**I. COURSE NUMBER AND TITLE, CATALOG DESCRIPTION, CREDITS:**

**CVT 2620 NON-INVASIVE CARDIOLOGY TECHNOLOGY I (3 CREDITS)**

This course presents an introduction to non-invasive cardiology and tests performed in this area. In addition, normal and abnormal heart rhythms, ECG acquisition and analysis, patient safety, stress testing, Holter monitoring, and an introduction to echocardiography are presented.

**II. PREREQUISITES FOR THIS COURSE:**

CVT 1000 and CVT 1200

**CO-REQUISITES FOR THIS COURSE:**

CVT 1801C and CVT 2420

**III. GENERAL COURSE INFORMATION:** Topic Outline.

* Cardiovascular anatomy and physiology
* Normal electrocardiogram
* Arrhythmias
* 12 Lead EKG
* Vectorcardiography and axis determination
* Atrial enlargement
* Ventricular enlargement
* Ventricular conduction disturbances
* Ischemia, injury and myocardial infarction patterns
* Cardiac arrest
* Exercise electrocardiography and stress testing, including nuclear stress testing
* Ambulatory ECG monitoring - Holter monitoring
* Pacemaker basics
* Echocardiography basics

**IV. ALL COURSES AT FLORIDA SOUTHWESTERN STATE COLLEGE CONTRIBUTE TO THE GENERAL EDUCATION PROGRAM BY MEETING ONE OR MORE OF THE FOLLOWING GENERAL EDUCATION COMPETENCIES:**

**C**ommunicate clearly in a variety of modes and media.

**R**esearch and examine academic and non-academic information, resources, and evidence.

**E**valuate and utilize mathematical principles, technology, scientific and quantitative data.

**A**nalyze and create individual and collaborative works of art, literature, and performance.

**T**hink critically about questions to yield meaning and value.

**I**nvestigate and engage in the transdisciplinary applications of research, learning, and knowledge. **V**isualize and engage the world from different historical, social, religious, and cultural approaches. **E**ngage meanings of active citizenship in one’s community, nation, and the world.

**A. General Education Competencies and Course Outcomes**

1. Listed here are the course outcomes/objectives assessed in this course which play an integral part in contributing to the student’s general education along with the general education competency it supports.

General Education Competency: **Investigate**

Course Outcomes or Objectives Supporting the General Education Competency Selected:

• Interpret and understand the major cardiac rhythm disturbances and other abnormal patterns including axis deviation, chamber enlargement and hypertrophy, bundle branch block, ischemia, injury and infarction as seen by 12-lead electrocardiography.

• Discuss the equipment used in this procedure, attachments, controls operation, and trouble-shooting.

2. Listed here are the course outcomes/objectives assessed in this course which play a *supplemental* role in contributing to the student’s general education along with the general education competency it supports.

General Education Competency: **Think**

Course Outcomes or Objectives Supporting the General Education Competency Selected:

* Describe in detail the theory of and rationale for electrocardiography, graded exercise stress testing, Holter monitoring, telemetry monitoring, and pacemaker usage.
* Perform echocardiography, graded exercise stress testing, Holter monitoring, telemetry monitoring, and pacemaker usage.
* Interpret and understand the major abnormal patterns obtained by electrocardiography, graded exercise stress testing, Holter monitoring, telemetry monitoring, pacemaker usage, and echocardiography.

General Education Competency: **Evaluate**

* Course Outcomes or Objectives Supporting the General Education Competency Selected:
* Identify the portion of the heart evaluated by each lead.
* Identify normal EKG waveforms in each lead.
* Identify and discuss causes of right axis deviation, left axis deviation, extreme right axis deviation, right atrial enlargement, left atrial enlargement, right ventricular hypertrophy, left ventricular hypertrophy, right bundle branch block, left bundle branch block, ischemia, injury and infarct patterns.
* Identify the portion of the heart compromised and possible coronary artery involved from analyzing ischemia, injury or infarct patterns on 12-lead EKG.

