

**Florida Department of Education  
Curriculum Framework**

**Program Title:**        **Cardiovascular Technology**  
**Career Cluster:**     **Health Science**

**AS**

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| CIP Number                 | 1351090100  |
| Program Type               | College Credit  |
| Standard Length            | 77 credit hours   |
| CTSO                       | HOSA: Future Health Professionals   |
| SOC Codes (all applicable) | 29-2031 Cardiovascular Technologists and Technicians  |
| CTE Program Resources      | <a href="http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml">http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml</a> |

**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 Health Science career cluster.

The program is designed to prepare students for employment as cardiovascular technologists, SOC Code 29-2031 (Cardiovascular Technologists and Technicians).

The content includes but is not limited to instruction in performing examinations leading to diagnosis and treatment of patients with cardiovascular disease. A clinical component is a necessary element to a program. Reinforcement of basic skills in English, mathematics and science occurs through classroom instruction and applied laboratory practice.

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

**Program Structure**

This program is a planned sequence of instruction consisting of 77 credit hours.

## **Standards**

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

- 01.0 Demonstrate knowledge of the health care delivery system and health occupations.
- 02.0 Demonstrate the ability to communicate and use interpersonal skills effectively.
- 03.0 Demonstrate legal and ethical responsibilities.
- 04.0 Demonstrate an understanding of and apply wellness and disease concepts.
- 05.0 Recognize and practice safety and security procedures.
- 06.0 Recognize and respond to emergency situations.
- 07.0 Recognize and practice infection control procedures.
- 08.0 Demonstrate an understanding of information technology applications in healthcare.
- 09.0 Demonstrate employability skills.
- 10.0 Demonstrate knowledge of blood borne diseases, including HIV/AIDS.
- 11.0 Apply basic math and science skills.
- 12.0 Explore career opportunities in one or more of the following: invasive cardiovascular technology (cardiac catheterization, invasive cardiac electrophysiology and non-invasive adult echocardiography, pediatric echocardiography, non-invasive vascular technology.
- 13.0 Identify the anatomic structure and function of body systems in relation to cardiovascular disease and studies.
- 14.0 Demonstrate the ability to recognize normal and abnormal electrocardiogram (EKG) rhythms and arrhythmias as each apply to intra-procedural therapies.
- 15.0 Practice safety and quality assurance.
- 16.0 Follow professional principles related to the practice of cardiovascular technology.
- 17.0 Use basic medical electronics and medical instrumentation.
- 18.0 Describe the role of the cardiovascular technologist in catastrophic event management.
- 19.0 Discuss the pharmacological aspects of cardiovascular drugs.
- 20.0 Perform patient care, record patient history and practice effective communication.

**One of the following sub-specialties must be added to the intended outcomes for students to complete the Cardiovascular Technology A.S.:**

- 21.0 Assist in all aspects of invasive cardiovascular diagnostic and interventional procedures and techniques with emphasis on cardiovascular catheterization.
- 22.0 Perform noninvasive cardiovascular techniques with an emphasis on echocardiography.
- 23.0 Perform noninvasive peripheral vascular studies.
- 24.0 Perform noninvasive cardiovascular techniques with an emphasis on echocardiography related to the pediatric patient.
- 25.0 Assist in all aspects of cardiovascular electrophysiology procedure.

Florida Department of Education  
Student Performance Standards

**Program Title:** Cardiovascular Technology  
**CIP Number:** 1351090100  
**Program Length:** 77 credit hours  
**SOC Code(s):** 29-2031

Standards 1-11 are referred to as the **Health Science Core** and are required standards in this program. Secondary and Postsecondary students completing the health science core will not have to repeat the core in any other health science program in which it is a part. When the recommended sequence is followed, the structure allows students to complete at specified points for employment or remain for advanced training or cross-training.

