CARDIOVASCULAR TECHNOLOGY MISSISSIPPI CURRICULUM FRAMEWORK

Cardiovascular Technology -CIP: 51.0901 (Cardiovascular Technology/Technologist)

2018





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FACULTY WRITING TEAM MEMBERS

Shannon Mayo, Employer Partnership Coordinator, Northwest Community College, Senatobia, MS Cynthia Stanford-Means, Instructor, Northwest Community College, Southaven, MS Richard B. Stevens, Instructor, Northwest Community College, Southaven, MS

Administrator Writing Team Members

Keith Reed, Dean of Career and Technical Education, Northwest Community College, Southaven, MS

BUSINESS AND INDUSTRY CONTRIBUTING TEAM MEMBERS

Christina McDaniel, Baptist Hospital, Memphis, TN.*

*Denotes industry members who attended the writing meeting

OFFICE OF CURRICULUM AND INSTRUCTION TEAM MEMBERS

Angela Bryan, Ph.D., Director of Curriculum, Mississippi Community College Board Teresa A. Barnes, Ph.D., Curriculum Specialist, Mississippi Community College Board LaToya Sterling, Curriculum Specialist, Mississippi Community College Board

The Office of Curriculum and Instruction (OCI) was founded in 2013 under the Division of Workforce, Career, and Technical Education at the Mississippi Community College Board (MCCB). The office is funded through a partnership with The Mississippi Department of Education (MDE), who serves as Mississippi's fiscal agent for state and federal Career and Technical Education (CTE) Funds. The OCI is tasked with developing statewide CTE curriculum, programming, and professional development designed to meet the local and statewide economic demand.

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NATIONAL CERTIFICATION STANDARDS

Joint Review Committee on Education in Cardiovascular Technology (JRCCT)

In December 1981, the American Medical Association (AMA) Council on Medical Education (CME) officially recognized cardiovascular technology as an allied health profession. Subsequently, organizations that had indicated an interest in sponsoring accreditation activities for the cardiovascular technologist were invited to appoint a representative to an ad hoc committee to develop *Essentials*. Interested individuals were also invited to join the committee.

The ad hoc committee on development of *Essentials* for the cardiovascular technologist held its first meeting on April 29, 1982, in Atlanta, Georgia. Twenty-one individuals attended the first meeting representing the following organizations: American College of Cardiology; American Medical Association; American Society of Echocardiography; American College of Radiology; American Registry of Diagnostic Medical Sonographers; Grossmont College, El Cajon, California; American Society of Radiologic Technologists; Society of Diagnostic Medical Sonographers; National Alliance of Cardiovascular Technologists; Society of Non-Invasive Vascular Technology; American College of Chest Physicians; American Cardiology Technologists Association; Santa Fe Community College, Gainesville, Florida; and National Society for Cardiopulmonary Technology.

An initial draft of the proposed *Essentials and Guidelines of an Accredited Educational Program in Cardiovascular Technology* was developed as a result of this meeting. Subsequent meetings were held to refine and polish the *Essentials*. In September 1983, the committee members reached agreement on the *Essentials*. The Joint Review Committee on Education in Cardiovascular Technology (JRC-CVT) held its first meeting in November 1985 in preparation for its ongoing review of programs seeking accreditation in cardiovascular technology.

The following organizations initially adopted the *Essentials* and agreed to sponsor the JRC-CVT: American College of Cardiology, American College of Chest Physicians, American College of Radiology, American Institute of Ultrasound in Medicine, American Society of Echocardiography, American Society of Cardiovascular Professionals, and Society for Vascular Ultrasound (formerly the Society of Vascular Technology and the Society of Noninvasive Vascular Technology). Subsequently, the American Institute of Ultrasound in Medicine withdrew as a sponsor and the Society of Invasive Cardiovascular Professionals and The North American Society of Pacing and Electrophysicology agreed to sponsor the JRC-CVT.

For more information, please visit <u>www.jrccvt.org</u>.

The Commission on Accreditation of Allied Health Education Programs (CAAHEP)

The Commission on Accreditation of Allied Health Education Programs is the largest programmatic accreditor of the health sciences professions. In collaboration with its Committees on Accreditation, CAAHEP reviews and accredits over 2100 individual education programs in 30 health science occupations. CAAHEP accredited programs are assessed on an ongoing basis to assure that they meet the Standards and Guidelines of each profession.

For more information, please visit www.caahep.org.

Cardiovascular Credentialing International (CCI)

CCI supports the professional triad: professional organizations, personnel credentialing and educational programs. As a CCI registrant, you are neither a member nor a licensee. Licensing is required by law and , when required, will allow licensees to practice the particular profession in a certain geographic area. Recently, there are a small number of states that have enacted licensure and utilize CCI's credentials in the license process. A state board will administer the licensing examinations or oversee the licensing requirement. Credentials are administered and governed by independent certification bodies, and the holding of a credential proves that you have a fundamental knowledge in the particular specialty.

For more information, please visit www.cci-online.org.

INDUSTRY JOB PROJECTION DATA

The Cardiovascular Technologists and Technicians require an education level of associate degree. There is expected to be an 18.78% increase in occupational demand at the regional level and state level. Median annual income for this occupation is \$33, 092.80 at the state level. A summary of occupational data from www.swib.ms.gov/DataCenter/ is displayed below:

Table 1: Education Level

Program Occupations	Education Level
CARDIOVASCULAR TECHNOLOGISTS & TECHNICIANS	ASSOCIATE DEGREE

Table 2: Occupational Overview

	Region	State	United States
2014 Occupational Jobs	442	442	53438
2024 Occupational Jobs	525	525	56885
Total Change	83	83	3447
Total % Change	18.78%	18.78%	6.45%
2014 Median Hourly Earnings	\$15.91	\$15.91	\$26.12
2014 Median Annual Earnings	\$33,092.80	\$33,092.80	\$54,929.60
Annual Openings	8	8	344

Table 3: Occupational Breakdown

Description	2014 Jobs	2024 Jobs	Annual Openings	2014 Hourly Earnings	2014 Annual Earnings 2,080 Work Hours
CARDIOVASCULAR TECHNOLOGISTS & TECHNICIANS	442	525	8	\$15.91	\$33,092.80

Table 4: Occupational Change

Description	Regional	Regional %	State %	National %
	Change	Change	Change	Change
CARDIOVASCULAR TECHNOLOGISTS & TECHNICIANS	83	18.78%	18.78%	6.45%

ARTICULATION

There are currently no secondary Cardiovascular Technology programs to articulate to this program of study.

$T{\tt echnical}\;S{\tt kills}\;A{\tt ssessment}$

Colleges should report the following for students who complete the program with a career certificate, technical certificate, or an Associate of Applied Science Degrees for technical skills attainment. To use the approved Alternate Assessment for the following programs of study, colleges should provide a Letter of Notification to the Director of Career Technical Education at the MS Community College Board. Please see the following link for further instructions: http://www.mccb.edu/wkfEdu/CTDefault.aspx.

CIP Code	Program of Study	
51.0901	Cardiovascular Technology	
Level	Standard Assessment	Alternate Assessment
AAS	Cardiovascular Credentialing International (CCI), Registered Cardiovascular Invasive Specialist Exam (RCIS)	

ONLINE AND BLENDED LEARNING OPPORTUNITIES

Course content includes lecture and laboratory semester credit hours. Faculty members are encouraged to present lecture related content to students in an online or blended learning environment. Training related to online and blended learning will be available to faculty members through the MS Community College Board.

INSTRUCTIONAL STRATEGIES

Instructional strategies for faculty members implementing the curriculum can be found through the Office of Curriculum and Instruction's professional development.

ASSESSMENT STRATEGIES

The Office of Curriculum and Instruction's professional development offer assessment strategies to faculty members implementing the curriculum. Additionally, standards were included in course content when appropriate.

RESEARCH ABSTRACT

In the summer of 2017, the Office of Curriculum and Instruction (OCI) met with the different industry members who made up the advisory committees for the Cardiovascular Technology program. An industry questionnaire was used to gather feedback concerning the trends and needs, both current and future, of their field. Program faculty, administrators, and industry members were consulted regarding industry workforce needs and trends.

