Delaware Department of Education

CTE & STEM Office

401 Federal Street, Suite 256

Dover, DE 19901

PHONE: 302.735.4015 FAX: 302.739.1780

**DELAWARE CTE PROGRAM OF STUDY APPLICATION**

|  |  |  |
| --- | --- | --- |
| LOCAL EDUCATION AGENCY INFORMATION | | |
| **Local Education Agency (LEA):** | | |
| **School(s) where the Program of Study will be Located:** | | **Program of Study Start Date:** |
| **LEA CTE Coordinator Name:** **Phone:** **E-Mail Address:** | | |
| **Career Cluster Title:**  Health Sciences | **Career Pathway Title:**  Therapeutic Services | **Program of Study Title:**  Allied Health |
| **CTE Program of Study Course Titles & Sequence:**   1. Fundamentals of Health Sciences (FHS) 2. Essentials of Health Careers (EHC) 3. Anatomy & Physiology I (A&P) | | |
| **CTE Program of Study Request:**  State-model CTE Program of Study  Local CTE Program of Study | | |
| ASSURANCES & SIGNATURES | | |
| CTE Program of Study approval and funding is contingent upon the following assurances:   1. The LEA will comply with Delaware Administrative Code, 14 Del.C. §525, Requirements for Career and Technical Education Programs and the Delaware State Plan for the Carl D. Perkins Career and Technical Education Act of 2006; 2. The LEA will submit CTE program data as required by the Delaware Department of Education; 3. All teachers are certified in the appropriate CTE area and participate in program specific professional learning; 4. The LEA will convene and engage a program advisory committee for the purposes of program development, implementation, and continuous improvement; 5. All students have equal access to the program of study as well as early career/early college options; 6. Career and Technical Student Organizations are integral components of the program of study; 7. The LEA will maintain safe facilities and equipment aligned with the program of study goals; and 8. A process for continuous improvement has been established, which includes a model of evaluation and program improvement. | | |
| LEA CTE Coordinator Signature: Date: | | |
| LEA Chief School Officer Signature: Date: | | |

|  |
| --- |
| PROGRAM ADVISORY COMMITTEE MEMBER INFORMATION |
| Complete the list of program advisory committee members. Program of study representatives should include, but are not limited to: CTE and academic teachers, CTE/curriculum district coordinators, school counselors, business and industry representatives, labor representatives, and post-secondary partners. Community stakeholders including parents and students can also be considered. *Attach additional information if applicable*. |
| Name: Title: |
| Affiliation: |
| Address: |
| Phone: E-Mail: |
| Area of Expertise: |
| Representing:  Business/Industry  Secondary Education  Post-Secondary Education  Community/Other |
|  |
| Name: Title: |
| Affiliation: |
| Address: |
| Phone: E-Mail: |
| Area of Expertise: |
| Representing:  Business/Industry  Secondary Education  Post-Secondary Education  Community/Other |
|  |
| Name: Title: |
| Affiliation: |
| Address: |
| Phone: E-Mail: |
| Area of Expertise: |
| Representing:  Business/Industry  Secondary Education  Post-Secondary Education  Community/Other |
|  |
| Name: Title: |
| Affiliation: |
| Address: |
| Phone: E-Mail: |
| Area of Expertise: |
| Representing:  Business/Industry  Secondary Education  Post-Secondary Education  Community/Other |
|  |
| Name: Title: |
| Affiliation: |
| Address: |
| Phone: E-Mail: |
| Area of Expertise: |
| Representing:  Business/Industry  Secondary Education  Post-Secondary Education  Community/Other |
|  |
| LABOR MARKET DEMAND |
| Certify that a labor market needs analysis has been completed for the proposed CTE program of study. Attach the [*Labor Market Information (LMI) Review*](http://www.doe.k12.de.us/Page/2016) document. |
| Access the [*Labor Market Information (LMI) Review*](http://www.doe.k12.de.us/Page/2016) document.  The LEA certifies that regional, state, and local labor market data have been reviewed to assure a demand exists for the POS occupations and that the number of POS completers will not significantly exceed this demand. Department of Labor data are available and/or documented. Supporting evidence of supply and demand is submitted with this proposal.  No data exist for POS due to a unique labor market demand. Supporting evidence of demand is submitted with this proposal. Evidence may include, but is not limited to: real-time labor market information, documentation of national, regional, state, or local labor trends, or letters from employers or workforce agencies documenting projected employment specific to the career pathway. |

