Standards and Guidelines
for the Accreditation of Educational Programs in Diagnostic Medical Sonography

Standards (Essentials) initially adopted in June 1979; revised 1987, 1996 by the
American College of Cardiology
American College of Obstetricians and Gynecologists
American College of Radiology
American Institute of Ultrasound in Medicine
American Society of Radiologic Technology
American Society of Echocardiography
Society of Diagnostic Medical Sonography
Society for Vascular Surgery
Society for Vascular Technology
and
Commission on Accreditation of Allied Health Education Programs

The Commission on Accreditation of Allied Health Education Programs (CAAHEP) accredits Diagnostic Medical Sonography programs upon the recommendation of the Joint Review Committee on Education in Diagnostic Medical Sonography (JRCDMS).

These Standards are the minimum standards of quality used in accrediting programs that prepare individuals to enter the profession of diagnostic medical sonography. The extent to which a program complies with these standards determines its accreditation status: therefore the Standards constitute the minimum requirements to which an accredited program is held accountable. The Standards are printed in regular typeface in outline form.

The Guidelines accompanying the Standards provide examples intended to assist in interpreting the Standards. Guidelines are printed in italic typeface in narrative form.

Sections I and III of these Standards are common to all educational programs accredited by CAAHEP. Section II contains a description of the profession and the specific requirements for preparing diagnostic medical sonographers.

Preamble

Objective

The American College of Cardiology, American College of Obstetricians and Gynecologists, American College of Radiology, American Institute of Ultrasound in Medicine, Society of Radiologic Technology, American Society of Echocardiography, American Society of Diagnostic Medical Sonography, Society for Vascular Surgery, Society for Vascular Technology and the Commission on Accreditation of Allied Health Education Programs cooperate to establish, maintain, and promote appropriate standards of quality for educational programs in diagnostic medical sonography and to provide recognition for educational programs that meet or exceed the standards outlined in the Standards.

Lists of accredited programs are published for the information of students, employers, educational institutions and agencies, and the public.

These standards are to be used for the development, evaluation, and self-analysis of diagnostic medical sonography programs. On-site review teams assist in the evaluation of a program's relative compliance with the Standards.

The three learning concentrations are as follows:
Section I: Requirements for Accreditation

A. Sponsorship

1. The sponsoring institution and any affiliates shall be accredited by recognized agencies or meet equivalent standards.

2. Sponsoring institutions must be authorized under applicable law or other acceptable authority to provide a program of postsecondary education.

3. In programs in which academic and clinical didactic and supervised practice are provided by two or more institutions, responsibilities for program administration, instruction, supervision and other functions of the sponsoring institutions and of each affiliate must be clearly documented as a formal affiliation agreement or memorandum of understanding.

Minor affiliates shall comprise no more than one-sixth of any 12-month educational period, and major affiliates require recognition by the JRCDMS.

Sponsoring institutions and affiliates that are not accredited by recognized agencies will be given individual consideration. The JRCDMS should be informed when a sponsoring institution or affiliate loses its accreditation.

The written document, signed by the appropriate officers, should include a clear delineation of responsibilities with regard to student supervision, benefits, liability and financial arrangements, if any. The agreement should include a clause to protect students and to ensure due process. Each institution concerned with the program should maintain copies of the written document.

A major affiliate is an institution having adequate resources to provide a broad range of appropriate clinical education opportunities for students as defined in section B.3.d.

A clinical education center is a department, division, or other designated part of a major affiliate having adequate resources to provide clinical education opportunities for students, integrated with the didactic curriculum, throughout the duration of the educational program. Multiple clinical education centers may be identified within a major affiliate.

A minor affiliate is an institution having resources to provide limited or specialized clinical education opportunities for students and should serve as an enhancement to the curriculum. Minor affiliates may include multiple clinical education centers, each of which should meet the same criteria required for major affiliates with the exception of caseload. Minor affiliates do not require JRCDMS recognition.

4. Accredited educational programs may be established in the following:

a. Community, technical, and junior colleges; senior colleges; and universities;

b. Hospitals and clinics;

c. Medical schools;

d. Postsecondary vocational/technical schools and institutions;

e. Proprietary schools; or

f. Other institutions or consortia that meet comparable standards for education in diagnostic medical sonography.

A consortium is an entity of two or more institutions formally established for the purpose of, and assuming the responsibilities of, program sponsorship.
5. The sponsoring institution assumes primary responsibility for student selection and admission processes, curriculum planning, selection of course content, coordination of classroom teaching and supervised clinical practice, appointment of faculty, and granting the certificate or degree documenting satisfactory completion of the educational program.

6. The sponsoring institution shall also be responsible for providing assurance that the practice activities assigned to students in a clinical setting are appropriate to the program.

B. Resources

1. Personnel

   a. Administrative Personnel
   The program must have adequate leadership and management. These officials shall possess the necessary qualifications to perform the functions identified in documented job descriptions.

   (1) Program Director
   (a) Responsibilities
   The program director shall be responsible for the structure as well as the daily operation of the program, including organization, administration, periodic review and evaluation, continued development, and general effectiveness. In programs with multiple affiliates or clinical education centers, a schedule of regular visits must be maintained. The program shall provide a position description delineating specific responsibilities. The program director shall maintain current knowledge of sonographic techniques and educational methodology through continuing professional development. The responsibilities of the program director shall not be adversely affected by educationally unrelated functions.

