DIAGNOSTIC MEDICAL SONOGRAPHY

Associate of Applied Science Degree: Diagnostic Medical Sonography

Certificate of Completion: Diagnostic Medical Sonography

Certificate of Completion: Vascular Sonography

This is a limited-entry degree program that starts a cohort every spring semester. Prospective applicants must visit the website to register for program orientation, and can request the application after attendance. The application cycle is open from July 1st - September 1st every year.

Information on requirements, forms, and deadlines for applications are available on our website at https://dacc.nmsu.edu/academics/programs/diagnostic-medical-sonography (https://dacc.nmsu.edu/academics/programs/diagnostic-medical-sonography/). You can also find information at the Health Sciences Division Office (room DAHL 190), or by calling (575) 528-7015.

Sonography is an allied health specialty that uses high-frequency sound waves (ultrasound) to image many structures in the body. Sonographers function as members of the healthcare team by providing and evaluating high quality images that aid physicians in the diagnosis and treatment of their patients. Sonographers are highly motivated, independent, critical thinkers who enjoy one-on-one patient interaction.

Employment opportunities are available in a variety of settings, such as hospitals, physicians' offices, and veterinarian practices. There are also opportunities in sales, education, management, research, marketing, and product development. Because job prospects in the Las Cruces—El Paso area occasionally are limited, it may be necessary to conduct a wider job search.

Training involves a combination of academic courses and a clinical internship in the ultrasound department of area hospitals and clinics where students will gain hands-on training under the supervision of registered diagnostic medical sonographers and will work alongside physicians and other health-care professionals. Coursework covers abdominal and OB-Gyn ultrasound, pediatric sonography, acoustic physics and instrumentation, and introductory vascular technology. Students will participate in lab activities and learn to write case reports and journal article reviews. The clinical sites include rotations in multiple cities, which can include Las Cruces, Alamogordo, Ruidoso, and Silver City, New Mexico, as well as El Paso, Texas.

The Diagnostic Medical Sonography program offers a certificate track for students who already possess an associate degree in a medically related, allied healthcare program or a bachelor's degree in a related field, which meet certain requirements. The associate degree track is designed for those who do not meet the entrance requirements for the certificate-track program. Once accepted into the Diagnostic Medical Sonography program the curriculum and schedule for certificate and associate degree pathways is identical.

Students in the Diagnostic Medical Sonography program are required to complete and pass a variety of background/screening measures that include a security background check, FBI fingerprinting and drug screening, in order to participate in the clinical education portion of the program. Criminal charges and/or convictions may limit a student's ability to be employable in the medical field. **Prospective students with a history of any misdemeanor or felony charges must communicate with the program director prior to application to initiate a pre-clearance process through the American Registry for Diagnostic Medical Sonography to determine eligibility.**

Students who satisfy program requirements are qualified to apply for national certification examinations in the Abdominal and OB/GYN Sonography specialty areas. These examinations are administered by the American Registry of Diagnostic Medical Sonography (ARDMS) and/or the American Registry of Radiologic Technologists (ARRT). Licensing requirements vary by state; New Mexico requires sonographers to obtain a state license. Continuing education beyond graduation is required to maintain credentials earned by the ARDMS and ARRT and to maintain a state license in New Mexico.

Accreditation

The DACC Sonography Program is accredited by the Commission on Accreditation of Allied Health Education Programs (CAAHEP), in conjunction with the Joint Review Committee on Education in Diagnostic Medical Sonography (JRC-DMS). Further information is available on the CAAHEP (https://www.caahep.org/) and JRC-DMS (https://www.jrcdms.org/) websites. Program outcomes are available on our website by visiting the "Program Effectiveness Data" link.