To ensure consistency whenever these courses are offered, the health science core standards (1-11) have been placed in a separate document. You can access the course standards and benchmarks by visiting this link:  
<http://www.fldoe.org/core/fileparse.php/5655/urlt/health-sci-core-psav-cc.rtf>

**Refer to Rule 6A-14.030 (4) F.A.C., for the minimum amount of general education coursework required in the Associate of Science (AS) degree. At the completion of this program, the student will be able to:**

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| 12.0  | Explore career opportunities in one or more of the following: invasive cardiovascular technology (cardiac catheterization, invasive cardiac electrophysiology and non-invasive adult echocardiography, pediatric echocardiography, non-invasive vascular technology. – The student will be able to: |
| 12.01 | Describe the CVT profession, including but not limited to, history, accreditation, education, job conditions, salaries, critical thinking and team building.  |
| 12.02 | Identify the cardiovascular professional organizations and discuss their roles (SDMS, ASE, SVU, HRS, and ACVP).   |
| 12.03 | Discuss certification, licensure, and registration for the Cardiovascular Technologist.   |
| 12.04 | Describe the sub-specialty of Invasive cardiovascular technology (Cardiovascular Catheterization) and identify the duties of the Cardiovascular Invasive Specialist.  |
| 12.05 | Describe the sub-specialty of and identify the duties of the Cardiovascular Technologist.   |
| 12.06 | Describe the sub-specialty of adult echocardiography and identify the duties of the Cardiovascular Technologist.  |
| 12.07 | Describe the sub-specialty of pediatric echocardiography and identify the duties of the Cardiovascular Technologist.  |
| 12.08 | Describe the sub-specialty of Non-invasive Vascular technologist and identify the duties of the Cardiovascular Technologist.  |
| 12.09 | Describe the sub-specialty of cardiac electrophysiology and identify the duties of the Cardiovascular Technologist.   |

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| 13.0  | Identify the anatomic structure and function of body systems in relation to cardiovascular disease and studies. – The student will be able to:  |
| 13.01 | Describe human anatomy and physiology with emphasis on the cardiovascular systems.  |
| 13.02 | Discuss principles and methods of disease transmission and prevention.  |
| 13.03 | Identify normal and abnormal data obtained from medical tests.  |
| 13.04 | Describe basic acquired and congenital pathological conditions of the cardiovascular systems.   |
| 14.0  | Demonstrate the ability to recognize normal and abnormal electrocardiogram (EKG) rhythms and arrhythmias as each apply to intra-procedural therapies. – The student will be able to:          |
| 14.01 | Identify cardiac anatomy and the normal and abnormal electrical conduction pathways within the heart.   |
| 14.02 | Identify the inherent rates of each segment of the nodal pathway of the heart.  |
| 14.03 | Identify the components of a normal cardiac cycle including the hemodynamic, mechanical and electrical components.  |
| 14.04 | Associate the action potential and each electrical segment of the EKG cycle (P wave, PR interval, QRS complex, ST segment, T wave, isoelectric line) to the mechanical function of the heart. |
| 14.05 | Explain how the PR interval and QRS complex are measured within the cardiac cycle.  |
| 14.06 | Identify sinus, atrial, junctional, supraventricular, and ventricular rhythms as well as heart blocks and paced rhythms.  |
| 14.07 | Correlate the clinical implications of arrhythmias to cardiac pathology.  |
| 14.08 | Differentiate artifact, interference, and noise versus arrhythmia.  |
| 14.09 | Identify the components of a 12-Lead EKG including appearance of infarct, ischemia and chamber enlargement.   |
| 15.0  | Practice safety and quality assurance. – The student will be able to:   |
| 15.01 | Apply acceptable safety practices in cardiovascular instrumentation per employer and OSHA standards.  |
| 15.02 | Demonstrate knowledge of radiation safety procedures.   |
| 15.03 | Demonstrate the practice of radiation safety procedures.  |
| 15.04 | Demonstrate knowledge of quality assurance as it relates to imaging equipment.  |
| 15.05 | Implement appropriate regulatory, institutional and department specific accreditation patient safety guidelines.  |
| 15.06 | Apply the knowledge of blood and air borne pathogens and the psychomotor skills to employ Standard precautions and safe practices to reduce occupational exposure.                            |
| 16.0  | Follow professional principles related to the practice of cardiovascular technology. – The student will be able to:   |

