
27.06	Build a model of the urinary system.
27.07	Analyze the results of a urinalysis test and apply the results to determine dysfunction of the urinary system.

CTE Standards and Benchmarks	
27.08	Identify the components of a urinalysis test and determine when a urinalysis should be utilized.
28.0	Demonstrate an understanding of how joints directly contribute to the movement of the human body. – The student will be able to:
28.01	Describe the structure and function of a hinge joint, ball and socket joint, pivot joint, saddle joint, and gliding joint and be able to identify an example of each.
28.02	Describe the normal motion of various joints in the body using correct terminology.
28.03	Measure joint range of motion of various joints using a goniometer OR determine the normal range of motion for various joints in the body.
28.04	Compare the structure of a cow elbow to a human elbow.
28.05	Discuss differences in an individual’s range of motion and the reason for these differences.
28.06	Discuss ways to improve joint flexibility such as stretching and other lifestyle modifications.
29.0	Demonstrate an understanding of how muscles directly contribute to the movement of the human body. – The student will be able to:
29.01	Describe the structure and function of the three types of muscle tissue.
29.02	Identify specific muscles of the body and understand how muscles are named.
29.03	Describe the steps of muscle contraction.
29.04	Explain the sliding filament mechanism of muscle contraction.
29.05	Explain the connection between nerves and muscle.
29.06	Interpret muscle function by examining structure and attachment to bone.
29.07	Build a model of a muscle group.
29.08	Explain why rigor mortis occurs using the concepts of muscle contraction.
29.09	Determine the role of calcium in muscle contraction.
30.0	Demonstrate an understanding of how blood flow acts as a transport for substances through the human body. – The student will be able to:
30.01	Explain the relationship between the heart and lungs and the path of blood flow through these organs.
30.02	Demonstrate how to take a pulse and explain the steps of how to take blood pressure.
30.03	Identify major arteries and veins and specify the body region each supplies.

CTE Standards and Benchmarks	
30.04	Interpret ankle brachial index (ABI) to determine possible blood vessel blockages.
30.05	Understand the relationship between the amounts of blood pumped by the heart through analysis of cardiac output values.
30.06	Investigate peripheral artery disease related to patient health through the analysis of patient symptoms and diagnostic testing.
30.07	Explain the structure and function of veins and explain how varicose veins form.
30.08	Build a model of the major circulatory routes.
30.09	Analyze risks for cardiovascular disease.
31.0	Using knowledge of power and movement in the human body, describe how the body fuels and responds to exercise. – The student will be able to:
31.01	Explain the human body's ability to generate ATP for the specific time period needed to fuel itself.
31.02	Assess muscle fatigue through interpretation of EMG and grip strength.
31.03	Design an experiment to test and analyze muscle fatigue.
31.04	Describe how the major body systems respond to exercise.
31.05	Understand how a training plan is designed for a fictional client, incorporating the specific health situation of the client.
31.06	Identify the reactants, products, and basic functions of aerobic and anaerobic cellular respiration.
32.0	Describe the structure and function of the integumentary system. – The student will be able to:
32.01	Classify the various degrees of burns and determine which layers of skin have been damaged for each.
32.02	Explain how burns impact the normal function of the skin and how the damage disrupts homeostasis in the body.
32.03	Explain how the body senses and responds to pain.
32.04	Explain why pain is necessary to human survival.
32.05	Determine the structures that have been damaged following a burn to the skin.
32.06	Analyze the rehabilitation a burn victim must undergo and the impacts it will have on activities of daily living.
33.0	Describe the composition of bones and how the skeletal system serves as a protection for the human body. – The student will be able to:
33.01	Describe and compare the structure and function of compact and spongy bone.

