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 one case study during each semester relative to the material being presented.

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.

CARDIAC / VASCULAR SONOGRAPHY OPTION
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
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 – IV 3 credits
Clinical Education V 4 credits

EMBRYOLOGY OF THE HEART
Credits: 3
This course will discuss cardiovascular development as it relates to various types of congenital heart disease. Lectures are correlated with scan lab demonstration as well as practical clinical experience.

PEDIATRIC ECHOCARDIOGRAPHY 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 septal defect (ASD), ventricular septal defect (VSD), patent ductus arteriosus (PDA), transposition of the great arteries (TGA), double outlet right ventricle (DORV) and double outlet left ventricle.

PEDIATRIC ECHOCARDIOGRAPHY 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 theories and techniques of research, management, education and applications and sales sonography. Students will learn possible career paths available and understand what that career path job description would entail. Students will chose between management, education, research and applications for their final project and develop a proposal/solution for that career pathway. 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 carotid. 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. Various vascular scanning techniques will be discussed. Lectures are correlated with scan lab demonstration and practice for each system.

VASCULAR SONOGRAPHY II
Credits: 3
This course focuses on the normal gross, relational, cross-sectional and sonographic anatomy of the vascular system to include intracranial vessels, lower and upper extremity venous and arterial 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. Various vascular scanning techniques will be discussed. Lectures are correlated with scan lab demonstration and practice for each system.

VASCULAR SONOGRAPHY III
Credits: 3
This course focuses on the normal and abnormal gross, relational, cross-sectional and sonographic anatomy of the vascular system to include the abdominal vasculature, organ transplants, and penile Doppler. 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.