**B. Other Course Objectives/Standards**

Upon satisfactory completion of this course, the student will be able to:

1. Describe, in detail, the anatomy of the cardiac chambers, valves, supporting structures and conduction system.
2. Describe, in detail, the function of the cardiac chambers, valves supporting structures and conduction system.
3. Describe, in detail, the theory of, rationale for, and perform electrocardiography, graded exercise stress testing, Holter monitoring, telemetry monitoring, and pacemaker usage. .
4. Perform technically satisfactory twelve lead electrocardiograms.
5. Perform all appropriate aspects of exercise stress testing in the clinical setting.
6. Perform all standard calculations used in electrocardiography.
7. Interpret and understand the major abnormal patterns obtained by the above mentioned examinations.
8. Interpret and understand the major cardiac rhythm disturbances and other abnormal patterns including axis deviation, chamber enlargement and hypertrophy, bundle branch block, ischemia, injury and infarction as seen by **12-lead electrocardiography:**
9. Demonstrate the ability to operate the equipment used in CVT 2620.
10. Adequately troubleshoot the equipment used in order to obtain the highest quality examinations possible.
11. Define terms assigned by the instructor.
12. Describe the pathway of electrical conduction through the heart.
13. Correlate the mechanical action of the heart to the electrical activity.
14. Describe the three planes of electrical activity in the heart.
15. Identify time and voltage measurement on EKG paper.
16. Describe the electro-mechanical activity of the heart in relation to normal wave deflection.
17. List four sites of cardiac arrhythmias.
18. List and differentiate various types of arrhythmias.
19. Calculate a heart rate from an EKG tracing.
20. List four steps in interpreting arrhythmias on an EKG tracing.
21. Discuss the effect of the autonomic nervous system on the SA node.
22. List and differentiate five arrhythmias originating in the SA node.
23. Identify SA nodal arrhythmias on EKG tracings.
24. Describe the etiology, danger, and treatment of each SA nodal arrhythmia.
25. List and differentiate five arrhythmias originating in the atria.
26. Identify atrial arrhythmias on EKG tracings.
27. Describe the etiology, danger and treatment of each atrial arrhythmia.
28. List and differentiate six AV nodal arrhythmias and their treatments.
29. Recognize AV nodal arrhythmias on EKG tracings.
30. List and differentiate ventricular arrhythmias.
31. Recognize ventricular arrhythmias on EKG tracings and describe treatments.
32. Detail the fundamentals of electrocardiography:
    1. Describe the Electrical Conduction through the Heart

