

## Course Number and Title: ECH 111 Echocardiography Techniques I

**Campus Location:**

Wilmington

**Effective Date:**

2022-51

**Prerequisite:**

BIO 120, DMS 106, SSC 100 or concurrent

**Co-Requisites:**

none

**Course Credits and Hours:**

3.00 credits

3.00 lecture hours/week

1.50 lab hours/week

**Course Description:**

This course introduces the fundamental skills and principles needed to perform echocardiography including technologist and patient safety. Topics include the standard two dimensional (2D) cardiac views and M-mode evaluations. Emphasis is placed on cardiac anatomy, cardiovascular physiology, cardiac disease and its effect on the heart, and the study of basic cardiovascular pharmacology.

**Required Text(s):**

Obtain current textbook information by viewing the [campus bookstore - https://www.dtcc.edu/bookstores](https://www.dtcc.edu/bookstores) online or visit a campus bookstore. Check your course schedule for the course number and section.

**Additional Materials:**

Sonography Student Manual

**Schedule Type:**

Classroom Course

**Disclaimer:**

None

**Core Course Performance Objectives (CCPOs):**

1. Apply ergonomics as they relate to the echocardiographer. (CCC 2, 4, 5; PGC 1, 3, 5)
2. Explain the terminology used in echocardiography. (CCC 1, 2, 5; PGC 1, 3)
3. Differentiate between the normal and abnormal cardiac anatomy. (CCC 1, 2, 5; PGC 1, 3, 5)
4. Explain the cardiovascular physiology. (CCC 1, 2, 5, 6; PGC 1, 5)
5. Demonstrate proper patient preparation of an echocardiogram. (CCC 1, 2, 3, 4, 5, 6; PGC 1, 3, 4, 5)
6. Explain cardiac risk factors, cardiac disease, and cardiovascular pharmacology. (CCC 1, 2, 6; PGC 1, 3, 4, 5)
7. Perform with competency the basic 2D echocardiography views and M-mode tracings of normal/abnormal cardiac structures. (CCC 1, 2, 3, 4, 5, 6; PGC 1, 3, 4, 5)
8. Identify valvular heart disease, and explain how valvular disease relates to the 2D and M-mode echocardiographic studies. (CCC 1, 2, 5, 6; PGC 1, 3, 4, 5)
9. Discuss coronary artery disease (CAD) and ischemic heart disease (IHD), and explain their effects on the systolic function of the left ventricle. (CCC 1, 2, 5, 6; PGC 1, 3, 4, 5)
10. Describe the diseases of the myocardium, hypertensive heart disease, systemic hypertension, and congestive heart failure. (CCC 1, 2, 5, 6; PGC 1, 3, 4, 5)

See Core Curriculum Competencies and Program Graduate Competencies at the end of the syllabus. CCPOs are linked to every competency they develop.

## Measurable Performance Objectives (MPOs):

Upon completion of this course, the student will:

1. Apply ergonomics as they relate to the echocardiographer.
  1. Describe the proper equipment and room set up for right and left handed scanning.
  2. Explain the proper adjustments to the exam table and ultrasound machine for optimal echocardiographer body alignment.
  3. Apply the correct positioning for patient safety and echocardiographer comfort.
2. Explain the terminology used in echocardiography.
  1. Explain the abbreviations related to the cardiovascular systems, diseases, and terms used in echocardiography.
3. Differentiate between the normal and abnormal cardiac anatomy.
  1. Identify normal intra-chamber anatomy and septation.
  2. Identify the atrioventricular valves and semilunar valves, inferior vena cava, superior vena cava, and coronary sinus as well as the branches of the aortic arch, pulmonary arteries, and veins.
  3. Identify the coronary artery anatomy.
  4. Explain the correlation of the coronary artery anatomy to the 2-D images obtained on the echocardiogram.
4. Explain the cardiovascular physiology.
  1. Describe the normal pressures of the four heart chambers and great vessels.
  2. Explain the intra-cardiac pressure changes that are responsible for the opening and closing of the four cardiac valves during the cardiac cycle.
  3. Describe the conduction system of the heart and the action potential of myocardial cells.
  4. Explain the electrocardiogram as it relates to the echocardiogram with emphasis on arrhythmias, evidence of chamber enlargement, ischemia, myocardial infarction, and pacemaker activity.
  5. Explain the cardiovascular hemodynamics.
  6. Describe the ventricular function, including the influence of loading conditions and measurement of cardiac output.
  7. Explain the cardiovascular physiology as it applies to exercise.
5. Demonstrate proper patient preparation of an echocardiogram.
  1. Choose appropriate instrumentation and machine settings, and prepare the examination room for basic imaging of the heart.
  2. Describe proper patient preparation, including the indications for an echocardiogram, acquisition of patient history and physical exam, and patient positioning.
6. Explain cardiac risk factors, cardiac disease, and cardiovascular pharmacology.
  1. Using the evaluation of an echocardiogram, discuss the cardiac risk factors and their effects on the heart that include enlargement of the chambers, depressed left ventricular function, evidence of myocardial infarction, left ventricular hypertrophy, and valvular disease.
  2. Describe the cardiovascular medications used to treat hypertension, hyperlipidemia, diabetes, edema, arrhythmias, congestive heart failure, and anticoagulants.
7. Perform basic 2D echocardiography views and M-mode tracings of normal/abnormal cardiac structures.
  1. Explain and evaluate the normal size and function of the heart through basic 2D images and M-mode tracing.
  2. Perform basic 2D echocardiography views and M-mode tracings at the required competency level.
8. Identify valvular heart disease, and explain how valvular disease relates to the 2D and M-mode echocardiographic study.
  1. Define valvular heart disease.
  2. Explain and identify valvular disease including:
    1. Physiology/Hemodynamic monitoring
    2. Anatomy of the semilunar and atrioventricular valves
    3. Physiology of semilunar and atrioventricular valves stenosis and regurgitation and mitral valve prolapse
    4. Characteristics of valvular disease on 2D and M-mode
    5. The effects on the heart
    6. Etiologies
    7. Murmurs
    8. Clinical manifestations
    9. Complications
    10. Treatment
    11. Echocardiographic approach
9. Discuss coronary artery disease (CAD) and ischemic heart disease (IHD), and explain their effects on the systolic function of the left ventricle.
  1. Define *CAD*.
  2. Describe the coronary anatomy and left ventricular wall segments.
  3. Define *IHD*.
  4. Explain the etiology, risk factors, signs, and symptoms related to IHD.
  5. Explain the IHD echocardiographic approach and the evaluation of regional ventricular function.
  6. Explain the acute myocardial infarct echocardiographic approach and its complication and associated findings.
10. Describe the diseases of the myocardium, hypertensive heart disease, systemic hypertension, and congestive heart failure.
  1. Define and explain cardiomyopathies (dilated, hypertrophic, and restrictive), hypertensive heart disease, systemic hypertension, and congestive heart failure for the following characteristics:
    1. Anatomy and pathology
    2. Etiology
    3. Potential causes
    4. Signs and symptoms
    5. Associated abnormalities
    6. Clinical presentation
    7. Complications
    8. Treatment
    9. Echocardiographic approach

**Evaluation Criteria/Policies:**

The grade will be determined using the Delaware Tech grading system:

90	-	100	=	A
80	-	89	=	B
70	-	79	=	C
0	-	69	=	F

Students should refer to the [Student Handbook - https://www.dtcc.edu/handbook](https://www.dtcc.edu/handbook) for information on the Academic Standing Policy, the Academic Integrity Policy, Student Rights and Responsibilities, and other policies relevant to their academic progress.

**Final Course Grade:**

Calculated using the following weighted average

Evaluation Measure	Percentage of final grade
8 Quizzes (3.75% each) (formative)	20%
Mid-Term Exam (formative)	25%
Final Exam (summative)	25%
5 Competencies (Total 100 points) (formative)	30%
TOTAL	100%

**Core Curriculum Competencies (CCCs are the competencies every graduate will develop):**

1. Apply clear and effective communication skills.
2. Use critical thinking to solve problems.
3. Collaborate to achieve a common goal.
4. Demonstrate professional and ethical conduct.
5. Use information literacy for effective vocational and/or academic research.
6. Apply quantitative reasoning and/or scientific inquiry to solve practical problems.

**Program Graduate Competencies (PGCs are the competencies every graduate will develop specific to his or her major):**

1. Perform competently a full range of echocardiography procedures.
2. Perform competently a full range of vascular sonographic procedures.
3. Utilize professional verbal, nonverbal, and written communication skills in patient care, procedure intervention, and professional relationships.
4. Act in a professional and ethical manner and comply with professional scope of practice.
5. Integrate critical thinking and problem solving skills as expected of a healthcare professional.

**Disabilities Support Statement:**

The College is committed to providing reasonable accommodations for students with disabilities. Students are encouraged to schedule an appointment with the campus Disabilities Support Counselor to request an accommodation needed due to a disability. A listing of campus Disabilities Support Counselors and contact information can be found at the [disabilities services - https://www.dtcc.edu/disabilitysupport](https://www.dtcc.edu/disabilitysupport) web page or visit the campus Advising Center.