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| 16.01 | Carry out all responsibilities in the best interest of the patient in an excellent manner.  |
| 16.02 | Carry out assigned tasks conscientiously, honestly, enthusiastically, and accept responsibility for the task and the results.     |
| 16.03 | Function effectively as part of a team-adaptable to change and willing to teach others.   |
| 16.04 | Abide by the rules and procedures of the work site.   |
| 16.05 | Maintain a hygienic, professional appearance.   |
| 16.06 | Demonstrate pride and loyalty to the profession.  |
| 17.0  | Use basic medical electronics and medical instrumentation. – The student will be able to:   |
| 17.01 | Identify the duties related to electronic monitoring and diagnostic testing of patient.   |
| 17.02 | Demonstrate computer literacy skills as applied to cardiovascular practice.   |
| 17.03 | Operate equipment used in diagnostic testing, physiological monitoring and interventional procedures for cardiovascular patients. |
| 17.04 | Set up, calibrate, and operate selected equipment in the cardiovascular laboratory.   |
| 18.0  | Describe the role of the cardiovascular technologist in catastrophic event management. – The student will be able to:             |
| 18.01 | Follow institutional catastrophic event protocol.   |
| 18.02 | Respond to simulated emergency care situations encountered in a cardiovascular department.  |
| 18.03 | Identify the components of the defibrillator and how it is used.  |
| 18.04 | Cite the indications for cardiac defibrillation and cardioversion.  |
| 19.0  | Discuss the pharmacological aspects of cardiovascular drugs. – The student will be able to:                                       |
| 19.01 | State the mechanism of action of selected cardiovascular drugs.   |
| 19.02 | Identify and describe uses of pharmacological agents on an emergency "crash" cart.  |
| 19.03 | Use needles and syringes in preparing medications for administration in simulated practice.                                       |
| 20.0  | Perform patient care, record patient history and practice effective communication. – The student will be able to:                 |
| 20.01 | Perform patient identification and time-out procedures.   |
| 20.02 | Examine the patients chart and/or electronic medical record in order to locate pertinent information, when allowable.             |

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| 20.03  | Perform a patient history pertinent to the cardiovascular exam.   |
| 20.04  | Practice patient care with emphasis on patient privacy, patient confidentiality, informed consent, body mechanics, patient positions and patient transportation.  |
| 20.05  | Measure vital signs and differentiate between normal and abnormal values.   |
| 20.06  | Cite the indications for and name the methods of oxygen administration.   |
| 20.07  | Recognize human behaviors indicative of anxiety.  |
| 20.08  | Identify and develop effective communication and interpersonal relations skills with patients, family, and colleagues.  |
| 20.09  | Discuss approaches used in dealing with a variety of hospitalized persons.  |
| 20.10  | Describe socio-cultural traits which may affect a person's hospital care.   |
| <b>One of the following sub-specialties must be added to the intended outcomes for cardiovascular. Additional sub-specialties may be included, as desired.</b> |   |
| <b>*For those programs which include the invasive cardiovascular sub-specialty, the following student performance standards are necessary.</b>                 |   |
| 21.0   | Assist in all aspects of invasive cardiovascular diagnostic and interventional procedures and techniques with emphasis on cardiovascular catheterization. – The student will be able to:  |
| 21.01  | Describe the history of invasive cardiovascular procedures, including pioneers in the field.  |
| 21.02  | Practice sterile technique as it applies to the cardiovascular catheterization set up and protocols for cardiovascular catheterization procedures.  |
| 21.03  | Demonstrate the knowledge diagnostic left heart, right heart and vascular catheterization set up, protocols and procedures.   |
| 21.04  | Apply communication skills and procedure knowledge in patient education pre, during and post procedure.   |
| 21.05  | Perform diagnostic left heart, right heart and vascular catheterization set up, protocols, and procedures.  |
| 21.06  | Demonstrate the knowledge of diagnostic procedures in the cardiovascular Cath lab including, but not limited to, angiography, IVUS (intravascular ultrasound), biopsy, FFR (fractional flow reserve), optical coherence tomography (OCT), and electrophysiology studies.  |
| 21.07  | Demonstrate the knowledge of interventional procedures in the cardiovascular Cath lab including, but not limited to, angioplasty, stent implantation, thrombectomy, IABP (intraaortic balloon pumping), valvuloplasty, pericardiocentesis, atherectomy, closure devices, vena cava filters, LVADs, and structural heart procedures. |
| 21.08  | Describe catheter insertion techniques and assist physician with manipulation of catheterization equipment and instruments during the procedures.   |
| 21.09  | Recognize cardiovascular anatomy through angiography and assess cardiovascular status from the data.  |