* Sinoatrial Node and Atrial Muscles Contraction
* Atrioventricular Node
* Bundle of His
* Left and Right Bundle Branches
* Purkinje Fibers
* Ventricular Contraction
* Repolarization
  1. Identify the Planes of Electrical Activity (Leads)
  2. Correlate Wave Deflections
* Graph Paper
  + Time measurement
  + Voltage measurement
* P Wave - SA Node
* PR Interval
* ORS Complex - Ventricular depolarization
* ST Segment
* T Wave – Repolarization
  1. Analyze Arrhythmias
* Describe Sites of Arrhythmias
  + SA Node (Sinus Arrhythmias)
  + Atrial
  + AV Node (Node Arrhythmias)
  + Ventricles
* Describe Mechanisms of Arrhythmias
  + Re-entry Mechanisms
  + Tachycardia
  + Bradycardia
  + Premature Beats
  + Flutter
  + Fibrillation
  + Defects in Conduction
* Describe Classification of Arrhythmias
  + Minor
  + Major
  + Life Threatening
  1. Interpretation of Arrhythmias
* Calculation of Rate and Regularity
* Examination of P Waves
  + Sinus Rhythm
  + Ectopic Pacemaker
* Measurement of PR Interval - Conduction Defect
* Measurement of QRS Complex - Conduction Defect
* Ratio of P waves to QRS complexes
  1. Describe and Interpret Arrhythmias Originating in the SA Node
* Effect of Autonomic Nervous System
* b) Prognosis of Sinus Arrhythmias
* Sinus Tachycardia - Identification
  + Clinical Features
  + Danger in Myocardial Infarction
  + Treatment
* Sinus Bradycardia - Vagal Stimulation
  + Clinical Features
  + Danger in Myocardial Infarction
  + Treatment
* Sinus Arrhythmia - Recognition
  + Effect of Respiration
  + Clinical Features and Risk
* Sinoatrial Arrest or Block - Recognition
  + Vagal Stimulation or Digitalis Overdose
  + Clinical Features
  + Treatment
* Wandering Pacemaker - Recognition
  + Etiology
  + Significance and Treatment
* Sick Sinus Syndrome
  1. Describe and Interpret Arrhythmias Originating in the Atria
* Premature Atrial Contraction (PAC) Recognition
  + 1) Etiology
  + 2) Clinical Features
  + 3) Danger in Myocardial Infarction
  + 4) Treatment
* Paroxysmal Atrial Tachycardia and Supraventricular Tachycardia (SVT) - Recognition
  + Etiology
  + Clinical Features
  + Danger in Myocardial Infarction
  + Treatment
* Atrial Flutter - Recognition
  + Etiology
  + Clinical Features
  + Danger in Myocardial Infarction
  + Treatment
* Atrial Fibrillation - Recognition
  + Etiology
  + Clinical Features
  + Danger in Myocardial Infarction
  + Treatment
* Atrial Standstill - Recognition
  + Etiology
  + Clinical Features
  + Danger Myocardial Infarction
  + Treatment
  1. Describe and Interpret Arrhythmias Originating in or around the AV Node
* Nodal Rhythms and Nodal Block
* Premature AV Nodal (Junctional) Contractions - Recognition
  + Etiology
  + Clinical Features
  + Danger in Myocardial Infarction
  + Treatment
* AV Nodal (Junctional) Tachycardia - Recognition
  + Etiology
  + Clinical Features
  + Danger in Myocardial Infarction
  + Treatment
* AV Nodal (Junctional) Rhythm - Recognition
  + Etiology
  + Clinical Features
  + Danger in Myocardial Infarction
  + Treatment
* Delayed AV Conduction (First Degree Heart Block)
  + Etiology
  + Clinical Features
  + Danger in Myocardial Infarction
  + Treatment
* Second Degree Heart Block, Type I and Type II- Recognition
  + Etiology
  + Clinical Features
  + Danger in Myocardial Infarction
  + Treatment
* Third Degree Heart Block - Recognition
  + Etiology
  + Clinical Features
  + Danger in Myocardial Infarction
  + Treatment
  1. Describe and Interpret Arrhythmias Originating in the Ventricles
* Groups of Ventricular Arrhythmias
  + Irritability of Ventricles
  + Damage of Conducting System
  + Cause Sudden Death
* Premature Ventricular Contractions - Recognition
  + Etiology
  + Clinical Features
  + Danger in Myocardial Infarction
  + Treatment
* Ventricular Tachycardia - Recognition
  + Etiology
  + Clinical Features
  + Danger in Myocardial Infarction
  + Treatment
* Bundle Branch Block - Recognition
  + Etiology
  + Clinical Features
  + Danger in Myocardial Infarction
  + Treatment
  1. Describe and Interpret Lethal Arrhythmias
* Ventricular Fibrillation - Recognition
  + Etiology
  + Clinical Features
  + Treatment
* Ventricular Standstill
  + Etiology
  + Clinical Features
  + Treatment
  1. Analyze 12-Lead EKG’s
* Identify the portion of the heart evaluated by each lead
* Identify normal EKG waveforms in each lead
* Identify and discuss causes of right axis deviation, left axis deviation, extreme right axis deviation d) Identify and discuss causes of right atrial enlargement, left atrial enlargement, right ventricular hypertrophy, left ventricular hypertrophy
* Identify and discuss causes of right bundle branch block, left bundle branch block
* Identify and discuss causes of ischemia, injury and infarct patterns
* Identify the portion of the heart compromised and possible coronary artery involved from analyzing ischemia, injury or infarct patterns on 12-lead EKG.