Industry advisory team members from the college involved with this program were asked to give input related to changes to be made to the curriculum framework. Occupation-specific skills stated include basic knowledge of cardiovascular, hemodynamics, EKG, and blood pressure.

Included in this revision is the combining of Cardiovascular Anatomy and Physiology (CVT 1214) and Cardiovascular Pharmacology (CVT 1312). The new course is Cardiovascular Anatomy, Physiology and Pharmacology (CVT 1415). In addition, Non-Invasive Cardiology I (CVT 2614) and Non-Invasive Cardiology II (CVT 2624) were removed from the framework. Finally, Cardiovascular Clinical IV (CVT 2746) was added.

REVISION HISTORY

2009, Research and Curriculum Unit, Mississippi State University 2018, Office of Curriculum and Instruction, Mississippi Community College Board

PROGRAM DESCRIPTION

The Cardiovascular Technology program trains technologists to operate sophisticated equipment in assisting physicians with diagnosing and treating patients with cardiac disease. The primary focus is on invasive cardiology procedures. The technologists are trained to work in a cardiac catheterization laboratory where they prepare patients for and assist the physician with a variety of diagnostic and therapeutic procedures usually performed via radiologically-guided catheters and other instrumentation. Most cardiovascular technologists work in hospital cardiology departments, while some work in cardiologists' offices, cardiac rehabilitation centers, or ambulatory surgery centers. This curriculum was written to meet the Commission on Accreditation of Allied Health Education Programs (CAAHEP) Standards and Guidelines for Cardiovascular Technologists.

Graduates of this 2-year program will be awarded an Associate of Applied Science Degree in Cardiovascular Technology and are eligible to make application to sit for the Cardiovascular Credentialing International (CCI), Registered Cardiovascular Invasive Specialist (RCIS) Exam.

Industry standards are based on the Cardiovascular Credentialing International (CCI), Registered Cardiovascular Invasive Specialist (RCIS) Examination Outline.

CARDIOVASCULAR TECHNOLOGY REQUIRED COURSES Anatomy & Physiology I & II and College Algebra are prerequisites.

			SCH Breakdown		SCH Breakdown			Program Certifications
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Clinical	Total Contact Hours		
CVT 1113	Foundations of Cardiovascular Technology	3	3	0	0	45		
CHE 1313	Principles of Chemistry	3	3	0	0	45		
CHE 1311	Principles of Chemistry Lab	1	0	2	0	30		
BOA 2613	Business Communication	3	3	0	0	45		
CVT 1415	Cardiovascular Anatomy, Physiology, and Pharmacology	5	4	2	0	90	Registered Cardiovascular	
BIO 2923	Microbiology	3	3	0	0	45	Invasive	
BIO 2921	Microbiology Lab	1	0	2	0	30	Specialist (RCIS)	
CVT 2716	Cardiovascular Clinical I	6	0	0	18	270	Examination	
CVT 2413	Invasive Cardiology I	3	2	2	0	60		
CVT 2726	Cardiovascular Clinical II	6	0	0	18	270		
CVT 2423	Invasive Cardiology II	4	2	2	0	60		
CVT 2512	Critical Care Applications	2	2	0	0	30		
CVT 2736	Cardiovascular Clinical III	6	0	0	18	270		
CVT 2746	Cardiovascular Clinical IV	6	0	0	18	270		
	TOTAL	52	22	10	72	1560		

GENERAL EDUCATION CORE COURSES

To receive the Associate of Applied Science Degree, a student must complete all of the required coursework found in the Career Certificate option, Technical Certificate option and a minimum of 15 semester hours of General Education Core. The courses in the General Education Core may be spaced out over the entire length of the program so that students complete some academic and Career Technical courses each semester or provided primarily within the last semester. Each community college will specify the actual courses that are required to meet the General Education Core Requirements for the Associate of Applied Science Degree at their college. The Southern Association of Colleges and Schools (SACS) Commission on Colleges Standard 2.7.3 from the Principles of Accreditation: Foundations for Quality Enhancement1 describes the general education core.

Section 2.7.3 In each undergraduate degree program, the institution requires the successful completion of a general education component at the collegiate level that (1) is substantial component of each undergraduate degree, (2) ensures breadth of knowledge, and (3) is based on a coherent rationale. For degree completion in associate programs, the component constitutes a minimum of 15 semester hours or the equivalent. These credit hours are to be drawn from and include at least one course from the following areas: humanities/fine arts, social/behavioral sciences, and natural science/mathematics. The courses do not narrowly focus on those skills, techniques, and procedures specific to a particular occupation or profession.

			SCH Breakdown			Program Certifications
		Semester	Lecture	Lab	Total Contact	
Course		Credit			Hours	
Number	Course Name	Hours				
	Humanities/Fine Arts	3				
	Social/Behavioral Sciences	3				
	College Algebra	3				
	Anatomy & Physiology I & Lab	4				
	Other academic courses per local community college requirements					
	for AAS degree	2				
	TOTAL	15				

¹

Southern Association of Colleges and Schools Commission on Colleges. (2012). *The principles of accreditation: Foundations for quality enhancement*. Retrieved from http://www.sacscoc.org/pdf/2012PrinciplesOfAcreditation.pdf

CARDIOVASCULAR TECHNOLOGY COURSES

			SCH Breakdown*				Program Certifications
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Clinical	Total Contact Hours	
CVT 1113	Foundations of Cardiovascular Technology	3	3	0	0	45	Registered
CVT 1415	Cardiovascular Anatomy, Physiology, and Pharmacology	5	4	2	0	90	Cardiovascular Invasive
CVT 2716	Cardiovascular Clinical I	6	0	0	18	270	Specialist
CVT 2413	Invasive Cardiology I	3	2	2	0	60	(RCIS) Examination
CVT 2726	Cardiovascular Clinical II	6	0	0	18	270	
CVT 2423	Invasive Cardiology II	4	2	2	0	60	
CVT 2512	Critical Care Applications	2	2	0	0	30	
CVT 2736	Cardiovascular Clinical III	6	0	0	18	270	
CVT 2746	Cardiovascular Clinical IV	6	0	0	18	270	

Course Descriptions

Course Number and Name:	CVT 1113 Fo	oundations of Car	diovascular Teo	hnology		
Description:	This course is designed to introduce the students to the fundamental elements in cardiovascular technology, including terminology, important to the delivery of health care in a safe, efficient, and professional manner.					
Hour Breakdown:	Semester Credit H	ours Lecture	Lab	Contact Hours		
	3	3	0	45		
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Prerequisite:

Instructor Approved

Student Learning Outcomes:

- 1. Demonstrate knowledge of the history of cardiovascular technology.
 - a. Identify significant events and dates in the development of the profession.
 - b. Identify significant individuals that influenced the development of the profession.
- 2. Summarize the roles of the cardiovascular technician.
 - a. Identify the roles and responsibilities of the cardiovascular catheterization team.
 - b. Discuss the professional relationships among the roles.
 - c. Discuss responsible participation in a supervisory relationship.
 - d. Explain the importance of professional development and formal continuing education.
- 3. Discuss state and national professional organizations, ethics and standards, principles, and guidelines.
 - a. Identify the functions and influence of national, state, and local professional associations.
 - b. Identify the methods of promoting cardiovascular technology.
 - c. Discuss ethics and standards as related to the cardiovascular technician including provisions of HIPPA.
 - d. Explain applicable state and federal laws to include the Americans with Disabilities Act and the Vulnerable Adult Act including the role of the Joint Commission on the Accreditation of Healthcare Organizations (JCAHO).
 - e. Discuss on-site rules, regulations, and guidelines affecting cardiovascular technology.
- 4. Discuss word components, terms, procedures, abbreviations, and symbols related to cardiovascular technology.
 - a. Identify combining forms, suffixes, and prefixes related to the various body systems.
 - b. Use medical terminology correctly including spelling and pronunciation.
 - c. Utilize abbreviations and symbols related to the body systems and physical conditions related to cardiovascular technology.
 - d. Communicate information using medical terms in a clear, concise manner.
- 5. Discuss safety measures as related to cardiovascular technology.
 - a. Discuss the role of OSHA in the clinical environment.
 - b. Explain Universal Precautions.
 - c. Demonstrate hand-washing procedures.
- 6. Explain areas of cardiovascular performance of the cardiovascular technician.
 - a. Define activities of daily procedures.
 - b. Define work and production activities.
 - c. Discuss the relationship of each performance area to each other.
 - d. Discuss the balance of performance areas to the achievement of health and wellness.
- 7. Demonstrate basic therapeutic communication skills.
 - a. Identify nonverbal and verbal components of active listening.
 - b. Explain the dynamics of feedback in interpersonal skills.