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| 21.10 | Recognize and interpret cardiovascular hemodynamic parameters and record and measure left and right heart and vascular pressures.   |
| 21.11 | Determine cardiac output and cardiac index by Fick equation, thermodilution technique and angiographic technique and perform Hemodynamic calculations.  |
| 21.12 | Perform calculations which include, but are not limited to, mean arterial pressure, ejection fraction regurgitation fraction, valve area using Gorlin formula and pulmonary and systemic vascular resistances.  |
| 21.13 | Recognize presence of shunts by oximetry and perform shunt calculations.  |
| 21.14 | Discuss permanent and temporary pacemaker protocols.  |
| 21.15 | Correlate and calculate necessary data from right and left heart and vascular catheterization and assess the cardiovascular status from this information.   |
| 21.16 | Demonstrate acceptable post-Cath care of the patient and catheterization access site(s).  |
| 21.17 | Identify complications which occur during cardiovascular catheterization procedures and describe treatment options.   |
| 21.18 | Describe and perform venipuncture to initiate intravenous fluid therapy on a venipuncture model, where applicable. (Optional)   |
| 21.19 | Maintain and troubleshoot existing intravenous/intra-arterial lines, where applicable. (Optional)   |
| 21.20 | Demonstrate knowledge of basic x-ray history, theory, production, radiation biology and protection.   |
| 21.21 | Demonstrate knowledge of patient assessment and practice patient care of the invasive Cardiovascular patient, including but not limited to basic assessment, history and physical, vital signs, lab values, CNS assessment, CVS assessment, peripheral vascular assessment etc.                                       |
| 21.22 | Demonstrate the knowledge associated with cardiovascular catheterization procedures, including but not limited to Pre and post-cardiovascular catheterization patient care, monitoring and recording, manipulation of imaging equipment, image acquisition quality control, scrubbing, and circulating.               |
| 21.23 | Perform the psychomotor clinical skills associated with cardiovascular catheterization procedures, including but not limited to Pre and post-cardiovascular catheterization patient care, monitoring and recording, manipulation of imaging equipment, image acquisition quality control, scrubbing, and circulating. |
| 21.24 | Demonstrate knowledge of the pharmacologic principles and medications required to function in the cardiovascular Cath labs including pharmacology calculations and IV fluid therapy.  |
| 21.25 | Administer medications during cardiovascular catheterization procedures under the direction of the physician.   |
| 21.26 | Demonstrate knowledge and skills of ACLS protocols.   |
| 21.27 | Demonstrate knowledge of the congenital and acquired cardiovascular diseases and their treatments found in cardiovascular patients.   |
| 21.28 | Demonstrate knowledge of arterial and venous blood gas and acid-base physiology; identify normal and abnormal blood gas values, interpret blood gas and acid-base data, outline steps in collecting arterial and venous blood samples, where applicable. (Optional)   |

