

DIAGNOSTIC MEDICAL SONOGRAPHY (DMSD)

DMSD 2100 - Patient Care in Sonography (3 Credits)

This course is designed to develop the knowledge and skills necessary to address the needs of the patient in the diagnostic imaging department. The success of the students in the clinical setting requires the ability to conduct themselves in a professional and ethical manner. The safety of the patient requires the student to have knowledge of the patient assessment, basic nursing skills and the ability to react to medical emergencies.

Lecture: 3 hours

DMSD 2210 - Sonographic Physics (4 Credits)

This course provides students with theoretical and practical aspects of ultrasound physics and instrumentation. Wave form, propagation, velocity, wave length, acoustic impedance, reflection and rarefaction are discussed. Components of the ultrasound imager are examined as well as recording devices and basic Doppler principles.

Lecture: 3 hours, Lab: 2 hours

DMSD 2220 - Sonographic Imaging (3 Credits)

This course provides students with general information that has application in all the ultrasonic imaging concentrations. It addresses standard protocols for patient care, as well as the management of data from other imaging modalities, laboratory findings and patient history. Pertinent legal principles are also covered. An overview of the categories in which disease occurs is included. The biological effects of ultrasound is discussed along with quality control procedures and their importance.

Lecture: 3 hours

DMSD 2230 - Abdominal Ultrasound (4 Credits)

This course provides a foundation of physiology, pathology and pathophysiology as it related to the human abdomen specific to the performance of abdominal Sonography. Students begin to recognize normal and abnormal imaging as it relates to anatomy, pathology and pathophysiology of the abdomen. Bioeffects, ALARA principle, pertinent in-vitro and in-vivo studies, exposure display indices, and maximum safe exposure levels will be incorporated into the didactic and laboratory classes. Laboratory experience will include development of entry level scanning techniques and protocols on the human abdomen. Students will demonstrate the ability to perform entry level abdominal sonographic examinations using real-time sonographic equipment, Doppler and color Doppler equipment with various transducers.

Lecture: 3 hours, Lab: 2 hours

Prerequisite(s): DMSD 2100 (may be taken concurrently)

DMSD 2235 - Ultrasound for Small Parts, Gynecology and Male Pelvis (4 Credits)

This course provides a foundation of physiology, pathology and pathophysiology as they relate to the male and female pelvis, thyroid, breast and scrotum. The student will begin to recognize normal and abnormal imaging as they relate to anatomy, pathology and pathophysiology of these structures. Scanning techniques and protocols are discussed in normal and abnormal conditions. Bio-effects, ALARA principle, pertinent in-vitro and in-vivo studies, exposure display indices, and maximum safe exposure levels will be incorporated into the didactic and laboratory classes. Laboratory experience will include further development of entry to mid-level scanning techniques and protocol on the human male and female pelvis, thyroid, breast, and scrotum. Students will demonstrate the ability to perform entry to mid-level sonographic examinations using real-time sonographic equipment, Doppler and color Doppler equipment with various transducers.

Lecture: 3 hours, Lab: 2 hours

Prerequisite(s): DMSD 2230

DMSD 2236 - Musculoskeletal Sonographic Imaging (3 Credits)

This course provides a foundation of anatomy and pathology as they relate to the human musculoskeletal system specific to the performance of sonography. Students will recognize normal and abnormal sonographic imaging related to the shoulder, elbow, hand and wrist, hip, knee, and foot and ankle. Bioeffects, LARA, principles of sonography will be incorporated in the didactic and laboratory classes. Laboratory experience will include development of entry-level sonographic scanning techniques of the musculoskeletal system. Student will demonstrate the ability to perform entry-level musculoskeletal sonographic examinations using real-time sonographic equipment, Doppler, and color Doppler with appropriate transducers. Note: Prerequisite waived for Registered Sonographers with ARDMS or CCI.

Lecture: 2 hours, Lab: 2 hours

Prerequisite(s): DMSD 2210

**DMSD 2240 - Obstetrical Ultrasound
(4 Credits)**

This course will focus on the embryology and fetal development in the first, second and third trimester. Recognition of normal and abnormal anatomy will be addressed in the obstetrical, embryonic and fetal patient. Abnormal patterns of pathology and pathophysiology including genetic malformations are discussed. Scanning techniques, protocols and sonographic findings are discussed in the normal and abnormal conditions. Bio-effects, ALARA principle, pertinent in-vitro and in-vivo studies, exposure display indices, and maximum safe exposure levels will be incorporated into the didactic and laboratory classes. Laboratory experience will include further development of entry to mid-level scanning techniques and protocol on the human female obstetrical, embryonic, and fetal patient. Students will demonstrate the ability to perform entry to midlevel level sonographic examinations using real-time sonographic equipment, Doppler and color Doppler equipment with various transducers.

Lecture: 3 hours, Lab: 2 hours

Prerequisite(s): DMSD 2235

**DMSD 2241 - General Ultrasound Practicum I
(3 Credits)**

Initial clinical scanning experience of the abdomen is covered. This course focuses on clinical application of standard protocols of the abdomen. Normal and abnormal anatomy are emphasized. Students begin to develop the critical thinking skills needed to correlate the examination with clinical history. Students must be competent in aortic and renal examinations at the completion of this class. Clinical education and competency occurs under the supervision of a Registered Sonographer.

Other: 32 hours

Prerequisite(s): DMSD 2230

**DMSD 2242 - General Ultrasound Practicum II
(3 Credits)**

This practicum involves ongoing assessment of advanced clinical skills of the abdomen incorporating advanced identification of pathology and pathophysiology. Age specific scanning protocol are covered (infant to adult). Basic scanning protocol on male and female pelvis, thyroid, breast and scrotum is covered. Students must be competent on the complete scan of the abdomen at the completion of this class. Clinical education and student competency is under the supervision of a Registered Sonographer.

Other: 32 hours

Prerequisite(s): DMSD 2241

**DMSD 2243 - General Ultrasound Practicum III
(3 Credits)**

This practicum involves ongoing assessment of advanced clinical skills of the male and female pelvis, thyroid, breast and scrotum incorporating advanced identification of pathology and pathophysiology. Basic obstetrical scanning protocol begins with a focus on normal anatomy of the maternal, embryo and fetus. Students must demonstrate critical thinking and competency in all areas of abdominal ultrasound, male and female pelvis and small parts and basic obstetrical examinations. Students must be competent on the complete scan of the female and male pelvis, small parts and basic obstetrical scanning at the completion of this class. Clinical education and student competency and verification is under the supervision of a Registered Sonographer.

Other: 32 hours

Prerequisite(s): DMSD 2242

**DMSD 2245 - Sonographic Anatomy
(3 Credits)**

This course provides comprehensive coverage of the abdomen and superficial structures (small parts) and their sonographic appearance. Pertinent gross anatomy, sectional anatomy, physiology, pathology and pathophysiology are examined. Students relate specific anatomy to scanning plane and preferred scanning protocols.

Lecture: 3 hours

**DMSD 2250 - Vascular Ultrasound I
(4 Credits)**

This course provides students with the basic information specific to the performance of vascular Sonography. Anatomy, pathology and pathophysiology of the vascular system including arterial, cerebrovascular and venous systems are included. Scanning protocols for the upper and lower extremity are addressed. Bioeffects, ALARA principle, pertinent in-vitro and in-vivo studies, exposure display indices, and maximum safe exposure levels will be incorporated into the didactic and laboratory classes. Laboratory experience will include the use of plethysmography and real-time Sonography to evaluate and record the hemodynamics of arterial flow. The recognition of normal anatomy, basic pathology and pathophysiology are addressed. Students will demonstrate the use of plethysmography and real-time Sonography equipment with vascular transducers, Doppler and color Doppler to perform entry level vascular Sonography examinations.

Lecture: 3 hours, Lab: 2 hours

Prerequisite(s): DMSD 2100

**DMSD 2251 - Vascular Ultrasound II
(4 Credits)**

This course provides an in-depth of vascular ultrasound including pathophysiology, etiology of disease clinical findings and related symptoms. Age-specific testing is discussed. Related testing for cerebrovascular, upper and lower extremity venous circulation is covered. Scanning techniques and protocols are discussed in normal and abnormal conditions. Bio-effects, ALARA principle, pertinent in-vitro studies, exposure display indices, and maximum safe exposure levels will be incorporated into the didactic and laboratory classes. Laboratory experience will include further development of entry to mid-level scanning techniques and protocol on the cerebrovascular, upper and lower extremity venous circulation. Students will demonstrate the ability to perform entry to mid-level sonographic examinations using real-time sonographic equipment, Doppler and color Doppler equipment with various transducers.

Lecture: 3 hours, Lab: 2 hours

Prerequisite(s): DMSD 2250

**DMSD 2252 - Advanced Vascular Ultrasound
(4 Credits)**

This course will focus on the application of vascular ultrasound relating to abdominal vasculature and other specialty examinations such as aorta, renal transplant, TIPS procedure, transcranial Doppler, pseudoaneurysm, mapping and the use of ultrasound contrast agents. Interpretation skills on all testing in all disease states will be further developed. Scanning techniques, protocols and sonographic findings are discussed in the normal and abnormal conditions. Bioeffects, ALARA principle, pertinent in-vitro studies, exposure display indices, and maximum safe exposure levels will be incorporated into the didactic and laboratory classes. Laboratory experience will include advanced scanning techniques and protocol on aorta, renal transplant, TIPS procedure, transcranial Doppler, pseudoaneurysm and fistula. Students will demonstrate the ability to perform advanced level sonographic examinations using real-time sonographic equipment, Doppler and color Doppler equipment with various transducers.

Lecture: 3 hours, Lab: 2 hours

Prerequisite(s): DMSD 2251

**DMSD 2253 - Vascular Practicum I
(3 Credits)**

This course provides students with initial clinical scanning experience for upper and lower extremity arterial examinations. Clinical application of standard protocols focuses on recognition of normal plethysmographic tracings, normal ultrasound vascular imaging and Doppler patterns. Students begin to develop the critical thinking skills required to correlate clinical history with exam requirements. Clinical education and clinical competency occurs under the supervision of a registered Vascular Sonographer.

Other: 32 hours

Prerequisite(s): DMSD 2250

**DMSD 2254 - Vascular Practicum II
(3 Credits)**

This course provides students with initial clinical scanning experience for cerebrovascular and venous examinations. Clinical application of standard protocols focuses on normal vascular ultrasound imaging for cerebrovascular and venous examinations. Recognition of normal and abnormal images and Doppler patterns are included. Students use critical thinking skills to integrate clinical history with abnormal findings. Clinical education and clinical competency occurs under the supervision of a registered Vascular Sonographer.

Other: 32 hours

Prerequisite(s): DMSD 2251

**DMSD 2255 - Vascular Practicum III
(3 Credits)**

This course provides students with advanced clinical scanning experience for upper and lower extremity arterial, venous, and cerebrovascular examinations. Final competency evaluation will occur along with the opportunity to perform abdominal vasculature and rare specialty examinations. Students use critical thinking skills to integrate clinical history to abnormal findings. Clinical education and clinical competency occurs under the supervision of a registered Vascular Sonographer.

Other: 32 hours

Prerequisite(s): DMSD 2252

**DMSD 2260 - Echocardiography I
(4 Credits)**

This course provides students with a basic information specific to the performance of echocardiography. An overview of basic normal and abnormal anatomy, cardiac measurements, pathology and pathophysiology will be covered. Bioeffects, ALARA principle, pertinent in-vitro and in-vivo studies, exposure display indices, and maximum safe exposure levels will be incorporated into didactic and laboratory classes. Laboratory will utilize sonographic equipment using two dimensional, M-Mode, Doppler and color Doppler for recognition of normal and abnormal anatomy, pathology and pathophysiology with basic scanning techniques, and specific protocols in echocardiography with related findings. Cardiac windows will include parasternal and apical views, recognizing cardiac chambers, valves, walls and other structures.

Lecture: 3 hours, Lab: 2 hours

Prerequisite(s): DMSD 2100

**DMSD 2261 - Echocardiography II
(4 Credits)**

This course expands on the material presented in Echocardiography I and continues to provide students with the knowledge necessary to capably perform a complete and diagnostic echocardiographic examinations using M-mode, 2-dimensional Doppler and color Doppler modalities. More complex anatomy and abnormal pathology will be addressed. Scanning techniques, specific protocols and echocardiographic findings will be discussed in relation to these more complex abnormalities including PLAX, RVIT, RVOT, PSAX views. The development of the ability to perform examinations in these areas will occur with classroom experience. using real-time equipment with transthoracic transducers and Doppler and color Doppler display modes. Bioeffects, ALARA principle, pertinent in-vitro studies, exposure display indices and maximum safe levels will be incorporated into the didactic and laboratory classes.

Lecture: 3 hours, Lab: 2 hours

Prerequisite(s): DMSD 2260

**DMSD 2262 - Advanced Echocardiography
(4 Credits)**

This course expands on the material presented in Echocardiography I and II, and continues to provide students with the knowledge necessary to capably perform a complete and diagnostic echocardiographic examination using M-mode, 2-dimensional Doppler and color Doppler modalities. More complex anatomy and abnormal pathology will be addressed including equation for aortic stenosis, mitral stenosis, pericardial effusion, hypertrophic cardiomyopathy, ischemic heart disease. Bioeffects, ALARA principle, pertinent in-vitro studies, exposure display indices and maximum safe exposure levels will be incorporated into the didactic and laboratory classes. Scanning techniques, specific protocols and echocardiographic findings will be discussed in relation to these more complex abnormalities. The development of the ability to perform examinations in these areas will occur with classroom experience using real-time equipment with transthoracic transducers and Doppler and color Doppler display modes.

Lecture: 3 hours, Lab: 2 hours

Prerequisite(s): DMSD 2261

**DMSD 2263 - Echocardiography Practicum I
(3 Credits)**

This practicum involves the observation and initial scanning experience of transthoracic adult cardiac sonographic examinations with emphasis on normal Two-dimensional, M-Mode and Doppler pattern recognition. Students are under the supervision of a Registered Echocardiographer. Other: 32 hours

Prerequisite(s): DMSD 2260

**DMSD 2264 - Echocardiography Practicum II
(3 Credits)**

This practicum involves the clinical performance of transthoracic adult cardiac sonographic examinations with emphasis on normal Two-dimensional, M-Mode and Doppler pattern recognition. Students are under the supervision of a Registered Echocardiographer. Other: 32 hours

Prerequisite(s): DMSD 2263

**DMSD 2265 - Echocardiography Practicum III
(3 Credits)**

This practicum involves the clinical performance of transthoracic adult cardiac sonographic examinations with emphasis on normal Two-dimensional, M-Mode and Doppler pattern recognition. Focus is on performing complete exams on patients with complex disease states. Students are under the supervision of a Registered Echocardiographer. Other: 32 hours

Prerequisite(s): DMSD 2264

**DMSD 2500 - Diagnostic Medical Sonography Seminar
(3 Credits)**

This is an interactive course combining General Abdominal Students, Echocardiography students and Vascular Students. This provides students with an opportunity to discuss their scanning experience and review skills necessary for professional practice. Students prepare a research project on a topic in their area of specialty. This includes patient history, clinical findings, anatomy, pathology, scanning protocols, image interpretation, differential diagnosis and patient care. Students prepare and deliver an oral presentation to the class based on their research using power point or other appropriate methods.

Lecture: 3 hours

Prerequisite(s): DMSD 2240 or DMSD 2252 or DMSD 2262