   (b) Qualifications
   The program director shall be an appropriately credentialed sonographer and/or vascular technologist. The program director shall document the equivalent of two years' full-time clinical experience as a diagnostic medical or cardiac sonographer and/or vascular technologist. The program director shall have adequate educational skills and administrative experience. The program director shall possess an academic degree, or educational equivalent, at least equal to that for which the students in the program are being prepared.

   The program director’s position description should ensure that adequate time is available to carry out all responsibilities of this position. The program director should assume a leadership role in the continued development of the program, including an ongoing process for periodic and systematic review of program effectiveness together with methodology for program revision based on the results of these reviews. Program directors are encouraged to pursue advanced academic degrees.

   Educational skills may include the following:
   Curriculum development
   Instructional methodologies
   Evaluation and assessment

   The program director should document a minimum of two years experience as an instructor in a diagnostic medical sonography or cardiac sonography and/or vascular technology program. The instructor experience may have been attained concurrently with the professional experience requirement.

   In programs with fewer than eight major affiliates or clinical education centers, the program director may act in the capacity of clinical coordinator.

   (2) Medical Director/Advisor
   (a) Responsibilities
   The medical director/advisor shall provide guidance to ensure that the medical components of the didactic and clinical curriculum meet current acceptable performance standards.

   (b) Qualifications
   The medical director/advisor shall be a licensed physician, experienced and proficient in the use of medical
ultrasound and/or other noninvasive diagnostic vascular techniques appropriate for the learning concentration(s) offered.

The medical director/advisor should participate in goal determination, curriculum development and outcomes assessment. The medical director/advisor is encouraged to participate in instruction.

The medical director/advisor should be board-certified in an appropriate medical specialty.

(3) Clinical Coordinator
Programs with 8 or more major clinical affiliates or clinical education centers shall have an additional faculty member designated as the clinical coordinator.

(a) Responsibilities
The clinical coordinator shall be responsible for coordinating clinical education with didactic education as assigned by the program director. Clinical education effectiveness shall be evaluated and ensured through a schedule of regular visits to the clinical education centers. The clinical coordinator's responsibilities shall include coordination, instruction and evaluation. The clinical coordinator shall maintain current knowledge of sonographic and/or other noninvasive diagnostic vascular techniques and educational methodology through continuing professional development. The responsibilities of the clinical coordinator shall not be adversely affected by educationally unrelated functions.

(b) Qualifications
The clinical coordinator shall possess proficiency in curriculum development, supervision, instruction, evaluation, and counseling. The clinical coordinator shall be an appropriately credentialed sonographer and/or vascular technologist and shall document the equivalent of two years' full-time professional experience as a diagnostic medical sonographer or cardiac sonographer and/or vascular technologist.

The clinical coordinator should document a minimum of one year of experience as an instructor in a diagnostic medical or cardiac sonography and/or vascular technology program. The instructor experience may have been attained concurrently with the professional experience requirement.

A position description for the clinical coordinator should specify the tasks related to these responsibilities. Tasks may include didactic instruction in addition to clinical instruction of students and direction and guidance of clinical instructors.

b. Faculty and Instructional Staff
All faculty shall be familiar with program goals and shall be able to demonstrate the ability to develop an organized plan of instruction and evaluation. Program sponsors shall establish policies to assess competence in teaching. Important criteria that shall be considered include: (a) knowledge of subject matter; (b) ability to organize and present the subject; (c) a positive attitude toward students and teaching; and (d) participation in continuing education to improve instructional skills and maintain professional competence.

(1) Didactic Instructors
(a) Responsibilities
The instructional staff shall be responsible for students attaining the objectives of each course, for evaluating students and reporting progress as required by the institution, and for the periodic review and updating of course material.

(b) Qualifications
The instructors shall be individually qualified by education and experience, be effective in teaching the subjects assigned, and meet the standards required by the sponsoring institution.

(2) Clinical Instructor
A clinical instructor shall be identified for each program's clinical education center. In programs with a single clinical education center, the program director may serve as clinical instructor.

(a) Responsibilities
A clinical instructor shall be available to students whenever he or she is assigned to a clinical setting, provide appropriate clinical supervision, and be responsible for student clinical evaluation. The program shall provide a
position description stating an appropriate amount of release time for the clinical instructor(s) to carry out educational responsibilities.

(b) Qualifications
Each clinical instructor shall be an appropriately credentialed sonographer and/or vascular technologist and have appropriate education and experience to fulfill the responsibilities of the position.

c. Clerical Staff
Adequate clerical staff shall be available.

d. Professional Development
Programs shall encourage program staff and faculty to pursue continuing professional growth, to ensure that program faculty and officials can fulfill their responsibilities.

Continuing education in medical ultrasonography and/or vascular technology should be encouraged for the program faculty. Programs should demonstrate a method of ongoing evaluation of faculty instructional expertise.

2. Financial Resources
Financial resources to operate an educational program shall be ensured to fulfill obligations to both current and newly accepted students.

The budget should reflect sound educational priorities. Continued operation of the educational program should be assured for each class of students admitted. Program officials should have input to the budgetary process.

3. Physical Resources
a. Facilities
Adequate classrooms, laboratories, and administrative offices shall be provided for students, program staff, and faculty.

Laboratories should be made available on a regularly scheduled basis to provide students with opportunity for demonstrations and practice prior to applying sonographic and/or other non-invasive diagnostic vascular technique principles to patients. The equipment in the laboratory should aid development of clinical competency.