Required Physical and Cognitive Skills

Sonography students must be able to do the following:

1. Read, write, and communicate effectively in English.
2. Possess emotional and physical health sufficient to meet the demands of the profession.
3. Position, move, and lift patients in wheelchairs and stretchers.
4. Maintain prolonged arm positions necessary for scanning.
5. Position and move ultrasound equipment on wheels (up to 500 lbs.)
6. Effectively operate sonographic equipment.
7. Evaluate sonograms, acquiring appropriate diagnostic information.
8. Integrate diagnostic sonograms, laboratory results, patient histories, and medical records, and adapt sonographic examinations as necessary.
9. Use independent judgment to acquire the optimal diagnostic sonographic information in each examination performed.
10. Evaluate, synthesize, and communicate diagnostic information to be used by the attending physician.
11. Communicate effectively with the patient and healthcare team, recognizing the special nature of sonographic exams and patients' needs.
12. Establish and maintain effective working relationships with the public and healthcare team.
13. Follow established departmental procedures.
14. Work efficiently and cope with emergency situations.

Reasonable accommodations may be available through the Student Accessibility Services (SAS) office. Please contact the Program Director for more information. Further information on the essential functions is available on the program website. *(*https://dacc.nmsu.edu/academics/programs/diagnostic-medical-sonography/DMSTechnicalAndEssentialFunctions.pdf*)*

Special Admissions Criteria- Associate Degree

Prior to applying to the program, students will have taken all program Core and Related Requirements. The following items are among the criteria considered in the selection of program applicants:

- Completion of program orientation
- Minimum overall college GPA 3.0
- GPA in Core and Related Requirements courses
- County of residence
- Prior healthcare experience

Special Admissions Criteria- Certificate of Completion

Criteria and factors used in evaluating applicants include the following:

- Completion of program orientation
- Completion of either
  - (a) an associate degree in an allied health program which is medically related and involves human-patient care (proof of current certification in ones' allied health area is required), OR
  - (b) a bachelor's degree in a related field that includes at least one semester of anatomy & physiology.
- Overall GPA of 3.0 or higher
- College-level course in algebra (MATH 1220G College Algebra or equivalent)
- College-level course in general physics or introductory physics for the health sciences or radiographic physics or equivalent.

A complete description of admission criteria is available on the DMS program website (https://dacc.nmsu.edu/academics/programs/diagnostic-medical-sonography/).

Course Fees

In addition to tuition, a fee of $200 is charged for each of the following courses: DMSO 1170, DMSO 1180, DMSO 2270, DMSO 2280.

Prefix	Title	Credits
DMSO 1170	Clinical Practicum I	1
DMSO 1180	Clinical Practicum II	4
DMSO 2270	Clinical Practicum III	3
DMSO 2280	Clinical Practicum IV	5

Diagnostic Medical Sonography - Associate of Applied Science (https://catalogs.nmsu.edu/dona-ana/academic-career-programs/diagnostic-medical-sonography/diagnostic-medical-sonography-associate-applied-science/)

Diagnostic Medical Sonography - Certificate of Completion (https://catalogs.nmsu.edu/dona-ana/academic-career-programs/diagnostic-medical-sonography/diagnostic-medical-sonography-certificate-completion/)

Vascular Sonography - Certificate of Completion (https://catalogs.nmsu.edu/dona-ana/academic-career-programs/diagnostic-medical-sonography/vascular-sonography-certificate/)

DMSO 1110. Introduction to Clinical Practicum
1 Credit (1)

Introduction to working in the medical environment. Includes preparation for clinical internship and observation hours in the ultrasound department. Restricted to: DMS majors.

Learning Outcomes

1. Recognize sonographic anatomy on observed sonographic procedures.
2. Identify and adhere to clinical site practices and policies.
3. Describe aspects of the clinical experience.
4. Demonstrate effective communication skills with patients and healthcare team members.

DMSO 1111. Introduction Sonography/Patient Care
2 Credits (2)

Introduction to the careers in sonography, terminology, medical ethics, scanning planes, applications of ultrasound, professional standards and patient care.

Learning Outcomes

1. Describe essential functions of the sonographer in the health care setting.
2. Distinguish key patient care differences based on patient demographics.
3. Develop and apply professional ethics in line with industry standards.
4. Describe best practices for infection control in the medical setting.