|  |
| --- |
| ACADEMIC AND TECHNICAL SKILL STANDARDS |
| List the academic, technical, and workplace skills and knowledge used to develop the program of study. |
| **Title and source of academic standards:**  [Common Core State Standards (CCSS)](http://www.corestandards.org/)  The Common Core State Standards (CCSS) are national standards that set clear college- and career-ready expectations for kindergarten through 12th grade in English language arts/literacy and Mathematics. The standards help to ensure that students graduating from high school are prepared to take credit bearing introductory courses in two- or four-year college programs and enter the workforce. The standards were developed by the nation's governors and education commissioners, through their representative organizations, the National Governors Association Center for Best Practices (NGA) and the Council of Chief State School Officers (CCSSO). Teachers, parents, school administrators, and experts from across the country provided input into the development of the standards. The implementation of the Common Core, including how the standards are taught, the curriculum developed, and the materials used to support teachers as they help students reach the standards, is led entirely at the state and local levels. For more information on CCSS, please visit the link above.  [Next Generation Science Standards (NGSS)](http://www.nextgenscience.org/)  The Next Generation Science Standards (NGSS) are national standards for science that lay out the disciplinary core ideas, science and engineering practices, as well as crosscutting concepts that students should master in preparation for college and careers. The standards were developed through a state-led effort that was managed by Achieve. The development of the NGSS involved the National Research Council (NRC), the National Science Teachers Association (NSTA), the American Association for the Advancement of Science (AAAS), and other critical partners such as K–12 teachers, state science and policy staff, higher education faculty, scientists, engineers, cognitive scientists, and business leaders. For more information on the NGSS, please visit the link above.  The Allied Health program of study incorporates aspects of Common Core State Standards for English language arts/literacy and mathematics, the Next Generation Science Standards, the National Health Science Standards, and other national standards where appropriate. |
| **Title and source of technical skill standards:**  [National Consortium for Health Science Education (NCHSE) – National Health Science Standards](http://www.healthscienceconsortium.org/index.php)  The National Health Science Standards provide a clear and consistent understanding of industry and post-secondary expectation for health science teachers and students. These standards are designed to provide essential knowledge common across health professions to prepare and increase the number of students that are college and career ready. The National Consortium for Health Science Education (NCHSE), in partnership with the U.S. Departments of Education and Labor, has established eleven (11) common health science standards and four (4) career pathway standard sets (i.e. Diagnostic, Therapeutic, Environmental, and Health Information) which guide curriculum related materials for healthcare programs. More than 1,000 healthcare employers, college and university faculty, secondary teachers, and professional organization representatives provided input to identify common practices, reviewed the content for each standard, and piloted the results within their agency or organization. For more information on the National Health Science Standards, please visit the link above. |
| **Title and source of workplace or other skill standards, as applicable:**  [Common Career Technical Core (CCTC)](http://www.careertech.org/CCTC)  The Common Career Technical Core (CCTC) are national standards for Career & Technical Education (CTE) that help to inform the establishment of state standards and/or programs of study. The CCTC were developed by educators, school administrators, representatives from business and industry, faculty from higher education, as well as workforce and labor markets economists.  The CCTC include a set of standards for each of the sixteen (16) Career Clusters and the corresponding Career Pathways that help to define what students should know and be able to do after completing instruction in a program of study. A crosswalk of the NCHSE National Health Science Standards and the CCTC standards for the Health Sciences Career Cluster can be accessed through the following link: <http://www.healthscienceconsortium.org/docs/Foundation_Standards_Crosswalk.pdf>.  [Career Ready Practices (CRP)](http://www.careertech.org/career-ready-practices)  The Career Ready Practices (CRP) are a component of the CCTC framework and includes twelve (12) statements that address the knowledge, skills, and dispositions that are important to becoming career ready. The CRP 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 and 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 career pathway. The CRP statements are embedded throughout the NCHSE Health Science Standards to ensure students possess employability and workplace skills for career success. For more information on the CRP, please visit the link above. |

|  |
| --- |
| EARLY CAREER AND EARLY COLLEGE OPPORTUNITIES |
| Identify CTE program of study early career opportunities, industry-recognized certifications and licenses, options for early college credit, two- and four-year degree and certification program alignment, and the technical skill attainment measures for the program of study. *Attach articulation/dual enrollment agreement(s)*. |
| **Describe early career opportunities (i.e. work-based learning experiences and industry-mentored projects):**  Upon successful completion of Fundamentals of Health Sciences (FHS) and/or Essential of Health Careers (EHC), students will participate in an organized summer volunteer program through a local healthcare system (Christiana Care Health System, Nemours Children’s Health System, Bayhealth Medical Center, or Beebe Healthcare).  The duration of the program, application process, and deadline for submission will be determined by each participating hospital system.  Students will earn a certificate of completion to be retained in their portfolio and provide a copy to the Health Science teacher.  Students will also explore a range of careers in healthcare as they learn content in the context of real-world, hands-on activities, projects, and problems, as well as the roles of healthcare professionals and the concepts of healthcare and interprofessional collaborative practice. Further, students will examine the structure and function of the human body systems and explore the prevention, diagnosis, and treatment of disease while working collaboratively to understand and design solutions to the most pressing health challenges of today and the future.  Clinical scenarios and simulated patient conditions will be used in the laboratory setting to introduce students to the clinical and communication skills needed in the healthcare industry. Work-based learning experiences such as health fairs, guest speakers, supervised clinical experiences, job-shadowing, and paid cooperative education experiences will be incorporated in each course as determined by the local education agency and program advisory committee. |

|  |
| --- |
| **List industry-recognized certifications and/or licenses, as appropriate (include the partner organization and credential):**  [National Consortium for Health Science Education (NCHSE)-Health Science Assessment](http://www.healthscienceconsortium.org/assessment_updates.php) **-** The National Health Science Assessment is a knowledge-based test designed to evaluate the extent of the candidate’s knowledge of the National Health Science Standards, which include academic foundation, communication, systems, employability skills, legal responsibilities, ethics, safety practices, teamwork, health maintenance practices, technical skills, and information technology application.  [American Heart Association](http://www.heart.org/HEARTORG/CPRAndECC/CPR_UCM_001118_SubHomePage.jsp) – The American Heart Association’s CPR/First Aid program certifies students for adult, child, and infant CPR, the use of an AED on adults, and treatment of a foreign body airway obstructions for adult and infant victims. |
| **Describe early college credit options (i.e. advanced placement, dual enrollment, transcripted and/or articulated credit, credit by exam, pre-apprenticeship, other) and options for two- and four-year degree and/or certification program alignment (attach articulation/dual enrollment agreement). The partner organization and hours of credit earned should be included, as applicable:**  Students who successfully complete Fundamentals of Health Sciences (FHS) course will receive articulated credit at Delaware Technical Community College for the following course:   * BIO100 - Medical Terminology (3 credits) **\***   Student who successfully complete the Essentials of Anatomy & physiology (A&P) course will receive articulated credit at Delaware Technical Community College for the following course:   * BIO110 – Essentials of Anatomy and Physiology (4 credits)**\***   Students who successfully complete the Anatomy & Physiology I (A&P) course will receive dual-enrollment credit at Delaware Technical Community College for the following course:   * BIO120 - Anatomy and Physiology I (5 credits)\*   Students who successfully complete the Allied Health Program of Study and chemistry will also have the opportunity to enroll in the following course at Delaware Technical Community College after graduation and prior to the Fall semester.   * BIO121 – Anatomy & Physiology II (5 credits)   **\***Depending on the program of study chosen at Delaware Technical Community College, credits completed at the secondary level may provide advanced placement or elective credit.  Many of the Allied Health programs offered at DTCC have connected degree programs with colleges and universities including Delaware State University, Immaculata University, Salisbury University, University of Delaware, Wesley College, Widener University, and Wilmington University. Information about connected degree programs is located at: <https://www.dtcc.edu/academics/transfer-options/connected-degrees>. |
| **List technical skill attainment measures for the program of study (i.e. industry recognized certification or license, advanced placement, dual enrollment, transcripted and/or articulated credit, dual enrollment, credit by exam):**  Nationally recognized exam (specify): [NCHSE National Health Science Assessment](http://www.healthscienceconsortium.org/assessment_updates.php)  Advanced standing (specify):  Delaware Technical Community College**:**  BIO100 – Medical Terminology: 3 credits  BIO110 – Essential of Anatomy & Physiology: 4 credits  BIO120 – Anatomy & Physiology I: 5 credits |

