

LAST REVIEW: 2010-2011 **NEXT REVIEW:** 2015-2016 **STATUS:** A
(A, I, D)

COURSE TITLE: Introduction to Echocardiography

COMMON COURSE NUMBER: SON2400

CREDIT HOURS: 2

CONTACT HOUR BREAKDOWN
(per 16 week term)

CLOCK HOURS:
(Voc. Course ONLY)

Lecture: **32** Lab:
Clinic: Other:

PREREQUISITE(S): SON1141, SON1824

COREQUISITE(S): SON2834

PRE/COREQUISITE(S):

COURSE DESCRIPTION *(750 characters maximum):* **Anatomy of the heart and the procedures used in screening are introduced stressing recognition of the normal versus abnormal.**

General Education Requirements – Associate of Arts Degree (AA), meets Area(s): Area
General Education Requirements – Associate in Science Degree (AS), meets Area(s): Area
General Education Requirements – Associate in Applied Science Degree (AAS), meets Area(s): Area

UNIT TITLES

1. Structure of the Thorax
2. Anatomy of the heart
3. Cardiac Electrophysiology
4. Cardiac Mechanical Physiology
5. Embryology of the heart
6. Echocardiography: Protocols and Views

ASSESSMENT:

Please provide a brief description (250 characters maximum) that details how students will be assessed on the course outcomes.

Quizzes, Midterm Exam and Final Exam – All are comprehensive. Attendance is required for successful completion.

UNITS

Unit 1 Structures of the Thorax

General Outcome:

- 1.0 The student shall:** describe the structures of the thorax, heart, and circulation.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 1.1 Describe the skeletal framework of the thoracic cavity.
- 1.2 Describe the divisions of the thoracic cavity.
- 1.3 Name the structures of the thoracic cavity and describe their physical relationships
- 1.4 Describe the position of the heart in the thorax.
- 1.5 Illustrate the angle of the heart with reference to the sagittal plane of the body.
- 1.6 Describe the relationship of the heart's position to the build of the patient.
- 1.7 Describe and illustrate the origin, pathway, and branches of the aorta.
- 1.8 Describe and illustrate the origin, pathway, and branches of the pulmonary trunk.
- 1.9 Describe and illustrate the origin and pathway of the superior and inferior vena cava.

UNITS

Unit 2 Anatomy of the Heart

General Outcome:

2.0 The student shall: describe the anatomy of the heart and explain the functioning of the heart

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 2.1 Describe the size and position of the heart in the adult.
- 2.2 Identify the structures related to the following aspects of the heart
 - a. Anterior
 - b. Inferior
 - c. Posterior
 - d. Left side
 - e. Right side
- 2.3 Describe the base of the heart.
- 2.4 Describe the apex of the heart.
- 2.5 Name and describe the layers of the heart.
- 2.6 Explain the function of the layers of the heart.
- 2.7 Identify and describe the anatomy and functions of the:
 - a. Right atrium
 - b. Right ventricle
 - c. Left atrium
 - d. Left ventricle
- 2.8 Describe the interatrial septum; its composition, sections, movement, etc., and illustrate its relationship to the cardiac chambers.
- 2.9 Describe the interventricular septum; its composition, sections, movement, etc., and illustrate its relationship to the cardiac chambers.
- 2.10 Describe and illustrate the anatomy, functioning and physical relationships of the:
 - a. Tricuspid valve
 - b. Mitral valve
 - c. Pulmonary valve
 - d. Aortic valve

- 2.11 Describe the apparatus of the valves.
- 2.12 Describe the three distinct circulations of the heart
 - a. Systemic circulation
 - b. Pulmonary circulation
 - c. Cardiac circulation
- 2.13 Describe the common pathways and branches of the:
 - a. Left coronary artery
 - b. Right coronary artery
- 2.14 Illustrate the areas supplied with blood by the:
 - a. Left anterior descending coronary artery.
 - b. Circumflex artery
 - c. Right coronary artery
- 2.15 Describe the coronary venous drainage, including, but not limited to the:
 - a. Thebesian veins
 - b. Coronary sinus
 - c. Great cardiac vein

UNITS

Unit 3 Cardiac Electrophysiology

General Outcome:

3.0 The student shall: explain the electrical and mechanical cardiac cycle.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 3.1** Describe the cellular structure of the heart.
- 3.2** Identify the electrical pathways of the heart.
- 3.3** Explain the normal electrical system of the heart and some of the alternate pathways.
- 3.4** Describe innervation of the heart, both intrinsic and extrinsic.
- 3.5** Explain how an electrocardiogram and cardiac monitoring is obtained.
- 3.6** Identify the segments of an electrocardiogram tracing.
- 3.7** Explain what each segment of the electrocardiogram represents
- 3.8** Determine normal from abnormal electrocardiogram tracings.
- 3.9** Describe some abnormal electrocardiographic tracings and what they represent.

UNITS

Unit 4 Cardiac Mechanical Physiology

General Outcome:

4.0 The student shall: demonstrate knowledge of the mechanical considerations of the cardiac cycle.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 4.1 Define the following:
 - a. Frank Starling law
 - b. Force-velocity relationship
 - c. Interval-strength relationship
 - d. Preload and after load
 - e. Stroke volume
 - f. Ejection fraction
 - g. Cardiac output
 - h. Cardiac index

- 4.2 Explain the mechanical sequence of the normal cardiac cycle

- 4.3 Describe the normal heart sounds and how they are assessed.

- 4.4 Describe the external influences on innervation of the heart:
 - a. Sympathetic
 - b. Parasympathetic

UNITS

Unit 5 Embryology of the Heart

General Outcome:

5.0 The student shall: describe the basic embryology of the heart, and compare fetal and postnatal circulation.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 5.1** Describe the development of the fetal heart including:
 - a. Primitive vascular tube
 - b. Sinus venous
 - c. Cardiac loop
 - d. Aortic arches
 - e. Septations
 - f. Valve formation

- 5.2** Describe the congenital defects associated with septation abnormalities.

- 5.3** Describe the pathways of circulation in the fetus.

- 5.4** Explain normal changes to the fetal circulation, which occur at birth.

UNITS

Unit 6 Echocardiography: Protocols and Views

General Outcome:

6.0 The student shall: describe the protocols for echocardiography and the views employed.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 6.1** Describe the various modalities for viewing the structure and functioning of the heart; set up, technique, advantages and disadvantages of each:
 - a. Transthoracic
 - b. Transesophageal
 - c. Cardiac catheterization
 - d. Nuclear cardiology
 - e. Phonocardiology
- 6.2** Describe the windows employed in transthoracic echocardiography.
- 6.3** List views obtained from each window.
- 6.4** Identify structures visualized in each view.
- 6.5** Explain which parameters can best be measured in each view.
- 6.6** Explain the protocol for obtaining M-mode of the heart:
 - a. Patient position
 - b. Transducer selection
 - c. Windows employed
 - d. Views obtained
- 6.7** Identify structures and function represented on M-mode of the heart.
- 6.8** List normal parameters for measurements made on M-mode of the heart and what abnormal measurements could represent.
- 6.9** Explain the protocol for obtaining Doppler studies of the heart:
 - a. Patient position
 - b. Transducer selection
 - c. Windows employed
 - d. Views obtained

- 6.10** Identify function represented on Doppler tracings of the heart.
- 6.11** List normal parameters for Doppler measurements of the heart and what abnormal measurements could represent.
- 6.12** Explain the differences between continuous-wave and pulse-echo Doppler, when each should be employed, advantages and disadvantages of each.