- 8. Discuss equipment in the heart cath lab.
 - a. Identify the major diagnostic and therapeutic equipment used in the lab.
 - b. Explain the function of each piece of equipment.
- 9. Explain lab management responsibilities.
 - a. List lab management responsibilities.
 - b. Discuss individual areas of management responsibilities including budget and finance, lab standards, quality assurance, record keeping, and continuing education.
- 10. Discuss that membership in professional organizations is important.
 - a. List three professional organizations involving cardiovascular technology.
 - b. Discuss the merits of the American Heart Association as related to cardiovascular technology.

CVT1	Cardiovascular Anatomy and Physiology
	Cardiovascular Diseases Pathophysiology
CVT2	Diagnostic Techniques
	Intervention
CVT3	Equipment and Instrumentation
	Patient Care and Patient Assessment
CVT4	
CVT7	
CVT8	

Course Number and Name:

CVT 1415 Cardiovascular Anatomy, Physiology, and Pharmacology

Description:

Hour Breakdown:

A study of anatomy and physiology in relation to the practice of cardiovascular technology.

Semester Credit Hours	Lecture	Lab	Contact Hours
5	4	2	90

Prerequisite:

Instructor Approved

Student Learning Outcomes:

- 1. Discuss the functions and major components of the circulatory system.
 - a. Describe the functions of the circulatory system.
 - b. Describe the major components of the circulatory system.
 - c. Describe regulatory mechanisms that affect the circulatory system.
 - d. Describe how endocrine and neurological system activity affects the circulatory system, especially heart rate and blood pressure.
- 2. Explain the development of the cardiovascular system.
 - a. Review development of fetal circulation.
 - b. Describe how abnormal fetal circulatory development affects the postnatal circulatory function.
- 3. Discuss the components of blood.
 - a. List the different types of formed elements of blood.
 - b. Describe the origin and function of erythrocytes, leukocytes, and thrombocytes.
 - c. List the different types of substances present in plasma.
- 4. Describe the heart and its functions.
 - a. Describe the location of the heart in relationship to other organs of the thoracic cavity and their associated serous membranes.
 - b. Describe the structure and functions of the three layers of the heart wall.
 - c. Identify the chambers, valves, and associated vessels of the heart.
 - d. Trace the flow of blood through the heart, and distinguish between the pulmonary and systemic circulations.
 - e. Describe the location of the parts of the conduction system of the heart, and trace the pathway of impulse initiation and conduction.
 - f. Discuss general electrical theory as it applies to cardiac electrical function.
- 5. Describe the functions of the blood vessels.
 - a. Describe the structure, size, and function of arteries, capillaries, and veins.
 - b. Explain why capillaries are considered the functional units of the circulatory system.
 - c. Discuss fluid dynamics as they apply to pressure, flow, and cardiovascular system.
- 6. Discuss the principal arteries of the body.
 - a. List the arterial branches of the ascending aorta and aortic arch.
 - b. Describe the arterial supply to the brain.
 - c. Describe the arterial pathways that supply the upper extremities.
 - d. Describe the major arteries to the thorax, abdomen, and lower extremities.
- 7. Explain the principal veins of the body.
 - a. Describe the venous drainage of the head, neck, and upper extremities.
 - b. Describe the venous drainage for the thorax, lower extremities, and abdominal region.
- 8. Discuss cardiovascular disease clinical considerations.
 - a. Give several examples of cardiac arrhythmias and their clinical significance.
 - b. Define ventricular fibrillation, its clinical significance, and forms of treatment.
 - c. Assess the clinical significance of data obtained through blood analysis.

- 9. Discuss pharmacology and its basic components.
 - a. Define absorption, distribution, metabolism, and excretion.
 - b. Define half-life.
 - c. Identify factors influencing dosing schedules.
 - d. Explain factors that affect how drugs act on the target tissue.
 - e. Explain how receptors work.
 - f. Define antagonist and agonist reactions.
 - g. Explain factors that may influence a drug's therapeutic response.
 - h. Explain factors that may contribute to toxicity.
 - i. Describe the difference between interactions and incompatibilities.
- 10. Demonstrate basic knowledge of analgesics, anesthetics, and narcotics and their relationship to cardiovascular technology.
 - a. Define controlled substance.
 - b. Identify the actions of each medication.
 - c. Identify the appropriate uses of each medication as they pertain to the cardiac cath lab.
 - d. State the appropriate doses of the medications.
 - e. Explain the contraindications, adverse reactions, and side effects of each medication.
 - f. Identify the actions of the reversal agents and which medications they reverse.
 - g. Identify the appropriate monitoring necessary to provide safe patient care when administering controlled substances.
- 11. Discuss the classification of drugs known as anti-arrhythmics and their effects on the cardiovascular system.
 - a. Identify the mechanism of action and indication for treatment of each class of anti-arrhythmics.
 - b. Explain the actions and uses of anti-arrhythmics.
 - c. Identify the contraindications and adverse reactions of the medications.
 - d. Identify the appropriate dose of each antiarrhythmic.
 - e. Explain the appropriate administration of medications.
- 12. Discuss the classification of drugs known as hypertensives and their effects on the circulatory system.
 - a. Discuss hypertension and the differences among primary and secondary hypertension.
 - b. Describe the risks of hypertension.
 - c. Define the treatments for hypertension.
 - d. Describe how beta blockers, ace inhibitors, and calcium channel blockers work.
 - e. Summarize the actions of each medication.
 - f. Discuss the contraindications, side effects, and possible adverse reactions to all medications.
 - g. Identify the normal dose of medications and how they are correctly administered.
- 13. Identify the major cardiac stimulants and their actions on the myocardium.
 - a. Identify the mechanism each medication used to increase myocardial contractility.
 - b. Identify the appropriate uses of each medication.
 - c. Discuss the situations when each medication is contraindicated.
 - d. Discuss possible adverse reactions to each medication and how to avoid them.
- 14. Demonstrate knowledge of anti-angina medications and their relationship to chest pain.
 - a. Discuss angina and its causes.
 - b. Define unstable angina.
 - c. Explain the goals of treatment of angina.
 - d. Describe how beta blockers work to relieve angina.
 - e. Describe how calcium channel blockers work to relieve angina.
 - f. Describe how nitrates act to relieve angina.
 - g. Discuss the action, indication, and normal dose for the antianginal medications.
- 15. Discuss the clinical usage of anticoagulants, anti-platelets, and thrombolytic medications and their effects on the clotting mechanisms of the circulatory system.
 - a. Discuss the clotting process and the stimulus for clotting.
 - b. Discuss why a coronary lesion is likely to attract clot after an interventional procedure.