CTE Standards and Benchmarks	
33.02	Describe the different types of bone fractures.
33.03	Identify bone fractures on x-rays and describe possible damage to internal organs.
33.04	Describe the roles of calcitonin and parathyroid hormone in the human body
33.05	Describe the stages of bone remodeling.
33.06	Identify lifestyle choices that affect development and maintenance of healthy bones.
34.0	Describe the composition the immune system and how it serves as a protection for the human body. – The student will be able to:
34.01	Describe the structure and function of the lymphatic and immune system.
34.02	Describe the roles of antigens and antibodies.
34.03	Explain the role of blood cells in specific immunity.
34.04	Understand how a pedigree can assist in determining blood types in a family.
34.05	Interpret data on antibody concentrations after an infection.
34.06	Determine potential blood donors for a transfusion through the analysis of blood types and Rh compatibility.
35.0	Analyze how various external factors require body systems to work together to maintain health and homeostasis. – The student will be able to:
35.01	Describe how various body systems respond to extreme external changes in the external environment.
35.02	Explain how body systems work together to maintain homeostasis and complete basic functions.
35.03	Understand how initial symptoms of an illness can lead to diagnosis and treatment.
35.04	Evaluate objective data to create a patient case study.
35.05	Understand that different diseases require different medical interventions.
35.06	Research the role of various medical professionals who will diagnose and treat a fictional patient.

**Florida Department of Education
Student Performance Standards**

Course Title: Medical Interventions
Course Number: 8708130
Course Credit: 1

Course Description:

Students investigate the variety of interventions involved in the prevention, diagnosis and treatment of disease as they follow the lives of a fictitious family. The course is a “How-To” manual for maintaining overall health and homeostasis in the body as students explore: how to prevent and fight infection; how to screen and evaluate the code in human DNA; how to prevent, diagnose and treat cancer; and how to prevail when the organs of the body begin to fail. Through these scenarios, students are exposed to the wide range of interventions related to immunology, surgery, genetics, pharmacology, medical devices, and diagnostics.

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental quality, and safety procedures will be an integral part of this course. Students will interact with materials and primary sources of data or with secondary sources of data to observe and understand the natural world. Students will develop an understanding of measurement error, and develop the skills to aggregate, interpret, and present the data and resulting conclusions. Equipment and supplies will be provided to enhance these hands-on experiences for students. A minimum of 20% of classroom time will be dedicated to laboratory experiences.

CTE Standards and Benchmarks	
36.0	Investigate the variety of interventions involved in the prevention, diagnosis and treatment of infectious disease. – The student will be able to:
36.01	Research various medical interventions and explain how these interventions help prevent, diagnose, and treat disease.
36.02	Define bioinformatics and explore how it is used in the collection, classification, storage, and analysis of biochemical and biological information.
36.03	Explain how bacteria can be identified using DNA sequencing.
36.04	Investigate the roles of diagnostic tests for infectious diseases.
36.05	Graphically organize connections between individuals in a fictitious disease outbreak.
36.06	Determine the concentration of infectious bacteria in simulated body fluids and identify infected patients using antibody-based diagnostic tests, such as ELISA assay.
37.0	Explore the factors that contribute to the effectiveness of antibiotics against infectious diseases. – The student will be able to:
37.01	Analyze and describe the structure of a bacterial cell.
37.02	Investigate how antibiotics disrupt the physiological pathways that bacteria need to survive.

CTE Standards and Benchmarks	
37.03	Explain how bacteria use adaptations to gain resistance to antibiotics.
37.04	Demonstrate one of the pathways through which bacterial cells transfer genes.
37.05	Use a model to simulate the effects of antibiotics on the population of bacteria during an infection.
38.0	Investigate the pathology of hearing loss as a detrimental effect of infectious disease. –The student will be able to:
38.01	Distinguish the properties of sound waves; including frequency and amplitude.
38.02	Explain the anatomy of the ear and create a model of the ear demonstrating how its structure relates to its function.
38.03	Identify diagnostic tests that assess and evaluate hearing loss.
38.03.01	Perform diagnostic tests to assess and evaluate hearing loss.
38.04	Research interventions and services available to aid those with hearing loss.
38.05	Investigate and debate the bioethical concerns related to the use of cochlear implant technology.
39.0	Explore vaccination as a mode of infectious disease prevention. – The student will be able to:
39.01	Explain how vaccines act as medical interventions to defend the body against infectious invaders.
39.02	Explore laboratory methods in which vaccines are produced.
39.03	Describe the structure and function of plasmids and explain their significance in genetic engineering.
39.04	Investigate the importance of epidemiologists and their impact on public health.
39.05	Describe how vaccines interact with the human immune system.
39.06	Interpret data from a disease outbreak to determine the course of the infection.
39.07	Explore general perspectives on the use of vaccinations.
40.0	Investigate the available types of genetic testing/screening and their ethical implications. – The student will be able to:
40.01	Describe genetic testing and how it is used to determine if someone has a genetic disorder.
40.02	Explain how genetic counseling impacts a patient's health outcome.
40.03	Amplify a segment of DNA in the laboratory using the Polymerase Chain Reaction (PCR) procedure.