DMSO 1114. Introduction to Clinical Practicum II
1 Credit (1P)

Development of technical and professional aspects of diagnostic ultrasound in a hospital or clinical setting at the developmental level. Ongoing reinforcement and broadening of knowledge base related to hospital procedures and policies. Continued observation, assistance and performance of patient care and sonographic duties under direct supervision.

Learning Outcomes

1. Demonstrate proficiency in patient care skills.
2. Recognize sonographic anatomy.
3. Assist with basic sonographic procedures in the clinical setting.
4. Describe aspects of the clinical experience.

DMSO 1116. Vascular Technology I
2 Credits (2)

Review of basic ultrasound physics and principles, peripheral vascular anatomy, hemodynamics, Doppler evaluation, peripheral vascular scanning techniques, physiologic testing and the carotid arteries and the peripheral vascular system.

Learning Outcomes

1. Describe peripheral and cerebrovascular anatomy and physiology.
2. Identify normal anatomy and waveforms on sonographic images and correlative imaging procedures.
3. Correlate Doppler waveforms to hemodynamic principles.
4. Differentiate venous and arterial hemodynamic principles.

DMSO 1116L. Vascular Technology I Lab
1 Credit (2P)

Includes protocol development, scanning techniques, recognition of anatomical relationships and the normal ultrasound appearance of the carotid arteries and peripheral vasculature utilizing real-time sonographic equipment including Doppler.

Learning Outcomes

1. Recognize and document peripheral and cerebrovascular anatomy on sonographic examinations.

2. Develop protocols for thorough imaging of peripheral and cerebrovascular sonographic imaging.
3. Describe Doppler waveforms and correlate findings with hemodynamic principles.

DMSO 1131. Pelvic Sonography
2 Credits (2)
Includes the anatomy, sectional anatomy and normal physiology of the pelvic structures; including the uterus, ovaries, prostate, pelvic muscles, lower GI, appendix and vessels as well as scanning techniques, sonographic appearance and Doppler evaluation of the pelvis.
Learning Outcomes
1. Describe the relational anatomy of the pelvic organs.
2. Distinguish the sonographic appearance of male and female pelvic anatomy.
3. Discuss the physiology of pelvic organ systems.
4. Correlate the physiologic cycles of pelvic organs with the appropriate sonographic appearances.

DMSO 1131L. Pelvic Sonography Laboratory
1 Credit (2P)
Includes protocol development, scanning techniques, recognition of anatomical relationships and the normal ultrasound appearance of the pelvic structures including the uterus, ovaries, prostate, lower gastrointestinal system, appendix and pelvic muscles utilizing real-time sonographic equipment including Doppler.
Learning Outcomes
1. Identify normal anatomy of the male and female pelvis on sonographic images.
2. Produce diagnostic sonographic images of pelvic organs.
3. Develop protocols for thorough sonographic evaluation of the pelvic organs.
4. Correlate sonographic findings with the normal physiologic processes of the female pelvic organs.

DMSO 1140. Abdominal Sonography
2 Credits (2)
Includes the anatomy, sectional anatomy and normal physiology of prevertebral vessels, liver, biliary system, pancreas, upper gastrointestinal system, kidneys, adrenals, and spleen as well as scanning techniques, sonographic appearance and Doppler evaluation of the deep abdominal organs.
Learning Outcomes
1. Identify the normal anatomy of the abdominal organs.
2. Describe the physiology of abdominal organs and how it relates to sonographic appearances.
3. Describe the relational anatomy of abdominal organ systems.

DMSO 1140L. Abdominal Sonography Laboratory
1 Credit (3P)
Includes protocol development, scanning techniques, recognition of anatomical relationships and the normal ultrasound appearance of prevertebral vessels, liver, biliary system, pancreas, upper gastrointestinal system, kidneys and spleen utilizing real-time sonographic equipment including Doppler.
Learning Outcomes
1. Identify the abdominal organs on sonographic images.
2. Produce diagnostic quality sonographic images of the abdominal organs.
3. Correlate sonographic appearances with the normal physiology of abdominal organs.
4. Develop protocols for thorough and efficient imaging of the abdominal organs.