|  |
| --- |
| POS OVERVIEW, COURSE DESCRIPTIONS, END-OF-COURSE, AND PROGRAM ASSESSMENTS |
| Provide a CTE program of study overview that broadly describes the program and student expectations. Identify end-of-program assessment(s) and opportunities for students to participate in early college and early career experiences. List each course title in the CTE program of study. Provide an overview of each course and define what students should know and be able to demonstrate upon completion of each level. Identify appropriate end-of-course assessment(s). |
| **CTE Program of Study Overview:**  TheAllied Health program of study is a three (3) course Career & Technical Education (CTE) instructional program that engages students in open-ended problem solving where they study topics such as medical terminology and human anatomy and physiology. Through exploration of the National Health Science Standards, students will acquire important skills necessary for healthcare professionals such as medical mathematics, communication, safety practices, legal responsibilities, and teamwork. In addition, students will develop technical skills such as performing a wound culture, measuring vital signs, collecting a throat culture and performing a strep test. The program prepares students for a variety of careers in healthcare such as respiratory therapist, nurse, physical therapist, dental hygienist, and medical lab technician.   * **Fundamentals of Health Sciences (FHS**) introduces students to careers in healthcare and is a prerequisite to the other Allied Health program of study courses. This course will explore the National Consortium for Health Science Education (NCHSE) National Health Science Standards and entry level healthcare skills as well as the language of medicine. Further, this course will be offered as an articulated course with Delaware Technical Community College (BIO100 – Medical Terminology). Students begin preparation for the National Consortium for Health Science Education ([NCHSE) National Health Science Assessment](http://www.healthscienceconsortium.org/assessment.php). * **Essentials of Health Careers (EHC)** offers students the opportunity to become effective and efficient healthcare providers as they develop a working knowledge of various healthcare opportunities. As students identify the various areas of Allied Health, they will discuss the potential of education, advancement, employment opportunities, employment sites, and financial rewards. Students will focus on careers in the healthcare field by applying classroom/lab knowledge and skills to clinical settings as they participate in direct or simulated patient care. This course reinforces and builds upon medical terminology skills learned in the Fundamentals of Health Sciences (FHS) course and is a prerequisite to the Anatomy & Physiology I (A&P) course. Students participate in CPR/First Aid certification through the [American Heart Association](http://www.heart.org/HEARTORG/CPRAndECC/CPR_UCM_001118_SubHomePage.jsp). * **Essentials of Anatomy and Physiology (EAP)** introduces student to the structure and function of the human body with an emphasis on gross anatomy as well as all organ systems and their relationship to homeostasis. Coordinated laboratory activities are an integral part of this course. Further, this course if offered as an articulated course through Delaware Technical Community College (BIO 110 – Essential of Anatomy and Physiology).   **AND/OR**   * **Anatomy & Physiology I (A&P)** introduces students to anatomy and physiology of humans including the structure and function of cells, tissues, integumentary, skeletal, muscular, nervous, and endocrine systems. Coordinated laboratory experiments are an integral part of this course. Further, this course is offered as a dual-enrollment course through Delaware Technical Community College (BIO120 – Anatomy & Physiology). Students learn physiology of each body system, as well as how to investigate common diseases, disorders, and emerging diseases. The prevention of disease, diagnosis, and treatment are addressed. At the completion of the program of study, students complete the National Consortium for Health Science Education ([NCHSE) National Health Science Assessment](http://www.healthscienceconsortium.org/assessment.php). |
| **End-of-Program Assessment(s):**  Certification/credentialing exam (specify):  Licensing exam (specify):  Nationally recognized exam (specify): [NCHSE National Health Science Assessment](http://www.healthscienceconsortium.org/assessment_updates.php)  Other (specify): |
|  |
| **Course title:**  Fundamentals of Health Sciences (FHS) |
| **Course description (include prerequisites):**  Fundamentals of Health Sciences (FHS) introduces students to careers in healthcare and is a prerequisite to the other Health Science pathway courses. This course focuses on medical terminology which includes Greek and Latin prefixes, suffixes, roots, abbreviations, names of diseases and surgeries related to hospital services and allied health specialties. In addition, students explore the National Consortium Health for Science Education (NCHSE) Health Science Standards and entry level healthcare skills. Students begin preparation for the [NCHSE National Health Science Assessment](http://www.healthscienceconsortium.org/assessment.php) and develop skills focusing on the language of medicine. |
| **Course knowledge and skills (what students will know and be able to do):**  By the end of this course students will:   1. Analyze the basic elements of a medical word, including word roots, combining forms, prefixes, and suffixes. 2. Define, pronounce, and appropriately apply (in written and oral communications) terminology related to the general structure and organization of the human body, the structures and functions the major body systems (i.e. digestive, urinary, female and male reproductive, nervous cardiovascular, respiratory, blood, and musculoskeletal system), human diseases, clinical and surgical procedures, imaging procedures, laboratory procedures, and medical abbreviations.      1. Interpret and apply medical abbreviations to communicate information and differentiate abbreviations confirmed by the Joint Commission official “Do Not Use List.” 2. Differentiate common diseases and disorders of each body system (e.g. cancer, diabetes, dementia, stroke, heart disease, tuberculosis, hepatitis, COPD, kidney disease, arthritis, ulcers); define the etiology, pathology, diagnosis, treatment, and prevention for common diseases and disorders through analysis of clinical case studies.      1. Research and discuss emerging diseases and disorders (e.g. autism, VRSA, PTSD, Listeria, seasonal flu) and biomedical therapies as they relate to the prevention, pathology, and treatment of disease including gene testing, gene therapy, human proteomics, cloning, and stem cell research. 2. Demonstrate competency in mathematics and mathematical conversions as they relate to healthcare including the use of the metric system, mathematical computations, and conversions; demonstrate the ability to analyze diagrams, charts, graphs, and tables to interpret healthcare results; and demonstrate the use of the 24-hour clock/military time. Demonstrate college and career readiness by applying Common Core State Standards (CCSS) with ratio reasoning, fractions, and decimals using clinical scenarios such as measuring intake and output and calculating medication dosages.      1. Utilize employability skills to enhance employment opportunities and job satisfaction; identify personal traits and attitudes desirable in a member of the career ready healthcare team such as communication, professional characteristics of healthcare professionals, teamwork, and employability preparation; and identify strategies for pursuing employment. 2. Analyze legal responsibilities, limitations, and implications on healthcare worker actions and explore accepted ethical practices with respect to cultural, social, and ethnic differences within the healthcare environment including the differentiation between ethical and legal issues impacting healthcare, identifying ethical issues, and their implications related to healthcare.      1. Differentiate how key systems affect services performed and quality of care by comparing healthcare delivery systems such as nonprofit and for profit and government and nonprofit; assess the impact of emerging issues on healthcare delivery systems; and discuss healthcare economics and common methods of payment for healthcare. 2. Identify existing and potential hazards to clients, co-workers, and self; employ safe work practices, follow health and safety policies and procedures to prevent injury and illness; and explore principles of infection control. 3. Differentiate between wellness and disease; promote disease prevention and model healthy behaviors; promote behaviors of health and wellness; describe strategies for prevention of disease; and investigate complementary and alternative health practices as they relate to wellness and disease prevention. 4. Utilize information technology applications common across health professions while understanding key principles of health information systems which includes identifying types of data collected in electronic health records (EHR)/electronic medical records (EMR), exploring different types of health record data collection tools, identifying the types and content of an EHR/EMR (e.g. pharmacy, laboratory, radiology), creating documentation in an EHR/EMR that reflects timeliness, completeness, and accuracy, and adhering to information systems policies, procedures, and regulations as required by national, state, and local entities. |
| **End-of-Course Assessment(s):**  Teacher designed assessment  LEA designed assessment  Certification/credentialing exam (specify):  Licensing exam (specify):  Nationally recognized exam (specify):  Other (specify): DTCC BIO100 Course Assessment(s) |
|  |
| **Course title:**  Essentials of Health Careers (EHC) |
| **Course description (include prerequisites):**  Essentials of Health Careers (EHC) offers students the opportunity to become effective and efficient healthcare providers as they develop a working knowledge of various allied health opportunities as well as interprofessional collaborative practice. Students focus on a career path in the healthcare field by applying classroom/lab knowledge and skills to clinical settings as they participate in direct or simulated patient care. Students participate in the CPR/First Aid certification program through the [American Heart Association](http://www.heart.org/HEARTORG/CPRAndECC/CPR_UCM_001118_SubHomePage.jsp).  Prerequisite: Fundamentals of Health Sciences (FHS) |