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| 21.29  | Discuss the main components of the blood-clotting cascade, how different pathology and pharmacological agents affect the process, and how manual, mechanical, and invasive arterial closure methods relate to post-op hemostasis.   |
| 21.30  | Demonstrate knowledge of patient preparation, sterile technique, instrumentation, and basic device function for PPM and ICD procedures.   |
| <b>*For those programs which include the adult echocardiography sub-specialty, these student performance standards are necessary.</b>                  |   |
| 22.0   | Perform noninvasive cardiovascular techniques with an emphasis on echocardiography. – The student will be able to:  |
| 22.01  | Relate normal and abnormal heart sounds to specific cardiac pathology.  |
| 22.02  | Assist in performance of stress electrocardiography and explain indications, contraindications, and positive and negative test results.   |
| 22.03  | Assist in performance of ambulatory electrocardiography, explain indications, and test results.   |
| 22.04  | Describe the physics of ultrasound as it applies to echocardiography and cardiac Doppler.   |
| 22.05  | Demonstrate function and use of noninvasive cardiology equipment.   |
| 22.06  | Perform, measure and analyze M-Mode and Two-Dimensional echocardiograms.  |
| 22.07  | Perform, measure and analyze Color Flow Doppler exams.  |
| 22.08  | Perform, measure, and analyze interventional spectral Doppler echocardiography.   |
| 22.09  | Demonstrate knowledge of pathophysiology of cardiovascular diseases as seen on echocardiography.  |
| 22.10  | Perform and demonstrate knowledge of information derived from echocardiography, including but not limited to measurements, normal parameters and equations.   |
| 22.11  | Demonstrate knowledge of patient assessment, and practice patient care of the cardiac patient.  |
| 22.12  | Perform and demonstrate knowledge of non-invasive modalities and advance techniques, including but not limited to stress echo, effects of medication, normal/abnormal findings, holter monitoring, stress testing, transesophageal echocardiogram, 3D echocardiograms, contrast agents and provocation maneuvers. |
| <b>*For those programs which include the noninvasive vascular technology sub-specialty, the following student performance standards are necessary.</b> |   |
| 23.0   | Perform noninvasive peripheral vascular studies. -- The student will be able to:  |
| 23.01  | Discuss the physics of ultrasound as it applies to Sonography imaging and Doppler, including but not limited to definition of sound, propagation of sound in tissue, Transducers and ultrasound imaging (.B, & M mode), artifacts and risks of bioeffects.  |
| 23.02  | Discuss the physical principles and instrumentation as it applies to tissue perfusion, including but not limited to general physics and laws of hemodynamics, tissue mechanics and pressure transmission, & plethysmography.  |
| 23.03  | Discuss normal vascular anatomy.  |



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| 23.04   | Interpret normal vascular ultrasonic anatomy.   |
| 23.05   | Describe patient positioning with respect to vascular modalities.   |
| 23.06   | Demonstrate knowledge of assessment and care of the cardiovascular patient.   |
| 23.07   | Discuss circulatory hemodynamics as it applies to arterial, venous and cerebral hemodynamics.   |
| 23.08   | Perform arterial patient physical assessment.   |
| 23.09   | Perform venous patient physical assessment.   |
| 23.10   | Perform cerebrovascular patient physical assessment.  |
| 23.11   | Perform noninvasive peripheral vascular evaluations, including venous, arterial, visceral and cerebral vascular studies.  |
| 23.12   | Discuss therapeutic intervention as it relates to arterial, venous, visceral and cerebrovascular studies.   |
| 23.13   | Describe test validation and measurements as they relate to vascular studies.   |
| 23.14   | Demonstrate a knowledge of the pathophysiology and etiology of diseases of the circulatory system, including venous, arterial, visceral and cerebrovascular diseases. |
| 23.15   | Discuss appropriate action based on data interpretation.  |
| <b>*For those programs which include the pediatric echocardiography sub-specialty, these student performance standards are necessary.</b> |   |
| 24.0  | Perform noninvasive cardiovascular techniques with an emphasis on echocardiography related to the pediatric patient. – The student will be able to:                   |
| 24.01   | Demonstrate knowledge of indication for echocardiogram and obtain information required for diagnosis and treatment of the pediatric patient.                          |
| 24.02   | Describe the physics of ultrasound as it applies to echocardiography and cardiac Doppler.   |
| 24.03   | Demonstrate function and safe use of cardiac ultrasound equipment.  |
| 24.04   | Demonstrate ability to acquire diagnostic images and utilization of proper display orientation.   |
| 24.05   | Perform, measure and analyze M-Mode and Two-Dimensional echocardiograms.  |
| 24.06   | Perform, measure, and analyze Color Flow Doppler exams.   |
| 24.07   | Perform, measure, and analyze spectral Doppler and recognize application for assessment of blood flow and prediction of intracardiac pressures.                       |
| 24.08   | Demonstrate knowledge of cardiac cycles and related hemodynamics.   |