CTE Standards and Benchmarks	
40.04	Use laboratory techniques such as DNA extraction, PCR, and restriction analysis to identify single base pair differences in DNA.
40.05	Utilize laboratory results to analyze the relationship between genotype and phenotype.
40.06	Analyze prenatal genetic screening results.
40.07	Describe the basics of proper prenatal care as well as specified medical interventions used to monitor a pregnancy.
40.08	Investigate how a person's ability to taste the chemical PCT, their phenotype, relates to their results from laboratory genetic testing their genotype.
41.0	Examine the current reproductive and genetic technology and discuss the future of medical interventions. – The student will be able to:
41.01	Explore how gene therapy can be used to treat genetic disorders.
41.02	Discuss and debate the safety and effectiveness of gene therapy.
41.03	Explore the various medical interventions parents have available to choose the sex of their future child, including sperm sorting and embryo selection by pre-implantation genetic diagnosis (PDG).
41.04	Discuss the possibility of reproductive cloning and the ethical concerns.
41.05	Evaluate and debate the potential impact of reproductive technology from moral, ethical and scientific perspectives.
42.0	Explore the diagnostic techniques and technology being used to better diagnose and understand cancer. – The student will be able to:
42.01	Investigate the physiology of cancer and discuss how cancerous cells differ from healthy cells.
42.02	Describe the different uses of x-rays, CT scans, and MRI scans.
42.03	Investigate what DNA microarrays measure and how this information is used to determine differences in gene expression between differing tissues samples.
42.04	Using statistical analysis, determine the similarities between gene expression patterns of multiple patients.
43.0	Explore the potential risk factors associated with cancer and the various situations which cause changes to DNA. – The student will be able to:
43.01	Describe the potential risk factors for different types of cancer as well as the ways to reduce the risk.
43.02	Explore some of the various cancer screening techniques that can be used to predict risk for developing cancer.
43.03	Investigate the risk factors of viruses and explain the role viruses' play as a risk factor for certain cancers.
44.0	Investigate the treatments and therapies available to treat the physical, mental, and emotional effects of cancer. – The student will be able to:

CTE Standards and Benchmarks	
44.01	Identify the major differences between chemotherapy and radiation therapy.
44.02	Describe how chemotherapy drugs interact with and destroy cancer cells.
44.03	Explore biofeedback therapy and how it is utilized to treat cancer and its symptoms.
44.04	Synthesize designs that advances and benefit prosthetic technology for those who have lost their limbs.
44.05	Explain how physical and occupational therapists help patients with disabilities and those recovering from surgery/injury.
45.0	Explore future medical interventions for cancer. – The student will be able to:
45.01	Discuss reasons why therapy drugs do not produce the same effect in all individuals.
45.02	Explain how SNP profiles factor into the decision to prescribe a specific medication.
45.03	Explore the field of pharmacogenetics and its contributions to the improvement of individualized patient treatment.
45.04	Research and present how cases of misuse and abuse have led to strict regulations of human participation in clinical trials.
45.05	Describe the importance of nanomedicine, particularly for cancer research and the development of medical interventions.
46.0	Explore the medical implications of proteins produced and purified in a laboratory setting. – The student will be able to:
46.01	Discuss the evolution of diagnosis and treatment of diabetes from the 1800s through today.
46.02	Explain the various aspects of the bacterial transformation process.
46.03	Define chromatography and how it is used to separate items in a mixture.
46.04	Interpret electrophoresis results to determine the molecular weight of specific proteins in a mixture.
46.05	Explore and discuss specific biomedical careers in the manufacturing of therapeutic proteins.
47.0	Investigate the epidemiology and therapeutic interventions of kidney failure. – The student will be able to:
47.01	Describe End Stage Renal Disease (ESRD) and how it is diagnosed.
47.02	Describe the physiological effects on the body when kidneys do not function properly and its impact on the production of red blood cells.
47.03	Explore the medical options for treatment for persons with ESRD including hemodialysis, peritoneal dialysis and kidney transplant.
48.0	Explore the process, policies and procedures involved in organ transplantation. – The student will be able to:

CTE Standards and Benchmarks	
48.01	Discuss factors to consider when deciding who should receive an organ transplant.
48.02	Describe the importance of blood and tissue matching for a successful organ transplant.
48.03	Describe the general steps involved in a live donor laparoscopic nephrectomy.
48.04	Compare the major similarities and differences between a heart and a kidney transplant.
48.05	Explain the most common ways members of the surgical transplant team work together to ensure a successful transplant.
49.0	Investigate how advances in medical knowledge and technology can aid in building a better human body for the future. – The student will be able to:
49.01	Explore how a variety of tissues and organs can be transplanted from one organism to another.
49.02	Describe the general process of how xenotransplantation and tissue engineering works, as well as potential risks, benefits, challenges and ethical/moral concerns.
49.03	Reflect on how current methods of medical intervention can be improved.
49.04	Describe how advancing medical knowledge and technology will enable scientists to delay the effects of aging and disease by enhancing the functions of the human body.
49.05	Design a potential “super” human using knowledge of the human body and available medical interventions.

**Florida Department of Education
Student Performance Standards**

Course Title: Biomedical Innovation
Course Number: 8708140
Course Credit: 1

Course Description:

In this capstone course, students apply their knowledge and skills to answer questions or solve problems related to the biomedical sciences. Students design innovative solutions for the health challenges of the 21st century as they work through progressively challenging open-ended problems, addressing topics such as clinical medicine, physiology, biomedical engineering, and public health

CTE Standards and Benchmarks	
50.0	Investigate biomedical problems related to clinical care by designing an effective emergency care center. – The student will be able to:
50.01	Evaluate the role that biomedical innovation plays in treating disease, reducing wait time and promoting efficient care in emergency room and emergency care centers.
50.02	Assess overall credibility of a website by analyzing its content.
50.03	Produce an effective presentation of scientific information by using oral communication skills and PowerPoint presentation.
50.04	Research and propose solutions to healthcare delivery problems in the 21 st century.
50.05	Design an innovative emergency medicine delivery system.
50.06	Demonstrate proficiency in using online search engines and journal databases to locate scientific articles.
51.0	Explore the variety of research study designs available and investigate how to set up and conduct valid and reliable studies. – The student will be able to:
51.01	Critique science data presented in popular media and compare this with data presented in scientific journals.
51.02	Analyze the results of experimental studies using knowledge of specified statistical analysis methods.
51.03	Design, conduct and analyze an experimental study to answer a question regarding one or more body systems.
51.04	Using at least three statistical fallacies, assume the role of an advertisement sales person selling a fictitious product.
51.05	Describe the various biomedical career fields related to clinical or research studies.
52.0	Explore the process, knowledge and skills required to design a medical innovation. –The student will be able to:

CTE Standards and Benchmarks	
52.01	Investigate the evolution of biomedical products.
52.02	Brainstorm ideas for a new biomedical product or methods to improve an existing product.
52.03	Discuss the role of the scientific design process and how it is significant to medical innovation.
52.04	Identify a problem related to the medical field and research the past and present solutions to this problem.
52.05	Examine possible design solutions to the selected problem, determine the best approach and develop a design proposal.
52.06	Design a marketing plan to pitch the chosen solution to potential investors.
53.0	Explore biomedical innovation through investigating water contamination. – The student will be able to:
53.01	List and describe multiple causes of water contamination.
53.02	Explain why water quality is a global issue.
53.03	Extrapolate on the cause of non-point source pollution and its implications.
53.04	Using knowledge of specific assays, interpret the results of various chemical and culture assays and identify specific contaminants found.
53.05	Research and propose solutions to prevent or treat water contamination.
53.06	Determine local potential hazards or sources of contamination of local water samples and research local and Internet resources to investigate the condition of the local water delivery system.
53.07	Research and report on the quality of the local water.
54.0	Evaluate a public health issue and combat the problem using knowledge of epidemiology, disease diagnosis and public health resources. – The student will be able to:
54.01	Discuss the significant role that epidemiologists and public health investigators play in a public health crisis.
54.02	Describe how to set-up case control and cohort studies.
54.03	Discuss how measures of association are used to illustrate the correlation between specific risk factors and the development of disease.
54.04	Calculate the measures of association used to assess risk in case control and cohort studies.
54.05	List and discuss the various components that may be involved in a public health intervention plan.
54.06	Determine the source of a mystery illness by examining evidence documents and data including laboratory results, imaging results, disease maps and molecular data.