Offices for the administrative and instructional staff should be accessible and suitably private to be conducive to planning, evaluation, and counseling responsibilities. Offices should provide security for instructional materials, evaluations, records, and other appropriate material.

b. Equipment and Supplies
Appropriate and sufficient modern equipment, instrumentation, supplies, and storage space shall be provided for student use and for teaching the didactic and supervised clinical education components of the curriculum.

c. Learning Resources
(1) Library
Students shall have ready access, in terms of time and location to an adequate supply of current books, journals, periodicals and other reference materials related to the curriculum and the profession.

The library provided or utilized by the program should contain printed and other media holdings to accommodate required study, to promote independent study and research, and to aid faculty in delivering and improving the program.
Reference materials should be accessible at all clinical education centers. A list of holdings should be compiled and available to students and faculty.
(2) Instructional Aids
Reference materials, case studies, equipment, demonstration aids, computer hardware and software, and audiovisual resources shall be provided in sufficient number and quality to enhance student learning experiences for either the didactic or supervised clinical education components of the curriculum.

d. Clinical Resources
Resources shall be adequate to support the number of students admitted to the program. Maximum student enrollment shall be commensurate with the volume and variety of sonographic procedures, equipment, and personnel available for educational purposes. The instructor/student ratio shall be adequate to achieve the stated objectives of the curriculum.

Programs should provide students with a variety of care settings in which sonographic and/or other non-invasive diagnostic vascular procedures are performed on in-patients and out-patients. These settings may include the following:

- Ambulatory care facilities
- Emergency/trauma
- Intensive/critical/coronary care
- Surgery
- Angiography/cardiac catheterization

The number of students assigned to the clinical education center should be determined by a student/clinical staff ratio not greater than one-to-one.

1. Each general learning concentration major affiliate or clinical education center should perform a minimum of 1,500 completed patient examinations, including production of permanent records and reports, per year, per student equivalent. The overall program volume of procedures should include a minimum of 30% ob/gyn procedures and a minimum of 30% abdominal procedures.

2. Each cardiac learning concentration major affiliate or clinical education center should perform a minimum of 800 patient examinations, including permanent records and reports, per year, per student equivalent. The overall program volume of procedures should be representative of the range of cardiac procedures.

3. Each vascular learning concentration major affiliate or clinical education center should perform a minimum of 1000 patient examinations, representative of the range of non-invasive vascular procedures, including permanent records and reports, per year, per student equivalent. The overall program volume of procedures should be representative of the range of non-invasive vascular procedures.

A student equivalent is defined as equal to one full-time student for one year.

C. Students

1. Admission Policies and Procedures
Admission of students, including advanced placement, shall be made in accordance with clearly defined and published practices of the institution. Any specific academic and technical standards required for admission to the program shall also be clearly defined and published and readily accessible to prospective students and the public.

If the program admits any students on the basis of ability to benefit, it must employ appropriate methods such as pre-admission testing or evaluation for determining that such students are indeed capable of benefiting from the training or education offered. Policies regarding advanced placement, transfer of credit, and credit for experiential learning shall be readily accessible to prospective students. Policies relating to previous education or work experience shall also be provided and readily accessible.

Applicants shall demonstrate satisfactory completion of the following prerequisites:
High school graduation or equivalent
General physics
Biological science
Algebra
Communication skills

Students shall demonstrate satisfactory completion of the following prerequisites and/or corequisites:

Human anatomy and physiology
Patient care
Medical ethics and law
Medical terminology
General pathophysiology

The program sponsor, with input from clinical representatives, is responsible for developing and distributing valid, objective admission criteria. Objective tests used in the admission process should be recognized measures of achievement or potential.

Institutions electing to accommodate an open admission policy should establish and define criteria for admission to the program. If preprofessional periods of study are involved, the policy should guarantee suitable clinical education opportunities for all students successfully completing the preprofessional period. The program may choose to have an admissions committee. Student selection criteria should be periodically evaluated to determine validity.

Programs should carefully evaluate applicants' existing knowledge base in subject areas such as mathematics, science, and physics. Applicants lacking prerequisite competence in these areas should be counseled for appropriate remediation prior to program acceptance to reduce potential attrition and to permit program concentration on the didactic and clinical education required by the curriculum.

Reasonable accommodation should be provided to applicants with disabling conditions.

2. Evaluation of Students
Criteria for successful completion of each segment of the curriculum and for graduation shall be given in advance to each student. Evaluation systems shall include content related to the objectives and competencies described in the curriculum for both didactic and supervised clinical education components. Documented evaluation shall be employed frequently enough to provide both students and program officials with timely indications of students' academic standing and progress, and to serve as a reliable indicator of the effectiveness of instruction and course design.

Performance standards in both didactic and clinical portions should be made clear to the students. Criteria for successful performance should be applied without discrimination. Provision for dismissal from the program, following due process, should be made for students unable to demonstrate satisfactory progress according to these criteria.

3. Health
Program officials shall establish a procedure for determining that an applicant's or student's health will permit him or her to meet the documented technical standards of the program. Students must be informed of and have access to the health care services provided to all other students of the institution.

4. Guidance
Guidance shall be available to assist students in understanding course content and in observing program policies, and practices, and to provide counseling or referral for problems that may interfere with the students progress through the program.

