



Course Number and Title: DMS 110 Acoustical Physics

Campus Location:

Georgetown, Wilmington

Effective Date:

2018-51

Prerequisite:

MAT 153, DMS 106 or DMS 107, SSC 100 or concurrent

Co-Requisites:

none

Course Credits and Hours:

3.00 credits

3.00 lecture hours/week

0.00 lab hours/week

Course Description:

This course gives a theoretical and practical understanding of the basic principles of ultrasound instrumentation, sound wave concepts, characteristics of sound propagating media, beam patterns, beam and image artifact, Doppler effect, system performance testing, bio-effects, and safety.

Required Text(s):

Obtain current textbook information by viewing the [campus bookstore - https://www.dtcc.edu/bookstores](https://www.dtcc.edu/bookstores) online or visit a campus bookstore. Check your course schedule for the course number and section.

Additional Materials:

Diagnostic Medical Sonography Student Handbook/Manual

Separate Instructor Handouts

Schedule Type:

Classroom Course

Disclaimer:

None

Core Course Performance Objectives (CCPOs):

1. Adhere to clinical safety standards while operating sonography equipment. (CCC 1, 2, 3, 4, 5; PGC DMS 2, 3, 4; CVS 3, 4, 5)
2. Explain physical principles of sonographic imaging. (CCC 1, 2, 5, 6; PGC DMS 4; CVS 5)
3. Identify and categorize ultrasound transducers. (CCC 2, 5, 6; PGC DMS 1, 4; CVS 1, 2, 5)
4. Explain and define pulsed echo instrumentation. (CCC 2, 5, 6; PGC DMS 1, 4; CVS 1, 2, 5)
5. Define and explain Doppler instrumentation and hemodynamics. (CCC 2, 5, 6; PGC DMS 1, 4; CVS 1, 2, 5)
6. Define and explain quality assurance. (CCC 2, 6; PGC DMS 4; CVS 5)
7. Discuss technologies relative to the field. (CCC 5, 6; PGC DMS 4; CVS 5)

See Core Curriculum Competencies and Program Graduate Competencies at the end of the syllabus. CCPOs are linked to every competency they develop.

Measurable Performance Objectives (MPOs):

Upon completion of this course, the student will:

1. Adhere to clinical safety standards while operating sonography equipment.
 1. Change equipment parameters based on the clinical environment.
 2. Describe appropriate transducer and equipment disinfecting procedures.
 3. Use appropriate output power.
 4. Modify exams based on displayed mechanical and thermal indexes.
 5. Practice as low as reasonably achievable (ALARA) principles.
 6. Describe basic cleaning/maintenance processes of the ultrasound system.
2. Explain physical principles of sonographic imaging.
 1. Select equipment parameters to optimize axial, lateral, and temporal resolution.
 2. Modify scanning techniques based on reflector characteristics.
3. Identify and categorize ultrasound transducers.
 1. Select a specific transducer based on the type of exam conducted.
 2. Adjust transducer frequency based on anatomy and body habitus being scanned.
 3. Identify and differentiate curvilinear array, endocavity, linear array, and phased array transducers.
4. Explain and define pulsed echo instrumentation.
 1. Describe and adjust depth of focus, dynamic range, edge enhancement, gray-scale maps, overall gain, persistence, and time-gain compensation.
 2. Demonstrate optimal display depth.
 3. Select appropriate number of focal zones.
 4. Identify and describe artifacts.
 5. Define and describe coded excitation, digital image storage, extended field of view, frequency compounding, harmonic imaging, and spatial compounding.
5. Explain and define Doppler instrumentation and hemodynamics.
 1. Adjust color angle to flow, color gain, color maps, and color scale.
 2. Adjust Doppler angle to flow, Doppler gain, and Doppler scale.
 3. Describe and evaluate spectral Doppler waveforms.
 4. Identify and describe color and Doppler artifacts.
 5. List measurements of blood flow velocities.
 6. Describe the usage of power Doppler imaging.
6. Explain and define quality assurance.
 1. Discuss performance testing using tissue equivalent phantoms.
 2. Discuss performance testing using Doppler flow phantoms.
7. Discuss technologies relative to the field.
 1. Define elastography imaging.
 2. Discuss three dimensional (3-D) and four dimensional (4-D) imaging.
 3. Define and discuss the use of contrast agents.
 4. Discuss off-line volume rendering for 3-D.

Evaluation Criteria/Policies:

Students must demonstrate proficiency on all CCPOs at a minimal 75 percent level to successfully complete the course. The grade will be determined using the Delaware Tech grading system:

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|----|---|-----|---|---|
| 92 | - | 100 | = | A |
| 83 | - | 91 | = | B |
| 75 | - | 82 | = | C |
| 0 | - | 74 | = | F |

Students should refer to the [Student Handbook - https://www.dtcc.edu/handbook](https://www.dtcc.edu/handbook) for information on the Academic Standing Policy, the Academic Integrity Policy, Student Rights and Responsibilities, and other policies relevant to their academic progress.

Core Curriculum Competencies (CCCs are the competencies every graduate will develop):

1. Apply clear and effective communication skills.
2. Use critical thinking to solve problems.
3. Collaborate to achieve a common goal.
4. Demonstrate professional and ethical conduct.
5. Use information literacy for effective vocational and/or academic research.
6. Apply quantitative reasoning and/or scientific inquiry to solve practical problems.

Program Graduate Competencies (PGCs are the competencies every graduate will develop specific to his or her major):
AHTAASDMS

1. Graduates will demonstrate clinical competence by performing a full range of diagnostic medical sonography procedures on all patient populations pertaining to their learning concentration.
2. Graduates will professionally utilize verbal, nonverbal, and written communication skills in patient care, procedure intervention, and professional relationships.
3. Graduates will demonstrate professional growth and development by acting in a professional and ethical manner and comply with the professional scope of practice.
4. Graduates will integrate critical thinking and problem solving skills as expected of a healthcare professional.

AHTAASCVS

1. Perform competently a full range of echocardiography procedures.
2. Perform competently a full range of vascular sonographic procedures.
3. Utilize professional verbal, nonverbal, and written communication skills in patient care, procedure intervention, and professional relationships.
4. Act in a professional and ethical manner and comply with professional scope of practice.
5. Integrate critical thinking and problem solving skills as expected of a healthcare professional.

Disabilities Support Statement:

The College is committed to providing reasonable accommodations for students with disabilities. Students are encouraged to schedule an appointment with the campus Disabilities Support Counselor to request an accommodation needed due to a disability. A listing of campus Disabilities Support Counselors and contact information can be found at the [disabilities services - https://www.dtcc.edu/disabilitysupport](https://www.dtcc.edu/disabilitysupport) web page or visit the campus Advising Center.