DMSO 1150. Sonographic Principles and Instrumentation I
2 Credits (2)
Includes the fundamental properties and mathematical relationships between variables of wave parameters, acoustic variables, attenuation, pulsed wave operation, transducers, system operation, Doppler, and artifacts utilizing real-time sonographic equipment.
Learning Outcomes
1. Describe the physics principles related to sonographic imaging.
2. Correlate physics principles to technical factor adjustments on sonographic equipment.
3. Solve mathematical equations related to sonographic physics principles.

DMSO 1170. Clinical Practicum I
1 Credit (8-10P)
Development of technical and professional aspects of diagnostic ultrasound in a hospital or clinical setting at the developmental level. Ongoing reinforcement and broadening of knowledge base related to hospital procedures and policies. Continued observation, assistance and performance of patient care and sonographic duties under direct supervision.
Learning Outcomes
1. Develop professional skills necessary in the clinical environment.
2. Perform basic sonographic procedures with minimal assistance from preceptors.
3. Assist with complex/advanced sonographic procedures under the guidance of preceptors.

DMSO 1180. Clinical Practicum II
4 Credits (4)
Development of technical and professional aspects of diagnostic ultrasound in a hospital or clinical setting at the beginner level. Ongoing reinforcement and broadening of knowledge base related to hospital procedures and policies. Continue observation, assistance and performance of patient care and sonographic duties under direct supervision.
Prerequisite: DMSO 1170.
Learning Outcomes
1. Demonstrate general and sonographic knowledge to function as a member of the healthcare team.
2. Identify and interpret data from patient charts.
3. Perform a broad range of general sonographic examinations with minimal to moderate assistance.
4. Demonstrate effective oral and written communication skills.

DMSO 1526. 1st Trimester Obstetric Sonography
1 Credit (1)
Includes the embryology, anatomy, sectional anatomy, normal physiology, biometrics, assessment, and sonographic appearance of the 1st trimester fetus, placenta, uterus and adnexa as well as scanning techniques according to recognized protocols.
Learning Outcomes
1. Describe the embryology and normal development of the 1st trimester pregnancy.
2. Recognize the sonographic anatomy of normal 1st trimester pregnancy.

3. Relate the gestational age with sonographic findings to recognize normal development of the 1st trimester pregnancy.

DMSO 1527. 2nd/3rd Trimester Obstetric Sonography
1 Credit (1)
Includes the anatomy, sectional anatomy, normal physiology, biometrics, assessment, and sonographic appearance of the 2nd and 3rd trimester fetus, placenta, uterus, and adnexa as well as scanning techniques according to recognized protocols.
Learning Outcomes
1. Describe the normal anatomy and physiology of the 2nd and 3rd trimester pregnancy.
2. Correlate the sonographic appearance of the pregnancy with the gestational age to identify appropriate growth and development of the fetus.
3. Develop protocols for efficient and thorough scanning of the pregnancy.
4. Describe best practices for imaging the pregnancy in accordance with ALARA principles.

DMSO 1528. High Risk Obstetric Sonography
3 Credits (3)
Includes congenital malformations of the developing fetus, high risk pregnancies, multiple gestation, maternal conditions and invasive procedures. Restricted to: DMS majors.
Learning Outcomes
1. Describe the sonographic signs of fetal anomalies.
2. Identify the risk factors for congenital anomalies to correlate with clinical history.
3. Describe the process for imaging multiple gestations.
4. Identify best practices for safe imaging in the high risk pregnancy.