| **Course knowledge and skills (what students will know and be able to do):**  By the end of this course students will:   1. Assemble major components of a medical record that include patient history and demographics, insurance information, and progress notes; measure adult height and weight using a manual physician’s scale; measure adult weight using an electronic scale; perform color vision screening using an Ishahara color vision test; perform distance vision screening using a Snellen eye chart; collect throat culture and conduct strep test; support therapeutic communication skills while performing patient instruction; and construct correct clinical documentation in a medical record noting the results of the height, weight, and vision screeningrequired in the healthcare discipline of medical office related to careers of physician, clinical medical office assistant, and administrative office assistant. 2. Demonstrate the proper instruction of using a peak flow meter; construct documentation in a medical record regarding the patient teaching and effectiveness of incentive spirometry; and demonstrate a pulse oximetry during normal ventilation, hyperventilation and hypoventilation required in the healthcare discipline of respiratory care related to careers of pulmonologist and respiratory therapist. 3. Perform proper posterioanterior (PA) and lateral positioning of a patient for radiographic imaging of the thoracic cavity; use proper protective devices for the patient and self and demonstrate effective communication skills and the ability to obtain pertinent history related to routine radiographic procedures required in the healthcare discipline of diagnostic imagining related to careers of radiologist and radiologic technologist. 4. Obtain a simulated wound for culture and sensitivity; apply personal protective equipment (PPE); create a sterile field; perform a sterile wound irrigation and dressing change with packing; and support therapeutic communication skills with patient in explaining the wound care procedure; construct clinical documentation in a medical record noting the drainage, color, and odor of the wound, the pain related to the wound and wound care as well as the response to any prescribe analgesics, and patient instruction and follow-up care prescribed by the physician required in the healthcare discipline of surgery related to careers of surgeons, physician assistants, operating room nurses, and surgical technicians. 5. Instruct a patient in the proper use of crutches, and assist a patient from a sitting position in a wheelchair to standing and ambulating using a gait belt; support therapeutic communication skills while performing patient instruction; demonstrate personal safety and use of proper body mechanics while instructing the patient; demonstrate patient safety while performing a transfer and instructing proper use of assistive ambulatory devices; assist a patient to dress using only one hand and compensatory techniques; and construct correct clinical documentation in a medical record noting the patient instruction and progress in meeting goals and objectives of physical and/or occupational therapy required in the healthcare discipline of physical rehabilitation related to careers of physiologist, physical therapist, physical therapist assistant, occupational therapy assistant, and occupational therapist. 6. Measure blood pressure using a manual and automatic sphygmomanometer; measure temperature via oral, aural, and temporal routes using electronic devices; measure pulse rate via apical, radial, carotid, and femoral sites; measure respiratory rate simultaneously with radial pulse; support therapeutic communication skills while performing patient instruction during measurement; and construct correct clinical documentation in a medical record noting the results of the vital signs required in the healthcare discipline of nursing related to careers of advanced practice nurse, nurse practitioner, registered nurse, licensed practical nurse, and nurse assistant. 7. Conduct proper patient teaching of brushing and flossing using a typodent and support therapeutic communication skills while performing patient instructionrequired in the healthcare discipline of dental science related to careers of dentist, dental hygienist, and dental assistant. 8. Collect biohazardous specimens using personal protective equipment (PPE); perform a urinalysis using simulated urine and reagent strips; perform urinalysis using simulated urine; demonstrate proper transfer of simulated blood from a syringe to a vacuum tube; and construct correct clinical documentation in a medical record noting the test results required in the healthcare discipline of medical laboratory services related to careers of microbiologist, medical laboratory scientist, histotechnician, and medical lab technician. 9. Perform cardiopulmonary resuscitation with chest compression and abdominal thrusts to relieve a foreign body airway obstruction; demonstrate use of an automated external defibrillator (AED) and use of a barrier device to perform rescue breathing on an adult, child and infant; demonstrate first aid techniques in response to common medical emergencies such as allergic reactions, bleeding and shock; demonstrate proper notification of emergency services; and obtain certification through the American Heart Association CPR/First Aid programrequired in the healthcare discipline of emergency medical services related to careers of emergency medical physicians, paramedics, and emergency medical technicians. |
| **End-of-Course Assessment(s):**  Teacher designed assessment  LEA designed assessment  Certification/credentialing exam (specify):  Licensing exam (specify):  Nationally recognized exam (specify):  Other (specify): |
|  |
|  |
| **Course title:**  Anatomy & Physiology I (A&P) |
| **Course description (include prerequisites):**  Anatomy & Physiology I (A&P) introduces students to human anatomy and physiology; including the structure and function of cells, tissues, integumentary, skeletal, muscular, nervous, and endocrine systems. Students will learn physiology of each body system, as well as how to investigate common diseases, disorders, and emerging diseases. The prevention of disease and the diagnosis and treatment are addressed. This course reinforces and builds upon the knowledge and skills developed in the Fundamentals of Health Sciences (FHS) and the Essentials of Health Careers (EHC) courses. Students will take the National Consortium for Health Science Education (NCHSE) National Health Science Assessment at the completion of this course.  Anatomy & Physiology I (A&P) is offered as a dual-enrollment course (BIO120-Anatomy & Physiology I) which is recommended to be taken during the senior year. Graduates will have the option to take BIO121-Anatomy & Physiology II in the summer semester following graduation.  Prerequisites: Essentials of Health Careers (EHS) and Chemistry |
| **Course knowledge and skills (what students will know and be able to do):**  By the end of this course students will:  1. Construct anatomic terminology to describe the human body and explore the eleven (11) principal body systems, organs and functions; compare common and anatomical terms used to describe regions of the body; define directional terms, planes, and sections associated with the human body; describe the major body cavities; and differentiate between the internal and external environments, and define negative and positive feedback systems.   1. Investigate the organization and processes of the various cells, tissues, and membranes in the body; describe the structure of a generalized cell; explore protein synthesis and the ions and molecules involved in cellular structure and function; identify the four basic tissue types and their locations; and differentiate between exocrine glands and endocrine glands. 2. Explore the components and processes of the integumentary system and determine the structure and functions of the skin; explain factors that influence skin color; and describe how the integumentary system regulates body temperature. 3. Analyze the various components of the skeletal system and integrate the analysis with the body’s articulations; define the skeletal system and state its function; identify the bones of the human body; identify the curves of the vertebral column; identify fontanels and sutures; compare the major structural differences between the male and female skeleton; and explain articulation. 4. Explore the organization and processes of the muscular system; define the muscular system and its function; explain how muscles are named; describe the role of calcium in muscle contraction; list the energy sources for muscle contraction; and compare isotonic and isometric contractions. 5. Investigate the organization and processes of the nervous system; identify the structure and function of neurons and neuroglia; describe the types of synapses and their structure and function; identify the functions of the spinal cord; describe the gross anatomy of the spinal cord and spinal nerves; explain the formation and circulation of cerebrospinal fluid; identify the cranial nerves and their functions; and compare the sympathetic and parasympathetic divisions of the autonomic nervous system. 6. Distinguish the components and processes of the body’s special senses; describe accessory structures of the eye and the structures forming the visual pathway to the brain; describe the anatomical divisions of the ear and their components; list the sequence of steps involved in the physiology of hearing; and describe olfactory and gustatory processes. 7. Analyze the organization and processes of the endocrine system; compare and contrast the nervous system and endocrine systems; distinguish between the different types of hormones; and explain the role of the hypothalamus and anterior pituitary in regulation of hormone release. 8. Conduct various lab activities related to anatomy and physiology; identify anatomy of the integumentary, skeletal, muscular, nervous, and endocrine systems on models, specimens, diagrams, dissection, and/or computer programs in a laboratory setting; and perform various physiological laboratory activities related to the cell, as well as the integumentary, skeletal, muscular, and nervous systems. |
| **End-of-Course Assessment(s):**  Teacher designed assessment  LEA designed assessment  Certification/credentialing exam (specify):  Licensing exam (specify):  Nationally recognized exam (specify):  Other (specify): DTCC BIO120 Course Assessment(s) |