- c. Explain how the anticoagulant heparin works.
- d. Describe how GP IIb/IIIa antiplatelet drugs work and how they are used.
- e. Explain how the oral antiplatelet drugs work.
- f. Explain how thrombolytic medications work to dissolve clots and how they are used.
- g. Identify the complications to each drug and how to prevent them.
- h. Identify the contraindications to each drug.
- 16. Discuss the classification of drugs known as diuretics and their clinical effectiveness in treating hypertension.
 - a. Identify the mechanism involving the renal system that contributes to regulation of blood pressure.
 - b. Describe how diuretics work to treat congestive heart failure.
 - c. Identify the contraindications to diuretics.
 - d. Identify the side effects and possible adverse events that can occur with administration of diuretics.
 - e. Identify the outcomes that demonstrate the therapeutic effects of diuretics.
- 17. Discuss the diagnostic properties and possible allergic reactions in the use of contrast media.
 - a. Discuss the uses, doses, contraindications, side effects, and possible adverse reactions of medications.
 - b. Identify the maximum dose of contrast.
 - c. Discuss the signs and symptoms of a contrast allergy.
 - d. Identify the medications useful for treating allergic reactions.

- CVT1 Cardiovascular Anatomy and Physiology
- CVT2 Cardiovascular Diseases Pathophysiology
- CVT3 Diagnostic Techniques
- CVT4 Intervention
- CVT5 Hemodynamic Data
- CVT6 Pharmacology
- CVT7 Equipment and Instrumentation
- CVT8 Patient Care and Patient Assessment

Course Number and Name:	CVT 2413	Invasive Ca	diology I		
Description:	Introduces th catheterizatic diagnosis. Ad- assessment, r anatomy, equ hemodynamic and treatmen	e students to f on laboratory a ditional topics adiography, p lipment and to c data and ana t of cardiac ca	the specific pro- ind the use of include asepti harmacology, pols utilized in lysis, right and theterization.	ocedures per the resulting to techniques cardiac wave cardiac cath d left heart ca	formed in the cardiac data for patient s, sterilization, patient forms, coronary artery eterization, aths, and complications
Hour Breakdown:	Semester C	Credit Hours	Lecture	Lab	Contact Hours
	3		2	2	60

Prerequisite:

Instructor Approved

Student Learning Outcomes:

- 1. Demonstrate knowledge of sterilization principles and sterile technique.
 - a. Define and differentiate between the terms "sterile" and "aseptic."
 - b. Describe and perform sterile technique as related to cardiac catheterization.
 - c. Explain the three major types of sterilization processes.
 - d. List and describe the sterilization equipment and supplies utilized in the cath lab.
 - Discuss the topics of infection, infectious diseases, and infection control. e.
- Discuss and perform patient assessment as it relates to cardiac catheterization. 2.
 - a. Demonstrate how to obtain vital information from the patient as well as the patient's medical folder.
 - b. Summarize the various components that make up an adequate patient assessment and the importance of each.
 - Demonstrate cardiac and peripheral auscultation and their importance in patient assessment. c.
- Demonstrate knowledge of radiology and radiography in relation to cardiovascular technology. 3.
 - a. Discuss briefly X-ray theory and its origins, systems, and safety.
 - b. Discuss X-ray techniques and patient positioning.
 - c. Identify the role radiography has in cardiac catheterization.
 - d. Identify radiological equipment and supplies utilized in the cath lab.
 - e. List the associated risks to patient and technician associated with radiation and contrast media exposure.
 - f. Discuss imaging process being employed by the cardiac catheterization industry.
- 4. Discuss basic pharmacology as related to cardiac catheterization.
 - a. Identify examples of the various classifications of cardiac medication.
 - b. Demonstrate basic knowledge of beta blockers, antiarrhythmics, calcium and sodium channel blockers, analgesics, anticoagulants, diuretics, cardiotonics, analgesics, and platelet inhibitors and thrombolytics.
 - c. Identify emergency drugs located in the emergency crash cart.
 - d. List the various routes of administration.
- 5. Demonstrate knowledge of the various cardiac wave forms that may be encountered in the cath lab.
 - a. Identify the components of a cardiac wave form.
 - b. Explain which cardiac wave forms are associated with which cardiac disease or abnormality.
 - c. Differentiate between cardiac wave form abnormality and artifact or interference.
- Identify all major coronary arteries and their locations.
 - a. List all of the major coronary arteries and their locations.
 - b. List all of the major coronary veins and their locations.
 - c. Distinguish between antegrade and retrograde blood flow directions.
 - d. Define CAD (coronary artery disease) and its effects on the American population.

- 7. Discuss the importance of hemodynamic data analysis.
 - a. Describe the various forms of cardiovascular hemodynamics.
 - b. List the five pressure readings obtained by the Swan-Ganz pulmonary artery catheter and the importance of each.
 - c. Define hemodynamic terms.
 - d. Explain the formulas for obtaining cardiac output, cardiac index, stroke volume index, right ventricular stroke work index, peripheral vascular resistance, and systemic vascular resistance.
- 8. Discuss in detail the cardiac catheterization tools and equipment found in the cath lab.
 - a. Identify and explain the use of the fluoroscope, physiologic recorder, contrast power injector, and patient table.
 - b. List the common items and supplies found in the cat lab crash cart.
 - c. Discuss the team approach to cardiac catheterization.
 - d. Identify the members that make up a cardiac cath team and the responsibility of each.
- 9. Describe and discuss cardiac catheterization techniques involving right and left heart cath procedures.
 - a. Describe and explain a right heart catheterization procedure.
 - b. List the various cardiomyopathies that may require a right heart cath procedure.
 - c. List the various catheter types and supplies that may be required in a right heart cath procedure.
 - d. Describe and explain a left heart catheterization and procedure.
 - e. List the various cardiomyopathies that may require a left heart cath procedure.
 - f. List the various catheter types and supplies that may be required in a left heart procedure.

- CVT2 Cardiovascular Diseases Pathophysiology
- CVT3 Diagnostic Techniques
- CVT4 Intervention
- CVT5 Hemodynamic Data
- CVT6 Pharmacology
- CVT7 Equipment and Instrumentation
- CVT8 Patient Care and Patient Assessment

Course Number and Name:	CVT 2423	Invasive Care	liology II	
Description:	This course is d teaching the st used in invasive diseases includ failure, valve di congenital ano learn the variou outputs, vascul	lesigned to tie tog udents classificat e cardiology. An i ing coronary arte iseases, cardiomy malies, and repai us calculations pe ar resistance, val	ether cardiac disease ons and the use of eq n-depth presentation ry disease, angina, my opathies, pericardial o r procedures is used. rformed in the cath la ve areas, and shunts.	is as well as to continue juipment and techniques of various cardiac vocardial infarction, heart disorders, arrhythmias, Additionally, students will ab including cardiac
Hour Proskdown	Somostor Cr		turo Lab	Contact Hours

Hour Breakdown:	Semester Credit Hours	Lecture	Lab	Contact Hours
	3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

- 1. Demonstrate extensive knowledge of cardiovascular conditions and diseases.
 - a. Discuss the general description, etiology, pathogenesis, clinical manifestations including patient presentation, EKG, stress and cardiac cath findings, detailed hemodynamic and angiographic findings, and laboratory values including but not limited to the following cardiac diseases:
 - (1) Coronary artery disease
 - (2) Atherosclerosis thrombus formation
 - (3) Restenosis after angioplasty
 - (4) Stable angina
 - (5) Unstable angina
 - (6) Prinzmetal's or variant angina
 - (7) Acute myocardial infarction
 - (8) Right side heart failure
 - (9) Left side heart failure
 - (10) Dilated cardiomyopathy
 - (11) Hypertrophic cardiomyopathy with and without obstruction
 - (12) Restrictive cardiomyopathy
 - (13) Myocarditis
 - (14) Endocarditis
 - (15) Pericarditis
 - (16) Pericardial disorders and effusion
 - (17) Constrictive pericarditis
 - (18) Cardiac tamponade
 - (19) Aortic stenosis and insufficiency
 - (20) Mitral stenosis and insufficiency
 - (21) Pulmonary stenosis and insufficiency
 - (22) Bicuspid stenosis and insufficiency
 - (23) Various congenital anomalies
 - (24) Patent ductus arteriosus
 - (25) Artrial septal defect
 - (26) Ventricular septal defect
 - (27) Truncus arteriosus
 - (28) Bicuspid aortic valve
 - (29) Coarctation of the aorta
 - (30) Tetrology of Fallot
 - (31) Transposition of the great vessels

- (32) Bicuspid atresia
- (33) Anomalous venous return
- (34) Kawasaki's disease
- (35) Ebstein's anomaly
- (36) Aortic dissection and aneurysm
- b. Discuss the treatments of the following cardiac diseases:
 - (1) Coronary artery disease
 - (2) Atherosclerosis thrombus formation
 - (3) Restenosis after angioplasty
 - (4) Stable angina
 - (5) Unstable angina
 - (6) Prinzmetal's or variant angina
 - (7) Acute myocardial infarction
 - (8) Right side heart failure
 - (9) Left side heart failure
 - (10) Dilated cardiomyopathy
 - (11) Hypertrophic cardiomyopathy with and without obstruction
 - (12) Restrictive cardiomyopathy
 - (13) Myocarditis
 - (14) Endocarditis
 - (15) Pericarditis
 - (16) Pericardial disorders and effusion
 - (17) Constrictive pericarditis
 - (18) Cardiac tamponade
 - (19) Aortic stenosis and insufficiency
 - (20) Mitral stenosis and insufficiency
 - (21) Pulmonary stenosis and insufficiency
 - (22) Bicuspid stenosis and insufficiency
 - (23) Various congenital anomalies
 - (24) Patent ductus arteriosus
 - (25) Artrial septal defect
 - (26) Ventricular septal defect
 - (27) Truncus arteriosus
 - (28) Bicuspid aortic valve
 - (29) Coarctation of the aorta
 - (30) Tetrology of Fallot
 - (31) Transposition of the great vessels
 - (32) Bicuspid atresia
 - (33) Anomalous venous return
 - (34) Kawasaki's disease
 - (35) Ebstein's anomaly
 - (36) Aortic dissection and aneurysm
- 2. Demonstrate cardiovascular hemodynamic knowledge as it relates to the cath-lab environment.
- a. Perform the following calculations, and know the normal values of the following:
 - (1) Mean arterial pressure
 - (2) Cardiac output
 - (3) Fick method
 - (4) Thermodilution method
 - (5) Angiography method
 - (6) Cardiac index
 - (7) Ejection fraction
 - (8) Regurgitatant fractions
 - (9) Systemic and pulmonary vascular resistance

- (10) Systolic ejection period
- (11) Diastolic filling period
- (12) Valve area calculation (Gorlin and Haaki formulas)
- (13) Shunts—right to left, left to right
- (14) Systemic blood flow (SBF)
- (15) Pulmonic blood flow (PBF)
- (16) Shunt ratio (Qp:Qs)
- (17) Percent shunt
- (18) Absolute shunt
- b. Identify the implications and treatments for the abnormal values of the following:
 - (1) Mean arterial pressure
 - (2) Cardiac output
 - (3) Fick method
 - (4) Thermodilution method
 - (5) Angiography method
 - (6) Green dye method
 - (7) Cardiac index
 - (8) Ejection fraction
 - (9) Regurgitant fractions
 - (10) Systemic and pulmonary vascular resistance
 - (11) Systolic ejection period
 - (12) Diastolic filling period
 - (13) Valve area calculation (Gorlin and Haaki formulas)
 - (14) Shunts—right to left, left to right
 - (15) Systemic blood flow (SBF)
 - (16) Pulmonic blood flow (PBF)
 - (17) Shunt ratio (Qp:Qs)
 - (18) Percent shunt
 - (19) Absolute shunt
- 3. Demonstrate advanced knowledge of common cardiac medications and IV therapy.
 - a. Identify the indications, contraindications, actions, risks, benefits, and dosages of commonly used cardiac medications.
 - b. Identify drug calculations of commonly used cardiac medications.
- 4. Demonstrate knowledge of cardiac pacemakers and defibrillators.
 - a. Discuss the indications, coding, setup, and troubleshooting of cardiac pacemakers.
 - b. Discuss the indications, coding, setup, and troubleshooting of automatic implantable cardioverter defibrillators (AICDs).
- 5. Demonstrate knowledge of an electrophysiology study as it relates to cardiovascular technology.
 - a. Discuss the indications, risks, benefits, equipment utilized, and data obtained in an electrophysiology study (EPS).
 - b. Discuss the use of radio frequency ablation and cryo-therapy techniques frequently used in electrophysiology studies.

- CVT1 Cardiovascular Anatomy and Physiology
- CVT2 Cardiovascular Diseases Pathophysiology
- CVT3 Diagnostic Techniques
- CVT4 Intervention
- CVT5 Hemodynamic Data
- CVT6 Pharmacology
- CVT7 Equipment and Instrumentation
- CVT8 Patient Care and Patient Assessment

Course Number and Name:	CVT 2512 Ci	itical Care Appli	cation			
Description:	This course is designed to familiarize students with characteristics of criticall cardiopulmonary patients and specific needs of such patients in relation to their particular illnesses. Patient case studies will be presented for student discussion and will address the specific diagnostic and therapeutic modalitie available to the cardiovascular patient for palliative and corrective results.					
Hour Breakdown:	Semester Credit Hou	rs Lecture	Lab	Contact Hours		
	2	2	0	30		
Prerequisite:	Instructor Approved					

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Student Learning Outcomes:

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- 1. Properly assess the patient's overall clinical condition.
 - a. Detect, discuss, and differentiate among the study patient's anomalous cardiovascular signs and symptoms according to the information presented in the patient case study.
 - b. Determine a tentative diagnosis of a critically ill patient according to the information presented in the patient study.
- 2. Determine the proper diagnostic and therapeutic treatment plan for the patient.

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- a. Explain in detail the sequential steps of the diagnostic and therapeutic treatments as prescribed for the study patient.
- b. Compare and contrast the terms diagnostic and therapeutic in relation to cardiovascular technology and cardiac catheterization procedures.
- 3. Discuss the probable prognosis of the patient according to the information presented in the patient case study.
 - a. Define the medical term prognosis.
 - b. Compare and contrast the term prognosis with the term diagnosis.
- 4. List and discuss preventative measures, if any, of the patient's clinical diagnosis.
 - a. List several types of preventative measures in combating coronary artery disease.
 - b. List several types of genetic predispositions that may influence the onset of cardiovascular disorders.
- 5. Discuss any recent relevant information, clinical studies, clinical trials, news articles, and publications concerning the patient's condition and/or disease according to the information presented in the patient case studies.
 - a. Select two topics, and give an oral presentation to the class regarding a condition or disease previously mentioned in a recent case study.
 - b. Provide case studies of anonymous patients.
- 6. Define the five basic steps of research.
 - a. Define the term problem as it relates to research.
 - b. Define the terms hypothesis and hypothesis testing as they relate to research.
 - c. Define the basic step collection of data as it relates to research.
 - d. Define the basic step interpretation of data as it relates to research.
 - e. Define the terms summary and discussion as they relate to research.
- 7. Discuss various statistical methods.
 - a. Define the term mean as it relates to statistical research.
 - b. Define the term median as it relates to statistical research.
 - c. Define the term mode as it relates to statistical research.
 - d. List and discuss the measures of central tendency.
 - e. Discuss various research and study designs.

- 8. Perform a research project.
 - a. Identify trends in the cardiovascular technology industry.
 - b. Present a research paper.

Cardiovascular Anatomy and Physiolo	gy
	Cardiovascular Anatomy and Physiolo

- CVT2 Cardiovascular Diseases Pathophysiology
- CVT3 Diagnostic Techniques
- CVT4 Intervention
- CVT5 Hemodynamic Data
- CVT6 Pharmacology
- CVT7 Equipment and Instrumentation
- CVT8 Patient Care and Patient Assessment

Course Number and Name:	CVT 2716	Cardiovascular Clinica	11			
Description:	Patient assessment and care plan formation are presented in the hospital environment. Clinical experience in all procedures performed in the cardiovascular laboratories, including use of equipment, performing tests, and patient care as it relates to the cardiovascular areas with emphasis on cardiac catheterization, ECG, stress testing, Holter monitoring, and introduction to echocardiography.					
Hour Breakdown:	Semester C Hours	redit Lecture	Clinical	Contact Hours		
	6	0	18	270		

Prerequisite:

Instructor Approved

Student Learning Outcomes:

- 1. Develop the appropriate psychomotor clinical skills as they relate to cardiovascular technology.
 - a. Observe and practice the skills required to function in all aspects in the cardiac cath lab in the appropriate time frame as indicated on the clinical checklist including the following:
 - (1) Patient transport
 - (2) Knowledge of department policies and procedures
 - Holding area, pre and post cath (3)
 - (4) X-ray positioning—manipulation of the imaging equipment and film development
 - (5) Scrubbing position
 - (6) **Circulating position**
 - Physiologic monitoring/recording position (7)
- 2. Develop the appropriate clinical and cognitive knowledge as it relates to cardiovascular technology.
 - a. Observe and practice the clinical and cognitive skills required to function in all aspects in the noninvasive cardiology department in the appropriate time frame as indicated on the clinical skills checklist including the following:
 - **EKG** department (1)
 - (2) Holter monitoring
 - (3) Stress testing
 - (4) Echocardiography laboratories
 - b. Demonstrate the clinical and cognitive skills required to function in all aspects in the noninvasive cardiology department in the appropriate time frame as indicated on the clinical skills checklist including the following:
 - EKG department (1)
 - (2) Holter monitoring
 - (3) Stress testing
 - (4) Echocardiography laboratories
- 3. Demonstrate the application of basic CPR.
 - a. Complete the American Heart Association program Basic Cardiac Life Support.
 - b. Exhibit correct one person CPR technique.
 - c. Exhibit correct two person CPR technique.
 - d. React to a clinical situation during CPR.
 - e. Exhibit correct techniques with a manual resuscitation bag.
 - f. Troubleshoot a resuscitation bag in the event of malfunction.

- 4. Demonstrate knowledge of protective and reverse isolation.
 - a. Identify the correct protective and reverse isolation procedures and protocols.
 - b. Demonstrate the correct protective and reverse isolation procedures and protocols.
- 5. Demonstrate interpersonal and affective skills with clinical affiliates.
 - a. Demonstrate skills within the department.
 - b. Demonstrate using effective telephone etiquette.
 - c. Demonstrate correct charge and record keeping procedures.
 - d. Follow policy and procedures manual.
- 6. Demonstrate knowledge of equipment used in the cath lab environment.
 - a. Demonstrate equipment assembly and disassembly.
 - b. Demonstrate equipment acquisition, setup, and cleaning.
- 7. Obtain patient vital signs.
 - a. Identify the steps in taking a patient's temperature, pulse, respiration, and blood pressure.
 - b. Practice taking temperature, pulse, respiration, and blood pressure.
- 8. Demonstrate appropriate charting.
 - a. Identify the different sections that make up a patient's chart.
 - b. Record all entries accurately and neatly.
 - c. Explain the chart significance as a legal document.
 - d. Clarify symbols and figures used for chart entries.
- 9. Observe professional communication in a cath lab/hospital environment.
 - a. Communicate and interact effectively with the primary physician and all medical staff.
 - b. Communicate and interact effectively with nursing staff and other allied health professionals.
 - c. Communicate effectively with patients and family members.

CVT1	Cardiovascular Anatomy and Physiology
CVT2	Cardiovascular Diseases Pathophysiology
CVT3	Diagnostic Techniques
CVT4	Intervention
CVT5	Hemodynamic Data
CVT6	Pharmacology
CVT7	Equipment and Instrumentation
CVT8	Patient Care and Patient Assessment

Course Number and Name:	CVT 2726	Cardiovascular Clir	nical II	
Description:	This course is de invasive cardiolo techniques, hen output measure includes circulat equipment durin procedures.	esigned for students to ogy including pre and p nodynamic monitoring ments. Clinical practic ing, scrubbing, recodir ng both diagnosis and	gain more in-dep post cath activities , intra-aortic ballo e in the cardiac ca ng, and manipulati interventional cat	th clinical experience in , cardiovascular on pump, and cardiac theterization lab ing the imaging heterization
Hour Breakdown:	Semester Cre Hours	dit Lecture	Clinical	Contact Hours
	6	0	18	270

Prerequisite:

Instructor Approved

Student Learning Outcomes:

- 1. Refine the appropriate psychomotor clinical skills as they relate to cardiovascular technology.
 - a. Demonstrate the skills required to function in all aspects in the cardiac cath lab in the appropriate time frame as indicated on the clinical checklist including the following:
 - (1) Patient transport
 - (2) Knowledge of department policies and procedures
 - (3) Holding area, pre and post cath
 - (4) X-ray positioning—manipulation of the imaging equipment and film development
 - (5) Scrubbing position
 - (6) Circulating position
 - (7) Physiologic monitoring/recording position
- 2. Refine the clinical and cognitive knowledge as it relates to cardiovascular technology.
 - a. Demonstrate the clinical and cognitive skills required to function in all aspects in the noninvasive cardiology department in the appropriate time frame as indicated on the clinical skills checklist including the following:
 - (1) EKG department
 - (2) Holter monitoring
 - (3) Stress testing
 - (4) Echocardiography laboratories
- 3. Practice protective and reverse isolation.
 - a. Identify the steps in protective and reverse isolation procedures and protocols.
 - b. Demonstrate the steps in protective and reverse isolation procedures and protocols.
- 4. Practice interpersonal and affective skills with clinical affiliates.
 - a. Demonstrate skills within the department.
 - b. Demonstrate using effective telephone etiquette.
 - c. Demonstrate correct charge and record keeping procedures.
 - d. Follow policy and procedures manual.
- 5. Practice knowledge of equipment used in the cath lab environment.
 - a. Demonstrate equipment assembly and disassembly.
 - b. Demonstrate equipment acquisition, setup, and cleaning.
- 6. Discuss types of sterilization and cleaning used in clinical affiliates.
 - a. Discuss knowledge chemical, gas, and steam autoclave sterilization and cleaning.
 - b. Discuss the pasteurization, respective time, concentration, and temperature of each method.

- 7. Continue to practice obtaining patient vital signs.
- 8. Practice appropriate charting.
- 9. Demonstrate professional communication in a cath lab/hospital environment.
 - a. Communicate and interact effectively with the primary physician and all medical staff.
 - b. Communicate and interact effectively with nursing staff and other allied health professionals.
 - c. Communicate effectively with patients and family members.

- CVT1 Cardiovascular Anatomy and Physiology
- CVT2 Cardiovascular Diseases Pathophysiology
- CVT3 Diagnostic Techniques
- CVT4 Intervention
- CVT5 Hemodynamic Data
- CVT6 Pharmacology
- CVT7 Equipment and Instrumentation
- CVT8 Patient Care and Patient Assessment

Course Number and Name: CVT 2736 Cardiovascular Clinical III	
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Description:Designed for students to gain additional clinical experience and polish their
skills in the cath lab performing all duties involved in diagnostic and
interventional cases.

Hour Breakdown:	Semester Credit Hours	Lecture	Clinical	Contact Hours
	6	0	18	270

Prerequisite:

Student Learning Outcomes:

Instructor Approved

- 1. Demonstrate mastery of the appropriate skills as detailed on the clinical skills checklists.
 - a. Observe and practice the skills required to function in all aspects in the cardiac cath lab in the appropriate time frame as indicated on the clinical checklist including the following:
 - (1) Patient transport
 - (2) Knowledge of department policies and procedures
 - (3) Holding area, pre and post cath
 - (4) X-ray positioning—manipulation of the imaging equipment and film development.
 - (5) Scrubbing position
 - (6) Circulating position
 - (7) Physiologic monitoring/recording position
 - b. Demonstrate mastery of the skills required to function in all aspects in the cardiac cath lab in the appropriate time frame as indicated on the clinical checklist including the following:
 - (1) Patient transport
 - (2) Knowledge of department policies and procedures
 - (3) Holding area, pre and post cath
 - (4) X-ray positioning—manipulation of the imaging equipment and film development
 - (5) Scrubbing position
 - (6) Circulating position
 - (7) Physiologic monitoring/recording position
- 2. Discuss the complete process of cleaning and sterilization, from breakdown to packaging.
 - a. Assemble and disassemble equipment.
 - b. Determine the appropriate and preferred method of sterilization.
 - c. Clean equipment before it is sterilized (if necessary).
 - d. Briefly describe the following methods of sterilization:
 - (1) Autoclave
 - (2) Ethylene oxide
 - e. Demonstrate knowledge of the following quantitative factors for each of the above methods of sterilization concerning:
 - (1) Time
 - (2) Concentration
 - (3) Temperature
- 3. Demonstrate knowledge of emergency equipment that may be in the hospital during an emergency situation.
 - a. Demonstrate how to maintain an adequate airway.
 - b. Demonstrate how to properly defibrillate a patient.
 - c. Demonstrate how to properly administer medication.

- 4. Acquire and develop the appropriate clinical and cognitive knowledge as it relates to cardiovascular technology.
 - a. Observe and practice the clinical and cognitive skills required to function in all aspects in the noninvasive cardiology department in the appropriate time frame as indicated on the clinical skills checklist including the following:
 - (1) EKG department
 - (2) Holter monitoring
 - (3) Stress testing
 - (4) Echocardiography lab
 - b. Demonstrate the clinical and cognitive skills required to function in all aspects in the noninvasive cardiology department in the appropriate time frame as indicated on the clinical skills checklist including the following:
 - (1) EKG department
 - (2) Holter monitoring
 - (3) Stress testing
 - (4) Echocardiography lab
- 5. Demonstrate knowledge and theory of the use of the intra-aortic balloon pump.
 - a. Adequately state the theory behind the use of the IABP.
 - b. Correctly set up an IABP.
 - c. Demonstrate the ability to monitor an IABP.
 - d. Troubleshoot an IABP.
- 6. Apply hemodynamic monitoring principles and calculation.
 - a. Perform thermodilution cardiac outputs.
 - b. Perform angiographic cardiac outputs.
 - c. Perform Fick cardiac outputs.
- 7. Draw blood from an arterial line and catheters.
 - a. Properly shut off stopcocks.
 - b. Utilize sterile technique.
 - c. Properly reopen closed off stopcocks.
 - d. Watch for and prevent air bubbles.
 - e. Re-zero arterial line if necessary.
- 8. Perform calculations common to the cath lab.
 - a. Calculate vascular resistance.
 - b. Calculate ejection fraction.
 - c. Calculate valve areas
 - d. Calculate shunts.
- 9. Demonstrate mastery of obtaining patient vital signs.
 - a. Obtain a patient's temperature.
 - b. Determine a patient's pulse.
 - c. Calculate a patient's respiration rate.
 - d. Properly obtain a patient's blood pressure.
- 10. Continue to demonstrate appropriate charting.
 - a. Identify the different sections that make up a patient's chart.
 - b. Record all entries accurately and neatly.
 - c. Explain the chart significance as a legal document.
 - d. Clarify symbols and figures used for chart entries.
 - e. Properly demonstrate correcting a mistake on a patient's chart.
- 11. Utilize interpersonal and effective skills with clinical affiliates.
 - a. Demonstrate knowledge of department locations.
 - b. Utilize professional telephone etiquette.
 - c. Demonstrate familiarization with charge and record keeping procedures.
 - d. Demonstrate knowledge of departmental policy and procedure manuals.

- 12. Demonstrate knowledge of the American Heart Association guidelines.
 - a. Identify cardiac arrest.
 - b. Apply the ABCs of cardiopulmonary resuscitation.
 - c. Identify ventricular tachycardia.
 - d. Identify bradycardia.
 - e. Identify asystole.
- 13. Apply the principles of ethical behavior to the cath lab environment.
 - a. Demonstrate practices that ensure patient confidentiality.
 - b. Demonstrate practices that ensure patient privacy.
- 14. Demonstrate mastery of professional communication in a cath lab/hospital environment.
 - a. Communicate and interact effectively with the primary physician and all medical staff.
 - b. Communicate and interact effectively with nursing staff and other allied health professionals.
 - c. Communicate effectively with patients and family members.

- CVT1 Cardiovascular Anatomy and Physiology
- CVT2 Cardiovascular Diseases Pathophysiology
- CVT3 Diagnostic Techniques
- CVT4 Intervention
- CVT5 Hemodynamic Data
- CVT6 Pharmacology
- CVT7 Equipment and Instrumentation
- CVT8 Patient Care and Patient Assessment

Description:	Designed for students skills in the cath lab pe interventional cases.	Designed for students to gain additional clinical experience and polish their skills in the cath lab performing all duties involved in diagnostic and interventional cases.					
Hour Breakdown:	Semester Credit Hours	Lecture	Clinical	Contact Hours			
	6	0	18	270			

Cardiovascular Clinical IV

Prerequisite:

Instructor Approved

CVT 2746

Student Learning Outcomes:

Course Number and Name:

- 1. Demonstrate mastery of the appropriate skills as detailed on the clinical skills checklists.
 - a. Observe and practice the skills required to function in all aspects in the cardiac cath lab in the appropriate time frame as indicated on the clinical checklist including the following:
 - (1) Patient transport
 - (2) Knowledge of department policies and procedures
 - (3) Holding area, pre and post cath
 - (4) X-ray positioning—manipulation of the imaging equipment and film development.
 - (5) Scrubbing position
 - (6) Circulating position
 - (7) Physiologic monitoring/recording position
 - b. Demonstrate mastery of the skills required to function in all aspects in the cardiac cath lab in the appropriate time frame as indicated on the clinical checklist including the following:
 - (1) Patient transport
 - (2) Knowledge of department policies and procedures
 - (3) Holding area, pre and post cath
 - (4) X-ray positioning—manipulation of the imaging equipment and film development
 - (5) Scrubbing position
 - (6) Circulating position
 - (7) Physiologic monitoring/recording position
- 2. Discuss the complete process of cleaning and sterilization, from breakdown to packaging.
 - a. Assemble and disassemble equipment.
 - b. Determine the appropriate and preferred method of sterilization.
 - c. Clean equipment before it is sterilized (if necessary).
 - d. Briefly describe the following methods of sterilization:
 - (1) Autoclave
 - (2) Ethylene oxide
 - e. Demonstrate knowledge of the following quantitative factors for each of the above methods of sterilization concerning:
 - (1) Time
 - (2) Concentration
 - (3) Temperature
- 3. Demonstrate knowledge of emergency equipment that may be in the hospital during an emergency situation.
 - a. Demonstrate how to maintain an adequate airway.
 - b. Demonstrate how to properly defibrillate a patient.
 - c. Demonstrate how to properly administer medication.

- 4. Acquire and develop the appropriate clinical and cognitive knowledge as it relates to cardiovascular technology.
 - a. Observe and practice the clinical and cognitive skills required to function in all aspects in the noninvasive cardiology department in the appropriate time frame as indicated on the clinical skills checklist including the following:
 - (1) EKG department
 - (2) Holter monitoring
 - (3) Stress testing
 - (4) Echocardiography lab
 - b. Demonstrate the clinical and cognitive skills required to function in all aspects in the noninvasive cardiology department in the appropriate time frame as indicated on the clinical skills checklist including the following:
 - (1) EKG department
 - (2) Holter monitoring
 - (3) Stress testing
 - (4) Echocardiography lab
- 5. Demonstrate knowledge and theory of the use of the intra-aortic balloon pump.
 - a. Adequately state the theory behind the use of the IABP.
 - b. Correctly set up an IABP.
 - c. Demonstrate the ability to monitor an IABP.
 - d. Troubleshoot an IABP.
- 6. Apply hemodynamic monitoring principles and calculation.
 - a. Perform thermodilution cardiac outputs.
 - b. Perform angiographic cardiac outputs.
 - c. Perform Fick cardiac outputs.
- 7. Draw blood from an arterial line and catheters.
 - a. Properly shut off stopcocks.
 - b. Utilize sterile technique.
 - c. Properly reopen closed off stopcocks.
 - d. Watch for and prevent air bubbles.
 - e. Re-zero arterial line if necessary.
- 8. Perform calculations common to the cath lab.
 - a. Calculate vascular resistance.
 - b. Calculate ejection fraction.
 - c. Calculate valve areas
 - d. Calculate shunts.
- 9. Demonstrate mastery of obtaining patient vital signs.
 - a. Obtain a patient's temperature.
 - b. Determine a patient's pulse.
 - c. Calculate a patient's respiration rate.
 - d. Properly obtain a patient's blood pressure.
- 10. Continue to demonstrate appropriate charting.
 - a. Identify the different sections that make up a patient's chart.
 - b. Record all entries accurately and neatly.
 - c. Explain the chart significance as a legal document.
 - d. Clarify symbols and figures used for chart entries.
 - e. Properly demonstrate correcting a mistake on a patient's chart.
- 11. Utilize interpersonal and effective skills with clinical affiliates.
 - a. Demonstrate knowledge of department locations.
 - b. Utilize professional telephone etiquette.
 - c. Demonstrate familiarization with charge and record keeping procedures.
 - d. Demonstrate knowledge of departmental policy and procedure manuals.

- 12. Demonstrate knowledge of the American Heart Association guidelines.
 - a. Identify cardiac arrest.
 - b. Apply the ABCs of cardiopulmonary resuscitation.
 - c. Identify ventricular tachycardia.
 - d. Identify bradycardia.
 - e. Identify asystole.
- 13. Apply the principles of ethical behavior to the cath lab environment.
 - a. Demonstrate practices that ensure patient confidentiality.
 - b. Demonstrate practices that ensure patient privacy.
- 14. Demonstrate mastery of professional communication in a cath lab/hospital environment.
 - a. Communicate and interact effectively with the primary physician and all medical staff.
 - b. Communicate and interact effectively with nursing staff and other allied health professionals.
 - c. Communicate effectively with patients and family members.

- CVT1 Cardiovascular Anatomy and Physiology
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APPENDIX A: RECOMMENDED TOOLS AND EQUIPMENT <u>Capitalized Items</u>

- 1. Apron, lead (4 per program)
- 2. EKG machine, 12 lead (1 per program)
- 3. EKG hemodynamic waveform simulator (1 per program)
- 4. Computer (2 per program)
- 5. Diagnostic imaging system (1 per program)
- 6. Mannequin, basic weighted (1 per program)
- 7. Model, heart, 3 dimensional and very detailed (1 per program)
- 8. Model, heart angioplasty and by-pass (1 per program)
- 9. Monitor, ambulatory blood pressure
- 10. Printer, laser (1 per 2 computers)
- 11. Projector, ciné (1 per program)
- 12. Intravascular and Intracardiac procedure simulator
- 13. Trajecsis or similar student record system

Non-Capitalized Items

- 1. Catheters, diagnostic (3 of each of the 20 designs per program)
- 2. Catheters, therapeutic (1 of each of the 5 types per program)
- 3. Charts, anatomy with tripod (1 set per program)
- 4. Chart, sequential human anatomy (1 per program)
- 5. Model, heart electrocardiogram (ECG) (1 per program)
- 6. Pack, tubing to include tubing, stopcock, manifolds, and transducers (10 per program)
- 7. Wires, guide (10 per program)

RECOMMENDED INSTRUCTIONAL AIDS

It is recommended that instructors have access to the following items:

- 1. Monitor, T.V., 31-in. Color (1 per program)
- 2. Laptop computer (1 per program)
- 3. Projector, data (1 per program)
- 4. Internet access
- 5. DVD player (1 per program)

APPENDIX B: CURRICULUM DEFINITIONS AND TERMS

- Course Name A common name that will be used by all community colleges in reporting students
- Course Abbreviation A common abbreviation that will be used by all community and junior colleges in reporting students
- Classification Courses may be classified as the following:
 - Career Certificate Required Course A required course for all students completing a career certificate.
 - Technical Certificate Required Course A required course for all students completing a technical certificate.
 - Technical Elective Elective courses that are available for colleges to offer to students.
- Description A short narrative that includes the major purpose(s) of the course
- Prerequisites A listing of any courses that must be taken prior to or on enrollment in the course
- Corequisites A listing of courses that may be taken while enrolled in the course
- Student Learning Outcomes A listing of the student outcomes (major concepts and performances) that will
 enable students to demonstrate mastery of these competencies

The following guidelines were used in developing the program(s) in this document and should be considered in compiling and revising course syllabi and daily lesson plans at the local level:

- The content of the courses in this document reflects approximately 75% of the time allocated to each course. The remaining 25% of each course should be developed at the local district level and may reflect the following:
 - Additional competencies and objectives within the course related to topics not found in the state framework, including activities related to specific needs of industries in the community college district
 - Activities that develop a higher level of mastery on the existing competencies and suggested objectives
 - Activities and instruction related to new technologies and concepts that were not prevalent at the time the current framework was developed or revised
 - Activities that include integration of academic and career-technical skills and course work, school-to-work transition activities, and articulation of secondary and postsecondary careertechnical programs
 - Individualized learning activities, including work-site learning activities, to better prepare individuals in the courses for their chosen occupational areas
- Sequencing of the course within a program is left to the discretion of the local college. Naturally, foundation courses related to topics such as safety, tool and equipment usage, and other fundamental skills should be taught first. Other courses related to specific skill areas and related academics, however, may be sequenced to take advantage of seasonal and climatic conditions, resources located outside of the school, and other factors. Programs that offer an Associate of Applied Science Degree must include all of the required Career Certificate courses, Technical Certificate courses **AND** a minimum of 15 semester hours of General Education Core Courses. The courses in the General Education Core may be spaced out over the entire length of the program so that students complete some academic and Career Technical courses each semester. Each community college specifies the actual courses that are required to meet the General Education Core Requirements for the Associate of Applied Science Degree at their college.

- In order to provide flexibility within the districts, individual courses within a framework may be customized by doing the following:
 - Adding new student learning outcomes to complement the existing competencies and suggested objectives in the program framework
 - Revising or extending the student learning outcomes
 - Adjusting the semester credit hours of a course to be up 1 hour or down 1 hour (after informing the Mississippi Community College Board [MCCB] of the change)

APPENDIX C: COURSE CROSSWALK

	Course Crosswalk						
	Cardiovascular Technology (CIP: 51.0901)						
Not	e: Courses that have been a	ndded or	changed in the	e 2017 curriculum are highlighted	1.		
	Existing			Revised			
	2009 MS Curriculum Fran	nework	20	017 MS Curriculum Framework			
Course	Course Title	Hours	Course	Course Title	Hours		
Number			Number				
	Foundations of			Foundations of Cardiovascular			
CVT 1113	Cardiovascular Technology	3	CVT 1113	Technology	3		
	Cardiovascular Anatomy						
CVT 1214	and Physiology	4		Part of CVT 1415			
	Cardiovascular						
CVT 1312	Pharmacology	2		Part of CVT 1415			
CVT 2414	Invasive Cardiology I	4	CVT 2413	Invasive Cardiology I	3		
CVT 2424	Invasive Cardiology II	4	CVT 2423	Invasive Cardiology II	4		
CVT 2512	Critical Care Applications	2	CVT 2512	Critical Care Applications	2		
CVT 2614	Non-Invasive Cardiology I	4	CVT 2614	removed			
CVT 2624	Non-Invasive Cardiology II	4	CVT 2624	removed			
				Cardiovascular Anatomy and			
			CVT 1415	Physiology and Pharmacology	5		
CVT 2716	Cardiovascular Clinical I	6	CVT 2716	Cardiovascular Clinical I	6		
CVT 2728	Cardiovascular Clinical II	8	CVT 2726	Cardiovascular Clinical II	6		
CVT 2738	Cardiovascular Clinical III	8	CVT 2736	Cardiovascular Clinical III	6		
			CVT 2746	Cardiovascular Clinical IV	6		