DMSO 2020. Pediatric Sonography
2 Credits (2)
Ultrasound evaluation relating to the pediatric population. Includes scanning techniques, transducer selection, and scanning protocols relating to normal and pathologic conditions that affect the premature infant, newborn and pediatric population across a variety of body systems.
Learning Outcomes
1. Identify anatomy, relational anatomy, anatomic variants, and sonographic appearances of normal anatomical structures related to the pediatric population.
2. Demonstrate knowledge of the physiology, pathophysiology, sonographic technique, measurements, sonographic appearances, and Doppler patterns, where applicable, in both normal and abnormal pediatric structures.
3. Demonstrate knowledge in scanning technique, protocol and modifications based on sonographic findings.
4. Demonstrate knowledge and application of patient care as it pertains to the pediatric population.

DMSO 2216. Vascular Technology II
2 Credits (2)
Includes the pathology and pathophysiology of the vascular system, scanning techniques, clinical presentation, ultrasound appearance and Doppler evaluation seen with pathological conditions of the carotid arteries, deep and peripheral vascular systems.
Learning Outcomes
1. Describe risk factors for vascular pathology.
2. Correlate Doppler waveforms with hemodynamic principles in the presence of pathology.
3. Describe the sonographic appearance of pathology in peripheral and cerebrovascular systems.
4. Identify modifications to sonographic techniques when pathology is identified.

DMSO 2226. Sonographic Case Studies I
1 Credit (1)
Includes integration of didactic knowledge, clinical presentation, laboratory values, sonographic appearance and related medical imaging of a variety of pathological conditions through a variety of case analysis and presentations.
Learning Outcomes
1. Utilize the Sonographic Reasoning Method to correlate clinical history with imaging findings.
2. Summarize the sonographic findings of case studies and analyze the technical factors utilized.
3. Recall knowledge of pathologies to apply to their evaluation of sonographic images.
4. Devise and defend a diagnostic hypothesis based on the clinical history and sonographic findings.

DMSO 2227. Sonographic Case Studies II
1 Credit (1)
Continuation of Sonographic Case Studies I, integration of didactic knowledge, clinical presentation, laboratory values, sonographic appearance and related medical imaging of a variety of pathological conditions through a variety of case analysis and presentations.
Learning Outcomes
1. Utilize the Sonographic Reasoning Method to correlate clinical history with imaging findings.
2. Summarize the sonographic findings of case studies and analyze the technical factors utilized.
3. Recall knowledge of pathologies to apply to their evaluation of sonographic images.
4. Devise and defend a diagnostic hypothesis based on the clinical history and sonographic findings.

DMSO 2230. Gynecologic Pathology
2 Credits (2)
Includes the pathology and pathophysiology of the female reproductive system, scanning techniques, clinical presentation, ultrasound appearance and Doppler evaluation seen with pathological conditions of the uterus, ovaries, and adnexa.
Learning Outcomes
1. Recall the normal gynecological anatomy to identify variations or the presence of pathology.
2. Describe risk factors, clinical findings, and the sonographic appearance of gynecological pathologies.
3. Identify diagnostic differentials based on the sonographic appearance of gynecological pathologies.

DMSO 2240. Abdominal Pathology I
2 Credits (2)
Includes the pathology and pathophysiology of abdominal structures of the prevertebral vessels, liver, biliary system, pancreas, spleen and gastrointestinal system; scanning techniques, ultrasound appearance,

clinical presentation and Doppler evaluation seen with pathological conditions.

Learning Outcomes

1. Recall the normal anatomy and physiology of the abdominal organs to recognize variations on sonographic images.
2. Describe modifications to the sonographic technique based when pathology is identified.
3. Correlate sonographic findings with clinical information to identify diagnostic differentials.

DMSO 2245. Abdominal Pathology II
2 Credits (2)

Includes the pathology and pathophysiology of abdominal structures of the genitourinary system, spleen, retroperitoneum, adrenal glands, abdominal wall and prostate; scanning techniques, ultrasound appearance, clinical presentation and Doppler evaluation seen with pathological conditions.

Learning Outcomes

1. Recall the normal anatomy and physiology of the abdominal organs to recognize variations on sonographic images.
2. Describe modifications to the sonographic technique when pathology is identified.
3. Correlate sonographic findings with clinical information to identify diagnostic differentials.