|  |
| --- |
| **Course title:**  Essentials of Anatomy and Physiology (EAP) |
| **Course description (include prerequisites):**  Essentials of Anatomy and Physiology (EAP) introduces student to the structure and function of the human body with an emphasis on gross anatomy as well as all organ systems and their relationship to homeostasis. Coordinated laboratory activities are an integral part of this course. Further, this course if offered as an articulated course through Delaware Technical Community College (BIO 110 – Essential of Anatomy and Physiology). This course reinforces and builds upon the knowledge and skills developed in the Fundamentals of Health Sciences (FHS) and the Essentials of Health Careers (EHC) courses. Students will take the National Consortium for Health Science Education (NCHSE) National Health Science Assessment at the completion of this course.  Essentials of Anatomy & Physiology (EAP) is offered as an articulated course (BIO110-Essentials of Anatomy and Physiology). Graduates will have the option to take BIO120-Anatomy & Physiology II in the summer semester following graduation.  Prerequisites: Essentials of Health Careers (EHS) and Chemistry\*  \*Students may be concurrently enrolled in HSF while completing this course. |
| **Course knowledge and skills (what students will know and be able to do):**  By the end of this course students will:  1. Construct anatomic terminology to describe the human body and explore terminology related to the general organization of the human body, which includes defining the terms anatomy and physiology as well as cell, tissue, organ, system, and organism; list the ten major organ systems of the human being; describe the correct anatomical position of the human body; list the body cavities into two major divisions and their subdivisions; list nine regions of the abdominopelvic cavity; list organs located in each four quadrants of the abdominopelvic cavity; list ten directional terms; describe and give two examples of each term; and define the three planes of division of the body.   1. Explore the basic chemical principles to cell function and homeostasis by defining terminology such as matter, atom, element, molecule, compound, and mixture, and give examples of each; define *pH*, and describe how the numbers on the pH scale relate to acidity and alkalinity; identify the value of electrolytes in maintaining an adequate acid-base and fluid; balance in the body, and give examples of cations and anions; define energy, calorie, and adenosine triphosphate (ATP); list three characteristics of organic compounds; and compare fats, carbohydrates, and proteins as to chemical constituents and their role. 2. Investigate the basic structure and functions for normal human cells, which includes defining terminology such as cell and organelles;diagram a cell and label the following: cell membrane, nucleus, ribosomes, endoplasmic reticulum, mitochondria, centrioles, lysosomes, Golgi apparatus, cilia, flagella, and cytoplasm; describe functions of the organelles; give the composition, location, and function of deoxyribonucleic acid (DNA) in the cell; identify the location and functions of ribonucleic acid (RNA) in the cell;   define mitosis*,* and briefly describe the steps of mitosis; describe a semipermeable membrane, diffusion, osmosis, and filtration; define active and passive transport methods, and give an example of each; define phagocytosis and pinocytosis; and  define isotonic, hypotonic, and hypertonic solutions with regard to their effect on red blood cells (RBCs).   1. Explore the organization and functions for tissues and membranes, which includes defining terminology such as cytology and histology; list four major groups of tissues in the body; give their locations, describe their functions, and give two or three examples of each; define exocrine and endocrine glands; list the four types of membranes, and give the locations and functions of each; and define fascia, keloids, perichondrium, and osseous tissue. 2. Investigate the normal structure and functions for each of the body systems, which includes   5a. Skin: describe the four functions of the skin; list two structures of the skin, and describe their characteristic features; list five appendages of the skin, and describe their functions; and identify on the diagram of skin the following structures: epidermis, dermis, subcutaneous layer, pore, sebaceous gland, sudoriferous gland, pressure receptor, hair follicle, and nerve.  5b. Skeleton, Bones, Joints: define osteoblast, osteocytes, osteoclast, diaphysis, epiphysis, collagen, compact bone, spongy bone, red bone marrow, yellow bone marrow, periosteum, endosteum, resorption, articular, and arthrology; list the five functions of the skeletal system.  list two main groups of bones, and describe each group; locate and identify the six cranial bones; locate and identify the eight facial bones; locate and identify the five vertebrae columns, and give numbers for each column; locate the following structures of the vertebrae: centrum, foramen, transverse process, spinous process, laminae, and pedicle; locate and identify the eight structures of the upper extremities and the seven structures of the lower extremities; locate and identify the two thorax bones, and describe their characteristics; name and identify the structures of a femur; name and identify the structure of a pelvis; list six major differences between the male and female pelvis; list the eight common landmarks of bones; define foramen magnum, fossae, intervertebrae foramina, obturator foramina, and anterior fontanel; name the three major kinds of joints; define and give examples of each kind of joint; describe the characteristics of synovial joints, and list the six types of synovial joints; define flexion, extension, abduction, adduction, circumduction, rotation, supination, pronation, inversion, and eversion, and demonstrate each movement correctly; list three compositions of the bone; list three nutrients required for the bone formation; and define axis and axial.  5c. Muscular System: list the three main structures and the two characteristics of skeletal muscle; describe the sliding filament theory of muscle contraction; define oxygen debt, isotonic contraction, and isometric contraction; list two structures for attachments of skeletal muscle, and describe each structure; list and describe the three main parts of muscle; list the four functions of muscle; describe seven principles of muscular action; locate and identify the eighteen major muscles; and list two major muscles involved in the act of breathing.  