Students should have access to faculty and professional counseling. Program sponsors should develop a student guidance procedure that includes documentation of regular and timely evaluation sessions by qualified faculty covering strengths, weaknesses, and progress in the program.
D. Operational Policies

1. Fair Practices
   a. Announcements and advertising must accurately reflect the program offered.

   b. Student and faculty recruitment, student admission practices, and faculty employment practices shall be non-discriminatory with respect to race, ethnic background, creed, sex, age, disabling conditions, or national origin.

   c. Academic credit and costs to the student shall be accurately stated, published, and made known to all applicants.

   d. The program or sponsoring institution shall have defined and published policies and procedures for processing student and faculty grievances.

   e. Policies and procedures for student withdrawal and for refunds of tuition and fees shall be published and made known to all applicants.

   f. Policies and processes by which students may perform service work while enrolled in the program must be published and made known to all concerned in order to avoid practices in which students are substituted for regular staff. Students may not take either the responsibility or the place of qualified staff. However, after demonstrating competency, students may be permitted to undertake certain defined activities under appropriate supervision and direction. Students may be employed in a clinical setting outside regular educational hours, provided the work does not interfere with regular academic responsibilities. The work must be non-compulsory, paid, and subject to standard employee policies.

   g. The health and safety of patients, students, and faculty associated with the educational activities of the students must be adequately safeguarded. The program shall provide a policy related to student pregnancy. The program shall provide a policy related to student exposure to blood-borne pathogens and communicable diseases.

   h. A program admitting students on the basis of ability to benefit must publicize its objectives, assessment measures, and means of evaluating ability to benefit.

2. Student Records
   Satisfactory records shall be maintained for student admission, attendance, and evaluation. Grades and credits for courses shall be recorded on the student transcript and permanently maintained by the sponsoring institution in a safe and accessible location.

   Records should be maintained in order to document achievement of program goals and objectives, to indicate compliance with accrediting and program policies, and to provide data for ongoing program evaluation. Provisions for availability and security of records should comply with the "Federal Family Educational Rights and Privacy Act of 1974" (Buckley Amendment). The supervising sonographer/vascular technologist should be identified on all student clinical education records.

E. Program Evaluation

The program must have a continuing system for reviewing the effectiveness of the educational program, especially as measured by student achievement, and must prepare timely reports to aid staff, the sponsoring institution, and the accrediting agencies in assessing program quality and needs.

1. Outcomes
   Programs shall routinely secure sufficient qualitative and quantitative information regarding the program's graduates to demonstrate an ongoing evaluation of outcomes consistent with the graduate competencies specified by the educational program.

2. Results of Ongoing Program Evaluation
   The results of ongoing program evaluation must be appropriately reflected in the curriculum and other
dimensions of the program. In particular, the program must systematically use the information obtained in its evaluation to foster student achievement with respect to the certificate or degree offered.

**Ongoing, systematic program self-evaluation should consider outcomes related to the student, the institution, and society.**

Self-evaluation should assist the program in decision-making, enhancing input, and improving processes. All staff and faculty should be involved in program self-evaluation activities.

Institutional and program missions should be considered when a program evaluates its goals achievement and considers revisions based on curriculum review and other elements of the evaluation process. Program focus should be on the students as a result of their educational experience.

As a part of the ongoing evaluation process, programs should consider assessment categories related to the following educational domains:

- **Cognitive:** Understanding of general or specific facts, processes, theories, and analytic and critical thinking
- **Psychomotor:** Performance of tasks and skills related to pertinent diagnostic examinations
- **Affective:** Communications, leadership/interpersonal skills, values, and beliefs

**Ongoing program evaluation should include, but is not limited to, assessment of items such as the following:**

- Attrition/retention/academic delinquency rates and reasons.
- Average length of time for program completion.
- Student characteristics in comparison with other students enrolled in the institution in areas such as grade distribution, membership in professional societies, honors, and awards.
- Number of graduates in specified employment settings or in other types of education.
- Relevance of employment setting to the educational program.
- Percent of graduates passing credentialing exams (with number of attempts) and mean scores on exams.
- Follow-up studies of alumni and employer satisfaction.

### 3. Program Support

Input from various groups such as admissions, curriculum and advisory committees, and from other channels of communication shall be documented.

### Section II: Requirements for Diagnostic Medical Sonography

#### A. Description of the Profession

The profession of diagnostic medical sonography includes general sonography, cardiac sonography, vascular technology, and various subspecialties. The profession requires judgement and the ability to provide appropriate health care services. Sonographers/vascular technologists are highly skilled professionals qualified by education to provide patient services using diagnostic techniques under the supervision of a licensed doctor of medicine or osteopathy. The sonographer/vascular technologist may provide this service in a variety of medical settings where the physician is responsible for the use and interpretation of appropriate procedures. Sonographers/vascular technologists assist physicians in gathering data necessary to reach diagnostic decisions. The sonographer/vascular technologist is able to perform the following:
1. Obtain, review, and integrate pertinent patient history and supporting clinical data to facilitate optimum diagnostic results.

2. Perform appropriate procedures and record anatomic, pathologic, and/or physiologic data for interpretation by a physician.

3. Record, analyze, and process diagnostic data and other pertinent observations made during the procedure for presentation to the interpreting physician.