DMSO 2250. Sonographic Principles and Instrumentation II
3 Credits (3)

Includes properties of sound and its use in diagnostic imaging, artifacts, system operation, Doppler, basic hemodynamics, image optimization, bio effects, quality assurance, and new technologies in ultrasound imaging.

Learning Outcomes

1. Explain the physics principles associated with sonographic imaging.
2. Describe how physics principles modify the sonographic image.
3. Relate ultrasound physics to bio effects and best practices for safe sonographic imaging.

DMSO 2270. Clinical Practicum III
3 Credits (3P)

Continued development of technical and professional aspects of diagnostic ultrasound in a hospital or clinical setting at an intermediate level. Ongoing reinforcement and broadening of knowledge base related to hospital procedures and policies. Continued observation, assistance and performance of patient care and sonographic duties under limited supervision.

Learning Outcomes

1. Consistently demonstrate professional skills and etiquette in the clinical setting.
2. Perform basic and advanced sonographic procedures with minimal assistance from preceptors.
3. Perform complex sonographic procedures with guidance from preceptors.
4. Analyze clinical experiences to broaden patient care skills.

DMSO 2280. Clinical Practicum IV
5 Credits (20P)

Application of technical and professional aspects of diagnostic ultrasound in a hospital or clinical setting at a proficient level. Ongoing reinforcement and broadening of knowledge base related to hospital procedures and policies. Continued observation, assistance and performance of patient care and sonographic duties under limited supervision.

Learning Outcomes

1. Demonstrate professional communication with patients and healthcare team members.
2. Perform basic and advanced sonographic procedures with minimal assistance from preceptors.
3. Perform complex sonographic procedures with guidance from preceptors.
4. Analyze clinical experiences to broaden patient care skills.

DMSO 2291. Registry Preparation: OB/GYN
1 Credit (1)

Registry preparation mock examinations over materials covered in Obstetric and Gynecological ultrasound. Students must pass this course with a 74% or better OR pass national certification in OB/GYN Sonography.

Learning Outcomes

1. Recall knowledge of normal anatomy, physiology, and pathology of obstetric and gynecological structures.
2. Evaluate sonographic images and patient history to identify likely pathologies.
3. Self-reflect on tested concepts to identify concepts that require further studying.

DMSO 2292. Registry Preparation: Abdomen
1 Credit (1)

Registry preparation mock examinations over materials covered in abdominal ultrasound including small parts and superficial structures. Students must pass this course with a 74% or better OR pass ARDMS national certification exam in Abdominal Sonography.

Learning Outcomes

1. Recall knowledge of normal anatomy, physiology, and pathology of abdominal and superficial structures.
2. Evaluate sonographic images and patient history to identify likely pathologies.
3. Self-reflect on tested concepts to identify concepts that require further studying.

DMSO 2293. Registry Preparation: Vascular
1 Credit (1)

Registry preparation mock examinations over materials covered in vascular ultrasound. Students must pass this course with a 74% or better OR pass national certification in Vascular Technology.

Learning Outcomes

1. Identify and describe vascular anatomy.
2. Recognize vascular pathology based on sonographic images.
3. Describe hemodynamic changes associated with vascular pathology.
4. Demonstrate understanding of patient care, exam protocols, and department procedures.

DMSO 2295. Small Parts and Superficial Structures
2 Credits (2)

Includes anatomy, pathology and pathophysiology, protocol development, scanning techniques, recognition of anatomical structures and the normal and pathological ultrasound appearance of the breast, thyroid, neck, scrotum, non-cardiac chest and musculoskeletal ultrasound.

Learning Outcomes

1. Describe the anatomy and physiology of small parts and superficial structures.
2. Identify normal anatomy, anatomical variants, and pathology on sonographic images of superficial structures.

3. Correlate sonographic appearances of pathologies with clinical history to develop diagnostic differentials of superficial structures.

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