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| 24.09   | Demonstrate knowledge of embryology, congenital heart diseases and acquired heart diseases.  |
| 24.10   | Demonstrate knowledge of pathophysiology of cardiovascular diseases as seen on echocardiography.   |
| 24.11   | Demonstrate knowledge of cardiac surgeries, allografts, interventional procedures and sequelae.  |
| 24.12   | Perform and demonstrate knowledge of information derived from echocardiography, including but not limited to measurements, normal parameters and equations.  |
| 24.13   | Demonstrate knowledge of limitations of echocardiography and Doppler techniques.   |
| 24.14   | Demonstrate knowledge of patient assessment, and practice patient care of the pediatric cardiac patient.   |
| 24.15   | Perform and demonstrate knowledge of advanced techniques, including but not limited to stress echo, effects of medication, normal/abnormal findings, stress testing, transesophageal echocardiogram, intra cardiac echo, 3D echo and contrast agents and provocation maneuvers.  |
| <b>*For those programs which include the invasive cardiac electrophysiology sub-specialty, the following student performance standards are necessary.</b> |  |
| 25.0  | Assist in all aspects of cardiovascular electrophysiology procedure. – The student will be able to:  |
| 25.01   | Describe the physiology of and indications for diagnostic and interventional EP procedures including, but not limited to, ventricular stimulation, syncope study, SVT study, single, dual and bi-ventricular internal cardiac device implant, venous angiography, PTVA, radiofrequency ablation, cryo-ablation, external cardioversion, internal cardioversion, pericardiocentesis, lead extraction and laser lead extraction. |
| 25.02   | Identify the complications associated with electrophysiology studies and internal cardiac device implants and describe emergency interventions.  |
| 25.03   | Demonstrate knowledge and skills of ACLS protocols.  |
| 25.04   | Demonstrate knowledge of and practice pre and post patient care for the patient undergoing diagnostic/interventional electrophysiology study and internal cardiac device implant to include review of history and physical, vital signs, lab values, medications and peripheral vascular assessment.   |
| 25.05   | Identify diagnostic and interventional catheters, their use, and how they could be configured for EGM acquisition.   |
| 25.06   | Describe catheter insertion techniques for manipulation of temporary & permanent pacing and interventional catheters.  |
| 25.07   | Practice sterile technique as it applies to the preparation of self and patients for electrophysiology procedures and internal cardiac device implants.  |
| 25.08   | Perform patient and sterile table set up for diagnostic and interventional ventricular, syncope and SVT electrophysiology procedures and internal cardiac device implants.   |
| 25.09   | Perform as a scrub and record technologist assisting physicians with diagnostic and interventional EP procedures including, but not limited to, ventricular stimulation, syncope study, SVT study, single, dual chamber, and bi-ventricular internal cardiac device implant, venous angiography, PTVA, radiofrequency ablation, cryo-ablation, external cardioversion and internal cardioversion.                              |
| 25.10   | Identify and properly utilize surgical instruments while assisting with internal cardiac device implants.  |