5d. Nervous System: define neurology, autonomic nervous system, neuron, receptor, internuncial neuron, effector, myelin sheath, neurolemma, afferent neuron, efferent neuron, nerve fibers, gray matter, white matter, corpus callosum, neuroglia, encephalon, telencephalon, and meninges; list two major subdivisions of the nervous system; diagram two nerve cells, identifying each cell body, nucleus, dendrites, axon, and synapse; describe the direction of the impulses, and describe the action that occurs at the synapse when given two nerve cells; diagram or identify on charts the following structures: cerebral hemisphere, cerebellum, cerebral cortex, thalamus, hypothalamus, brain stem, midbrain, pons, medulla oblongata, and pituitary gland; diagram the human brain, identifying the frontal, parietal, temporal, and occipital areas, and describe the major functions of each of the areas; list the three main divisions of the brain, and give the location; describe the functions of the cerebral cortex, thalamus, hypothalamus, midbrain, pons, medulla oblongata, cerebellum, and basal nuclei (ganglia); identify the eight functional areas of the cerebrum on the diagram; identify the location of cerebrospinal fluid in the four ventricles, and describe how it is formed and its two functions; describe the structure of the spinal cord, and list three functions of the spinal cord; describe the nature of a reflex arc; name the three meninges and three spaces, and describe the locations; identify the name and functions of the twelve cranial nerves; identify the numbers and locations of the spinal nerves, and list the three anterior branches; and describe briefly the function of the autonomic nerve system.  5e. Sensory System: describe the functions of the sensory system; list the six types of sense receptors affected by the external environment, and state where they are located; locate on a chart or diagram and describe the functions of the major structures of the eye: sclera, choroid, retina, cornea, lens, suspensory ligaments, ciliary muscles, anterior cavity, posterior cavity, vitreous body (humor), aqueous humor, blind spot, iris, conjunctiva, lacrimal apparatus, and optic nerve; define rods, cones, accommodation, presbyopia, hyperopia, myopia, astigmatism, cataract, glaucoma, refraction, and enucleation; identify the intrinsic muscles and extrinsic muscles of the eye; identify the boundaries of the external, the middle, and the inner ear; locate on a chart or model and describe the function of the major structure of the ear, including the auricle, external auditory meatus, tympanic membrane, eustachian tube, ossicles, bony labyrinth, vestibule, cochlea, semicircular canals, perilymph, and endolymph; identify the two sensory nerve supplies to the ear; and list the names of the nerves that involve taste and smell.  5f. Endocrine System and Hormones; define endocrine, exocrine, and hormone; describe the nature of a negative feedback system for release of most of hormones; locate on a chart or diagram the nine major endocrine glands, and describe the chief action of all hormones secreted from each gland; describe briefly the effects of malfunctioning of the endocrine glands; and briefly describe how the endocrine system responds to stress.  5g. Blood: define hematology, plasma, pH of blood, thrombus, embolus, ischemia, hypoxia, anoxia, necrosis, procoagulant, and anticoagulant; state the average amount of blood found in an average adult; list the three functions of the blood, and describe each function; identify the nine components of plasma, and describe the functions of each; list the three types of formed elements in the blood; describe an erythrocyte and where it is formed, destroyed, and its function; describe a leukocyte and where it is formed, destroyed, and its function; describe the five types of leukocytes; describe a platelet and where it is formed, destroyed, and its function; describe the chain of events that occurs when an artery forms an embolus that blocks it; describe the chain of steps that occurs in the clotting process; identify the four blood groups, and state which is the universal donor and the universal recipient; describe the effect of blood type on transfusion; list the four reasons for blood transfusion; and state the normal values for the following blood tests and a possible cause for an abnormal reading in each case: hemoglobin (Hb), hematocrit (HCT), white blood cell (WBC), and prothrombin time.  5h. Heart: define cardiology, chordae tendinea, systole, diastole, cardiac cycle, bradycardia, tachycardia, sinus arrhythmia, premature beats, murmurs, functional murmur, organic murmur, and electrocardiogram (EKG); identify the location of the heart, and list the three layers of the heart; locate and identify the four chambers, the valves, and the vessels leading into and out of the heart and the two partitions; trace the circulation of blood through the heart and lungs; identify at which points the blood is oxygenated; briefly describe blood circulation through the myocardium; list and describe the components of the heart's conduction system; and diagram the normal EKG, name each wave, and describe the relationship to the activity of the heart.  5i. Blood Vessels and Blood Circulation: define arteries, veins, capillaries, pulmonary vessels, systemic circulation, venules, anastomosis, circle of Willis, saphenous vein, cephalic vein, vasoconstriction, vasodilation, and pulse; name the three layers of the blood vessels; compare and contrast the structure of arteries and veins and what controls the rate of flow of blood; name the four sections of the aorta; name the main branches of the aorta; on a chart, trace the route of circulation of blood throughout the body by identifying the following: brachiocephalic, left and right subclavian, left and right common carotid, pulmonary veins, coronary arteries, intercostal arteries, thoracic aorta, gastric artery, splenic artery, mesenteric artery, common iliac artery, femoral artery, testicular artery, hepatic artery, renal artery, celiac trunk, popliteal, axillary, brachial, radial, ulnar, jugular veins, superior vena cava, inferior vena cava, and coronary sinus; list two functions of capillaries; briefly describe the function of the hepatic portal system; and list the six factors that may influence the pulse rate.  5j. Lymphatic System: list the three major functions of the lymphatic system; describe how lymphatic capillaries differ from blood capillaries; list the two main lymphatic ducts, and describe the areas drained by each; and list the major structures of the lymphatic system, and provide the function of each.  5k. Respiratory System: define ventilation, external respiration, internal respiration, cellular respiration, and mediastinum; describe the purpose of the respiratory system; diagram the upper respiratory tract and lungs, labeling the parts in both scientific and lay terms; trace the pathway of O2 and CO2; describe the characteristics and functions of the following structures: nasal cavity, pharynx, larynx, trachea, bronchi, bronchiolus, alveolar duct, and alveolus; identify the location of the lungs, and describe the characteristics of the pleural cavity; describe the nature of the respiratory movement, and name the respiratory center; draw a graph and list the name and amount of the respiratory volume measurement of the following terms: tidal volume, inspiratory reserve volume, expiratory reserve volume, vital capacity, total lung capacity, and functional residual capacity; define dyspnea, apnea, eupnea, hyperpnea, hypopnea, tachypnea, and Cheyne-Stokes respiration; and describe the way in which respiration is regulated.  