4. Exercise discretion and judgement in the performance of sonographic and/or other non-invasive diagnostic services.

5. Demonstrate appropriate communication skills with patients and colleagues.

6. Act in a professional and ethical manner.

7. Provide patient education related to medical ultrasound and/or other non-invasive diagnostic vascular techniques, and promote principles of good health.

**B. Curriculum**

1. **Description of the Program**
   Faculty and students shall be provided with a clear description of the program and its content, including learning goals, course objectives, supervised clinical practice assignments, and competencies required for graduation.

   Based on its mission and available resources, the sponsor shall determine and specify the learning concentration(s) to be offered. The combined total didactic/clinical student involvement in the program shall not exceed 40 hours per week. The program shall balance the didactic and clinical education components to ensure that competencies are achieved. Clinical learning experience shall be integrated with didactic education.

   *Sponsoring institutions are expected to demonstrate accountability to the public, students, and profession for an effective and valid educational process, including goals, objectives, and ongoing program evaluation in specific learning concentrations.*

   Programs offering a learning concentration in general sonography shall include goals, objectives, and ongoing program evaluation of knowledge of anatomy, physiology, pathology and pathophysiology, and competency in the performance of two-dimensional, Doppler, and other sonographic procedures.

   Programs offering a learning concentration in cardiac sonography shall include goals, objectives, and ongoing program evaluation of knowledge of cardiovascular anatomy, physiology, pathology, pathophysiology and hemodynamics, and competency in performance of M-mode, two-dimensional, Doppler, and other special echocardiographic procedures.

   Programs offering a learning concentration in vascular technology shall include goals, objectives, and ongoing program evaluation of knowledge of appropriate pharmacology, vascular anatomy, physiology, pathology and pathophysiology, and competency in performance of physiologic and ultrasonographic procedures for arterial, venous, cerebrovascular and abdominal vascular evaluation, and other special non-invasive vascular procedures.

2. Instruction must follow a master plan that documents achievement of competencies specific to each learning concentration. The master plan of education shall be available for student and faculty to review.

   a. Appropriate learning experiences and curriculum sequencing in order for students to develop the competencies necessary for graduation, including appropriate instructional materials, classroom presentations, discussions, demonstrations, and supervised clinical education. During laboratory hours, supervision shall be provided. Sufficient patient scanning/performance time for students to obtain clinical competency shall be provided.
b. Clearly written course syllabi that describe learning objectives and competencies to be achieved for both didactic and clinical education components.

c. Frequent, documented evaluation of students to assess their acquisition of knowledge, problem identification and problem-solving skills, and psychomotor, behavioral, and clinical competencies.

Records indicating the number and type of procedures performed by the student, the examination findings, the extent of student supervision, and the level of involvement of the student in scanning/performance should be maintained.

Documentation of the program master plan of education should include the following:

- Philosophies and goals of the program and institution
- Curriculum sequence
- Course outlines, course descriptions, and performance (behavioral) objectives
- Clinical education plan demonstrating correlation with the didactic curriculum
- Performance objectives for clinical education
- Mechanics for evaluation of learning concentration competencies
- Grading policy
- Program policies
- Internal and external mechanisms for evaluating program effectiveness

The master plan of education should be sufficiently detailed to provide for continuity, delivery, and ongoing evaluation of the program in the event of staff changes.

For each learning concentration included in the curriculum, a physician experienced in that concentration should be available to support the educational process.

If a program uses students or other human subjects for non-clinical scanning, the program should ensure voluntary and prudent use of these subjects. Explanation of grading policy, including derivation, should be provided to all students.

The clinical education plan should provide adequate learning experiences for each student to ensure professional competency in the learning concentration(s) offered. Programs that allow a student to develop multiple learning concentrations should ensure proportionate clinical learning experiences to allow the student to demonstrate competence in each.

3. The length of the educational program shall be determined by student achievement of identified competencies.

Recognizing the expanding body of knowledge in the profession, a desirable program-length goal for the core curriculum and one learning concentration, excluding prerequisites and corequisites, is 18 months. Each additional learning concentration would encompass an additional six months of education.

C. Required Competencies Common to Each Learning Concentration

Competencies developed by the program shall be specific to the learning concentration(s) offered and shall include but not be limited to the following areas of proficiency:*  

1. Utilize oral and written communication.

   a. Maintain clinical records.

   b. Interact with the interpreting physician or other designated physicians with oral or written summary of findings as permitted by employer policy and procedure.

   c. Recognize significant clinical information and historical facts from the patient and the medical records, which may impact on the diagnostic examination.
d. Comprehend and employ appropriate medical terminology, abbreviations, symbols, terms, and phrases.

e. Educate other health care providers and the public in the appropriate applications of ultrasound/non-invasive diagnostic vascular evaluation, including the following:

Medical terminology
Sonographic/other non-invasive diagnostic vascular terminology
Pertinent clinical signs, symptoms, and laboratory tests
Pertinent legal principles

2. Provide basic patient care and comfort.

a. Maintain infection control and utilize universal precautions.

b. Anticipate and be able to respond to the needs of the patient.

c. Identify life-threatening situations and implement emergency care as permitted by employer procedure, including the following:

Infection control and universal precaution procedures
Pertinent patient care procedures
Principles of psychological support
Emergency conditions and procedures
First aid and resuscitation techniques

3. Demonstrate knowledge and understanding of human gross and sectional anatomy.

a. Evaluate anatomic structures in the region of interest.

b. Recognize the sonographic appearance of normal tissue structures, including the following:

Gross sectional anatomy
Embryology
Normal sonographic patterns

4. Demonstrate knowledge and understanding of physiology, pathology, and pathophysiology.

a. Obtain and evaluate pertinent patient history and physical findings.

b. Extend standard diagnostic testing protocol as required by patient history or initial findings.

c. Review data from current and previous examinations to produce a written/oral summary of technical findings, including relevant interval changes, for the interpreting physician's reference.

d. Recognize examination findings that require immediate clinical response and notify the interpreting physician of such findings, including the following:

Patient interview and examination techniques
Chart and referral evaluation
Diagnostic testing protocols related to specific disease conditions
Physiology including blood flow dynamics
Pertinent pathology and pathophysiology
Pertinent legal issues

5. Demonstrate knowledge and understanding of acoustical physics, Doppler ultrasound principles, and ultrasound instrumentation.
a. Select the appropriate technique(s) for examination(s) being performed.

b. Adjust instrument controls to optimize image quality.

c. Perform linear, area, circumference, and other related measurements from sonographic images or data.

d. Recognize and compensate for acoustical artifacts.

e. Utilize hard-copy devices to obtain pertinent documentation of examination findings.

f. Minimize patient exposure to acoustical energy, which includes the following:

   Acoustical physics
   Sound production and propagation
   Interaction of sound and matter
   Instrument options and transducer selection
   Principles of ultrasound instruments and modes of operation
   Operator control options
   Physics of Doppler
   Principles of Doppler techniques
   Methods of Doppler flow analysis
   Techniques for recording static and dynamic images
   Acoustical artifacts

6. Demonstrate knowledge and understanding of the interaction between ultrasound and tissue and the probability of biological effects in clinical examinations, including the following:

   Biologic effects
   Pertinent in-vitro and in-vivo studies

7. Employ professional judgment and discretion.

   a. Protect the patient's right to privacy.

   b. Maintain confidentiality.

   c. Perform within the scope of practice.

   d. Adhere to the professional codes of conduct/ethics through the following:

      Medical ethics
      Pertinent legal principles
      Professional interaction skills
      Professional scopes of practice

8. Understand the fundamental elements for implementing a quality assurance and improvement program, and the policies, protocols, and procedures for the general function of the ultrasound laboratory, including the following:

   Administrative procedures
   Quality control procedures
   Elements of quality assurance program
   Records maintenance
   Personnel and fiscal management
   Trends in health care systems
9. Recognize the importance of continuing education, through the following:

- Professional journals
- Conferences
- Lectures
- In-house educational offerings
- Professional organizations and resources
- Recent developments in sonography
- Research statistics and design

**D. Competencies Specific to the General Learning Concentration Shall Include, but not be Limited to the Following:**

1. Demonstrate the ability to perform sonographic examinations of the abdomen, superficial structures, non-cardiac chest, and the gravid and nongravid pelvis according to protocol guidelines established by national professional organizations and the protocol of the employing institution utilizing real-time equipment with both transabdominal and endocavitary transducers, Doppler, and color Doppler display modes:

- Demonstration/laboratory sessions
- Clinical education

2. Recognize and identify the sonographic appearance of normal anatomic structures, including anatomic variants and normal Doppler patterns:

- Liver
- Biliary system
- Pancreas
- Urinary tract
- Adrenal glands
- Spleen
- Prevertebral vessels
- Peritoneal cavity, including potential spaces
- Gastrointestinal tract
- Noncardiac chest
- Neck
- Breast
- Scrotum
- Prostate
- Anterior abdominal wall
- Extremities
- Brain and spinal cord

3. Recognize, identify, and appropriately document the abnormal sonographic and Doppler patterns of disease processes, pathology, and pathophysiology of the structures listed above. Modify the scanning protocol based on the sonographic findings and the differential diagnosis:

- History and physical examination
- Related imaging, laboratory, and functional testing procedures
- Clinical differential diagnosis
- Role of ultrasound in patient management

Sonographic and Doppler patterns in clinical diseases which may occur in the following categories:

- Iatrogenic
- Degenerative
- Inflammatory
- Traumatic
- Neoplastic
Infectious
Obstructive
Congenital
Metabolic
Immunologic

4. Recognize and identify the sonographic appearance of normal anatomic structures of the female pelvis, including anatomic variants and normal Doppler patterns:

Reproductive system
Pelvic muscles
Suspensory ligaments
Peritoneal spaces
Pelvic vasculature

5. Recognize and identify the sonographic appearance of normal maternal, embryonic, and fetal anatomic structures during the first, second, and third trimesters:

Sonographic sectional anatomy
Pertinent measurement techniques
Doppler applications
Normal sonographic appearance of fetal and maternal structures

6. Recognize, identify, and appropriately document the sonographic appearance of gynecologic disease processes, pathology, and pathophysiology:

History and physical examination
Related imaging, laboratory, and functional testing procedures
Differential diagnosis
Role of ultrasound in patient management

Abnormal sonographic patterns in pregnancy:

Iatrogenic
Degenerative
Inflammatory
Traumatic
Neoplastic
Infectious
Obstructive
Congenital
Metabolic
Immunologic

Contraceptive devices
Infertility procedures
Doppler applications

7. Recognize, identify, and appropriately document the sonographic appearance of obstetric abnormalities, disease, pathology, and pathophysiology:

History and physical examination
Related imaging, laboratory, and functional testing procedures
Differential diagnosis
Role of ultrasound in patient management
Abnormal sonographic patterns in pregnancy:

Placenta
Congenital/genetic anomalies
Growth abnormalities
Amniotic fluid
Viability
Multiple gestation
Fetal monitoring
Maternal factors
Postpartum
Fetal therapy

8. Demonstrate knowledge and understanding of the role of the sonographer in performing interventional/invasive procedures.

