AURORA ST. LUKE’S MEDICAL CENTER
SCHOOL OF DIAGNOSTIC MEDICAL SONOGRAPHY
COURSE OVERVIEW

The core curriculum defines several major modules of ultrasound education. All lectures are correlated with scan lab demonstration and practice for each organ system. Each module of instruction includes the following components:

- Terminology
- Gross and sectional anatomy
- Physiology and pathophysiology
- Clinical medicine
- Sonographic pathology
- Sonographic technique

Students will formally present case studies during semesters two – five. Detailed information is provided in the Case Study Policy.

Clinical Education

The clinical component of our program allows students to rotate through all aspects of sonography specific to their chosen learning track. Students progress in competence and ability on an individual basis and within the guidelines set forth by program faculty. A predetermined number of competencies specific to each learning concentration must be achieved during the duration of the program.

In addition, specialty rotations have been designed in order to broaden the scope of the student’s clinical experiences.

ADULT ECHOCARDIOGRAPHY / VASCULAR TECHNOLOGY COURSE OUTLINE

Semester I
Introduction to Sonography
Cardiovascular Principles
Cardiovascular Physiology
Vascular Sonography I
Clinical Education I

Semester II
Adult Echocardiography I
Embryology of the heart
Vascular Sonography II
Sonography Principles & Instrumentation
Clinical Education II

Semester III
Pediatric Echocardiography I
Adult Echocardiography II
Clinical Education III

Semester IV
Pediatric Echocardiography II
Stress Echocardiography
Adult Echocardiography III
Vascular Sonography III
Clinical Education IV

Semester V
Specialized Procedures in Echocardiography
Seminar in Professional Development
Seminar in Management and Education
Clinical Education V
ADULT ECHOCARDIOGRAPHY / VASCULAR TECHNOLOGY COURSE DESCRIPTIONS

INTRODUCTION TO DMS
Credits: 3
The focus of this course includes content that emphasizes personal adaptation skills, nursing skills and staff development issues. An introduction to basic sonographic terminology, techniques, ultrasound physics, and scanning techniques form the framework for future study. Lectures are correlated with scan lab demonstration and practice. The student handbook policies and procedures are emphasized.

ADULT ECHOCARDIOGRAPHY I – VALVULAR DISEASE
Credits: 3
This course focuses on the necessary knowledge and assessment of adult valvular heart disease. Students will learn how to perform a comprehensive valvular heart assessment. This course will include an introduction to valvular disease, echocardiographic assessment of the aortic, mitral, tricuspid and pulmonary valve using 2D, M-mode, Doppler and color flow imaging. The course will also cover surgical valvular interventions and interrogation of both pre-op and post-op complete echocardiographic hemodynamic assessments. Lectures are correlated with scan lab demonstration as well as practical clinical experience.

ADULT ECHOCARDIOGRAPHY II – CARDIOMYOPATHY
Credits: 3
This course focuses on the necessary knowledge and assessment of adult cardiomyopathies. Students will learn how to perform a comprehensive assessment of hypertrophic, restrictive, dilated, arrhythmogenic and unclassified cardiomyopathies. Students will learn the necessary 2D imaging and Doppler hemodynamics assessments to complete a full comprehensive examination. Lectures are correlated with scan lab demonstration as well as practical clinical experience.

ADULT ECHOCARDIOGRAPHY III – ADVANCED PATHOLOGY
Credits: 3
The focus of this course is to provide the basic knowledge of major cardiac pathophysiology that students will encounter while practicing echocardiography. This course will cover systemic and pulmonary hypertension, infiltrative heart disease, cardiac tumors and masses, pericardial disease, cardiac diseases related to systemic illness, and diseases of the great vessels. Students will learn how to complete a comprehensive 2D and Doppler assessment of these major cardiac diseases.

CARDIOVASCULAR PRINCIPLES
Credits: 2
The first half of the course focuses on structure, function and pathology of the cardiovascular system. Mechanisms of function of the cardiovascular system will be discussed. Cardiac structures and identification will be covered. The second portion of this course will provide the necessary skills and knowledge to perform a complete cardiac Doppler examination. The course will cover the introduction to cardiac Doppler assessment, Doppler hemodynamics, and color flow imaging. The student will learn how to perform Doppler assessment and quantification of severity of valvular stenosis and
regurgitation. Students will also learn how to provide information for both systolic and diastolic Doppler assessments. Lectures are correlated with scan lab demonstration as well as practical clinical experience.

CARDIOVASCULAR PHYSIOLOGY
Credits: 3
This course is designed to put into practice basic and advanced cardiovascular physiology concepts. The course will include the conduction system, circulation system, ECG pattern recognition and intracardiac pressures. CV physiology will also explore the heart at the cellular level. Student will learn about the cardiac action potential, coupling and uncoupling of myocardial sarcomeres and preload/afterload concepts. This course will include cardiac heart sounds and other clinical clues used in conjunction with echocardiographic evidence to determine a cardiac diagnosis. Lectures are correlated with scan lab demonstration as well as practical clinical experience.

CLINICAL EDUCATION I - V
Students are scheduled for clinical practicum at participating clinical education centers. Students progress in competence and ability on an individual basis and within the guidelines set forth by program faculty. Students are routinely evaluated on professional growth, personal interactions, and technical ability. A predetermined number of competencies specific to each learning concentration must be achieved during the duration of the program. Clinical experience rotations include abdominal imaging, OB/GYN, transthoracic cardiac imaging and vascular technology. Sonographic technique is also practiced during routinely scheduled scan lab sessions, which are conducted by the program faculty.

