

# Diagnostic Medical Sonography

## **SO 102 FOUNDATIONS OF SONOGRAPHY**

Credit Hours: 2

Prerequisites: Admission into the program  
Student will be introduced to the profession of sonography and the role of the sonographer. Emphasis will be placed on history of the profession, written and verbal communication, and professional issues relating to registry, accreditation, and the professional organizations. Basic sonographic physics principles will be introduced.

## **SO 108 INTRODUCTION TO SONOGRAPHY AND PATIENT CARE**

Credit Hours: 6

Prerequisites: SO 102, SC 116

An orientation will be included in this course to review the student handbook, goals of the program, curriculum sequence, clinical education guidelines, performance objectives, grading policies and all program policies. This course will focus on introducing the student to the field of diagnostic medical sonography. It will include medical terminology with application to sonography. Course work will include information concerning to sonography, basic patient care, infection control and universal precautions, emergency conditions, body mechanics/ergonomics, learning methods, and professionalism. General sonographic physics principles, terminology, and clinical applications related to abdominal, OB/GYN and high resolution imaging are addressed. Students will begin to learn scanning techniques in the laboratory on real-time ultrasound equipment. The student will be required to complete a course in cardiopulmonary resuscitation (BCLS).

## **SO 115 CLINICAL PRACTICUM I**

Credit Hours: 2

Prerequisites: SO 108

Students are assigned to the clinical setting to begin performing sonographic procedures, practice basic patient care skills including patient mobility and practice fundamental operation of the ultrasound machine.

## **SO 118 INTRODUCTION TO CARDIOVASCULAR SONOGRAPHY AND PATIENT CARE**

Credit Hours: 6

Prerequisites: SO 102, SC 116

An orientation will be included in this course to review the student handbook, goals of the program, curriculum sequence, clinical education guidelines, performance objectives, grading policies and all program policies.

This course will focus on introducing the student to the field of diagnostic medical sonography. It will include medical terminology with application to sonography. Course work will include information concerning to basic patient care, infection control and universal precautions, emergency conditions, body mechanics/ergonomics, learning methods, and professionalism. General sonographic physics principles, terminology, and clinical applications related to basic cardiovascular principles that are essential to the understanding of cardiovascular function and evaluation. Topics include anatomy of the heart, basic embryology, cardiac physiology, principles of cardiac hemodynamics and cardiac evaluation. Students will also be introduced to fundamental principles of vascular and duplex imaging. Students will begin to learn scanning techniques in the laboratory on real-time ultrasound equipment. The student will be required to complete a course in cardiopulmonary resuscitation (BCLS).

## **SO 126 CARDIOVASCULAR CLINICAL PRACTICUM I**

Credit Hours: 2

Prerequisites: SO 118

Students are assigned to the clinical setting to begin performing cardiovascular procedures, practice basic patient care skills including patient mobility and practice fundamental operation of the ultrasound machine.

## **SO 214 SONOGRAPHIC PHYSICS I**

Credit Hours: 2

Prerequisites: SC 110, SO 108/118

Principles of sound propagation and tissue interaction are addressed. These include reflection, refraction, absorption and attenuation, the piezoelectric effect, transducer characteristics, focusing and resolution.

## **SO 216 SONOGRAPHIC PHYSICS II**

Credit Hours: 1

Prerequisites: SC 110, SO 108/118, SO 214

Building on material taught in SO 214, this course continues with the principles Doppler and hemodynamics. In addition to classroom lecture and discussion, students will participate in practical exercises involving setting up and performing Doppler examinations.

## **SO 218 SONOGRAPHIC PHYSICS III**

Credit Hours: 2

Prerequisites: SC 110, SO 108/118, SO 214, SO216

Building on material taught in SO 214 and SO216, this course continues with the principles of pulse-echo imaging, image storage and display, image features and artifacts, quality assurance and bioeffects.