10. HOLTER MONITORING OBJECTIVES:

1. Discuss the equipment used on this procedure: attachments, operation, trouble-shooting. 2) Review indications for a Holter monitor and data obtained.

11. TILT TABLE OBJECTIVES:

1. Define and discuss the indications for a tilt table test.
2. List and explain the steps involved in a tilt table test.
3. Compare and contrast the signs and symptoms between a negative and positive tilt table test.
4. Define and discuss the action required during a positive tilt table test.
5. List and explain the treatment options if a tilt table is positive.

12. STRESS TESTING OBJECTIVES:

1. Discuss the equipment used in this procedure; attachments, controls operation, trouble-shooting.
2. Review etiology of abnormal graded exercise test.
3. Discuss the indications for a stress test
4. Discuss the physiology changes and steps taken in a stress test.
5. Compare and contrast the difference between a regular stress test and a nuclear stress test.
6. Compare and study various texts on this subject and review product information.
7. Discuss the basics of a stress echocardiogram

**V. DISTRICT-WIDE POLICIES:**

**PROGRAMS FOR STUDENTS WITH DISABILITIES**

Florida SouthWestern State College, in accordance with the Americans with Disabilities Act and the College’s guiding principles, offers students with documented disabilities programs to equalize access to the educational process. Students needing to request an accommodation in this class due to a disability, or who suspect that their academic performance is affected by a disability should contact the Office of Adaptive Services at the nearest campus. The office locations and telephone numbers for the Office of Adaptive Services at each campus can be found at http://www.fsw.edu/adaptiveservices.

**REPORTING TITLE IX VIOLATIONS**

Florida SouthWestern State College, in accordance with Title IX and the Violence Against Women Act, has established a set of procedures for reporting and investigating Title IX violations including sexual misconduct. Students who need to report an incident or need to receive support regarding an incident should contact the Equity Officer at equity@fsw.edu. Incoming students are encouraged to participate in the Sexual Violence Prevention training offered online. Additional information and resources can be found on the College’s website at http://www.fsw.edu/sexualassault.

**VI. REQUIREMENTS FOR THE STUDENTS:**

List specific course assessments such as class participation, tests, homework assignments, make-up procedures, etc.

**VII. ATTENDANCE POLICY:**

The professor’s specific policy concerning absence. (The College policy on attendance is in the Catalog and defers to the professor.)

**VIII. GRADING POLICY:**

Include numerical ranges for letter grades; the following is a range commonly used by many faculty:

| **Grade Percent** | **Letter Grade** |
| --- | --- |
| 90 - 100 | A |
| 80 - 89 | B |
| 70 - 79 | C |
| 60 - 69 | D |
| Below 60 | F |

(Note: The “incomplete” grade [“I”] should be given only when unusual circumstances warrant. An “incomplete” is not a substitute for a “D,” “F,” or “W.” Refer to the policy on “incomplete grades.)

**IX. REQUIRED COURSE MATERIALS:**

(In correct bibliographic format.)

**X. RESERVED MATERIALS FOR THE COURSE:**

Other special learning resources.

**XI. CLASS SCHEDULE: Class is on Wednesday from 8:00 am to 11:30 am**

This section includes assignments for each class meeting or unit, along with scheduled Library activities and other scheduled support, including scheduled tests.

**XII. ANY OTHER INFORMATION OR CLASS PROCEDURES OR POLICIES:**

(Which would be useful to the students in the class.)