BACHELOR OF SCIENCE IN DIAGNOSTIC MEDICAL SONOGRAPHY

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Diagnostic medical sonographers play a critical role in the health care team. The sonographer provides patient services using high-frequency sound waves that produce images of internal structures. Working under the supervision of a physician responsible for the use and interpretation of ultrasound procedures, the sonographer helps gather sonographic data to diagnose a variety of conditions and diseases, as well as monitor fetal development.

To prepare students for careers in sonography and certification examinations in the subspecialty areas, Quinnipiac offers a BS in Diagnostic Medical Sonography. The Diagnostic Medical Sonography program offers didactic, laboratory and clinical training in multiple subspecialties of sonography including abdominal and small parts, breast, vascular technology, OB/GYN and musculoskeletal imaging for the student who is motivated to become a multi-credentialed member of this profession.

The first two years of the bachelor's degree program consists of University Curriculum studies in addition to an introductory course into the field of diagnostic medical sonography. The professional component of the program begins in the third year of study. Each student spends two full years concentrating on didactic sonography classes, laboratory sessions on campus and clinical education at multiple clinical education centers. The curriculum is structured so students can apply the knowledge and skills developed in the classroom and laboratory to the care of patients in the clinical setting. Throughout the professional component of the program, didactic and clinical courses are taken simultaneously to provide the opportunity for immediate application and reinforcement.

Upon completion of their Bachelor of Science in Diagnostic Medical Sonography, students are eligible to apply for the American Registry of Diagnostic Medical Sonography certification. Graduates may take the Sonography Physics and Instrumentation examination in addition to the following ARDMS specialty examinations: abdomen and small parts, breast, vascular technology and obstetrics/gynecology.

Diagnostic Medical Sonography Curriculum

The curriculum for the professional courses in the program are subject to modification as deemed necessary to maintain a high-quality educational experience and keep current with best practices in the profession. The Academic Standing and Progression Committee recommendations regarding student progression, discipline or dismissal will be considered on a case-by-case basis.

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<tr>
<th>Course</th>
<th>Title</th>
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<tbody>
<tr>
<td>EN 101</td>
<td>Introduction to Academic Reading and Writing</td>
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<td>FYS 101</td>
<td>First-Year Seminar</td>
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<tr>
<td>MA 275</td>
<td>Biostatistics</td>
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<td>DMS 100</td>
<td>Foundations of Diagnostic Imaging</td>
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**Spring Semester**

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<tr>
<td>BIO 102 &amp; 102L</td>
<td>General Biology II and General Biology Lab II</td>
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<tr>
<td>EN 102</td>
<td>Academic Writing and Research</td>
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<tr>
<td>PHY 101</td>
<td>Elements of Physics and Elements of Physics Lab (UC Elective)</td>
<td>4</td>
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<td>UC Elective</td>
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**Sophomore**

**Fall Semester**

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<td>Human Anatomy and Physiology I and Human Anatomy and Physiology Lab I</td>
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<td>UC Elective</td>
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**Spring Semester**

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<td>Human Anatomy and Physiology II and Human Anatomy and Physiology II Lab</td>
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<tr>
<td>DMS 101 &amp; 101L</td>
<td>Introduction to Diagnostic Medical Sonography and Sonography Laboratory Practicum I (UC Elective)</td>
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<td>UC Elective</td>
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**Junior**

**Fall Semester**

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<tr>
<td>DMS 200</td>
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<tr>
<td>DMS 210 &amp; 210L</td>
<td>Abdominal and Small Parts Sonography and Abdominal and Small Parts Sonography Lab Practicum</td>
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<td>DMS 250</td>
<td>Sonography Clinical Education I</td>
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<tr>
<td>DMS 297 &amp; 297L</td>
<td>Methods of Patient Care and Methods of Patient Care Lab</td>
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**Spring Semester**

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<td>DMS 220 &amp; 220L</td>
<td>Vascular Sonography and Vascular Sonography Lab Practicum</td>
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<td>DMS 260</td>
<td>Sonography Clinical Education II</td>
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**Summer Semester**

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<td>DMS 270</td>
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<td><strong>Credits</strong></td>
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All diagnostic medical sonography course requirements must be completed in the appropriate semester as indicated above. All diagnostic medical sonography course requirements are reserved for DMS majors only.