**SO 233 SONOGRAPHIC ANATOMY,  
PATHOLOGY AND CRITIQUE I**

Credit Hours: 5

Prerequisites: SO 108

Lecture content includes gross anatomy, physiology, pathologic conditions, pertinent lab values, and sonographic imaging of the abdominal organs to include liver, biliary system and great vessels. Normal anatomy and ultrasound evaluation of the female pelvis and reproductive system as well as obstetrical applications of ultrasound to include embryology, the developing fetus, and sonographic imaging and measurement of the normal fetus will be taught. The laboratory is used to enhance and reinforce material taught didactically. The essential components of the case presentation are introduced. Students present cases in an open forum for discussion and evaluation. Information presented includes patient history, sonographic findings, and patient follow-up. The examinations are also critiqued for technique, artifacts, and demonstration of anatomy and pathology. Students are evaluated based on their in-class written and oral presentations, and overall participation. Students also participate in journal club exercise.

**SO 235 CARDIOVASCULAR SEMINAR**

Credit Hours: 2

This course is designed to help prepare students for the ARDMS board examinations in Sonography Principles and Instrumentation (SPI), Adult Echocardiography and Vascular Technology.

Methods include the use of computer-assisted instruction (CAIs), case review, simulated registry examinations and class discussion. Students also work with an application skill specialist on effective test-taking techniques for exams on the computer. Students will also be required to take the SPI examination as a part of this course prior to graduation in May. This course will assist students in the transition from student sonographer to professional sonographer, including ARDMS registry exam preparation. Additional topics such as resume writing, interview and negotiation skills, understanding benefits and different avenues of the sonography career ladder are also discussed.

**SO 236 SONOGRAPHIC SEMINAR**

Credit Hours: 2

This course is designed to help prepare students for the ARDMS board examinations in Sonography Principles and Instrumentation (SPI), Abdomen and OB/GYN. Methods include the use of computer assisted instruction (CAIs), case review, simulated registry examinations and class discussion. Students also work with an application skill specialist on effective test-taking techniques for exams on the computer. Students will also be required to take the SPI examination as part of this course prior to graduation in May. This course will assist

students in the transition from student sonographer to professional sonographer, including ARDMS registry exam preparation. Additional topics such as resume writing, interview and negotiation skills, understanding benefits and different avenues of the sonography career ladder are also discussed.

**SO 237 SONOGRAPHIC CLINICAL  
PRACTICUM II**

Credit Hours: 4

Prerequisites: SO 115

Students are assigned to various clinical rotations where they gain hands-on experience under the direction and supervision of clinical instructors. While students will observe and participate in all areas of sonography, the specific areas of emphasis are abdominal and gynecological applications.

**SO 238 CARDIOVASCULAR  
SONOGRAPHIC ANATOMY,  
PATHOLOGY AND CRITIQUE I**

Credit Hours: 6

Prerequisites: SO 118

Students are introduced to fundamental principles of adult echocardiography including terminology, 2-D and m-mode imaging techniques, and Doppler evaluation of the heart. This course will also cover beginning concepts of vascular sonography to include: extracranial and intracranial arterial systems, lower venous systems. The laboratory is used to enhance and reinforce material taught didactically. The essential components of the case presentation are introduced. Students present cases in an open forum for discussion and evaluation. Information presented includes patient history, sonographic findings, and patient follow-up. The examinations are also critiqued for technique, artifacts, and demonstration of anatomy and pathology. Students are evaluated based on their in-class written and oral presentations, and overall participation. Students also participate in journal club exercise.

**SO 239 SONOGRAPHIC ANATOMY,  
PATHOLOGY AND CRITIQUE II**

Credit Hours: 6

Prerequisites: SO 233

This course focuses on the sonographic appearance of pathologic conditions related to the abdomen. In addition to abdominal pathology, pathologic processes in the nonpregnant pelvis & gynecologic infertility studies as well as 1st trimester pregnancy complications will be taught. The laboratory setting is used to enhance and reinforce material taught didactically. Students will also present interesting cases in a small group setting. Patient's medical history, pertinent lab values, medical procedures, and sonographic images comprise a complete case review to be followed by an open

discussion. In addition, the essential elements of technical report writing are taught.

**SO 243 SONOGRAPHIC ANATOMY, PATHOLOGY AND CRITIQUE III**

Credit Hours: 6

Prerequisites: SO 108, SO 233, SO 239

Course material includes anatomy, pathology, and sonographic imaging used in the care of the high-risk obstetric patient and high-resolution sonography, which includes thyroid, breast, testicular, peritoneum/retroperitoneum, superficial imaging and invasive/biopsy procedure. The laboratory setting is used to enhance and reinforce material taught didactically. This course puts more emphasis on technical report writing and film critique.

**SO 248 SONOGRAPHIC CLINICAL PRACTICUM III**

Credit Hours: 5

Prerequisites: SO 115, SO 237

A continuation of Clinical Practicum I and II this course will allow students to broaden their hands-on experience in the clinical setting to include obstetrics/gynecology as well as abdominal sonography. Students continue to perform examinations under direct supervision of clinical instructors and, as the semester progresses, they are given more clinical responsibility.

**SO 253 SONOGRAPHIC CLINICAL PRACTICUM IV**

Credit Hours: 5

Prerequisites: SO 115, SO 237, SO 248

This clinical course continues to provide the opportunity for students to provide quality patient care while performing supervised sonographic examinations in all areas of practice. Professional judgment, patient care and critical thinking skills are further developed through interaction with patients and health care providers.

**SO 255 SONOGRAPHIC ANATOMY, PATHOLOGY AND CRITIQUE IV**

Credit Hours: 3

Prerequisite: SO 108, SO 233, SO 239, SO 243

This course will introduce the multispecialty sonography student to vascular sonography. It will include the hemodynamics and physiology of the vascular system. The student will be introduced to normal I vasculature and the differentiation between the venous and arterial systems. Discussion will include the clinical signs and symptoms and the appropriate diagnostic testing and treatment of various vascular diseases. Emphasis will be placed on the functional workings and settings associated with vascular procedures. Students will also be responsible for writing a Case Report according to the JDMS guidelines and presenting it in digital format in front of peers (students, program staff, and clinical instructors).

**SO 256 CARDIOVASCULAR CLINICAL PRACTICUM II**

Credit Hours: 4

Prerequisite: SO 118, SO 126

This is a continuation of Cardiovascular Clinical Practicum I. Under direct supervision, students gain hands-on experience in the clinical setting. Students provide basic patient care and perform limited examinations demonstrating fundamental principles in instrumentation and cardiac scanning. In addition, students begin to perform examinations including carotid duplex and ankle/brachial indices in the vascular lab.

**SO 258 CARDIOVASCULAR SONOGRAPHIC ANATOMY, PATHOLOGY AND CRITIQUE II**

Credit Hours: 6

Prerequisites: SO 118, SO 238

This course expands on the cardiac imaging techniques and begins to focus on pathologic conditions of the heart. Comparative imaging, pathophysiology, sonographic appearance and Doppler echocardiography are integrated into the lectures. In addition, students will continue to learn lower extremity and venous examinations. New topics include: lower extremity arterial examinations (ABI's and SAP's), upper extremity venous and arterial exams and graft assessment. Pathologies of thrombus and arterial plaque and signs and symptoms of arterial and venous pathology are addressed. The laboratory setting is used to enhance and reinforce material taught didactically. Students will also present interesting cases in a small group setting. Patient's medical history, pertinent lab values, medical procedures, and sonographic images comprise a complete case review to be followed by an open discussion. In addition, the essential elements of technical report writing are taught.

**SO 259 CARDIOVASCULAR CLINICAL PRACTICUM III**

Credit Hours: 6

Prerequisites: SO 118, SO 126, SO 256

This is a continuation of Cardiovascular Clinical Practicum I and II, in which students' experiences are broadened to include more advanced cardiac imaging techniques using two dimensional imaging, M-mode and spectral Doppler analysis. In the vascular lab, students begin to perform advanced vascular imaging procedures including deep venous examinations and intravenous graft assessments. Patient care skills are further developed through direct patient contact.

**SO 260 MEDICAL ETHICS AND LAW IMAGING**

Credit Hours: 1

Prerequisites: Instructor permission required for those not enrolled in the Sonography Program This course addresses a broad range of topics related to professional ethics and law including application of ethical principles, professionalization of medical imaging disciplines, theories and models related to incidence and prevention of medical mistakes and state and federal laws that affect medical imaging.

**SO 261 CARDIOVASCULAR SONOGRAPHIC ANATOMY, PATHOLOGY AND CRITIQUE III**

Credit Hours: 5

Prerequisites: SO 118, SO 238, SO 258, SO 261

This course covers cardiac physiology and cardiac physics as it relates to aspects of mitral, aortic pulmonary and tricuspid stenosis as well as prosthetic valves, hypertensive disease and cardiomyopathies. The vascular portion of this course focuses on pathology and advanced imaging procedures (transcranial). Abdominal vascular imaging to include renal artery stenosis, the aorta and its branches and other abdominal applications are addressed. The laboratory setting is used to enhance and reinforce material taught didactically. This course puts more emphasis on technical report writing and film critique.

**SO 262 APPLIED SECTIONAL ANATOMY IN IMAGING**

(Cross-listed: RA 262)

Credit Hours: 1

This course provides an introduction to the basics of cross-sectional anatomy of the head, neck, chest, abdomen and pelvic anatomy with emphasis on structures visualized in diagnostic medical sonography, computerized technology (CT), and magnetic resonance imaging (MRI) and nuclear medicine. The anatomy will be evaluated in multiple planes. The cadaver lab will be used to emphasize the relationships between anatomic structures.

**SO 265 CARDIOVASCULAR CLINICAL PRACTICUM IV**

Credit Hours: 6

Prerequisite: SO 118, SO 126, SO 256, SO 259

This is a continuation of Cardiovascular Clinical Practicum I, II, and III. Building on skills developed in the previous two semesters, students perform advanced cardiac procedures such as stress-echocardiograms and transesophageal imaging and demonstrate technical proficiency in non-invasive vascular studies. Professional judgment, patient care and critical thinking skills are further developed.

**SO 267 CARDIOVASCULAR SONOGRAPHIC ANATOMY, PATHOLOGY AND CRITIQUE IV**

Credit Hours: 1

Prerequisites: SO 118, SO 239, SO 258, SO 261

Students will be responsible for writing a Case Report according to the JDMS guidelines and presenting it in digital format in front of peers (students, program staff, and clinical instructors).

**SO 420 PROFESSIONAL EXTERNSHIP**

Credit Hours: 1-3

Prerequisites: Instructor permission

Students will determine an appropriate setting in which to shadow a professional (physician, sonographer, administrator, educator, etc.) to obtain additional practical experience in an area of predetermined interest.

**SO 430 SONOGRAPHY DIRECTED STUDY**

Credit Hours: 1-4

Prerequisites: Instructor permission

Students may select a topic directly related to Diagnostic Medical Sonography for in-depth study. Topics may include, but are not limited to, advanced concepts in neurosonology, pediatric echocardiography or breast imaging.

**Diagnostic Medical Sonography - On-Line Advanced Skills Certificate in Vascular Sonography**

**SO 001 PRINCIPLES OF HEMODYNAMICS**

A discussion of Doppler Sonography that includes basic ultrasound physics and instrumentation, continuous-wave Doppler, pulsed Doppler, and duplex-triplex scanning with emphasis on the analysis of Doppler spectral waveforms and interpreting color Doppler images. An in-depth analysis of normal vascular hemodynamics and the effect of pathology on the flow of blood within and throughout the vascular circulation are presented.

**SO 002 EXTREMITY VENOUS PRINCIPLES AND PROCEDURES**

Study of the clinical applications of Vascular Technology including the pathophysiologic basis, clinical signs and symptoms, related diagnostic procedures and typical findings of common and rare conditions of the upper and lower extremity venous vascular systems.

**SO 003            EXTREMITY ARTERIAL  
                         PRINCIPLES AND PROCEDURES**

Study of the clinical applications of Vascular Technology including the pathophysiologic basis, clinical signs and symptoms, related diagnostic procedures and typical findings of common and rare conditions of the upper and lower extremity arterial systems.

**SO 004            CEREBROVASCULAR  
                         PRINCIPLES AND PROCEDURES**

Study of the abnormal vascular examinations of the cerebrovascular system.

**SO 005            MISC APPLICATIONS IN  
                         VASCULAR TECHNOLOGY**

Further study of the clinical applications of vascular technology, including abdominal Doppler applications and other advanced and/or rare examinations.

**SO 006            ON-LINE REGISTRY REVIEW  
                         COURSE (OPTIONAL)**

This course will consist of review in preparation for the ARDMS examinations in