

# ECHOCARDIOGRAPHY (ECH)

## **ECH 100 Clinical Practicum I 1 credit**

This course is provided as an opportunity for the student to perform portions of the echo exam, positions, transducer placement and terminology in the clinical setting alongside a clinical instructor. The student will apply the skills learned in Foundations of Echo scan lab in the clinical setting. This opportunity will provide the student clinical environment observation, clinical application of echocardiography and interaction with sonographers, nurses and physicians within the echo lab. (Prerequisites: BIO 117, PHS 112, MAT 165, ENG 121, and DMS 100; Co-requisites: ECH 111, ECH 116, and BIO 350).

## **ECH 105 Ultrasound Physics 4 credits**

This course establishes the foundation for the understanding of physics of sonography and its impact on interpreting data as well as ultrasound physics principles, hemodynamics, bioeffects, and quality assurance. (Prerequisites: ECH 111, ECH 116, ECH 100, and BIO 350; Co-requisites: ECH 156 and ECH 150).

## **ECH 110 Foundations of Echocardiography 4 credits**

This course will cover the history of echocardiography and where/ how it plays a role in the hospital and clinic setting. They will learn about the echo machines and their different make/models. This course will provide an understanding of the machine instrumentation, the different make/ models and the different knobs along with their functionality. Recognition of cardiac anatomy on an echocardiogram and identifying proper 2-D, M-Mode and Doppler techniques and assessment of systolic and diastolic function. This course will cover; maintaining infection control and utilizing standard precautions. Demonstrating age related competencies (ie; adults, pediatric and obstetric patients). Demonstrating appropriate techniques in intensive care environments (ancillary equipment, central venous lines, ET tubes, respiratory ventilators, etc.). Identifying life threatening situations and implementing emergency care as permitted; Emergency conditions and procedures, first aid and resuscitation techniques). Proper patient positions and transferring. Professionalism and communication skills within a health care setting. An introduction to basic cardiac medications. Overview of Allina's Commitment to Care. The student gains experience through participation in scanning labs. (Prerequisites: BIO 115, PHY 112, MAT 165, ENG 120, and DMS 100; Co-requisites: ECH 115, ECH 100, and BIO 350).

## **ECH 111 Foundations of Echocardiography 5 credits**

This course will cover the history of echocardiography and where/ how it plays a role in the hospital and clinic setting. They will learn about the echo machines and their different make/models. This course will provide an understanding of the machine instrumentation, the different make/ models and the different knobs along with their functionality. Recognition of cardiac anatomy on an echocardiogram and identifying proper 2-D, M-Mode and Doppler techniques and assessment of systolic and diastolic function. This course will cover; maintaining infection control and utilizing standard precautions. Demonstrating age related competencies (ie; adults, pediatric and obstetric patients). Demonstrating appropriate techniques in intensive care environments (ancillary equipment, central venous lines, ET tubes, respiratory ventilators, etc.). Identifying life threatening situations and implementing emergency care as permitted; Emergency conditions and procedures, first aid and resuscitation techniques). Proper patient positions and transferring. Professionalism and communication skills within a health care setting. An introduction to basic cardiac medications. Overview of Allina's Commitment to Care. The student gains experience through participation in scanning labs. (Prerequisites: BIO 117, PHS 112, MAT 165, ENG 121, and DMS 100; Co-requisites: ECH 116, ECH 100, and BIO 350).

## **ECH 115 Cardiovascular Anatomy & Physiology 3 credits**

This course will provide an understanding of the embryologic and fetal cardiac development, cardiac chambers, valve anatomy and dynamics, coronary artery anatomy and the relationship of the chambers and the great vessels. They will learn the hemodynamics of the cardiovascular system, ventricular function, pre load and after load conditions and understanding how the conduction system affects the chambers and their function. Students will be able to demonstrate knowledge of normal and abnormal cardiac anatomy and physiology. (Prerequisites: BIO 115, PHY 112, MAT 165, ENG 120, and DMS 100; Co-requisites: ECH 110, ECH 100, and BIO 350).

## **ECH 116 Cardiovascular Anatomy and Physiology 2 credits**

This course will provide an understanding of the embryologic and fetal cardiac development, cardiac chambers, valve anatomy and dynamics, coronary artery anatomy and the relationship of the chambers and the great vessels. They will learn the hemodynamics of the cardiovascular system, ventricular function, pre load and after load conditions and understanding how the conduction system affects the chambers and their function. Students will be able to demonstrate knowledge of normal and abnormal cardiac anatomy and physiology. (Prerequisites: BIO 117, PHS 112, MAT 165, ENG 121, and DMS 100; Co-requisites: ECH 111, ECH 100, and BIO 350).

## **ECH 150 Clinical Practicum II 2 credits**

The intent of this course is to provide the student with an opportunity to perform portions of an echo exam (progression from previous semesters scanning portion), review position, transducer placement, and terminology in the clinical setting. Two-dimensional (2-D) and Doppler skills learned in Foundations of Echocardiography and Adult Echo will be applied in the clinical setting. This opportunity will provide the student clinical environment observation, clinical application of echocardiography and interaction with sonographers, nurses and physicians within the echo lab. At the end of the semester the student will be able to scan a complete 2D echo within 60minutes. (Prerequisites: ECH 111, ECH 116, ECH 100, and BIO 350; Co-requisites: ECH 156 and ECH 105).