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| 25.11 | Identify the ionic properties of the cardiac action potential and the changes to the action potential associated with abnormal values.  |
| 25.12 | Identify the normal refractory periods of the nodes & tissue and describe the effects that antiarrhythmics may have on them.  |
| 25.13 | Identify intra-cardiac electrograms from the right & left atrium, at the AV node, bundle of His, right & left ventricles and in the coronary sinus.   |
| 25.14 | Identify and describe the mechanism and perform differential diagnosis of cardiac arrhythmias including, but not limited to, ventricular tachycardia, AV nodal reentrant tachycardia, AV reentrant tachycardia, atrial flutter and atrial fibrillation.   |
| 25.15 | Perform stimulation protocols and identify pharmacology used for induction, termination, and differential diagnosis of arrhythmias, including but not limited to, ventricular tachycardia's (ischemic, RVOT-VT, idiopathic LV VT & BBRT), AV nodal reentrant tachycardia, AV reentrant tachycardia, atrial flutter and atrial fibrillation. |
| 25.16 | Demonstrate knowledge of the pharmacologic principles and medications used for the care of patients in the cardiac electrophysiology lab.   |
| 25.17 | Demonstrate knowledge of differential diagnosis techniques and treatment of congenital arrhythmias, including but not limited to, Brugada Syndrome, Long QT syndrome, Arrhythmogenic Right Ventricular Dysplasia and Wolf-Parkinson-White.  |
| 25.18 | Identify the coronary venous system utilizing radiographic and angiographic imaging.  |
| 25.19 | Identify venous and arterial hemodynamic waveforms while performing trans-septal puncture and respond appropriately to recognized data.   |
| 25.20 | Perform in the record role, demonstrating knowledge of acquisition and evaluation of data, stimulator operations, and provide differential diagnosis of arrhythmias during electrophysiology and internal cardiac device procedures.  |
| 25.21 | Demonstrate the ability to perform basic internal cardiac device programmer operations, including interrogation, diagnostic information retrieval, pacing & sensing thresholds, and emergency pacing.   |
| 25.22 | Analyze diagnostic data and results of functional testing retrieved from pacemakers and internal cardiac devices.   |
| 25.23 | Demonstrate appropriate post-procedure care for venous/arterial access sites and/or electrophysiology procedures or internal cardiac device implant sites.  |
| 25.24 | Demonstrate knowledge of basic x-ray history, theory, production, biology, and patient/employee safety.   |
| 25.25 | Demonstrate critical behaviors and knowledge of quality control while manipulating imaging equipment, and providing image acquisition during diagnostic/interventional electrophysiology procedures and internal cardiac device implants.   |
| 25.26 | Identify mapping technologies and theories currently used in ablation procedures: To include impedance based, hybrid and electromagnetically derived systems. Mapping theories such as: anatomical, high definition, voltage, isochronal, and CFE.  |
| 25.27 | Identify the difference between bipolar and unipolar electrograms, including current filtering utilization.   |
| 25.28 | Demonstrate basic knowledge of ICE (Intracardiac echocardiography) applications currently used during electrophysiology procedures.   |
| 25.29 | Demonstrate knowledge of procedural focused aspects of the transeptal procedure used in EP labs. Including but limited to: Anatomical locations, equipment currently used, complications, indications, monitoring and scrub duties.   |

## 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.

### Special Notes

Basic preparation in English, Mathematics, and the Sciences are recommended prior to entering the Cardiovascular/Cardiopulmonary professional component of the curriculum. The following courses with an (\*) marking those thought to be essential. (Prerequisite courses required to complete the program must be included in the listed program length credits.

- \_ English - Composition\*
- \_ Communications - Speech
- \_ Electronic
- \_ Oral Biology
- \_ Anatomy & Physiology - General\*
- \_ Math - Algebra \*
- \_ Chemistry\*
- \_ Physics\*
- \_ Microbiology
- \_ Psychology - Social Skills
- \_ Computers (health informatics)
- \_ Keyboarding
- \_ Word processing
- \_ Hardware & systems
- \_ Software
- \_ Humanities - as required for graduation

Cardiovascular/cardiopulmonary technology educational programs will address one or more of the five basic sub-specialties: 1) invasive cardiovascular technology, 2) adult echocardiography) pediatric echocardiography, 4) noninvasive vascular study and 5) cardiac electrophysiology. Cardiopulmonary technology should include the additional component of pulmonary function testing. The Cardiovascular/Cardiopulmonary Technology Program may award an Associate of Applied Science (AAS) and/or Associate of Science (AS) degree within the program length guidelines. When the cardiovascular program competencies are offered, the program cannot exceed 77 credit hours.

This program meets the Department of Health's education requirements for HIV/AIDS, Domestic Violence and Prevention of Medical Errors. Although not a requirement for initial licensure, it is a requirement for renewal; therefore, the instructor may provide a certificate for renewal purposes to the student verifying these requirements have been met.

The program should meet the requirements of the American Medical Association and Commission on Accreditation of Allied Health Education Programs (CAAHEP), 1361 Park Street, Clearwater, FL 33756, Phone: 727-210-2350, Fax: 727-210-2354 [www.CAAHEP.org](http://www.CAAHEP.org).

Graduates should be prepared to take the appropriate registry and/or state licensure examinations.

Outcomes 01-11 are referred to as the Health Careers Core and do not have to be completed if the student has previously completed the Core in another health science program. The Core should be taken first or concurrently with the first course in the program. Following the successful completion of the core, the student is eligible to take the National Health Care Foundation Skill Standards Assessment with instructor approval and the completion of a portfolio.

### **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.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. 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.

### **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>