ASSOCIATE OF APPLIED SCIENCE IN DIAGNOSTIC MEDICAL SONOGRAPHY (DMS AAS)

2,160 clock hours / 84 weeks (Total time to complete the program may vary based on school holidays and breaks)
60 weeks Theory/Lab (20 hours per week) + 24 week externship (40 hours per week)

Program Objective:

The Associate of Applied Science in Diagnostic Medical Sonography (DMS AAS) Program is designed to prepare competent entry-level general sonographers in the cognitive (knowledge), psychomotor (skills), and effective (behavior) learning domains. This preparation is accomplished through didactic, laboratory, and clinical instruction in the theoretical knowledge, skills, and responsibilities of a diagnostic medical sonographer. The successful program graduate will be able to perform appropriate ultrasound scanning examinations and procedures, and record anatomic, pathologic, and/or physiologic data for interpretation by a physician. The graduate will also be able to obtain, review, and integrate pertinent patient history and supporting clinical data to facilitate optimum diagnostic results. In addition, the graduate will be prepared to exercise discretion and judgment in the performance of sonographic diagnostic services, provide appropriate and compassionate patient care for patients undergoing ultrasound examinations, demonstrate excellent communication skills with patients and other health care professionals, and act in an ethical and professional manner.

Completion of the General Education requirements for the AAS Degree program may be transferable if the student wishes to pursue a Bachelor's Degree in Diagnostic Medical Sonography. The award of transfer credit is at the discretion of other institutions and is not guaranteed.

A graduate of the DMS Program will be qualified to work as an entry-level sonographer in a hospital or medical center, a medical clinic, a radiology imaging center, a physician's office, or a mobile ultrasound service; as a free lance sonographer; or as a traveling sonographer.

It is not currently mandatory that graduates take any licensing or credentialing examination upon successful program completion. However, many employers prefer or require that DMS graduates be credentialed by the American Registry of Diagnostic Medical Sonographers (ARDMS) or Cardio Vascular Credentialing (CCI). Depending upon the graduate's prior education, he or she may be eligible to sit for EITHER the CCI examination OR the ARDMS examination upon graduation, as prerequisites for these examinations are currently written.

The graduate of the DMS AAS must pass all General Education courses, core theory and laboratory courses, and clinical externship courses with a grade of 75% or better to complete the program.

Upon successful completion of the program, graduates may obtain employment as:

- Diagnostic Medical Sonographer/Ultrasound Technician
  (CIP # 51.0910; O-NET # 29-2032.00)

Mod #	Module Title	Week #	Clock Hours
I	General Education	1-12	240
II	Ultrasound Physics	13-24	240
III	Abdominal Sonography	25-36	240
IV	OB/GYN Sonography	37-48	240
V	Vascular Sonography	49-60	240
VI	Clinical Practicum I	61-72	480
VII	Clinical Practicum II/Test Preparation	73-84	480
		Total:	**2160**

Note: one clock hour is defined as a 60-minute span of time in which 50 minutes is devoted to actual class instruction, with the remaining portion designated as a break.

Program Syllabus:

Course Number	Course Title	Lecture Hours	Lab Hours	Clinical Hours	Total Clock Hours
MTH 101	College Math	45	0	0	45
ENG 102	Oral Communication Skills	45	0	0	45
PHY 101	General Physics	45	0	0	45
BIO 101	Human Anatomy	45	0	0	45
BIO 102	Human Physiology	45	0	0	45
DMS 200	Orientation to Ultrasound Imaging	15	0	0	15
DMS 240	Physical Principles & Instrumentation of Ultrasound	96	96	0	192
DMS 245	Professional Aspects of Sonography	48	0	0	48
DMS 210	Abdominal & Small Parts Ultrasound Imaging	96	96	0	192
DMS 215	Fundamentals of Sonography	48	0	0	48
DMS 220	Obstetrics & Gynecology Ultrasound Imaging	96	96	0	192
DMS 225	Patient Care for Sonographers	48	0	0	48
DMS 230	Vascular Ultrasound Imaging	96	96	0	192
DMS 235	Patient / Sonographer Interaction	48	0	0	48
DMS 250	Clinical Practicum I	0	0	480	480
DMS 260	Clinical Practicum II	0	0	480	480
	TOTAL	**816**	**384**	**960**	**2160**

For information on graduation rates, median debt of graduates completing this program or other important information, visit:
http://www.cbd.edu/programs/diagnostic-medical-sonography-ultrasound/

DMS AAS Program Descriptions:

MODULE I MATH 101 – COLLEGE MATH

Prerequisites: None. *Total clock hours: 45*

This course is designed primarily for students who know the fundamentals of arithmetic, and have had little or no background in algebra. The course strengthens the student's arithmetic and informal geometry skills, provides an introduction to the abstractions of algebra using fundamental principles of rational numbers, order of operations, and solution of linear equations. Upon course completion, the student will be able to solve mathematical problems applicable to theory and practice of diagnostic medical sonography.

MODULE I ENG 102 – ORAL COMMUNICATION

Prerequisites: None. *Total clock hours: 45*

This introductory course is designed to provide students with greater skills in all aspects of oral presentation. The course enables students to prepare effective speeches, emphasizing the relevant elements of public speaking. The process of preparing a presentation is covered, including topic selection, development, research, organization, language, and delivery of speeches for many types of audiences and occasions. The course will focus on building self-confidence of the students by presenting the appropriate techniques to deliver informative and persuasive oral presentations. Upon course completion, the student will be able to prepare and deliver job related oral communications.

MODULE I PHY 101 – GENERAL PHYSICS

Prerequisites: None. *Total clock hours: 45*

This is an introductory course in physics that surveys basic concepts, principles and laws of physics including the topics of mechanics, thermodynamics, heat, fluids, sound, waves and vibrations, electricity, magnetism, optics and radioactivity. It is specifically designed for students with no previous experience with physics.

MODULE I BIO 101 – HUMAN ANATOMY

Prerequisites: None. *Total clock hours: 45*

This course emphasizes the principles of human anatomy and includes an overview of all body systems, organs, tissues, and cells with focus on major biochemical, mechanical and cellular biology theories. Topics dealing with the nature of science, human genetics and development are included.

MODULE I BIO 102 – HUMAN PHYSIOLOGY

Prerequisites: None. *Total clock hours: 45*

The course offers a comprehensive study of human physiology. Included is an overview of structure and functions of all body systems, organs, tissues, and cells. This course focuses on the function of the integumentary, skeletal, muscular, respiratory, cardio-vascular, immune systems, as well as endocrine, nervous, urinary, digestive, and reproductive systems.

MODULE I DMS 200 – ORIENTATION TO ULTRASOUND IMAGING

Prerequisites: Module I *Total clock hours: 15*

This course is a prerequisite to the core courses of the DMS program. It provides an overview of the scope and content of the DMS program. It focuses on the elementary operational principles of diagnostic medical ultrasound, basic ultrasound terminology specific to the profession, anatomic imaging planes and body directions used in ultrasound imaging, and the image orientation on the ultrasound display.

MODULE II DMS 240 – PHYSICAL PRINCIPLES AND INSTRUMENTATION OF ULTRASOUND

Prerequisites: Module I, ***Co-requisite:*** DMS 245 *Total clock hours: 192*

This course covers the basic physical principles of ultrasound and the instrumentation relating to the ultrasound unit. The information covered in the course will include the basic acoustic principles of ultrasound, the physics of pulsed ultrasound, Doppler principles, transducer operating principles and composition, the components of the ultrasound imaging unit, common artifacts in imaging, and safety in operation of the ultrasound imaging system. In the laboratory component, emphasis will be placed upon the instrumentation controls required for optimum operation of the ultrasound machine.

MODULE II DMS 245 – PROFESSIONAL ASPECTS OF SONOGRAPHY

Prerequisites: Module I, ***Co-requisite:*** DMS 240 *Total clock hours: 48*

The aspects of sonography as a career will be examined in this course. Topics of discussion include sonography career ladder opportunities, benefits of professional organizations, certification and registration advantages, sonographer safety, medical ethics and legal aspects of sonography, professional behavior, sonography employment venues, resume writing, and interview techniques.

MODULE III DMS 210 – ABDOMINAL AND SMALL PARTS ULTRASOUND IMAGING

Prerequisites: Module I and II, Co-requisite: DMS 215 *Total clock hours: 192*

This course covers the aspects of abdominal and small parts ultrasound scanning required for employment as an entry-level sonographer. This course will include both lecture and laboratory components. The lecture component will focus on normal ultrasound appearances of the organs of the abdominal cavity, breast, thyroid, prostate, and testes, and on the pathological conditions that may affect these organs. In the laboratory portion of the course the student will learn proper ultrasound scanning techniques for imaging the organs of the abdomen and small parts, and preparation of the necessary information for an initial written or oral presentation to the radiologist.

MODULE III DMS 215 – FUNDAMENTALS OF SONOGRAPHY

Prerequisites: Module I and II, ***Co-requisite:*** DMS 210 *Total clock hours: 48*

This course provides a broad overview of the field of diagnostic medical sonography. It covers the history and evolution of ultrasound as an imaging modality, the sonographer's role, required skills and abilities, and effective learning techniques.

MODULE IV DMS 220 – OBSTETRICS AND GYNECOLOGY ULTRASOUND IMAGING

Prerequisites: Module I-III, ***Co-requisite:*** DMS 225 *Total clock hours: 192*

This course provides a basic understanding to the student of the normal and abnormal conditions that affect the organs of the female pelvic cavity and the developing fetus. The lecture portion will center on the normal and pathological conditions of the uterus, ovaries, and fetus. During the laboratory component the student will learn proper scanning techniques and protocols used in ultrasound imaging of the gynecologic and obstetric patient. Emphasis is placed on recognition of normal anatomy, ultrasound documentation, biometry measurements, and preparation of initial preliminary reports to the reading radiologist.

MODULE IV DMS 225 – PATIENT CARE FOR SONOGRAPHERS

Prerequisites: Module I and III, ***Co-requisite:*** DMS 220 *Total clock hours: 48*

This course presents the student with different aspects of patient care that are relevant to the sonographer. Focus is placed on patient/sonographer interaction, and patient confidentiality and HIPAA compliance. Students will learn patient care skills that apply to Diagnostic Medical Sonography. Emphasis is placed on vital signs, body mechanics for patient transfer, and care techniques for patients with tubing, standard precautions for infection control, aseptic/sterile technique, isolation techniques, and emergency medical situations.

MODULE V DMS 230 – VASCULAR ULTRASOUND IMAGING

Prerequisites: Module I and IV, ***Co-requisite:*** DMS 235 *Total clock hours: 192*

This course in vascular ultrasound will introduce the student to the hemodynamic considerations of the arterial and venous vascular systems. The lecture portion of this course will cover the anatomy of the arterial and venous systems of the body, and the pathologies commonly encountered in those systems. During the laboratory sessions, the student will receive instruction in scanning techniques for the carotid arteries, upper and lower extremity arteries, upper and lower extremity veins, and abdominal vessels. This course is designed to instruct the student in procedures performed in the practice of vascular ultrasound imaging.

MODULE V DMS 235 – PATIENT / SONOGRAPHER INTERACTION

Prerequisites: Module I and IV, ***Co-requisite:*** DMS 230 *Total clock hours: 48*

Students will learn how to communicate with patients and other health care professionals, care for those with special needs, prepare the patient for different types of ultrasound examinations, recognize laboratory values that pertain to specific ultrasound examinations, and examine the role of different imaging modalities in patient diagnosis.

MODULE VI DMS 250 – CLINICAL PRACTICUM I

Prerequisites: Module I and V, ***Co-requisite:*** None *Total clock hours: 480*

During this course the student will be assigned, and directly supervised in a Diagnostic Medical Ultrasound imaging facility such as a hospital, clinic or imaging center. The student will be introduced to the clinical setting and departmental organization. Under direct supervision by a supervising sonographer or supervising physician, and the school's Clinical Coordinator, the student will begin to acquire the hands-on skills necessary for the sonographer in a clinical site. This is accomplished through observation and participation in clinical case studies of patients undergoing ultrasound examinations.

MODULE VII DMS 260 – CLINICAL PRACTICUM II

Prerequisites: Module I and VI, ***Co-requisite:*** None *Total clock hours: 480*

This course is designed as a more advanced continuation of Clinical Practicum I. The student will continue to perfect his/her skills in the clinical environment and learn more advanced imaging techniques required of the sonographer. The student will gain more experience in performing ultrasound imaging of the patient undergoing abdominal, small parts, gynecologic, obstetric, or vascular ultrasound examinations.

DMS CLINICAL GRADING

All grading of the clinical education courses is the responsibility of the Clinical Coordinator.

The Clinical Evaluation Form (CEF) will be used to assess DMS student's clinical performance. All evaluation materials must be returned to the Clinical Coordinator by the student or by mail within a week after the completion of a clinical assignment. These evaluation forms are a means of recording a student's clinical performance and professional development. They also assist the student in recognition of their growth as a DMS and assist in planning future clinical experiences. It assists the clinical instructor in determining strengths and weaknesses of the student's clinical performance while planning new learning experiences and it assists the Clinical Coordinator in determining strengths and weaknesses in the overall academic curriculum and in determining ways in which the individual student may be assisted in achieving individual clinical education objectives.

If a student is having difficulty with the clinical requirements, it is best to discuss this with his/her clinical instructor and the Program Director at CBD College as soon as possible. Appropriate steps including tutoring and guidance may be considered.

If a student fails a clinical course they may be unable to continue with the program. The student may be invited to apply for re-admission into the DMS program into the following cohort.

If it is determined through consultation with the clinical instructor that performance is unsatisfactory and the student can verify that there were extenuating circumstances to their inability to be successful within the allotted time, the Clinical Coordinator may offer the student an incomplete grade with terms for removal established by the Clinical Coordinator. An action plan will be constructed by the Clinical Coordinator with input from the student to address the terms for removal of the incomplete. The Clinical Coordinator may seek input from academic faculty and the clinical instructor when constructing remedial action plans. Incomplete clinical coursework may interrupt the student's ability to proceed with subsequently scheduled didactic or clinical courses.

DMS ACADEMIC INTEGRITY

STUDENTS ARE REQUIRED TO TAKE ALL THE EXAMS LISTED IN THE SYLLABUS. IT IS NOT PERMITED TO SKIP ANY TESTS.

TESTING ENVIRONMENT

CBD students are expected to take their tests following and complying with ethical behavior and integrity principles.

Any kind of communication, in any kind of language, is an example of academic dishonesty.

Students found cheating or engaged in any means of academic dishonesty are at risk of immediate termination.

Any questions relative to clarification of test instructions are to be directed to the instructor, not other students. In this case, when the student has a question he/she will raise his/her hand and wait for the instructor to acknowledge him/her.

General testing procedures

1. Prior to beginning a test, all students' possessions, except for pen/pencil must be placed under his/her chair.
2. Once the test is in process of being handed out:
   a) Students MUST turn cell phones off or silence it before the start of the test and keep in an area assigned by the instructor;
   b) No talking or any other type of communication will be allowed;
   c) Students will not be permitted to leave the room and come back to resume the exam.

A student found violating any of these general testing procedures or exercising any practice that qualifies as academic dishonesty will have the test taken away, the student will be required to leave the test room, and the test will be graded as is, with no opportunity to be retaken.

Tardy Students will not be allowed to enter the room and will be under the retake policy for that test.

Students absent for a test will be automatically under the retake policy.

REVIEW OF TESTS/ASSIGNMENTS

Tests and assignments will be reviewed with the instructor after all of the students in the program have taken them. Notations may not be made during the review. All tests will be returned at the end of the review.

RETAKE POLICY

The retake policy limits students retaking an exam to earn a maximum of the minimum pass score established for the course.

This policy applies to students who miss a test without an excused absence and to those who fail a test.

Scores on the first attempt (if applicable) and on the retake will be compared and the higher score will be recorded, in case the student fails the retake.

Students will have 1 (one) opportunity to retake a test, within 2 (two) weeks of the failed/missed test, or until the last day of the course, whichever occurs first.

The number of retakes is limited to 1 in each Module.

Plan for improvement

A Plan for improvement will be provided for students not achieving the minimum pass score in any given test.

The theory instructor will identify the areas needing improvement and will develop a plan indicating the areas needing improvement and the steps to be followed, allowing the students, if applicable, to retake the failed test, under the retake policy conditions, observing the timeframe of 2 (two) weeks of the failed/missed test, or until the last day of the course, whichever occurs first.

Remediation Plan

The remediation plan is an intensive intervention to help students with failing average scores to bring their GPA to the minimum required to pass the course. This plan is developed by the theory instructor and may include tutoring sessions, research projects and other didactic methodologies applicable to address the problem.

Students not reaching the minimum pass score average at any given month during a Module will be advised to follow the Remediation Plan individually created to optimize the weak areas.

Failure in achieving the minimum pass score at the end of the module may result in immediate termination from the program.

PARTICIPATION & USE OF SCANNERS/ULTRASOUND

As a student in the CBD College Diagnostic Medical Sonography Program you are asked to participate in an academic setting as a participant in program demonstrations and laboratory experiences for educational purposes. Participation is voluntary and rejection to participate will not affect your grade.

If you choose to participate, you understand that no commitment is made by CBD College to provide free medical care or compensation for your participation or any adverse results because of your participation. Supervised sessions are for educational purposes only and will not diagnose medical conditions.