CTE Standards and Benchmarks	
54.07	Research local, national and global health issues and analyze how culture, geographic location and access to health care affect health and wellness.
54.08	Write a grant proposal outlining an intervention plan for a particular public health issue.
54.09	Present and defend the proposed intervention plan to a professional audience.
55.0	Understand medical research and the process of writing a scientific grant. – The student will be able to:
55.01	Define and elaborate on what medical research is used for and how funding for it is obtained.
55.02	Explain the role of a grant in relation to medical research.
55.03	Understand the difference between what constitutes a credible source opposed to a non-credible source when conducting a literature search.
55.04	Distinguish between primary and secondary sources.
55.05	Discuss potential bias based on construct and funding sources of research.
55.06	Discuss the role of an IRB in ensuring safety of a research project prior to data initiation.
55.07	Understand and identify the process by which a grant is created and the principle components that are included in scientific grant proposals (i.e. abstract, specific aims, background and significance, preliminary data/progress, project description, resources, supplemental materials).
55.08	Prepare and present a detailed grant proposal for a research project that will impact a specific aspect of a disease or medical condition.
56.0	(Optional) Use modern molecular biology techniques to clone and transfer DNA. – The student will be able to:
56.01	Explain the structure and function of plasmids, and how they are used in genetic engineering.
56.02	Describe the role restriction enzymes and how they interact with plasmids.
56.03	Interpret plasmid maps to determine the results of specific digestions with restriction enzymes.
56.04	Explain how to assemble recombinant DNA and clone a gene of interest using bacterial cells.
56.05	Interpret gel electrophoresis results to determine the success of a cloning experiment.
56.06	Using the process of bacterial transformation, insert a new plasmid into bacterial cells.
56.07	Draw and label possible ligation products and describe digestion results for each product.
57.0	(Optional) Assuming the role of a medical expert, investigate a mysterious death using forensics autopsy techniques.–The student will be able to:

CTE Standards and Benchmarks	
57.01	Describe observations of the internal and external anatomy of a fetal pig.
57.02	Evaluate a fetal pig for any abnormalities that may have led to the pig's death.
57.03	Complete an autopsy report for the fetal pig.
57.04	Solve the cause of death for a fetal pig by assuming the role of a forensic pathologist.
57.05	Design a fictitious death scenario using knowledge of the human body.
57.06	Create fictitious documents including an autopsy report and medical history to illustrate clues left behind in a dead body.
57.07	Research and reflect on the various biomedical careers involved in forensic pathology and describe two of these careers in detail.
58.0	(Optional) Students work independently in an area of interest in the biomedical sciences and outline milestones in a long-term open ended problem using skills learned throughout the program to complete the project. – The student will be able to:
58.01	Choose a topic and describe work previously completed pertaining to that topic.
58.02	Interpret charts, graphs, data sets and any other information related to the project.
58.03	Utilize time and project management skills to complete the approved project in the time allotted.
58.04	Apply skills and knowledge of researching a topic, evaluating information and decision making in order to complete the project.
58.05	Write a well-constructed final report describing the purpose, procedures and results of the project and present this information orally.
58.06	Write a self-analysis of what was learned during the project with a focus on whether things should have been done differently or not.
58.07	Prepare a portfolio of all artifacts related to the project in order to demonstrate the work progression.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.ELL.SI.1

English Language Development (ELD) Standards Special Notes:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: <http://www.cpalms.org/uploads/docs/standards/eld/SI.pdf>. For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

Special Notes

This program uses a combination of activity-based, project-based and problem-based (APPB) learning styles to engage students.

Hands-on projects include designing experiments, investigating the structures and functions of body systems, and using data acquisition software to monitor body functions such as muscle movement, reflex and voluntary actions, and respiratory operation. Using 3D imaging, data acquisition software, and current scientific research, students design a product that can be used as a medical intervention.

The capstone course gives student teams the opportunity to work with a mentor, identify a scientific research topic, conduct research, write a scientific paper, and defend team conclusions and recommendations to a panel of outside reviewers.

Career and Technical Student Organization (CTSO)

HOSA: Future Health Professionals is the intercurricular career and technical student organization providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular course or a modified course. If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete a Career and Technical Education (CTE) course. The student should work on different competencies and new applications of competencies each year toward completion of the CTE course. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml>