

## CARDIOVASCULAR SONOGRAPHY ASSOCIATE OF APPLIED SCIENCE DEGREE PROGRAM

Offered at the HNL and FW Campus

### **Program Description:**

The Cardiovascular Sonography program is designed to prepare the graduate to perform adult echocardiographic examinations under the direction of a physician. This program integrates classroom theory, and laboratory with the practical clinical experience necessary to graduate competent entry-level cardiovascular technologists in the cognitive (knowledge), psychomotor (skills), and affective (behavior) learning domains in the field of adult echocardiography. Students will gain specialized knowledge in cardiovascular anatomy and physiology, cardiac pathology, electrocardiogram interpretation, and ultrasound physics. Students will acquire proficiency in two-dimensional echocardiography, M-mode and Doppler modalities, and learn to implement the critical thinking skills necessary to recognize and evaluate the sonographic appearance of adult cardiac diseases. Graduates will have the skills to seek entry-level employment as cardiovascular sonographers in hospitals, clinics, doctor's offices, and outpatient facilities.

### **Program Requirements:**

Each participant must possess a high school diploma or GED and be able to read and write English. Students entering the program must first pass the Scholastic Level Exam with a minimum score of 21. Participants must be in excellent health, have excellent vision, hearing, manual dexterity, and demonstrate professional attributes. Applicants must complete a criminal background check. Students who have criminal histories must have already completed the Declaratory Order of Eligibility (DOE) for licensure through the American Registry of Diagnostic Medical Sonographers (ARDMS) and Cardiovascular Credentialing International (CCI) and provide a copy of the eligibility letter prior to acceptance into the program.

### **Program Admission Selection Process:**

The college uses an applicant ranking system to select the most qualified candidates for admission into the program. The competitive selection process is designed to give all qualified applicants an opportunity to be a member of the class while ranking the individuals that have the best potential for success. An admissions representative interviews each applicant. The representative provides detailed information about the program and confirms the student meets the Cardiovascular Sonography program requirements.

Once the applicant completes all the Cardiovascular Sonography program requirements, the applicant must interview with a panel of members comprised of Cardiovascular Sonography team members and/or other faculty members. In addition, the applicant must submit one letter of recommendation to the Cardiovascular Sonography program director. The letter of recommendation must be from an adult, non-family member who can comment on the applicant's character. The final ranking score is based on a weighted point system that includes aspects of the applicant's prior education, GPA and interview.

Applicants will be offered a seat in the class based on the Cardiovascular Sonography ranking score and class space availability. Applicants wishing to re-enter the program, after a previous drop, are required to follow the re-entry process outlined in the school catalog. Cardiovascular Sonography re-enters are admitted on a space availability basis, and are placed at the bottom of the waiting list if the class is already filled.

Once admitted into the Cardiovascular Sonography program, it is important to note:

1. All Cardiovascular Sonography students are required to submit proof of vaccination for: measles; mumps; rubella; hepatitis B; varicella; tetanus; influenza (seasonal); tuberculosis skin test (or chest x-ray & questionnaire if history of positive test); hepatitis A (depending on clinical facility).
2. All Cardiovascular Sonography students are required to pass urine drug screenings. If at any point the result is positive, the applicant is removed from the program, and deferred from reapplying for one year at which time they may re-apply and repeat the entire admission process.
3. Each graduate is expected to sit for his or her registry within 90 days of graduation.

**Program Length:** The length of time normally required to complete the program is ninety-six (96) weeks.

**Delivery Method:** Hybrid Program delivered by both residential and distance education. Courses with (\*) are delivered via full distance education or blended. All core courses will be delivered residential.

COURSE #	COURSE NAME	LECTURE HOURS	LAB HOURS	EXTERN HOURS	TOTAL HOURS	SEMESTER CREDITS
<b>SEMESTER I</b>						
MATH 1314	College Algebra*	48	0	0	48	3.0
ENGL 101	<i>English Composition*</i>	48	0	0	48	3.0
HPRS 101	Medical Terminology*	48	0	0	48	3.0
PHYS 100	<i>General Physics*</i>	48	0	0	48	3.0
APS 101	Anatomy & Physiology*	48	32	0	80	4.0
LES 100	Law and Ethics in Allied Health	30	0	0	30	2.0
<b>Total</b>		<b>270</b>	<b>32</b>	<b>0</b>	<b>302</b>	<b>18.0</b>
<b>SEMESTER II</b>						
DBS 201	Patient Care and Professionalism	30	15	0	45	2.5
CVS 200	Cardiovascular Principles	30	0	0	30	2.0
CVS 210	Cardiovascular Pharmacology	30	0	0	30	2.0
CVS 220	Cardiovascular Pathology	45	0	0	45	3.0
CVS 230	Electrocardiography	30	30	0	60	3.0
<b>Total</b>		<b>165</b>	<b>45</b>	<b>0</b>	<b>210</b>	<b>12.5</b>
<b>SEMESTER III</b>						
PSYT 101	<i>Introduction to Psychology*</i>	48	0	0	48	3.0
CVS 340	Introduction to Echocardiography	45	60	0	105	5.0
DBS 290	Ultrasound Physics and Instrumentation	90	15	0	105	6.5
<b>Total</b>		<b>183</b>	<b>75</b>	<b>0</b>	<b>258</b>	<b>14.5</b>
<b>SEMESTER IV</b>						
CVS 450	Echocardiography I	45	60	0	105	5.0
CVSC 1	Echocardiography Clinical Practicum I	0	0	240	240	5.0
DBS560	Introduction to Vascular Sonography	45	45	0	90	4.5
<b>Total</b>		<b>90</b>	<b>105</b>	<b>240</b>	<b>435</b>	<b>14.5</b>
<b>SEMESTER V</b>						
CVS 560	Echocardiography II	45	60	0	105	5.0
CVSC 2	Echocardiography Clinical Practicum II	0	0	360	360	8.0
DBS390	Ultrasound Physics Prep	15	0	0	15	1.0
<b>Total</b>		<b>60</b>	<b>60</b>	<b>360</b>	<b>480</b>	<b>14.0</b>
<b>SEMESTER VI</b>						
CVS 670	Echocardiography III	15	30	0	45	2.0
CVSC 3	Echocardiography Clinical Practicum III	0	0	360	360	8.0
CVS 600	Echocardiography Registry Review	30	0	0	30	2.0
<b>Total</b>		<b>45</b>	<b>30</b>	<b>360</b>	<b>435</b>	<b>12.0</b>
<b>Program Total</b>		<b>813</b>	<b>347</b>	<b>960</b>	<b>2120</b>	<b>85.5</b>

NOTE: Students are required to successfully pass all courses, including general education courses, with a minimum GPA of 2.0 within the maximum allowable time frame. The student will be awarded an Associate of Applied Science Degree (AAS) upon successful completion of all course work, clinical hours, and payment of all monies due.

## COURSE DESCRIPTIONS

Course descriptions include the course number, title, and synopsis, a listing of lecture, laboratory, externship hours, total clock hours and academic credits. For example, the listing "15/30/0/45/2.0" indicates that the course consists of 15 hours of lecture, 30 hours of laboratory, 0 externship hours, 45 total clock hours and 2.0 academic.

Course Code	Course Title and Description	Hours and Semester Credits
<b>MATH 1314</b>	<b>COLLEGE ALGEBRA</b>	<b>48/0/0/48/3.0</b>
The students will identify and operate with absolute value equations and inequalities, will acquire graphing skills, inverse functions, logarithmic and exponential functions, polynomial and rational functions, piece-wise defined functions, theory of equations and matrices. PREREQUISITE: NONE		
<b>ENGL 101</b>	<b>ENGLISH COMPOSITION</b>	<b>48/0/0/48/3.0</b>
This course provides students with instruction and practice in expository writing and emphasizes grammatical and mechanical accuracy and proper essay form. Emphasis is placed on clarity, logical organization, unity and coherence of central idea and supporting material. PREREQUISITE: NONE		
<b>HPRS 101</b>	<b>MEDICAL TERMINOLOGY</b>	<b>48/0/0/48/3.0</b>
This course is an introduction to medical terminology and covers terminology associated with the structure of the body, the integumentary, muscular and skeletal systems, the lymphatic, immune, and cardiovascular systems, the urinary, respiratory, digestive, and nervous systems, the eyes and ears, the reproductive and endocrine systems, diagnostic and imaging procedures, and pharmacology. PREREQUISITE: NONE		
<b>PHYS 100</b>	<b>GENERAL PHYSICS</b>	<b>48/0/0/48/3.0</b>
In this course the student will gain a general understanding of physics. Topics that will be introduced in this course are related to mechanics, thermal physics, light and optics, to conclude with a review of modern physics. <b>PREREQUISITE: COLLEGE ALGEBRA</b>		
<b>APS 101</b>	<b>ANATOMY &amp; PHYSIOLOGY</b>	<b>48/32/0/80/4.0</b>
This course provides students with the fundamental knowledge of human anatomy and physiology. Topics include structure and function of cells, tissues, organs, and systems. Systems being studied in this class include the skeletal and muscular systems, integumentary system, nervous system, endocrine system, lymphatic system, respiratory system, digestive system, urinary system, reproductive system, and cardiovascular system. PREREQUISITE: NONE		
<b>LES 100</b>	<b>LAW AND ETHICS IN ALLIED HEALTH</b>	<b>30/0/0/30/2.0</b>
This course is a detailed study of law and ethics and how the legal system affects the medical professional. Students will discuss current issues and concepts to help prepare for many common ethical issues related to the allied health field. PREREQUISITE: NONE		
<b>DBS 201</b>	<b>PATIENT CARE AND PROFESSIONALISM</b>	<b>30/15/0/45/2.5</b>
This course will introduce the students to the foundation and origins of Diagnostic Medical Ultrasound. The student will receive an orientation to sonography learning dynamics, testing, and educational curricula. The students will learn patient-sonographer interaction as well as work place behaviors including: communication skills, problem solving, ethics, and professionalism. This course will also teach students goal-setting, conflict management, building resumes, and interview techniques. PREREQUISITE: NONE		
<b>CVS 200</b>	<b>CARDIOVASCULAR PRINCIPLES</b>	<b>30/0/0/30/2.0</b>
This course will cover various cardiac related principles necessary to build a comprehensive understanding of the cardiovascular system. Detailed topics taught in this course include cardiovascular anatomy, cardiac physiology, basic embryology, and cardiac hemodynamics. Cardiac evaluation methods and types of diagnostic tests will also be covered. PREREQUISITE: SEMESTER I		
<b>CVS 210</b>	<b>CARDIOVASCULAR PHARMACOLOGY</b>	<b>30/0/0/30/2.0</b>
This course covers drug classification, indications, contraindications, mechanism of action, normal dosages, side effects, and patient considerations of drugs used in the treatment of cardiovascular related diseases. This course will also explain the use of emergency cardiac medications. PREREQUISITE: SEMESTER I		

<b>CVS 220</b>	<b>CARDIOVASCULAR PATHOLOGY</b>	<b>45/0/0/45/3.0</b>
This course will cover the pathological mechanisms, clinical manifestations and appropriate therapeutic measures of various diseases that affect the cardiovascular system. Cardiovascular topics taught in this course include fluid and hemodynamic disorders, atherosclerosis, rheumatic heart disease, hypertension, heart failure, aneurysms, cardiomyopathies, congenital defects seen in adults, arterial diseases, and diseases of the veins. PREREQUISITE: SEMESTER I		
<b>CVS 230</b>	<b>ELECTROCARDIOGRAPHY</b>	<b>30/30/0/60/3.0</b>
This course will focus on identification and analysis of cardiac arrhythmias, identification of abnormal ECG changes characteristic of myocardial ischemia, injury, infarction, bundle branch blocks, chamber enlargement, hypertrophy, and electrolyte imbalances. Exercise stress testing will also be covered. PREREQUISITE: SEMESTER I		
<b>PSYT 101</b>	<b>INTRODUCTION TO PSYCHOLOGY</b>	<b>48/0/0/48/3.0</b>
This course covers the interrelationship between biology and human behavior. Included in the course are theories involved in sensation and perception, consciousness, learning, memory, thought language, mental abilities, motivation and emotion, effect of stress, personality traits, social psychology, and psychological disorders and their treatments. PREREQUISITE: NONE		
<b>CVS 340</b>	<b>INTRODUCTION TO ECHOCARDIOGRAPHY</b>	<b>45/60/0/105/5.0</b>
This course covers fundamental theoretical principles and basic scan techniques of two-dimensional echocardiography, M-mode, and Doppler modalities. The normal sonographic appearance of standard two-dimensional transthoracic views, M-mode tracings, Doppler tracings, and routine measurements related to these modalities are the focus of this course. Sonographer responsibilities before and after examinations, patient positioning, and orientation to the ultrasound equipment will also be covered. PREREQUISITE: SEMESTER II		
<b>DBS 290</b>	<b>ULTRASOUND PHYSICS AND INSTRUMENTATION</b>	<b>90/15/0/105/6.5</b>
This course provides fundamental knowledge of theory based acoustic physics, ultrasound principles, and instrumentation. The students will learn how diagnostic ultrasound works and optimize image acquisition. Students will learn to recognize and compensate for acoustical artifacts. Understand acoustic energy and bio effects while applying the ALARA principle. Students will be able to apply basic concepts of acoustic physics including sound production and propagation, interaction of sound and matter, Doppler physics and principles, various Doppler methods, operator control options, methods of recording, as well as emerging technologies. This course will also teach students about patient privacy and confidentiality, professional conduct and ethics, as well as Quality control procedures. PREREQUISITE: SEMESTER II		
<b>CVS 450</b>	<b>ECHOCARDIOGRAPHY I</b>	<b>45/60/0/105/5.0</b>
This course covers the clinical presentation of various cardiac diseases. Clinical assessment and physiological changes associated with cardiac diseases will be taught. The application of two-dimensional echocardiography, M-mode, and Doppler modalities to identify and assess abnormal sonographic changes characteristic of cardiac diseases will be discussed. Cardiac diseases taught in this course include valvular stenosis, valvular regurgitation, endocarditis, ischemic cardiac disease, hypertensive and pulmonary heart disease, and diseases of the great vessels. PREREQUISITE: SEMESTER III		
<b>CVSC 1</b>	<b>ECHOCARDIOGRAPHY CLINICAL PRACTICUM I</b>	<b>0/0/240/240/5.0</b>
This course allows students to observe, participate, and train in those tasks required of a Cardiovascular Sonographer. The focus will be on the acclimation to the clinical environment and clinical site procedures in a supervised clinical setting. Hands-on clinical experience will be gained by performing basic limited studies on technically average patients per facility protocol. Students will complete competencies as directed by the clinical education plan. PREREQUISITE: SEMESTER III, CO-REQUISITE: CVS 450		
<b>DBS 560</b>	<b>INTRODUCTION TO VASCULAR SONOGRAPHY</b>	<b>45/45/0/90/4.5</b>
This course is an introduction to non-invasive vascular technology. Students will learn the anatomy, physiology, and pathology of the extra cranial vessels as well as the peripheral arterial and veins in the upper and lower extremities. Students will learn to perform duplex exams of the extra cranial vessels and the lower extremities. PREREQUISITE: SEMESTER III		
<b>CVS 560</b>	<b>ECHOCARDIOGRAPHY II</b>	<b>45/60/0/105/5.0</b>
This course is a continuation of Echocardiography I and covers the clinical presentation of various cardiac diseases. Clinical assessment, and physiological changes associated with cardiac diseases will be discussed. The application of two-dimensional echocardiography, M-mode, and Doppler modalities to identify and assess abnormal sonographic changes characteristic of cardiac diseases will be discussed. Cardiac diseases taught in this course include cardiomyopathies, pericardial diseases, prosthetic valves, cardiac masses and congenital heart disease in the adult. PREREQUISITE: SEMESTER IV		

<b>CVSC 2</b>	<b>ECHOCARDIOGRAPHY CLINICAL PRACTICUM II</b>	<b>0/0/360/360/8.0</b>
<p>This course is a continuation of Echocardiography Clinical Practicum I. Students will continue to observe, participate and train in those tasks required of a Cardiovascular Sonographer. Students will continue to gain hands-on practical experience in a clinical setting and focus on scanning technically average patients, producing high quality images, practicing routine measurements, and learning to document relevant clinical information. Students will complete competencies as directed by the clinical education plan. PREREQUISITE: SEMESTER IV, CO-REQUISITE: CVS 560</p>		
<b>DBS 390</b>	<b>ULTRASOUND PHYSICS PREP</b>	<b>15/0/0/15/1.0</b>
<p>This course prepares students for the Ultrasound Physics Registry Exam. Concepts and principles learned in Ultrasound Physics and Instrumentation will be reviewed. PREREQUISITE: SEMESTER IV</p>		
<b>CVS 670</b>	<b>ECHOCARDIOGRAPHY III</b>	<b>15/30/0/45/2.0</b>
<p>This course provides an overview of advanced echocardiographic modalities utilized in the field of echocardiography. Topics include Stress Echocardiography, Transesophageal Echocardiography, Contrast Echocardiography, Three-Dimensional Echocardiography, and Strain Rate Imaging. PREREQUISITE: SEMESTER V</p>		
<b>CVSC 3</b>	<b>ECHOCARDIOGRAPHY CLINICAL PRACTICUM III</b>	<b>0/0/360/360/8.0</b>
<p>This course is a continuation of Echocardiography Clinical Practicum II. Students will observe, participate and train in those tasks required of a Cardiovascular Sonographer. Students will focus on scanning patients in a timely manner, producing high quality images, acquiring accurate measurements, and documenting relevant clinical information. Students will complete competencies as directed by the clinical education plan. PREREQUISITE: SEMESTER V, CO-REQUISITE: CVS 670</p>		
<b>CVS 600</b>	<b>ECHOCARDIOGRAPHY REGISTRY REVIEW</b>	<b>30/0/0/30/2.0</b>
<p>This course prepares students for the Adult Echocardiography Registry Exam. Concepts and principles learned in the core echocardiography courses will be reviewed. PREREQUISITE: SEMESTER V</p>		