The American Institute of Ultrasound in Medicine's (AIUM) Bio-effects Committee and the US Food and Drug Administration approve of the use of ultrasound for training and research.

> *"In those special situations in which examinations are to be carried out for purposes other than direct medical benefit to the individual (e.g., training or research), it is necessary to educate the person regarding the risks of the procedure, anticipated exposure conditions and of how these compare with conditions for normal diagnostic practice, and obtain his or her informed consent."*

Since 1994, the US Food and Drug Administration (FDA) has been notifying the ultrasound community and manufacturers that the use of diagnostic ultrasound for non-medical purposes constitutes an unapproved use of a medical (prescription) device. The AIUM has stated, "ultrasound should be used in a prudent manner to provide medical benefit to a patient." This statement has been also endorsed by the American College of Obstetricians and Gynecologists (ACOG), American College of Radiology (ACR), Society for Maternal-Fetal Medicine (SMFM), Society of Radiologists in Ultrasound (SRU), and American Registry for Diagnostic Medical Sonography (ARDMS).

Students are expected to practice the principles of ALARA (As Low As Reasonably Achievable.) Guidance to be followed when participating in ultrasound training sessions includes:

- Users should familiarize themselves with their equipment. Acoustical exposure information is provided by the equipment manufacture in the operator's manual.
- Use the minimum output power and the maximum amplification to optimize image quality.
- Reduce the exposure time.

- Do not perform studies without reason. This includes conducting an ultrasound on a fetus when the exam has not been medically indicated.
- Do not prolong sessions without reason.

The Sonography Program prohibits the use of diagnostic ultrasound on friends and family. Such use is a significant breach to CBD College's legal liability and will result in disciplinary action.

References:

1. AIUM Bioeffects Committee: Safety considerations for diagnostic ultrasound, Laurel, MD, 1999, American Institute of Ultrasound in Medicine.
2. Environmental Health Criteria 22: Ultrasound. World Health Organization: Geneva, 1982, pg 19.
3. US Food and Drug Administration, Center for Devices and Radiological Health, Diagnostic Devices branch. Fetal keepsake Videos. Available at: http://www.fda.gov/cdrh/consumer/fetalvideos.html. Updated September 2002.

DMS EQUIPMENT AND MATERIALS

- Blood Pressure Cuffs
- Bottles of Transducer Disinfectant Spray
- Boxes of Medical Examination Latex Gloves
- Cases of Patient Drape Sheets
- DVD Player
- Five Liter Containers of Ultrasound Coupling Gel
- Laptop Computer
- Overhead Projector
- Patient Examination Tables
- Pull Down Screen
- Rolls of Examination Table Paper
- Rolls of Thermal Ultrasound Film
- Sphygmomanometers
- Stethoscopes
- Storage Cabinet for Storage of Expendable Supplies
- Table Pillows
- Table Wedges
- Thermal Printers
- Ultrasound Transducers
- Wheel Chair
- X Acuson Sequoia Ultrasound Machine with Gray Scale Imaging Capabilities, Color Doppler, and Spectral Doppler Capabilities
- X GE Logiq 3 Ultrasound machine
  X Linear Probe , X Convex Probe, X Invasive probe
- X Siemens X300 Ultrasound Machine
- X Ultrasound Transducers

Books:

- *Diagnostic Medical Sonography: A Guide to Clinical Practice Abdomen and Superficial Structures*
- *Workbook for Diagnostic Medical Sonography: A Guide to Clinical Practice, Abdomen and Superficial Structures*
- *Essentials of Sonography and Patient Care*
- *Sonography Scanning: Principles and Protocols*
- *Diagnostic Medical Sonography: A Guide to Clinical Practice Obstetrics and Gynecology*
- *Workbook for Diagnostic Medical Sonography: A Guide to Clinical Practice Obstetrics and Gynecology*
- *Sonography Principles and Instruments (Diagnostic Ultrasound: Principles & Instruments)*
- *Understanding Ultrasound Physics*
- *Techniques in Noninvasive Vascular Diagnosis*
- *Sonography Exam Review: Physics, Abdomen, Obstetrics and Gynecology*

Software:

- *Abdomen ExamSim Program*

General Education:

- *Communication Skills for the Healthcare Professional*
- *Structure and Function of the Body*
- *Study Guide for Structure and Function of the Body*
- *Beginning Algebra*
- *Conceptual Physics*