**ECH 155 Adult Ecocardiography I 5 credits**

This course is provided to learn the basics of cardiomyopathies, coronary artery disease, systemic disease that affect the cardiovascular system, pericardial diseases, pulmonary hypertension, cardiac mass/ tumors and diseases of the great vessels. Students will learn 2D, M-Mode and Doppler techniques to interrogate the valvar diseases that coincide with those pathologies as well as organic valvar disease. This course will also cover the congenital abnormalities/corrections that may be seen in an adult echo lab (VSD/ASD/repairs). The student gains experience through participation in scanning labs. (Prerequisites: ECH 110, ECH 115, ECH 100, and BIO 350; Co-requisites: ECH 150 and ECH 105).

**ECH 156 Adult Echocardiography I 6 credits**

This course is provided to learn the basics of cardiomyopathies, coronary artery disease, systemic disease that affect the cardiovascular system, pericardial diseases, pulmonary hypertension, cardiac mass/ tumors and diseases of the great vessels. Students will learn 2D, M-Mode and Doppler techniques to interrogate the valvar diseases that coincide with those pathologies as well as organic valvar disease. This course will also cover the congenital abnormalities/corrections that may be seen in an adult echo lab (VSD/ASD/repairs). The student gains experience through participation in scanning labs. (Prerequisites: ECH 111, ECH 116, ECH 100, and BIO 350; Co-requisites: ECH 150 and ECH 105).

**ECH 200 Medical Law and Ethics 3 credits**

This course is designed to define the sources of law, causes of action, and litigation processes related to the professional practice of medical imaging. The interrelatedness of standards of care, law, ethical standards, and competence are examined, as are laws and regulations affecting the practitioner in employment and liability. The course is designed to establish a foundation for, and define the parameters of, professional practice. Ethical behaviors within a defined scope of practice will be discussed and examined within the context of the healthcare delivery system. (Prerequisites: Acceptance to the Diagnostic Medical Sonography Program and DMS 100).

**ECH 225 Clinical Practicum III 3 credits**

This course will primarily focus on development of students clinical skills for 2-Dimensional and Doppler echocardiography. Clinical Practicum III is devoted to clinical training, allowing students an opportunity to apply didactic classroom instruction and develop their clinical skills. Students will begin to integrate the clinical and echo findings and identify final impressions related to the echo exam. Observational rotations will include intraoperative TEE, Outreach echocardiography, Stress Echocardiography, TEE and contrast echocardiography. 3D and strain rate echocardiography and the role of the sonographer for each procedure will also be included in this course. (Prerequisites: ECH 156, ECH 150, ECH 105; Co-requisites: ECH 255).

**ECH 250 Special Procedures 4 credits**

This course will introduce other cardiac imaging modalities. This course will introduce Stress Echocardiography, contrast echo, and bubble studies. Students will be introduced to starting a peripheral IV, required supplies, and technique. This class will focus on special procedures that involve echocardiography such as; transesophageal echocardiogram, intraoperative procedures, pericardiocentesis, cardiac catheterization procedures, LVAD device interrogation, and structural heart imaging. This course will also include an overview of 3D and Strain. (Prerequisites: ECH 255, ECH 200; Co-requisite: ECH 275).

**ECH 251 Special Procedures 3 credits**

This course will introduce other cardiac imaging modalities. This course will introduce Stress Echocardiography, contrast echo, and bubble studies. Students will be introduced to starting a peripheral IV, required supplies, and technique. This class will focus on special procedures that involve echocardiography such as; transesophageal echocardiogram, intraoperative procedures, pericardiocentesis, cardiac catheterization procedures, LVAD device interrogation, and structural heart imaging. This course will also include an overview of 3D and Strain. (Prerequisites: ECH 255, ECH 200; Co-requisite: ECH 275).

**ECH 255 Adult Echocardiography II 4 credits**

This course will focus on case reviews and the integration of all 2-D and Doppler data. Students will be able to demonstrate application of echocardiographic data and recognize discrepancies in data, ability to identify key findings, ability to create a preliminary report, and effectively communicate the echo findings to the reviewer. (Prerequisites: ECH 155, ECH 150, ECH 105; Co-requisites: ECH 225).

**ECH 275 Introduction to Congenital Echocardiography 3 credits**

This course will provide the student with an introduction to congenital echocardiography. Students will learn about Cardiac embryology and fetal cardiac circulation. Students will receive an overview of the congenital echo and how the focus is different than the adult echo. Students will learn the most common congenital abnormalities, the etiology, the symptoms, the treatments, and the follow-up imaging. Students will learn the unique windows and information needed for congenital echos and specific diseases. (Prerequisites: ECH 255, ECH 200; Co-requisite: ECH 250).

**ECH 280 Clinical Practicum IV 3 credits**

Clinical Practicum IV will continue to develop the student's clinical skills and enhance their echocardiographic hemodynamic assessment. The focus of the term will be the ability to integrate 2-D and apply echo data in an accurate patient report. Clinical Practicum IV will introduce students to transesophageal echocardiography, congenital echocardiography and to the field of stress echocardiography. (Prerequisites: ECH 255, ECH 225; Co-requisites: ECH 275, ECH 250).

**ECH 290 Clinical Practicum V 5 credits**

During Clinical Practicum V, the students will apply previous didactic and clinical training to complete a quality echocardiographic examination. Students will be responsible for integrating echo data, preparing preliminary echo findings and delivering the report. (Prerequisites: ECH 275, ECH 250).

**ECH 299 Capstone/Board Review 1 credit**

This comprehensive course contains lectures and interactive learning activities to prepare the student to transition from student to employee. The focus is on preparation for national adult echo board exams and demonstrating an understanding of the echocardiography assessment for adult cardiac pathologies. (Prerequisites: ECH 280; Co-requisites: ECH 290).