E. Competencies Specific to the Cardiac Learning Concentration Shall Include, but not be Limited to the Following:

1. Demonstrate knowledge of normal and abnormal cardiac anatomy:

   Embryology and fetal cardiac development
   Cardiac chambers and septation
   Valve anatomy and dynamics
   Coronary artery anatomy
   Relationships of cardiac chambers and great vessels

2. Demonstrate knowledge of normal cardiovascular physiology:

   Hemodynamics
   Ventricular function, including influence of loading conditions and measurement of cardiac output
   Exercise physiology
   Electrophysiology and conduction system
   Pulmonary vascular disease

3. Demonstrate knowledge and understanding of cardiac pathology, pathophysiology, and hemodynamics in different types of cardiac disease:

   Valvular heart disease
   Ischemic cardiac disease
   Cardiomyopathy
   Pericardial disease
   Congenital heart disease
   Cardiac neoplasms and masses
   Cardiac trauma
   Pulmonary vascular disease
   Diseases of the aorta and great vessels

4. Demonstrate knowledge and understanding of clinical cardiology:

   Relationship of echocardiography to history and physical examination (including indications for echocardiography)
   Differential diagnosis as it relates to the echocardiographic examination
   Cardiovascular surgery and interventional cardiology
   Effect of systemic diseases on cardiovascular anatomy and physiology
5. Demonstrate knowledge of other diagnostic cardiac procedures emphasizing indications, utility, and limitations of these procedures:

*Angiography and cardiac catheterization*
*Electrocardiography, electrophysiologic studies, Holter monitoring*
*Stress testing*
*Radiouclide studies*
*Other tomographic imaging procedures*
*Phonocardiography and external pulse recording*

6. Demonstrate proficiency in the performance of M-mode, two-dimensional, and Doppler (pulsed wave, continuous wave and color flow) echocardiographic diagnostic procedures.

Recognize, identify, and appropriately document the abnormal echocardiographic and Doppler patterns of disease, pathology, and pathophysiology for the disease categories listed in Section II.D.3.

7. Demonstrate knowledge and understanding of the indications, utility, limitations, and technical procedures for related echocardiographic diagnostic procedures:

*Stress echocardiography*
*Transesophageal echocardiography*
*Intraoperative echocardiography*
*Contrast echocardiography*
*Echo-guided procedures*

8. Demonstrate knowledge and understanding of clinical pharmacology as it relates to echocardiography and provocative maneuvers:

*Cardiovascular pharmacology*
*Theory and use of provocative stress agents*
*Non-pharmacologic stress*
*Potential effects of cardiac medications on echocardiographic findings*

9. Demonstrate knowledge, understanding, and proficiency in the use of quantitation principles applied to echocardiographic images and flow data:

*Standard M-mode, two-dimensional, and Doppler measurements and calculations*
*Knowledge and understanding of normal and abnormal values for M-mode, two-dimensional and Doppler echocardiography*
*Evaluation of normal and abnormal ventricular function*
*Evaluation of the severity of valve stenosis and regurgitation*
*Knowledge of normal and abnormal cardiovascular hemodynamics and flow patterns*

**F. Competencies Specific to the Vascular Learning Concentration Shall Include, but not be Limited to:**

1. Demonstrate knowledge of normal and abnormal vascular anatomy:

*Arterial: Upper and lower extremities*
*Venous: Upper and lower extremities*
*Cerebrovascular: Extracranial and intracranial*
*Abdominal Vasculature: Arterial and venous*
*Special circulations: Arterial and venous*
2. Demonstrate knowledge of normal and abnormal vascular physiology:

*Hemodynamics: Flow physics*
*Exercise physiology*

3. Demonstrate knowledge and understanding of vascular physiology, pathophysiology, and hemodynamics in the different types of vascular disease/dysfunction:

*Iatrogenic*
*Degenerative*
*Inflammatory*
*Traumatic*
*Neoplastic*
*Infectious*
*Obstructive*
*Congenital*
*Metabolic*
*Immunologic*
*Flow changes secondary to other states, eg, cardiac diseases, pulmonary diseases, pregnancy, inflammatory diseases*
*Pharmacology*

4. Demonstrate knowledge and understanding of clinical vascular diagnostic procedures:

*Relationship of vascular diagnostic techniques to patient history and physical examination*

*Knowledge of appropriate indications for non-invasive vascular examination*

*Differential diagnosis as it relates to non-invasive vascular testing and examination*

*Vascular surgery and interventional vascular procedures including intravascular ultrasound, angioscopy, transluminal angioplasty, atherectomy, endarterectomy, patch graft endarterectomy, vein and synthetic vascular bypass procedures as well as embolectomy and thrombectomy*

5. Demonstrate knowledge of other diagnostic vascular procedures emphasizing indications, utility, and limitations of these procedures:

*Angiography*
*Venography*
*Magnetic resonance angiogram*
*Magnetic resonance flow meters*
*Computed tomography*
*Nuclear medicine vascular procedures*

6. Knowledge of importance and impact of other laboratory values and modalities.

7. Demonstrate proficiency in the performance of plethysmography, ultrasound, Doppler (pulsed and continuous wave and color flow) vascular procedures, transcranial Doppler insonation/visualization, pressure measurements, and vascular stress testing.