5i. Digestive System: define gastroenterology, digestion, absorption, peristalsis, peritoneum, villi, omentum, amino acid, fatty acid, monosaccharide, anorexia, anorexia nervosa, and bulimia; list the structures of the true digestive tract and the accessory organs; list the four main functions of the digestive system; list the three functions of the mouth; list and describe the four types of teeth; compare and contrast deciduous and permanent teeth; diagram a molar, identify the location of the crown, neck, root, enamel, pulp cavity, dentin, cementum, and 5th cranial nerve; describe the function of salivary glands and the location of the three salivary glands in the body; describe the structures and functions of the pharynx and esophagus; diagram the stomach; identify the cardiac orifice, fundus, rugae, greater curvature, lesser curvature, pyloric canal, pyloric sphincter, pyloric orifice, and duodenum; state the three major functions of the stomach; identify five components of gastric juice, and describe their functions; describe the two phases in the production of gastric juice; state three major sections of the small intestine; list the seven functions of the small intestine; identify four components of intestinal juice, and describe their function; diagram the large intestine, identifying the ileocecal valve, appendix, cecum, ascending colon, transverse colon, descending colon, sigmoid colon, rectum, anal canal, and anal sphincter; describe the three functions of the large intestine; describe the structure and location of the liver; list the eight functions of the liver; describe the structure and function of the gallbladder; diagram a duct system for bile and identify the gallbladder, hepatic duct, cystic duct, common bile duct, pancreas, pancreatic duct, sphincter of Oddi, ampulla of Vater, and duodenum; describe the structure and location of the pancreas; describe all the functions of the pancreas; list absorption of foods in the following structures: stomach, small intestines, and large intestine; and list the four hormones that control digestion.  5j. Urinary System and Body Fluids: define urology, specific gravity, polyuria, oliguria, anuria, diuresis, pH of urine, volume, hematuria, pyuria, glycosuria, albuminuria, and ketonuria; list the four organs of the excretory system, and describe the waste from each organ; describe the location and structure of the kidney; describe and label the parts of the urinary system and their functions; describe and diagram a nephron and identify the location and functions of the following terms: afferent arterioles, glomerulus, Bowman's capsule, efferent arteriole, proximal convoluted tubule, loop of Henle, distal convoluted tubule, collecting tubule, calyces, and renal pelvis; list the four processes involved in urine formation and describe the functions of each; describe the role of antidiuretic hormone (ADH) in urine formation; list the four functions of the kidney; name two hormones produced by the kidneys, and describe the functions of each; state the normal and maximum bladder capacities; state the length of the female and the male urethra; name three constituents of urine; compare intracellular and extracellular fluids; define electrolytes; list at least five ions, and describe their functions; state the normal pH of the body fluids, and describe the three mechanisms for regulating the pH of body fluids; and describe the interrelationship between the bladder and the autonomic nervous system.  5k. Reproductive System: define gynecology, asexual, sexual, gametes, spermatozoa, ova, meiosis, gonads, testosterone, hymen, perineum, episiotomy, puberty, menopause, and contraception; diagram or identify on a chart and describe the functions of the following structures: scrotum, testes, seminiferous tubules, interstitial cells, epididymis, vas deferens, seminal vesicle, ejaculatory duct, Cowpers glands, prostate gland, and penis; draw and label a spermatozoan; diagram or identify on a chart and describe the functions of the following structures: ovaries, fallopian tubes, uterus (noting the cervix, fundus, body, myometrium, and endometrium), vagina, Bartholin glands, ovarian ligaments, broad ligaments, vulva (noting the clitoris, vestibule, urinary meatus, vaginal opening, labium minus, labium majus, and mons pubis); describe the phases of the menstrual cycle and the hormones involved; describe the function of the mammary glands, and list the advantages of breastfeeding, and list at least five methods of contraception currently in use.   1. Describe the basic principles of human genetics and heredity, which includes defining terminology such as heredity, medical genetics, chromosome, gene, DNA, RNA, congenital defects, dominant gene, recessive gene, homozygous gene, heterozygous gene, gametes, and mutation; describe the process of meiosis; state the number of chromosomes present in somatic and sex cells, and describe how sex is determined in humans; and describe what is meant by the term sex-linked, and list three sex-linked traits. 2. Perform and analyze various lab activities related to anatomy and physiology, which includes identifying anatomy of the integumentary, skeletal, muscular, nervous, and endocrine systems on models, specimens, diagrams, and/or computer programs, and identifying anatomy of the digestive, cardiovascular, respiratory, urinary, and reproductive systems on models, specimens, diagrams, and/or computer programs. |
| **End-of-Course Assessment(s):**  Teacher designed assessment  LEA designed assessment  Certification/credentialing exam (specify):  Licensing exam (specify):  Nationally recognized exam (specify):  Other (specify): |
| PROGRAM OF STUDY CURRICULUM |
| Identify the method of technical and academic curriculum development (adopted, adapted, or developed in accordance with guidance from the program advisory committee). |
| **POS technical and academic curriculum will be:**  Adopted (specify source): State-model program of study  Adapted (specify source):  Developed locally (describe):  Other (specify): |
| TEACHER CERTIFICATION |
| Provide valid teacher certification(s), candidate experience, pre-requisite and requisite licensure or certification requirement(s) for POS teachers. |
| **POS teacher requirements include:**  Teacher certification(s) (list): Skilled and Technical Sciences (STS) in Therapeutic Services (Allied Health)  Candidate experience (describe): Candidate may have experience as a Registered nurses providing care for sick, disabled, infirmed, or other individuals or groups. Nursing care includes instruction in the administration of medication and treatments, assisting a physician during treatments and examinations, referring patients to physicians and other health care professionals, and providing education for health maintenance. Each Allied Health program must have a primary teacher who is an RN to teach Level I and Level II of the program of study. For more information, please see the Bureau of Labor Statistics: Registered Nurse.  Pre-requisite professional licensure or certification requirement(s) (list): Current American Heart Association CPR Certification and:  **Primary Allied Health Teacher** **requirements:**  A current Delaware Registered Nurse license in good standing with the Delaware Division of Professional Regulations Board of Nursing: <http://regulations.delaware.gov/AdminCode/title24/1900.shtml>. The Primary Allied Health teacher must teach Levels I and Level II of the Allied Health Program of Study and be available to all supporting instructors in the development of lesson plans.  **Supporting Allied Health Teacher(s) requirements:**  A Health Education, science teacher, or other certified/licensed healthcare professional (for example: physical therapist, chiropractor, respiratory therapist) who is qualified to teach Level III or any additional courses that the LEA has assigned to support the Allied Health program of study.  Requisite professional licensure or certification requirement(s) (list):  Other (describe): |