Clinical Education I – V 3 credits each

EMBRYOLOGY OF THE HEART
Credits: 3
This course will introduce the student echocardiographer to cardiovascular development as it relates to congenital heart disease. The student will be able to recognize stages in development when a congenital defect can form. This includes atrial anomalies, ventricular anomalies, venous and arterial connection anomalies, patent ductus arteriosus (PDA), AV Canal anomalies, Conotruncal defects, and fetal circulation.

PEDIATRIC ECHOCARIOGRAPHY I
Credits: 3
This course will introduce the student Echocardiographer to various types of congenital heart disease. The types of congenital heart disease to be discussed in this course are atrial anomalies, ventricular anomalies, venous and arterial connection anomalies, patent ductus arteriosus (PDA), AV Canal anomalies, Conotruncal defects, and single ventricles.

PEDIATRIC ECHOCARIOGRAPHY II
Credits: 3
This course will discuss the role of ultrasound in evaluating the pediatric heart and complex congenital heart disease. Types of CHD to be discussed in this course include inflow lesions, review of Conotruncal anomalies, outflow lesions, cardiac chamber anomalies, abnormal vascular communications, cardiomyopathies, and
post-operative evaluation of repair of congenital heart disease.

**SEMINAR IN PROFESSIONAL DEVELOPMENT**
Credits: 3
The main objective is for the student to apply the academic and clinical knowledge used in this program to develop a senior project. This course is designed to showcase the students’ ever evolving knowledge in sonography. The senior project consists of two parts; an in-depth written paper and oral presentation to your peers.

Preparation for the sonography boards and professionalism review:
The main objective is to provide the student with the opportunity to improve test-taking skills in preparation for the examination of the American Registry for Diagnostic Medical Sonography. Job-hunting, interview skills and resume writing will provide the student with skills needed when seeking employment. An overview of professional behavior and standards will be reviewed at this time.

**SEMINAR IN MANAGEMENT AND EDUCATION**
Credits: 3
This course will discuss the Scope of Practice for a sonographer, developing a resume and learning interview skills. There will be in class discussions on evaluating and accepting job offers, learning about retirement options and exploring the career interest of the student. Students will learn possible career paths available and understand what that career path job description would entail. Students will develop a research project in either lab accreditation or sonographer education. Students will participate in weekly online discussions regarding the pathways.

**SONOGRAPHY PRINCIPLES & INSTRUMENTATION**
Credits: 3
Course Description:
This course focuses on mathematical principals, the characteristics of sound and the mechanism of sonographic image production and display. Potential biological effects and safety are discussed together with the practical application of physical concepts.

**SPECIAL PROCEDURES IN ECHOCARDIOGRAPHY**
Credits: 3
This course focuses on the necessary knowledge and role of cardiac sonographers in special cardiac imaging procedures. Students will learn the fundamentals as well as the basic techniques of transesophageal imaging, contrast echocardiography, cardiac resynchronization therapy, pacemaker optimization setting, strain rate, twist/torsion, three-dimensional (3D) and pericardiocentesis imaging. Lectures are correlated with scan lab demonstration as well as practical clinical experience.

**STRESS ECHOCARDIOGRAPHY**
Credits: 3
The intent of this course is to focus on preparing the student for coronary artery disease and stress echocardiography testing. Students will become competent in coronary artery distribution and anomalies. Student will actively participate in numerous stress echocardiographic examinations during this rotation. Lectures are correlated with scan lab demonstration as well as practical clinical experience.
VASCULAR SONOGRAPHY I
Credits: 3
This course focuses on the physical principles relating to the vascular system, normal gross, relational, cross-sectional and sonographic anatomy of the peripheral arterial, venous and the abdominal visceral vessels. Mechanisms of disease, unique to the vascular system, as well as the relationship between cardiovascular disease and the health of other organ systems will be discussed. Correlation of laboratory findings and etiologies of disease will be covered. Doppler principles and vascular hemodynamics are presented. Lectures are correlated with scan lab demonstration as well as practical clinical experience.

VASCULAR SONOGRAPHY II
Credits: 3
This course focuses on the physical principles relating to the vascular system, normal gross, relational, cross-sectional and sonographic anatomy of the cerebrovascular, intracranial, peripheral arterial and venous systems. Mechanisms of disease, unique to the vascular system, as well as the relationship between cardiovascular disease and the health of other organ systems will be discussed. Correlation of laboratory findings and etiologies of disease will be covered. Doppler principles and vascular hemodynamics are presented. Lectures are correlated with scan lab demonstration as well as practical clinical experience.

VASCULAR SONOGRAPHY III
Credits: 3
This course focuses on the normal and abnormal gross, relational, cross-sectional and sonographic anatomy of the abdominal vascular system to include the penile Doppler. In addition, liver, pancreas and renal transplants will be discussed. Treatment options for renal hypertension, liver disease and arterial and venous pathology will be discussed. Also discussed will be correlative imaging modalities, including angiography, CT scan, MRI and Nuclear Medicine. Mechanisms of disease, unique to the vascular system, as well as the relationship between cardiovascular disease and the health of other organ systems will be discussed. Correlation of laboratory findings and etiologies of disease will be covered. Advanced scanning techniques will be discussed. A short correlation of statistical data and vascular testing will be covered. Lectures are correlated with scan lab demonstration and practice for each system.