*Individuals should also demonstrate knowledge and understanding of other plethysmographic procedures to include but not be limited to pneumoplethysmography, strain-gauge plethysmography, photo-pulse plethysmography, and ocular plethysmography.*
8. Demonstrate knowledge and understanding of clinical pharmacology as it relates to non-invasive vascular evaluation and stress testing:

*Vasoactive relationships*
*Potential effects of medications on non-invasive vascular diagnostic findings*

9. Demonstrate knowledge, understanding, and proficiency in the use of quantitation principles applied to non-invasive vascular testing:

*Ankle/brachial pressure ratios*
*Segmental pressures*
*Aorta/renal ratios*
*Resistive index*
*Pulsatility index*
*Internal carotid artery to common carotid artery ratio*
*Percentage velocity change across stenosis for grading arterial lesions*

*Measurements from B-mode image for percentage area and diameter reduction from true to residual vessel lumen*

*Knowledge of normal and abnormal vascular flow patterns and wave form morphology*

**Section III: Maintaining and Administering Accreditation**

**A. Program and Sponsoring Institution Responsibilities**

1. **Applying for Accreditation**
   The accreditation review process conducted by the Commission on Accreditation of Allied Health Education Programs (CAAHEP) can be initiated only at the written request of the chief executive officer or an officially designated representative of the sponsoring institution.

   This process is initiated by requesting an application form from and returning it to:

   Joint Review Committee on Education in Diagnostic Medical Sonography
   2025 Woodlane Drive
   St. Paul, MN 55125

   The Joint Review Committee on Education in Diagnostic Medical Sonography (JRCDMS) requests additional application materials prior to guiding the program through completion of a self-study and preparation of a Self-Study Report.

   A program or sponsoring institution may at any time prior to the final accreditation action withdraw its request for initial or continuing accreditation.

2. **Administrative Requirements for Maintaining Accreditation**
   Programs are required to comply with administrative requirements for maintaining accreditation, which include:

   a. Submitting the Self-Study Report or other required reports within a reasonable period of time as determined by the JRCDMS.

   b. Agreeing to a reasonable site visit date before the end of the period for which accreditation was awarded.

   c. Informing the JRCDMS within a reasonable period of time of changes in the positions of program director or medical director. If either position remains vacant for 30 days, the program should send the JRCDMS a description of the actions taken to maintain the continuity and effectiveness of the program.
d. Submitting requests for changes in recognition of major clinical affiliates and/or student capacities to the JRCDMS.

e. Paying JRCDMS and CAAHEP accreditation fees within a reasonable period of time as determined by the JRCDMS and CAAHEP, respectively.

f. Notifying the JRCDMS and CAAHEP of its intent to transfer program sponsorship, in accord with CAAHEP policy.

g. Notifying the JRCDMS and CAAHEP within 30 days of any adverse decision affecting its accreditation or other specialty recognition status.

Failure to meet these administrative requirements for maintaining accreditation may lead to being placed on Administrative Probation and ultimately to having accreditation withdrawn.

B. CAAHEP and JRC-DMS Responsibilities

1. Administering the Accreditation Process
   At the written request of the chief executive officer or an officially designated representative, CAAHEP and the JRCDMS review educational programs to assess compliance with the Standards.

   The accreditation review process includes a site visit. If the performance of a site visit team is unacceptable, the institution may request a second site visit.

   Before the JRCDMS forwards its recommendation to CAAHEP, the program being reviewed is given an opportunity to review the findings and conclusions of the site visit team and to comment on their accuracy.

   Prior to recommending Probationary Accreditation to CAAHEP, the JRCDMS provides the sponsoring institution with a second opportunity to respond to the cited deficiencies. JRCDMS reconsideration of a recommendation for Probationary Accreditation is made on the basis of conditions existing when the review committee arrived at its accreditation recommendation to CAAHEP and subsequent documented evidence of corrected deficiencies.

   CAAHEP assignments of Probationary Accreditation, including those following JRCDMS reconsideration, are final and not eligible for further appeal.

2. Withholding or Withdrawing Accreditation
   Prior to recommending Accreditation Withheld or Accreditation Withdrawn to CAAHEP, the JRCDMS provides the sponsoring institution with an opportunity to request reconsideration. CAAHEP decisions to withhold or withdraw accreditation are final unless appealed to CAAHEP. A copy of CAAHEP Appeals Procedures for Accreditation Withheld or Withdrawn is included with the letter notifying the program of one of these actions.

   When accreditation is withdrawn, the appropriate official is provided with a clear statement of each deficiency and is informed that application for accreditation as a new applicant may be made whenever the program is believed to be in substantial compliance with the Standards.

   As indicated in Classification of Accreditation Actions, all students successfully completing a program granted any accreditation category at any point during their tenure as students are regarded as graduates of a CAAHEP-accredited program.

3. Inactive Programs
   The sponsoring institution may request inactive status for a program that does not enroll students for up to two years. Such program must pay annual fees to the JRCDMS. After being inactive for two years, the program will be considered discontinued, and accreditation may be withdrawn.