|  |
| --- |
| VALUE-ADDED OPPORTUNITIES |
| List extended early career and college credit opportunities available during the student’s senior year. Document transition services, cooperative learning experiences, additional dual enrollment, or other. |
| **Opportunities for extended and accelerated learning include:**  Cooperative education (describe):  Structured internship (describe):  Dual enrollment (list):  Advanced Placement (list):  Transition services (describe):  Other (describe): |

|  |
| --- |
| CAREER AND TECHNICAL STUDENT ORGANIZATIONS |
| Indicate the Career and Technical Student Organization (CTSO) affiliation by checking the appropriate box. |
| HOSA – Future Health Professionals |

|  |
| --- |
| PROGRAM OF STUDY MATRIX |
| Complete the program of study matrix to demonstrate the alignment of academic and technical courses, culminating early career and/or early college experiences. Identify appropriate certification and licensure options, opportunities for obtaining early college credit (courses with articulated or dual enrollment credit agreements should be appropriately designated within the matrix), the post-secondary program sequence, and potential career options. *Attach the Program of Study Matrix*. |
| Access the [Program of Study Matrix](http://www.doe.k12.de.us/Page/2016). |

|  |  |  |
| --- | --- | --- |
| DEPARTMENT OF EDUCATION PROGRAM OF STUDY APPROVAL | | |
| The following section will be completed by staff from the Delaware Department of Education, CTE & STEM Office and reported to the LEA as part of the CTE program of study approval process. | | |
| **Date Delaware CTE Program of Study Application Received:** | | |
| **Local Education Agency (LEA):**    **School(s):** | | **Program of Study Start Date:** |
| **LEA CTE Coordinator Name:** **Phone:** **E-Mail Address:** | | |
| **Career Cluster Code:**  Health Sciences / 8 | **Career Pathway Code:**  Therapeutic Services / 8.01 | **Program of Study Code:**  Allied Health / 8.01607 |
| **CTE Program of Study Course Titles, Course Codes, and Funding Levels:**  1. Name/CIP: Fundamentals of Health Sciences / 8.0160711 / 2  2. Name/CIP: Essentials of Health Careers / 8.0160722 / 3  3. Name/CIP: Anatomy & Physiology I (A&P) / 8.0160733 / 3 | | |
| **CTE Concentrator/Completer Course Titles:**  Concentrator Course: Essentials of Heath Careers  Completer Course: Anatomy & Physiology I (A&P) | | |
| **CTE Program of Study Request:**  State-model CTE Program of Study  Local CTE Program of Study | | |
| **CTE Program of Study Attachments:**  Labor Market Information (LMI) Review;  Articulation/Dual Enrollment Agreement(s); and  Program of Study Matrix. | | |
| DDOE CTE & STEM Director Signature: Date: | | |
| DDOE Chief Academic Officer Signature: Date: | | |