### Student Learning Outcomes

Upon completion of the Diagnostic Medical Sonography program, students will demonstrate the following competencies:

**Goal:** The students will be clinically competent.

1. **Clinically Knowledgeable:** Apply foundational skills and knowledge from didactic and laboratory courses to clinical practice.
2. **Procedurally Knowledgeable:** Demonstrate procedural knowledge from all DMS coursework.

**Goal:** The students will demonstrate effective communication skills.

1. **Effective Communication:** Execute effective communication with patients.
2. **Oral Proficiency:** Demonstrate the ability to present clear and creative ideas related to a case study.

**Goal:** The students will demonstrate critical thinking.

1. **Critical Decision Making:** Demonstrate the ability to obtain, review and integrate patient history, physical examination and sonographic findings to provide a physician with an oral or written interpretation of technical findings.

2. **Image Analysis:** Evaluate images for quality and diagnostic value.

**Goal:** The students will grow as professionals.

1. **Professional Ethics:** Understand and apply ethical decision making.
2. **Professional Behaviors:** Conduct themselves professionally.
3. **Professional Research:** Create a culminating capstone research project.

### Mission Statement

The mission of the Diagnostic Medical Sonography program at Quinnipiac University is to provide a quality and comprehensive education, through didactic, laboratory and clinical experiences, that will prepare students to become multi-credentialed sonographers. The program offers multiple clinical assignments to provide maximum exposure to diversified sonographic procedures.

The program prepares students to be competent in the art and science of diagnostic medical sonography, both for career entry and advanced study. Graduates of the program are prepared to meet the needs of the community for highly qualified professionals.

### Admission to the Program

Candidates applying for admission to the Diagnostic Medical Sonography program are required to have at least three years of high school college preparatory mathematics and one year of biology. One year of anatomy and physiology and one year of general physics is highly recommended. In addition, the scores of the SAT or the ACT are an important consideration. Related health care experience is highly desirable. Prospective candidates also must satisfy general Quinnipiac University Admission Requirements (http://catalog.qu.edu/general-information/admissions).

### Program Policies

In addition to the general policies of Quinnipiac University, such as due process and academic honesty, the following apply to students enrolled in the Diagnostic Medical Sonography program:

#### Progression in the Program

The Diagnostic Medical Sonography program has both GPA and final course grade requirements.

A cumulative university GPA of 2.85 and programmatic GPA of 3.0 must be maintained each semester. The expectation is that all DMS courses be completed with a final course grade of B or better. Final course grades of D or F in any DMS course are unacceptable. Programmatic GPA calculation and final course grade requirements begin with DMS 100 and include all DMS coursework thereafter.

Any student who does not maintain GPA requirements or earns a grade of a B- or lower in any DMS course will be referred to the Diagnostic Imaging Department’s Academic Standing and Progress Committee (ASPC) for review. Students who fail to meet the minimum cumulative university GPA requirement of 2.85 and/or the minimum programmatic GPA requirement of 3.0 will be subject to sanctions up to and including program dismissal. Students who earn a final course grade of D or F for any DMS course will be subject to program dismissal.
Transfer Students from Other Colleges and Universities

The admission of external transfer students to the Diagnostic Medical Sonography major is on a space-available, competitive basis only and will be reviewed on a yearly basis at the end of every fall semester. These students must meet the course requirements, performance standards and technical standards of the program. The program director will notify Admissions of available spots at the end of the fall semester after final grades have posted and internal transfers have been accepted. External transfer students will have the ability to take RS 100/DMS 100 online over the J-Term.

External transfers must meet the following criteria for acceptance into the major and progression into DMS 101/DMS 101L in the spring:

1. A cumulative GPA of 2.85
2. Successful completion of RS 100/DMS 100 by the end of J-term
3. Successful completion of BIO 101 and BIO 101L

All diagnostic medical sonography courses must be taken and completed at Quinnipiac University. Diagnostic medical sonography courses from the student’s previous institution will not be considered for replacement for any of the diagnostic medical sonography courses offered at Quinnipiac.

DMS 100. Foundations of Diagnostic Imaging. 1 Credit.
This course provides the student with a basic knowledge of the fundamentals of diagnostic imaging practice. Topics include defining diagnostic imaging as it relates to all imaging modalities, historical development of the profession, introduction to current and emerging practice arenas, and application of professional terminology. Students complete a self-study in medical terminology. 
Offered: Every year, Fall

DMS 101. Introduction to Diagnostic Medical Sonography. 3 Credits.
This is an introductory course to the field of diagnostic medical sonography. This course is taken in conjunction with DMS 101L. Throughout the course, the career of sonography is defined. Students are introduced to terminology pertaining to ultrasound as well as the physics responsible for its production. Cross-sectional anatomy pertaining to the abdomen, thyroid gland, scrotum and prostate is presented. Normal sonographic anatomy of the abdomen and small parts also is presented.
Prerequisites: Take DMS 100.
Corequisites: Take DMS 101L.
Offered: Every year, Spring

DMS 101L. Sonography Laboratory Practicum I. 1 Credit.
This is an introductory lab course to the field of diagnostic medical sonography. This course is taken in conjunction with DMS 101. To produce high-quality diagnostic images, it is necessary for the students to have a thorough understanding of image orientation, acoustic properties, scanning techniques and image documentation. The students have the opportunity to utilize ultrasound equipment to learn to identify normal sonographic anatomy of the abdomen and small parts and begin to develop scanning techniques.
Prerequisites: Take DMS 100.
Corequisites: Take DMS 101.
Offered: Every year, Spring
DMS 200. Sonography Physics and Instrumentation I. 3 Credits.
This core course is designed to prepare the student toward eligibility for the Sonography Physics and Instrumentation portion of the American Registry of Diagnostic Medical Sonographers (ARDMS) registry exam. The course encompasses the theoretical concepts and practical applications related to ultrasound physics and instrumentation. Concepts include: sound, sound waves, pulse waves, intensities, interaction of sound and media, transducers, sound beams and display modes. These concepts are tied in with terms used in Introduction to Sonography course and how they apply to practical, daily scanning skills.
Prerequisites: Take DMS 101 DMS 101L PHY 101 MA 275.
Offered: Every year, Fall

DMS 201. Sonography Physics and Instrumentation II. 3 Credits.
This core course is designed to prepare the student toward eligibility for the Sonography Physics and Instrumentation portion of the American Registry of Diagnostic Medical Sonographers (ARDMS) registry exam. The course encompasses the theoretical concepts and practical applications related to ultrasound physics and instrumentation. Concepts include: two dimensional imaging, real-time imaging, displays, harmonics, contrast agents, hemodynamics, Doppler, artifacts, quality assurance and bioeffects. These concepts are tied in with terms used in the Physics and Instrumentation I course and how they apply to practical, daily scanning skills.
Prerequisites: Take DMS 200.
Offered: Every year, Spring

DMS 205. Human Anatomy Lab I. 1 Credit.
This course presents in-depth consideration of human anatomy within systems located in the neck, abdomen and pelvis. Students discuss the structure and function of each anatomic component within each region. Conventional anatomic illustrations are correlated with their sonographic counterpart. The sonographic appearance of specific structures is correlated to images obtained using other advanced imaging modalities such as computed tomography and magnetic resonance imaging.
Prerequisites: Take BIO 212 BIO 212L.
Offered: Every year, Fall

DMS 206. Human Anatomy Lab II. 1 Credit.
This course presents in-depth consideration of human anatomy within systems located in the upper and lower extremity. For each region, students discuss the structure and function of each anatomic component. Conventional anatomic illustrations are correlated with their sonographic counterpart. The sonographic appearance of specific structures is correlated to images obtained using other advanced imaging modalities such as computed tomography and magnetic resonance imaging?
Prerequisites: Take DMS 205.
Offered: Every year, Spring

DMS 210. Abdominal and Small Parts Sonography. 3 Credits.
This course is designed to prepare the student toward eligibility for the abdomen (AB) portion of the ARDMS Registry. This course is taken in conjunction with DMS 210L. The course encompasses all aspects of abdominal and small parts scanning including: anatomy and vasculature, normal variants and congenital abnormalities, pathology, organ function and laboratory tests. The course continues to emphasize cumulative learning to include materials covered in prior ultrasound directed courses.
Prerequisites: Take DMS 101 DMS 101L BIO 102.
Corequisites: Take DMS 210L.
Offered: Every year, Fall

DMS 210L. Abdominal and Small Parts Sonography Lab Practicum. 1 Credit.
This lab course is designed to prepare the student toward eligibility for the abdomen (AB) portion of the ARDMS Registry. This course is taken in conjunction with DMS 210. The course encompasses all aspects of abdominal and small parts scanning including: anatomy and vasculature, normal variants and congenital abnormalities, pathology, organ function and laboratory tests. The students utilize ultrasound equipment to learn to identify sonographic anatomy of the abdomen and small parts and develop scanning techniques. The students learn to review and critique sonographic images.
Prerequisites: Take DMS 101-DMS 101L BIO 102.
Offered: Every year, Fall

DMS 220. Vascular Sonography. 3 Credits.
This course is dedicated to the instruction of vascular sonography. It is designed to prepare students for the (VT) portion of the ARDMS registry exams. This course is taken in conjunction with DMS 220L. Anatomy pertaining to the vascular system is reviewed. Sonographic anatomy and pathologic conditions of the upper and lower extremity veins, the aorta, abdominal vasculature, the upper and lower extremity arteries, the carotid arteries and intracranial arteries are presented. Venous and arterial physiologic testing, interventional vascular procedures, surgery and other treatment options are introduced.
Prerequisites: Take DMS 101 DMS 101L BIO 102.
Corequisites: Take DMS 220L.
Offered: Every year, Fall

DMS 220L. Vascular Sonography Lab Practicum. 1 Credit.
This lab course is dedicated to the instruction of vascular sonography. It is designed to prepare students for the (VT) portion of the ARDMS registry exams. This course is taken in conjunction with DMS 220. Sonographic anatomy and pathologic conditions of extremity veins, the aorta, abdominal vasculature, extremity arteries, the carotid arteries and intracranial arteries are presented. The students utilize ultrasound equipment to learn to identify sonographic anatomy of the vascular system and develop scanning techniques. The students learn to review and critique sonographic images.
Prerequisites: Take DMS 101 DMS 101L BIO 102.
Corequisites: Take DMS 220.
Offered: Every year, Spring

DMS 250. Sonography Clinical Education I. 3 Credits.
This course is designed to develop the student’s sonographic scanning skills and interpersonal communication skills through experiences in the clinical setting.
Prerequisites: Take DMS 101 BIO 102 MA 275.
Offered: Every year, Fall

DMS 260. Sonography Clinical Education II. 3 Credits.
This course, a continuation of DMS 250, is a clinical experience under the supervision of certified clinical instructors and clinical staff. Clinical competency and proficiency related to the performance of the sonographic procedures are developed and assessed.
Prerequisites: Take DMS 250.
Offered: Every year, Spring

DMS 270. Sonography Clinical Education III. 5 Credits.
This course, a continuation of DMS 260, is a clinical experience under the supervision of certified clinical instructors and clinical staff. Clinical competency and proficiency related to the performance of the sonographic procedures are developed and assessed.
Prerequisites: Take DMS 260.
Offered: Every year, Summer
DMS 297. Methods of Patient Care. 2 Credits. This course focuses on a study of skills in providing humanistic care for the well, acute or chronically ill individual, including preparing patients for invasive as well as non-invasive imaging studies; basic clinical skills in infection control, including aseptic technique, venipuncture, vital signs and O2 administration; effective communication with emphasis on problem-solving skills. (2 lab hrs.)
Prerequisites: Take DMS 101 DMS 101L.
Corequisites: Take DMS 297L.
Offered: Every year, Spring

DMS 297L. Methods of Patient Care Lab. 1 Credit. This lab develops preclinical competency for the procedures described and demonstrated in DMS 297.
Prerequisites: Take DMS 101 DMS 101L.
Corequisites: Take DMS 297.
Offered: Every year, Spring

DMS 330. OB/GYN Sonography. 3 Credits. This course is designed to prepare the student toward eligibility for the OB/GYN ARDMS Registry exam. This course is taken in conjunction with DMS 330L. The course encompasses all aspects of gynecology, and obstetrical scanning including: anatomy and vasculature, normal variants and congenital anomalies, pathology, organ function and laboratory tests. The course continues to emphasize cumulative learning to include materials covered in prior ultrasound directed courses. 
Prerequisites: Take DMS 101 DMS 101L BIO 102.
Corequisites: Take DMS 330L.
Offered: Every year, Fall

DMS 330L. OB/GYN Sonography Lab Practicum. 1 Credit. This lab course is designed to prepare the student toward eligibility for the OB/GYN ARDMS Registry. This course is taken in conjunction with DMS 330. The course encompasses all aspects of gynecology, and obstetrical scanning including: anatomy and vasculature, normal variants and congenital anomalies, pathology, organ function and laboratory tests. The students utilize ultrasound equipment to learn to identify sonographic anatomy of the female pelvis and develop scanning techniques. The students learn to review and critique sonographic images. 
Prerequisites: Take DMS 101 DMS 101L BIO 102.
Corequisites: Take DMS 330.
Offered: Every year, Fall

DMS 340. Breast Sonography. 3 Credits. This course is dedicated to the instruction of the growing field of breast sonography. It is designed to prepare the student toward eligibility for the breast portion of the ARDMS Registry. This course is taken in conjunction with DMS 340L. To produce high-quality diagnostic images, it is necessary for students to have a thorough understanding of the anatomy and physiology of the breast as well as the normal and abnormal sonographic appearance of breast tissue. 
Prerequisites: Take DMS 101 DMS 101L BIO 102.
Corequisites: Take DMS 340L.
Offered: Every year, Spring

DMS 340L. Breast Sonography Lab Practicum. 1 Credit. This course is dedicated to the instruction of the growing field of breast sonography. This lab course, taken in conjunction with DMS 340, prepares the student toward eligibility for the breast portion of the ARDMS Registry. The students utilize ultrasound equipment to identify sonographic anatomy of the breast and develop scanning techniques. The students learn to review and compare sonographic and mammographic images. 
Prerequisites: Take DMS 101 DMS 101L BIO 102.
Corequisites: Take DMS 340.
Offered: Every year, Spring

DMS 350. Musculoskeletal Sonography. 3 Credits. This course, taken in conjunction with DMS 350L, is designed to prepare the student toward eligibility for the MSK ARDMS Registry. The course encompasses all aspects of MSK scanning including: anatomy and vasculature, normal variants, physiology, pathology, interventional procedures. The course continues to emphasize cumulative learning to include materials covered in prior ultrasound directed courses. 
Prerequisites: Take DMS 101 DMS 101L BIO 102.
Corequisites: Take DMS 350L.
Offered: Every year, Spring

DMS 350L. MSK Sonography Lab Practicum. 1 Credit. This lab course, taken in conjunction with DMS 350, is designed to prepare the student toward eligibility for the MSK ARDMS Registry. The course encompasses all aspects of MSK scanning including: anatomy and vasculature, normal variants, physiology, pathology and interventional procedures. The students utilize ultrasound equipment to identify MSK sonographic anatomy of the upper and lower extremities and develop scanning techniques. The students learn to review and critique sonographic images. 
Prerequisites: Take DMS 101 DMS 101L BIO 102.
Corequisites: Take DMS 350.
Offered: Every year, Spring

DMS 380. Sonography Clinical Education IV. 3 Credits. This course, a continuation of DMS 270, is a clinical experience under the supervision of certified clinical instructors and clinical staff. Clinical competency and proficiency related to the performance of the sonographic procedures are developed and assessed. 
Prerequisites: Take DMS 270.
Offered: Every year, Fall

DMS 390. Sonography Clinical Education V. 3 Credits. This course, a continuation of DMS 380 is a clinical experience under the supervision of certified clinical instructors and clinical staff. Clinical competency and proficiency related to the performance of the sonographic procedures are developed and assessed. 
Prerequisites: Take DMS 380.
Offered: Every year, Fall

DMS 414. Research Analysis and Critique (RS 414). 3 Credits. This course explores the basic elements of health care research including different types of research models and research strategies. Students explore the difference between a variety of publication types, including editorial, case studies and peer-reviewed research articles. Students also learn techniques for database queries. 
Prerequisites: Take DMS 101.
Offered: Every year, Fall
DMS 499. Capstone (RS 499). 3 Credits.
This capstone course is intended for radiologic sciences majors and diagnostic medical sonography majors in their final semester. Students are required to develop a research project as it relates to the field of diagnostic imaging. The project may relate to the student’s chosen focus and must include either a formal thesis paper or poster presentation.

Prerequisites: Take DMS 414.

Offered: Every year, Spring